



***Reducing UPOPs and Mercury Releases from the Health Sector in  
Africa***

**UNDP PIMS ID 4865**

**GEF ID 4611**

**Midterm Review, October/November 2018**

**Final Evaluation Report**

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## DISCLAIMER

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## Acronyms and Abbreviations

ADR	European Agreement concerning the International Carriage of Dangerous Goods by Road
BAT	Best Available Technologies
BEP	Best Environmental Practices
BoQ	Bill of Quantities
CEDHA	Centre for Educational Development in Health, Arusha (Tanzania)
CEO	Chief Executive Officer (of GEF)
CHRD	Centre Hospitalier de Reference de District (District referral hospital)
CSB1 & 2	Centre de Santé de Base (primary care facilities - no. 2 has a doctor; no. 1 does not)
CTF	Centralised Treatment Facility
DIM	Direct Implementation Modality
EHO	Environmental Health Officer
GEF	Global Environment Fund
GGHH	Global Green and Healthy Hospitals
HCF	Healthcare Facility
HCW	Healthcare Waste
HCWH	Health Care Without Harm (an NGO)
HCWM	Healthcare Waste Management
HHD	HIV, Health and Development
ICAN	Infection Control Africa Network
IRH	UNDP Istanbul Regional Hub
MoE	Ministry of Environment
MoEEF	Ministry of Environment, Ecology and Forests (Madagascar)
MoH	Ministry of Health
MoPH	Ministry of Public Health (Madagascar)
MOU	Memorandum of Understanding
MPU	UNDP Montreal Protocol Unit
MRF	Materials Recovery Facility
MSW	Municipal Solid Waste
MTR	Midterm Review

MUHAS	Muhimbili University of Health and Applied Sciences
NIM	National Implementation Modality
NIP	National Implementation Plan (for POPs)
PIR	Project Implementation Review
PIU	Project Implementation Unit
POP	Persistent Organic Pollutants
PPE	Personal Protection Equipment
PPG	Project Preparation Grant
SDG	Sustainable Development Goals (United Nations)
SMART	Specific, Measurable, Achievable, Relevant, Time-bound
TEQ	Toxic Equivalents
TSH	Tanzanian Shilling
TTM	Technologie Transfer Marburg (German supplier of medical equipment)
UNICEF	United Nations Children's Fund
USD	United States Dollar
UTH	University Teaching Hospitals, Zambia
UNDP	United Nations Development Programme.
UNIDO	United Nations Industrial Development Organisation
UPOP	Unintentional Persistent Organic Pollutants
WASH	Water, Sanitation and Hygiene (aka WaSH)
WASH FIT	Water and sanitation for health facility improvement tool
WHO	World Health Organisation
ZEMA	Zambia Environmental Management Agency

## 1 Executive Summary

Table 1: The Project Information Table

Project Title	Reducing UPOPs and Mercury Releases from the Health Sector in Africa		
UNDP Project ID	4865	PIF Approval Date	5 June 2012
GEF Project ID	4611	CEO Endorsement Date	25 September 2014
ATLAS Business Unit, Atlas Project ID, Atlas Output ID	Regional component: SVK10, 00090700, 00096344 Ghana: GHA10, 00089426, 00095673 Madagascar: MDG10, 00092732, 00097308 Tanzania: TZA10, 00087082, 00094230 Zambia: ZMB10, 00087064, 00094207	Project Document Signature Date	Regional component: 9 December 2015 Ghana: 14 October 2015 Madagascar: 12 April 2016 Tanzania: 25 February 2016 Zambia: 19 January 2016
Country	Ghana, Madagascar, Tanzania, Zambia	Date PM hired	Regional component: December 2015
Region:	Africa	Inception W/shop date	Regional component: 22 September 2016 Ghana: 24 February 2016 Madagascar: 15 November 2016 Tanzania: 07 September 2016 Zambia: 13 June 2016
GEF Focal Area/Strategic Objective	GEF-5 Chemicals and Waste Focal Area: Objective 1: Phase-out POPs and	MTR completion date	March 2019

	Reduce POPs Releases Objective 3: Pilot Sound Chemicals Management and Mercury Reduction		
Trust Fund	GEF Trust Fund	Planned closing date:	12 April 2020
Executing Agency/Implementing partner	Regional component: UNDP Istanbul Regional Hub for Europe and the CIS		
Other executing partners	UNDP Country Offices in Ghana, Madagascar, Tanzania and Zambia Ghana: Ministry of Health Madagascar: Ministry of Environment, Ecology and Forests Tanzania: Ministry of Health, Community Development, Gender, Elderly and Children Zambia: Ministry of Health Responsible Partners: World Health Organizations (WHO) Health Care Without Harm (HCWH)		
<b>Project Financing</b>	at CEO endorsement (USD)	At MTR (USD) <sup>1</sup>	
[1] GEF Financing	\$ 6,453,195	\$ 4,130,044	
[2] In-kind contribution (UNDP, WHO, HCWH):	\$ 7,897,400	\$ 2,805,000	
[3] Governments	\$ 15,680,822	\$ 5,246,450	
[4] Other partners (national partners)	\$ 5,357,942	\$ 3,928,228	
[5] Total co-financing [2 + 3+ 4]:	\$ 28,936,164	\$ 11,979,678	
<b>PROJECT TOTAL COSTS</b>	\$ 35,389,359	\$ 16,109,722	

### Project Description

The project focuses on the healthcare sector and aims to reduce the emission of UPOPs as well as Mercury releases. The project started on the Project Document signature date 14 October 2015 and is scheduled for completion on 12 April 2020. This is a GEF funded project that has a budget of just above 6,5 million USD. The project is being implemented

<sup>1</sup> For details of co-financing, please see Table in Annex H

by the UNDP, in partnership with the WHO and the NGO Health Care Without Harm (HCWH). The objective is to implement Best Environmental Practices (BEP) and Best Available Technologies (BAT) to reduce harmful releases from the health sector. This will be achieved through the introduction of non-incineration healthcare waste treatment technologies and mercury-free medical devices at healthcare facilities in four countries. The countries are Ghana, Madagascar, Tanzania and Zambia, these are all Sub-Saharan African countries.

The project promotes best practices and techniques for healthcare waste management (HCWM) with the aim of minimising or eliminating releases of Persistent Organic Pollutants (POPs) to help countries meet their obligations under the Stockholm Convention. The project also supports these countries in phasing-out the use of mercury containing medical devices and products, while improving practices for mercury containing wastes with the objective to reduce releases of mercury. This supports the countries in meeting their obligations under the Minamata Convention.<sup>2</sup> As the project aims to improve HCWM systems through the improved handling, segregation, storage, transport and disposal of the waste, it also contributes to the reduction of the spread of infections at the healthcare facility level.

### **Project Progress Summary**

The project is on schedule and has made good progress over the past 2½ years. The Regional Project Team has been established and is based at the UNDP IRH; four national Project Implementation Units (PIUs) have been established in the project countries. All the entities are functioning well.

The project's first step was to develop training materials and to undertake a training of Master Trainers in HCWM, where a total of 18 national experts were coached at the regional level in Nakuru, Kenya during a two-week course. These experts then helped develop the project implementation plan for their own country.

National working groups were set up to evaluate and strengthen national policies, regulatory framework, and national plans for HCWM and mercury. Based on their assessment, a detailed proposal for an intervention supported by the project was made. Three countries have been successful in the development of the national policies and regulatory improvements. These generally consists of a national policy, technical guidelines and a handbook. Zambia is still in the process of reviewing both the Public Health Act and the Environmental Management Act (as HCW is a hazardous waste it must also be covered in this act).

Through the work of the Regional Project Team and the four PIUs, a total of 24 healthcare facilities (HCF) were selected to become pilot/ model sites in the four countries for demonstrating non-incineration and mercury-free technologies. Using a catalogue developed by the Regional Project Team, the national PIUs were able to make a Bill of Quantities for all the equipment required for these facilities. In this manner bins, sharps boxes, needle cutters, personal protection equipment (PPE), autoclaves and so forth could be ordered.

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<sup>2</sup> Tanzania has signed but not ratified the Minamata Convention, so in this case it is a future obligation.

The Regional Project Team made two rounds of purchasing: First for non-mercury medical devices that were couriered to the four countries. Since then, these mercury free instruments have been (mostly) distributed to the model facilities and, where possible, the project has endeavoured to recover an equal quantity of mercury containing devices from the hospitals. I.e. for every non-mercury sphygmomanometer delivered to an HCF, the facility should hand over a mercury containing sphygmomanometer to the PIU. As explained in this report, it has not always been possible to make a one-to-one exchange.

The second round of purchasing was an international tender for all the non-incineration technologies. This included 18 autoclaves destined for 14 of the 24 model facilities. The procured equipment has been shipped to the model facilities. The 14 HCFs that received autoclaves had to prepare a building to house their autoclave(s); this construction work was completed successfully and today all but one autoclave is operational. In Madagascar the autoclave vendor's local technician quit his job just as the last autoclave was to be connected and commissioned, so this task is still outstanding.

Through training sessions organised by the PIUs and led by the Master Trainers, Environmental Health Officers (EHO) and Nurses were trained in the proper procedures for HCWM. The purchased bins, boxes, containers, needle cutters and so forth were set up in the 24 HCFs and today most facilities have a relatively well- or well-functioning HCWM system.

At present the project faces one challenge: The host countries are reluctant to place the yellow or red bags of sterilised waste on their dumpsites, as there is a fear that scavengers will sort through the waste. In itself, other than the risk of sharps, this should be relatively safe, as the waste is sterilised. The issue how are scavengers to distinguish between sterilised waste from the model facilities and bags of infectious waste (also in yellow or red bags) from hospitals that do not treat their waste? This means that at present very little waste is being sterilised. The Regional Project Team is working to rectify this issue and in the second phase of the project, it will be possible to acquire shredders and compactors, so that the physical form of the treated waste can be altered. Then the shredded/ compacted waste can be landfilled and scavengers will know that all yellow/ red bags contain infectious waste.

The projects progress to date is summarised in Table 2.

*Table 2: MTR Ratings & Achievement Summary Table*

Measure	MTR Rating	Achievement Description
<b>Project Strategy</b>	N/A	<p>The project is directly linked and highly relevant to the implementation of the Stockholm and Minamata Conventions all four countries; it is hence perfectly aligned with the GEF strategy for chemicals, where the programme has focussed on persistent organic pollutants and ozone layer depletion for many years. Two newer focal areas are the sound management of chemicals and the phase-out of mercury.</p> <p>The project directly contributes to the execution of the National Implementation Plans on POPs by reducing the release of dioxins and furans.</p> <p>All countries except Tanzania have ratified the Minamata Convention on Mercury and are under the obligation to phase out mercury. The project has helped the four countries with their (future) obligations under the Minamata Convention in two ways:</p>

		<p>Firstly, by conducting an inventory of mercury containing medical devices found in HCFs. Seconding, by directly contributing to the phasing-out of these instruments.</p> <p>It is clear that HCWM has a high priority for the Ministries of Health in all four countries; and all the support with policies, regulations, awareness raising, training, model facilities and so forth have been greatly appreciated. Other than reducing UPOPs and mercury releases from the health sector, the health authorities also see a substantial benefit from the project in the form of a decrease in nosocomial infections.</p>
<b>Progress Towards Results</b>	Objective Achievement Rating: <b>S</b>	The project is on schedule and seems likely to complete all its objectives. Shredders or compactors will be purchased during the project's second phase, so that the current difficulties in disposing of the sterilised waste will be resolved. Otherwise, the project is progressing smoothly and it is on schedule for an on-time completion.
	Outcome 1 Achievement Rating: <b>S</b>	<p>Outcome 1.1: Technical guidelines, evaluation criteria and allocation formula adopted</p> <p>Outcome 1.2: Country capacity to assess, plan, and implement healthcare waste management (HCWM) and the phase-out of Mercury in healthcare built</p> <p>The evaluation criteria and the allocation formula were formulated during the Inception Workshop and confirmed during the Project Board Meeting in September 2016.</p> <p>The project undertook the core training of the national experts over a two-week period in Nakuru, Kenya from 28 November to 10 December 2016 where 18 national experts participated. The quality of the training materials is high and all participant that the MTR interviewed spoke warmly of the quality of the training. This training course also made available to the participants several guidelines, SOPs, and other supporting documents developed by the regional expert team. These documents were intended to help the Master Trainers in developing national curricula and enhancing trainings at national level.</p> <p>The countries identified model facilities that were to receive the non-incineration and mercury-free technologies. Those involved in the project have also received training through a number of other courses provided by organisations such as GIZ, ICAN, UNICEF and WHO in various African countries.</p>
	Outcome 2 Achievement Rating: <b>S</b>	<p>Outcome 2.1: Institutional capacities to strengthen policies and regulatory framework, and to develop a national action plan for HCWM and mercury phase-out enhanced</p> <p>Outcome 2.2: National Plan with Implementation Arrangement adopted</p> <p>The Master Trainers have since used the skills that they acquired in their training to help strengthen their national regulatory framework and to plan the implementation of the project in their country.</p>
	Outcome 3 Achievement Rating: <b>S</b>	<p>Outcome 3a: Favourable market conditions created for the growth in the African region of affordable technologies that meet BAT guidelines and international standards</p> <p>Outcome 3b.1: HCWM systems demonstrated at the model facilities</p> <p>Outcome 3b.2: Reduction in greenhouse gas emissions through recycling demonstrated</p> <p>Outcome 3b.3: Mercury reduction in the model facilities demonstrated</p>

		<p>Outcome 3b.4: Institutional capacities for national training strengthened</p> <p>Through the Regional Project Team, the non-incineration and mercury-free technologies were successfully procured and delivered to the four project countries.</p> <p>13 of 14 autoclaves have been installed and commissioned. All equipment for HCWM has been distributed within the HCFs and are in operation. At present recycling systems for cardboard and plastic (and at times other materials) are being set up at the hospitals. Long-term, all these measures will reduce the emissions of UPOPs and greenhouse gases.</p> <p>Non-mercury medical devices have been distributed in the 24 model facilities and, to the extent possible, mercury containing equipment has been collected and placed in safe storage.</p>
	<p>Outcome 4 Achievement Rating: <b>S</b></p>	<p>Outcome 4a.1: Capacities of recipient countries to absorb additional technologies evaluated</p> <p>Outcome 4a.2: Additional technologies distributed depending on evaluated capacities for absorption</p> <p>This report evaluates the capacities of recipient countries to absorb additional technologies, see section 0. The Regional Project Team has determined the budget available to each country during Phase 2 of the project.</p>
	<p>Outcome 5 Achievement Rating: <b>S</b></p>	<p>Outcome 5.1: Project's results sustained and replicated</p> <p>The project is already working to disseminate the project's experience and lessons learnt at regional training courses, workshops and conferences. The other activities under Outcome 5.1 will take place during Phase 2 of the project.</p>
<p><b>Project Implementation &amp; Adaptive Management</b></p>	<p><b>S</b></p>	<p>The Project consists of five components: One regional component managed by the UNDP IRH and four national components, one for each project country. The regional component is being implemented by the UNDP IRH in close cooperation with UNDP's Montreal Protocol/ Chemicals Unit. The regional project component is carried out using the Direct Implementation Modality (DIM). The regional component has a Project Manager who is responsible for running the project on behalf of the Implementing Partner and under the overview of the Regional Project Board.</p> <p>The National Project Components are executed following the National Implementation Modality (NIM) and are implemented by the project's national implementing entities which are the following:</p> <ul style="list-style-type: none"> <li>• Ghana: Ministry of Health</li> <li>• Madagascar: Ministry of Environment, Ecology and Forests; and Ministry of Public Health</li> <li>• Tanzania: Ministry of Health, Community Development, Gender, Elderly and Children</li> <li>• Zambia: Ministry of Health; and Ministry of Lands, Natural Resources and Environmental Protection</li> </ul> <p>The NIM means that the responsibility for the project execution lies with the national governments. Here the national implementing entities assume full responsibility for the effective use of UNDP resources and the delivery of outputs in the signed project document.</p> <p>To date all major project decisions have been taken in close cooperation with the key stakeholders and approved by the</p>

		<p>Regional Project Board. Hence the Regional Project Board has advised and guided the project as intended. All interviewed people were satisfied with the project management arrangements and felt that the lines of communication within the project worked well.</p> <p>The National Project Boards all seem to promote a close cooperation between the Ministries of Health and Environment, as these seek to address concerns that have a high national priority. The Ministries of Environment are keen to address their obligations under the Stockholm and Minamata Conventions, whilst the Ministries of Health are eager to improve hygiene and safety in their healthcare facilities. Hence the project acts as a catalyst, making the two ministries closely collaborate to address issues that are of national importance.</p> <p>It can be observed that there are clear benefits of implementing these activities as a regional project rather than as a national project. The most obvious advantage is the economies of scale: There are clear benefits to purchasing autoclaves, HCWM equipment and non-mercury medical devices in bulk, as this lowers the unit cost. Likewise, the cost for the preparation of training materials or of organising a training course are mostly independent of the number of recipients or participants, so again there are significant savings in a regional project. Two other benefits were observed: Firstly, the four countries are keen to exchange experiences and lessons learned. These interactions assist the project countries in resolving any difficulties they may face. Secondly, there is clearly a competitive spirit between the four countries and all are eager to make good progress, as not to be outdone by others.</p> <p>The regional component has acted in a very professional manner throughout the project implementation: Training materials and training courses have been of a high quality. Advice to the four countries, procurement and technical support has all been excellent.</p>
<p><b>Sustainability</b></p>	<p><b>L</b></p>	<p>The regulatory and policy framework has been developed to strengthen healthcare waste management and for the phase-out of mercury containing products. These instruments are already largely in place and all components are likely to be adopted. The training of healthcare professionals, especially EHOs and Nurses, is well on the way to being strengthened in Schools of Hygiene and other teaching institutions in the four countries. This will greatly improve the HCWM skills of the future medical professionals, which in turn will support the future operation and expansion of the HCWM systems.</p> <p>In all four countries, good HCWM was already a priority prior to the project. Following the increased awareness at the decision-making level due to the project, proper HCWM is now a high priority with the MoH and the Ministries are evidently keen to continue and expand their HCWM programmes. Hence, the four countries have a strong ownership of the HCWM systems, these are something that the countries wished for and that filled a gap in their healthcare system.</p> <p>All countries are on track to become nations where all HCFs are mercury free within a few years.</p>

Note: The ratings scales are explained in Annex D

### **Summary of conclusions**

The MTR finds that this project is well-managed and very likely to be a successful project. All activities are on schedule and the quality of work is good. The project has been financially prudent and effective.

POPs and mercury are both part of the GEF Focal Area, so the project is well adjusted to GEF's policy and objectives. For the participating countries, the focus of the project fits extremely well with the national priorities. All four countries are signatories to the Stockholm and Minamata Conventions. This means that the project's goals of reducing the emissions of UPOPs and the elimination of mercury containing medical devices help them meet their obligations under these international treaties. Furthermore, the project conducted inventories of mercury containing devices in the four countries' healthcare facilities, something that was found very helpful.

Twenty-four healthcare facilities were identified as model facilities. These have all been trained and equipped, so that all waste is correctly sorted at source, safely stored and transported. Fourteen of these facilities have received a total of 18 autoclaves to sterilise the collected infectious waste. The recipient countries were responsible for the supply of the buildings that were to house the autoclaves, as well as utilities such as a power connection and water supply. This was successfully achieved in all four countries in a timely manner, today there is only one autoclave that has not been commissioned and this is the supplier's fault.

The operation of the autoclaves currently faces difficulties, as the Ministries of Health in the four countries are reluctant to place sterilised bags of healthcare waste on an open dumpsite. This issue is being address and will be fully remedied during the second project phase. In some instances, there is also a need to strengthen the healthcare waste management systems within the hospitals.

The countries have all received mercury free medical devices and these have been distributed within the four countries. All countries are well on their way to eliminate mercury containing medical devices from their hospitals.

In all four countries the regulatory and policy framework has been developed to strengthen healthcare waste management and for the phase-out of mercury containing products. These instruments are already largely in place and all components are likely to be adopted. The training of healthcare professionals, especially EHOs and nurses, is well on the way to being strengthened in Schools of Hygiene and other teaching institutions within the countries. This will greatly improve the HCWM skills of the future medical professionals, which in turn will support the future operation and expansion of the HCWM systems. During the second phase of this project, there are plans to install more autoclaves in healthcare facilities. This can be done, but given that the project will end in April 2020, it is essential that great care is taken in the planning and selection of model facilities. There will be very limited time to establish the buildings for the autoclaves, something that can easily be time consuming when funded by a local HCF.

The project management should also work during the project's second phase to ensure that the autoclaves are utilised to their full treatment capacity. This can, where feasible, be achieved by including surrounding HCFs as suppliers of HCW to the autoclaves.

This is a lighthouse project and there have been considerable efforts made to collaborate with other projects, as well as to share experiences and expertise. The two-week regional Training of Trainers course covering Advanced Healthcare Waste Management also included participants from four other 4 African countries <sup>3</sup> that are implementing related GEF funded healthcare waste projects. Likewise, a representative from a sister HCWM project in Jordan joined the Regional Project Meeting in December 2018. Some impacts can already be seen: The curriculum developed by the project for Ghana’s three schools of hygiene is not only used to teach all future Environmental Health Officers, Occupational Therapists and Occupational Health and Safety Experts within the country, it has also now used by the West Africa Health Examination Board, and is the basis for all HCWM training in West Africa.

Table 3: Recommendation Summary Table

Rec #	Recommendation	Entity Responsible
A	HCWM systems demonstrated at the model facilities (Outcome 3b.1) Reduction in greenhouse gas emissions through recycling demonstrated (Outcome 3b.2) Mercury reduction in the model facilities demonstrated (Outcome 3b.3) Institutional capacities for national training strengthened (Outcome 3b.4)	
A.1	<b>Key recommendation:</b> The placement of sterilised waste on a dumpsite or landfill, without any change of physical form is clearly a concern to all project countries. To fully utilise the autoclaves, it is clear that the sterilised waste must be shredded or otherwise altered prior to landfilling. The Regional Project Team is already aware of this and shredders are included in the new <i>Catalogue of HCWM Equipment</i> , so that the countries will receive shredder during the second project phase.  For areas where there are several autoclaving facilities within one city, it should be examined whether one shredder could be installed at either the landfill or a central location, and handle all the sterilised waste.	Regional Project Team
A.2	<b>Key recommendation:</b> There are clearly issues with the availability of a local service technicians from TTM to provide maintenance and repair services for the autoclaves. During the MTR visits, this was an issue in Ghana, Madagascar and Tanzania. It is essential that this issue is resolved with the TTM main office.	Regional Project Team
A.3	<b>Key recommendation:</b> The project must ensure that the non-incineration and mercury-free technologies introduced under Phase 1 of the project become or remain (as applicable) sustainable in the long-term through periodic follow-up visits.	National PIUs
A.4	<b>Key recommendation:</b> It is essential that the solar panel system at the CHRD Manjakandriana provides enough power to compensate for the consumption of the autoclave. A meter shall be installed and the PIU shall regularly check if the electricity produced is sufficient to compensate the electricity consumed by the autoclave.	Madagascar PIU
A.5	<b>Key recommendation:</b> The instructional posters for hospitals and clinics on how to properly manage HCW should be updated, so that they reflect the existing system.	Madagascar PIU
A.6	<b>Key recommendation:</b> Currently the source separation in most of the project hospitals is poor. It is paramount that the waste is correctly separated for the installed waste management system to work. This will require engagement with the hospital’s top management and an endeavour to ensure that staff at all levels are aware of the benefits of proper HCWM. Hereafter, the training will have to	Tanzania PIU

<sup>3</sup> Kenya, Mauritius, South Africa and Uganda.

	<p>be repeated and it should target a broader group of staff, so that doctors, nurses and EHOs all work together to make the system function. The difficulties currently experienced are most likely due to insufficient awareness amongst the senior staff. Hence the EHOs (and nurses) are not supported in the waste separation by doctors, and the management may be reluctant to provide the necessary materials (e, g. bin liners, protective equipment) and other support (e.g. training) to ensure that all HCW is managed properly.</p>	
A.7	<p><b>Key recommendation:</b> The Muhimbili hospital stated that given the manner in which their waste is sorted at the moment, it is unsuited for autoclaving due to liquids and needles. This explanation makes it urgent to re-evaluate the waste sorting at the facility, so that the infectious waste can be autoclaved.</p>	Tanzania PIU
A.8	<p><b>Key recommendation:</b> To date little progress has been made in establishing a national training programme for HCWM, it is suggested that a determined effort be made to incorporate HCWM in the curriculum of Tanzania’s five schools of hygiene, so that all future Environmental Health Officers receive instruction.</p>	Tanzania PIU
A.9	<p><b>Key recommendation:</b> The HCWM system at the UTH must be fully implemented and made functional. It is essential that the country’s premier teaching hospital has a well-functioning HCWM system.</p>	Zambia PIU
A.10	<p><b>Key recommendation:</b> The recycling company Waste Master (Z) is a perfect opportunity to easily recover recyclable materials from hospitals in Lusaka. Efforts are starting at the UHT, for the Chilenje and Matero Level 1 Hospitals matters are still at the discussion stage. The PIU should encourage and facilitate the process, so that plastic, paper and cardboard are recovered at these three hospitals.</p>	Zambia PIU
B	<p>HCWM systems expanded to other facilities in the country (Outcome 4b.1) Country capacity to manage Mercury and to phase in Mercury-free devices improved (Outcome 4b.2) National training expanded (Outcome 4b.3) Information disseminated at environment and health conferences in the region (Outcome 4b.4)</p>	
B.1	<p><b>Key recommendation:</b> The Project Document states that “an additional 12 rural health posts are to be supported during the second phase of the project.” It is strongly recommended that the project focusses on larger hospitals in the second phase. Rural health posts may be able to properly segregate and handle their infectious waste, but the quantities of waste they generate is small and the costs of bringing this waste to an autoclave facility are prohibitive.</p>	Regional Project Team
B.2	<p><b>Key recommendation:</b> The Project Document recommends to “Increase composting activities, which will significantly reduce the volume of the waste that needs to be transported to the landfill/dump site. Organic waste makes up the majority of HCF waste. By developing composting activities on the premises, HCFs could reduce waste collection rates charged by the municipal service providers, while generating some additional income through the sale of compost.” This advice should be disregarded. While it is environmentally sound guidance to collect and treat organic waste, this activity, like other forms of waste treatment, costs money and it is very unlikely that the compost can be sold. Therefore, the Regional Project Team should only encourage the on-site composting of garden waste (not food waste) for use within the hospitals’ green areas.</p>	Regional Project Team
B.3	<p><b>Key recommendation:</b> The Project Document expects the introduction of non-incineration and mercury-free technologies at more HCFs during the second phase of the project. It is recommended to consider the installation of more autoclaves very carefully, as the project’s completion date is in April 2020. This leaves little time of the time consuming and complex issue of establishing structures to house the new autoclaves. So, if the PIU decides to purchase one or more autoclaves, very great care must be taken in selecting the receiving</p>	National PIUs

	HCFs, so that it is certain that all necessary resources are available to rapidly establish a building for the new autoclaves.	
B.4	<b>Key recommendation:</b> When planning the second phase of the project, it is important that measures are taken to ensure that the treatment capacities of the installed (and any future) autoclaves are fully utilised. These autoclaves can complete six treatment cycles in an eight-hour working day. This means that several treatment facilities should not be placed within one city, unless there is sufficient waste to keep all the autoclaves busy. Some of the already installed autoclaves can be expected to operate at well below capacity, i.e. their waste treatment capacity is far greater than the quantity of waste generated by their host facility. To utilise this excess capacity, the PIU should work toward ensuring that all surrounding HCFs send their infectious waste to the hospitals equipped with treatment systems. Here the project can help these new model facilities with training, equipment, workshops and other actions to bring about a collaboration between the HCFs within each project region.	National PIUs

## 2 Introduction

### 2.1 Purpose of the MTR and objectives

The Midterm Review (MTR) of the UNDP-supported GEF-financed project *Reducing UPOPs and Mercury Releases from the Health Sector in Africa* was carried out according to the UNDP-GEF Monitoring and Evaluation Policy following the *Guidance for Conducting Midterm Reviews of UNDP-Supported, GEF-Financed Projects* (2014). Under UNDP Contract IRC/IC/2018/124, Mr Peder Bisbjerg has been hired as the International Consultant to carry out this review. His Terms of Reference can be found in Annex A.

Under the *Guidance for Conducting Midterm Reviews of UNDP-Supported, GEF-Financed projects*, the aim of the MTR is to provide a systematic and comprehensive review and evaluation of the performance of the project to date by assessing its design, processes of implementation, achievement relative to its objectives. Under this overarching aim, its objectives are i) to promote accountability and transparency for the achievement of GEF objectives through the assessment of results, effectiveness, efficiency, relevance, sustainability and impact of the partners involved in the project, and ii) to promote learning, feedback and knowledge sharing on the results and lessons learned from the project and its partners as a basis for adjusting the course of the project to improve its performance in the remaining implementation period and as a basis for decision-making on policies, strategies, programme management and projects, and to improve knowledge and performance.

### 2.2 Scope & Methodology: principles of design and execution of the MTR, MTR approach and data collection methods, limitations to the MTR

The approach for the MTR is determined by the Terms of Reference (Annex A) and the *Guidance for Conducting Midterm Reviews of UNDP-Supported, GEF-Financed projects*. Both documents outline four focus areas:

1. Project Strategy

2. Progress Towards Results
3. Project Implementation and Adaptive Management
4. Sustainability

The MTR concentrated on assessing i) the concept and design of the project, ii) its implementation in terms of quality and timeliness of inputs, financial planning, and monitoring and evaluation, iii) the efficiency, effectiveness and relevance of the activities that are being carried out, iv) whether the desired outcomes and objectives are being achieved, v) the likelihood of sustainability of the results of the project, and vi) the involvement of stakeholders in the project's processes and activities. To achieve this, the following three principal sources of primary data and information were examined:

1. A wide variety of documents covering project design, implementation progress and monitoring were examined, this included amongst others (a complete list can be found in the Annex G):
  - The Project Document
  - Regional Inception Workshop Minutes
  - Minutes of Regional Project Meetings
  - Project Implementation Reviews
  - Project Progress Reports
  - Implementation and Monitoring Stage Quality Assurance Report
  - GEF POPs Tracking Tool
  - Regional Monthly Progress Reports
  - Social and Environmental Screening for the project
  - Social, Environmental and Gender Analysis for the project
  - National legislation and policy documents produced by the project
  - Guidelines produced by the project
  - Training Manuals produced by the project
  - WHO Safe management of wastes from health-care activities
  - GEF-5 Focal Area Strategies
2. Face-to-face consultations with relevant of stakeholders who have project responsibilities: This included the project management team in UNDP IRH, UNDP Country Offices, responsible partners (WHO, HCWH), national PIUs, the Ministries of Health and Environment in all four countries, hospital management and staff, project consultants, private sector stakeholders, local government, medical universities and schools of hygiene.

For the interviews, a “semi-structured interviews” with a key set of questions in a conversational format have been used (see Annex C for the list of questions used). The questions asked aimed to provide answers to the points described in the following section. Triangulation of results, i.e. comparing information from different sources, such as documentation and interviews, or interviews on the same

subject with different stakeholders, were used to corroborate or check the reliability of evidence. (a complete list of people met can be found in the Annex F):

3. Direct observations of project results and activities in selected facilities at the following project sites (a complete list of sites visited is included in the Annex F):
  - Cape Coast Teaching Hospital
  - Winneba Trauma & Specialist Hospital
  - Koforidua Eastern Regional Hospital
  - CHU-JRA Ampefiloha
  - CHU-MET Tsaralalàna
  - CHU-JRB Befelatanana
  - CSB2 Manjakandriana
  - CHRD Manjakandriana
  - CSB2 Sambaina Manjakandriana
  - Muhimbili National Hospital
  - Sinza Hospital
  - Mwananyamala Regional Referral Hospital
  - Mbagala Ranji Tatu Hospital
  - Mercury Storage Container at MoH, Lusaka
  - University Teaching Hospitals, Lusaka
  - Kabwe General Hospital
  - Mukonchi Rural Health Centre
  - Kapiri Mposhi District Hospital
  - Ndola Teaching Hospital
  - Chilenje Level 1 Hospital, Lusaka

The information collected, including documentary evidence, interviews and observations, are compiled and organised in this MTR Report.

There were two limitations on the MTR review. A few of project model sites where the HCWM systems have been implemented could not be visited for logistical reasons. The distances to these sites, combined with the UNDP curfew on driving at night in certain countries, made it physically impossible to visit a few remote HCFs. The consultant was able to meet with all stakeholders as planned, in a few cases the counterpart was unavailable and the meeting was held with his or her deputy, or a Skype call was arranged.

### **2.3 Structure of the MTR report**

This report follows the structure for evaluations recommended in the *Guidance for Conducting Midterm Reviews of UNDP-Supported, GEF-Financed projects* (2014). As such, it provides a description of the project and the development context in Sub-Saharan African countries (Section 3), it then deals with the Findings (Section 4) of the evaluation within four sections (Project Strategy, Progress Towards Results, Project Implementation

and Adaptive Management, and Sustainability, respectively). The report then draws together the Conclusions and Recommendations (Section 5):

### **3 Project Description and Background Context**

#### **3.1 Background**

The project *Reducing UPOPs and Mercury Releases from the Health Sector in Africa* is implemented by the UNDP Istanbul Regional Hub (IRH), in collaboration with the World Health Organisation (WHO), the NGO Health Care Without Harm (HCWH), and with funding from the Global Environment Fund (GEF). The project implements Best Environmental Practices (BEP) and introduces non-incineration healthcare waste treatment technologies and mercury-free medical devices in Ghana, Madagascar, Tanzania and Zambia to reduce the release of toxic chemicals from the health sector. In each of these four Sub-Saharan African countries, the project is implemented through the national Ministries of Health and in the case of Madagascar and Zambia, also the Ministry of Environment: For the four countries the National Implementing Entity/Responsible Partners are:

- Ghana: Ministry of Health
- Madagascar: Ministry of Environment; Ecology and Forests and Ministry of Public Health
- Tanzania: Ministry of Health, Community Development, Gender, Elderly and Children
- Zambia: Ministry of Health; and Ministry of Lands, Natural Resources and Environmental Protection

Unlike the other countries, the lead agency in Madagascar is the Ministry of Environment, Ecology and Forests; the Project Director is from the MoEEF and this is also the national person responsible for the Minamata Convention.

The project aims to promote the best practices and techniques for healthcare waste management with the aim of minimising or eliminating the release of Persistent Organic Pollutants to help the four countries meet their obligations under the Stockholm Convention on POPs. The project also supports these countries in phasing-out the use of mercury containing medical devices and products, while improving the management of mercury containing wastes, in order to reduce the release of mercury and hence help the countries meet their (future) obligations under the Minamata Convention. Finally, because the project will improve healthcare waste management systems, and hence improve the hygiene, the project will also contribute to the reduction of the spread of infections both within healthcare facilities and wherever healthcare waste is handled.

Persistent Organic Pollutants are a group of organic compounds that are resistant to environmental degradation through chemical, biological, and photolytic processes. Due to these characteristics, these compounds can bio-accumulate with potential significant impacts on human health and the environment. The 2001 Stockholm Convention on Persistent Organic Pollutants seeks to eliminate or severely restrict the production of these compounds. Most of the POPs that are currently used or were used in the past are

pesticides, solvents, pharmaceuticals, or industrial chemicals. In the context of this project, dioxins and furans are of interest. These were two of the original twelve POPs designated by the Stockholm Convention in 2001.

Dioxins are unintentional by-products of high-temperature processes, such as incomplete combustion or pesticide production. Dioxins are typically emitted from the burning of hospital waste, municipal waste and hazardous waste. Other sources are automobile emissions, as well as the combustion of peat, coal and wood. Dioxins have been associated with several adverse effects in humans, including immune and enzyme disorders, chloracne, and are classified as a possible human carcinogen. In laboratory studies of dioxin effects, an increase in birth defects and stillbirths, and lethal exposure have been associated with the substances. Food, particularly from animals, is the principal source of human exposure to dioxins.

Polychlorinated dibenzofurans are also by-products of high-temperature processes, such as incomplete combustion when waste is incinerated or pesticide manufacture. Structurally furans are similar to dioxins and the two compounds have similar toxic effects.

Small amounts of dioxins and furans are formed whenever organics, oxygen and chlorine are available at suitable temperatures; the optimal temperature range is 400°C to 700°C and the presence of a metal catalysts, such as copper, will increase the production. This means that formation of these Unintentional Persistent Organic Pollutants (UPOPs) through combustion is highest when organic material is burned in less-than-optimal conditions such as open fires, building fires, dumpsite fires and forest fires. Historically, municipal and medical waste incineration was the most important source of dioxins and furans.<sup>4</sup>

Mercury is an element and it is not classified as a persistent organic pollutant, it is covered by the Minamata Convention (see further down). It is used in medical equipment such as thermometers and sphygmomanometers (measurement of blood pressure). Concerns about the element's toxicity have led to mercury thermometers and sphygmomanometers being largely phased out in clinical environments in favour of alternatives such as alcohol- or galinstan-filled glass thermometers and thermistor- or infrared-based electronic instruments. Mercury is also found in fluorescent lamps.

Mercury and most of its compounds are extremely toxic and must therefore be handled with care. Toxic effects include damage to the brain, kidneys and lungs, where the symptoms typically include sensory impairment (vision, hearing, and speech), disturbed sensation and a lack of coordination. The WHO describes mercury as “one of the top ten chemicals or groups of chemicals of major public health concern.” The major sources of atmospheric mercury emissions are both natural and human generated; with natural sources - such as volcanoes - being responsible for approximately half of all the emissions. For man-made emissions, coal fired power plants are the largest source (65%); followed by gold mining (11%); smelters (7%); cement manufacture (6%) and waste disposal (3%). It is estimated that 5,500 to 8,900 tonnes of mercury are currently emitted and reemitted

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<sup>4</sup> See [https://en.wikipedia.org/wiki/Dioxins\\_and\\_dioxin-like\\_compounds](https://en.wikipedia.org/wiki/Dioxins_and_dioxin-like_compounds)

each year to the atmosphere, with much of the reemitted mercury considered to be related to human activity, as are the direct releases.<sup>5</sup>

The Stockholm Convention on Persistent Organic Pollutants is an international environmental treaty, signed in 2001 and effective from May 2004, that aims to eliminate or restrict the production and use of persistent organic pollutants. The countries that are part of the Convention have agreed to outlaw nine of the dirty dozen chemicals,<sup>6</sup> limit the use of DDT to malaria control, and curtail inadvertent production of dioxins and furans. Parties to the Convention have agreed to a process by which persistent toxic compounds can be reviewed and added to the Convention, if they meet certain criteria for persistence and transboundary threat, and today there are 22 chemicals covered by the Convention. As of June 2018, there were 182 parties to the Convention, (181 states and the European Union) The most notable non-ratifying country is the United States of America.

Key elements of the Convention include the requirement that developed countries provide new and additional financial resources and measures to eliminate production and use of intentionally produced POPs, eliminate unintentionally produced POPs where feasible, and manage and dispose of POPs wastes in an environmentally sound manner. Precaution is exercised throughout the Stockholm Convention, with specific references in the preamble, the objective, and the provision on identifying new POPs.

The Minamata Convention on Mercury is the 2013 international treaty designed to protect human health and the environment from man-made emissions and releases of mercury and mercury compounds. The objective of this agreement is to ensure the reduction of mercury pollution from the targeted activities responsible for the major release of mercury to the immediate environment; thereby benefitting both public health and the environment. The Minamata Convention stipulates that parties to the Convention shall not allow, by taking the appropriate measures, the manufacture, import or export of mercury added thermometers and sphygmomanometers by 2020.

All four project countries are signatories of both the Stockholm and Minamata Conventions, as can be seen in Table 4, only Tanzania still has to ratify the Minamata Convention. Hence this project is intended to help the four countries meet their obligations under these Conventions.

*Table 4: Country status for the Stockholm and Minamata Conventions*

Country	Stockholm Convention		Minamata Convention	
	Signed	Ratified	Signed	Ratified
Ghana	2001	2003	2014	2017
Madagascar	2001	2005	2013	2015
Tanzania	2001	2004	2013	-
Zambia	2001	2006	2013	2016

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<sup>5</sup> See [https://en.wikipedia.org/wiki/Minamata\\_Convention\\_on\\_Mercury](https://en.wikipedia.org/wiki/Minamata_Convention_on_Mercury)

<sup>6</sup> The “dirty dozen” of chemicals that were on the first list of the Stockholm Convention are Aldrin, Chlordane, Dieldrin, Endrin, Heptachlor, Hexachlorobenzene, Mirex, Toxaphene, Polychlorinated biphenyls (PCBs), DDT, Polychlorinated dibenzo-p-dioxins (“dioxins”), and polychlorinated dibenzofurans (“furans”).

The design of this project builds on earlier POPs and mercury projects, most notably the projects described below.

UNDP-supported GEF-financed Project on POPs and mercury in Kyrgyzstan (GEF ID # 5068)

From 2014 to 2018, the project *Protect human health and the environment from unintentional releases of POPs and mercury from the unsound disposal of healthcare waste in Kyrgyzstan* was implemented by UNDP through the Ministries of Health and Environment (officially the “State Agency on Environment Protection and Forestry”). The project’s overarching goal was to “Implement Best Environmental Practices (BEP) and Best Available Technologies (BAT) in the healthcare sector to assist Kyrgyzstan in meeting its obligations under the Stockholm Convention to reduce UPOPs as well as Mercury releases.”<sup>7</sup> The undertaking built on earlier work with healthcare waste management in Kyrgyzstan.

In 2005 the Swiss Red Cross collaborated with the Ministry of Health to address nosocomial infections, better known to the layperson as “hospital acquired infections.” These are infections occurring within 48 hours of hospital admission, 3 days of discharge or 30 days of an operation. In Great Britain they affect 1 in 10 patients admitted to hospital and annually this causes 5,000 deaths.<sup>8</sup> The risk of hospital acquired infections is higher in less developed countries. The Swiss project undertook two pilot projects and the conclusion was that a good healthcare waste management system greatly contributed to reducing such infections in hospitals. This led to a project between the Swiss Red Cross and the Public Centre for Infection Control covering 10 hospitals in the Naryn and Talas Regions. Other projects followed and by now all hospitals with over 25 beds in Kyrgyzstan have a healthcare waste management system, as do many other smaller HCW waste generators. The system implemented in Kyrgyzstan has proven very successful and sustainable, offering a tremendous benefit in terms of a greatly decreased occurrence of nosocomial infections within the health sector.

The Global Healthcare Waste Project (GEF ID # 1802)

The *Global Healthcare Waste Project* officially began in August 2008, though most of the national projects were delayed in starting the implementation phase. The project objective was to help Argentina, India, Latvia, Lebanon, Philippines, Senegal and Vietnam in developing and sustaining best healthcare waste management practices in a way that is both locally appropriate and globally replicable. The rationale was that the health sector is a major source of dioxins and mercury in the global environment, primarily due to medical waste incineration and the breakage and improper disposal of mercury-containing devices. Hospitals in the project countries were to be equipped with non-incineration waste treatment technology and non-mercury medical devices.

In an eighth country, Tanzania, the project worked with the University of Dar es Salaam to design, develop, test and disseminate affordable and effective alternative healthcare waste treatment technologies appropriate to conditions in much of sub-Saharan Africa,

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<sup>7</sup> Project objective quoted from the Project Document.

<sup>8</sup> See <http://ceaccp.oxfordjournals.org/content/5/1/14.full>

where the focus was on developing a robust autoclave and other appropriate waste treatment technology.

The Project to reduce UPOPs releases in African Countries (GEF ID # 5322)

The project *Promotion of BAT and BEP to Reduce uPOPs Releases from Waste Open Burning in the Participating African Countries of COMESA-SADC Subregions* seeks to minimise the emission of unintentionally produced POPs caused by open burning through introduction of best available techniques and best environmental practices (BAT/BEP) measures at selected priority demonstration sites. The project started in 2016 and covers the countries of Botswana, Ethiopia, Lesotho, Madagascar, Mozambique, Sudan, Swaziland, Tanzania, Uganda, and Zambia.

### **3.2 Project Description and Strategy**

The project focuses on the healthcare sector and aims to reduce UPOPs as well as Mercury releases. The project was officially launched on 12 April 2016 and will end in April, 2020. This is a GEF funded project that has a budget of just above 6.5 million USD. The project is being implemented by the UNDP, in partnership with the WHO and the NGO Health Care Without Harm (HCWH).

#### **Project objective**

The *Africa Regional Healthcare Waste Project* seeks to:

1. Implement best environmental practices and non-incineration and Mercury-free technologies to help African countries meet their Stockholm Convention obligations and to reduce Mercury use in healthcare;
2. Enhance the availability and affordability of non-incineration waste treatment technologies in the region, building on the outcomes of the GEF supported UNDP/WHO/HCWH Global Medical Waste project.

The project promotes Best Environmental Practices (BEP) and Best Available Technologies (BAT) for healthcare waste management with the aim of minimising or eliminating releases of Persistent Organic Pollutants, specifically dioxins and furans due to the combustion of healthcare waste, to help countries meet their obligations under the Stockholm Convention on POPs. This is to be achieved through the advancement of non-incineration waste treatment technologies.

The project also supports the four project countries in phasing-out the use of mercury containing medical devices and products, while improving the management of mercury containing wastes, with the objective to reduce releases of mercury. This supports the countries in meeting the obligations under the Minamata Convention on mercury (in the case of Tanzania, a country that has not yet ratified the Convention, these are “future” obligations).

Finally, because the project aims to improve healthcare waste management systems through improved classification, segregation, storage, transport and disposal, it will also contribute to the reduction of the spread of infections both at healthcare facility level, as well as in places where healthcare waste is being handled.

As mentioned in section 3.1, the project’s key stakeholders are the Ministries of Health in the four project countries, as well as the Ministries of Environment in Madagascar and Zambia. Other stakeholders that are involved include UNDP IRH, as well as the four UNDP Country Offices, the Global Fund, the World Health Organisation, the NGO Health Care Without Harm, Infection Control Africa Network, Global Green and Healthy Hospitals, Ministries of Finance, Local Government, Medical Universities, Schools of Hygiene, the private sector and NGOs.

The bulk of the budget focusses on improved healthcare waste management, where the Project Document that 50 facilities should be covered (4 CTFs, 22 hospitals with an average number of beds of 150 and 24 health posts), amounting to a total of 36,900 beds. In the first phase of the project, it is advocated that HCWM systems and mercury-free devices be provided “for at least 12 health posts, 8 hospitals and 4 central or cluster facilities,” where the intent waste to supply 3 health posts, up to 2 hospitals and 1 central or cluster treatment facility per country. These selected 24 facilities are then to be the “model” facilities for the country; 14 of these facilities were equipped with autoclaves by the project during the first phase.

Based on the outcome of the first project phase, the intent is to support an additional 14 additional HCFs with an average of 150 beds, or a total of about 2,100 beds. Furthermore, an additional 12 rural health posts are to be supported during the second phase of the project.

A smaller component is the phasing out of mercury containing thermometers and sphygmomanometers, where the model facilities will receive mercury free devices. These facilities will have all their mercury thermometers and sphygmomanometers, substituted with non-mercury devices. The mercury containing thermometers will be stored in a safe national central storage facility established by the PIU. This activity also aims to raise awareness about mercury and to ensure that there is adequate capability to respond to mercury spills.

The project also aims to strengthen the national regulatory and policy framework for healthcare waste management within each country and to develop a national action plan for HCWM and mercury phase-out. Finally, the project aims to ensure that HCWM is part of the curriculum for health professionals, especially Environmental Health Officers (EHO) and Nurses.

Specifically, the following components and outcomes aim to achieve the abovementioned two project objectives:

**Component 1: Disseminate technical guidelines, establish mid-term evaluation criteria and technology allocation formula, and build teams of national experts on BAT/BEP at the regional level** [*Regional component, with National consultants under National component*]

Outcome 1.1: Technical guidelines, evaluation criteria and allocation formula adopted

Output 1.1: Mid-term evaluation criteria and formula for the allocation of technologies among countries agreed upon.

Outcome 1.2: Country capacity to assess, plan, and implement healthcare waste management (HCWM) and the phase-out of Mercury in healthcare built

Output 1.2: Teams of national experts trained (at the regional level).

**Component 2: Healthcare Waste National plans, implementation strategies, and national policies in each recipient country [National component]**

Outcome 2.1: Institutional capacities to strengthen policies and regulatory framework, and to develop a national action plan for HCWM and mercury phase-out enhanced

Output 2.1: National policy and regulatory framework for HCWM and mercury phase-out.

Outcome 2.2: National Plan with Implementation Arrangement adopted

Output 2.2: National action plan including the selection of up to 1 central or cluster treatment facility, 2 hospitals, and 3 small rural health posts as models

**Component 3a: Make available in the region affordable non-incineration HCWM systems and mercury-free devices that conform to BAT and international standards [Regional component]**

Outcome 3a: Favourable market conditions created for the growth in the African region of affordable technologies that meet BAT guidelines and international standards

Output 3a.1: HCWM systems and mercury-free devices for at least 3 health posts, 2 hospitals and 1 central or cluster facility procured

Output 3a.2: Initial set of HCWM systems and mercury-free devices given to 3 health posts, up to 2 hospitals, and 1 central or cluster treatment facility

**Component 3b: Demonstrate HCWM systems, recycling, mercury waste management and Mercury reduction at the model facilities, and establish national training infrastructures [National component]**

Outcome 3b.1: HCWM systems demonstrated at the model facilities

Output 3b.1: BAT/BEP implemented at the model facilities

Outcome 3b.2: Reduction in greenhouse gas emissions through recycling demonstrated

Output 3b.2: Recycling programs in the model facilities

Outcome 3b.3: Mercury reduction in the model facilities demonstrated

Output 3b.3: Safe storage sites for Mercury and Mercury-free devices used in model facilities

Outcome 3b.4: Institutional capacities for national training strengthened

Output 3b.4: National training program

**Component 4a: Evaluate the capacities of each recipient country to absorb additional non-incineration HCWM systems and Mercury-free devices and**

**distribute technologies based on the evaluation results and allocation formula**  
*[Regional component]*

Outcome 4a.1: Capacities of recipient countries to absorb additional technologies evaluated

Output: 4a.1 Evaluation report for each recipient country including recommendations for improvement

Outcome 4a.2: Additional technologies distributed depending on evaluated capacities for absorption

Output: 4a.2 Additional technologies distributed to countries based on the evaluation and allocation formula

**Component 4b: Expand HCWM systems and the phase-out of Mercury in the recipient countries and disseminate results in the Africa region** *[National and regional components]*

Outcome 4b.1: HCWM systems expanded to other facilities in the country

Output 4b.1: BAT/BEP and related infrastructures improved and expanded in the recipient countries

Outcome 4b.2: Country capacity to manage Mercury and to phase in Mercury-free devices improved

Output 4b.2: More Mercury devices phased out and stored and more Mercury-free devices deployed

Outcome 4b.3: National training expanded

Output 4b.3: More people trained in HCWM and Mercury

Outcome 4b.4: Information disseminated at environment and health conferences in the region

Output 4b.4: Replication tools disseminated

**Component 5: Monitoring, learning, adaptive feedback, outreach, and evaluation**  
*[Regional component]*

Outcome 5.1: Project's results sustained and replicated

Output 5.1: M&E and adaptive management applied to project in response to needs, mid-term evaluation findings with lessons learned extracted

Output 5.2: Lessons learned and best practices are disseminated at national, regional and global level

An overview of the implementation status of the project, at the time of the mid-term evaluation, can be found in section 0.

**Project Implementation Arrangements**

The project has a Regional Project Board is chaired by the Manager of the UNDP IRH who also serves as the Project Executive. The Project Board makes the management

decisions for the project, such as approving project plans and revisions. The Project Board has seven members:

- UNDP IRH Manager
- A senior level official designated by each of the Project Participating Governments
- A representative from HCWH
- A representative from WHO

The voting members of the Regional Project Board are the IRH Executive, the Country Representatives, and the representatives for UNDP MPU/Chemicals and UNDP HHD. Other donors and partners can participate in the Board meetings as observers.

The Project consists of five components: One regional component managed by the UNDP IRH and four national components, one for each project country. The regional component is being implemented by the UNDP IRH in close cooperation with UNDP's Montreal Protocol/ Chemicals Unit. The regional project component is carried out using the Direct Implementation Modality (DIM). The regional component has a Project Manager who is responsible for running the project on behalf of the Implementing Partner and under the overview of the Regional Project Board.

The National Project Components are executed following the National Implementation Modality (NIM) and are implemented by the project's national implementing entities which are the following:

- Ghana: Ministry of Health
- Madagascar: Ministry of Environment, Ecology and Forests; and Ministry of Public Health
- Tanzania: Ministry of Health, Community Development, Gender, Elderly and Children
- Zambia: Ministry of Health; and Ministry of Lands, Natural Resources and Environmental Protection

The NIM means that the responsibility for the project execution lies with the national governments. Here the national implementing entities assume full responsibility for the effective use of UNDP resources and the delivery of outputs in the signed project document.

The National Project Boards makes decisions for the project at national level, especially when the National Project Coordinator requires guidance. A representative from the project's national implementing entity (i.e. the Ministry) chairs the Board which meets at least twice every year.

### **Project timing and milestones**

The main milestones and key dates for the project are.

Approval of the Project Proposal (PIF):	5 June 2012
CEO Endorsement Date	25 September 2014

Project Document Signature and Hiring Dates:

Regional component:	9 December 2015
Ghana:	14 October 2015

Madagascar:	12 April 2016
Tanzania:	25 February 2016
Zambia:	19 January 2016
Regional component Project Manager hired:	December 2015

Inception Workshop dates:

Regional component:	22 September 2016
Ghana:	24 February 2016
Madagascar:	15 November 2016
Tanzania:	07 September 2016
Zambia:	13 June 2016

Planned project closing date: 12 April 2020

### **Main Stakeholders Summary List**

The project's key stakeholders are the Ministries of Health in the four project countries, as well as the Ministries of Environment in Madagascar and Zambia. Other stakeholders that are involved include UNDP IRH, as well as the four UNDP Country Offices, the Global Fund, the World Health Organisation, the NGO Health Care Without Harm, Infection Control Africa Network, Global Green and Healthy Hospitals, Ministries of Finance, Local Government, Medical Universities, Schools of Hygiene, the private sector and NGOs.

### **Country Specific Topics**

The project furthermore has country specific activities, where each country is charged with investigation one or two key topic of interest to help pilot improved approached to managing healthcare facilities and making better use of technologies The individual countries are then to share their experiences with the other countries, these activities are described toward the end of section 0.

## **4 Findings**

### **4.1 Project Strategy**

#### **Project Design**

This section discusses the project design and relevance of the project within its international and national context. The project is obviously directly linked and highly relevant to the implementation of the Stockholm and Minamata Conventions in the recipient countries.

The GEF provides funding to assist developing countries in meeting the objectives of international environmental conventions. The GEF serves as "financial mechanism" to five conventions, of which two are the Stockholm and Minamata Conventions.<sup>9</sup> Hence the project is perfectly aligned with the GEF's strategy, where two focal areas are persistent organic pollutants and the phase-out of mercury.

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<sup>9</sup> The other three are the Convention on Biological Diversity, the, United Nations Framework Convention on Climate Change and the UN Convention to Combat Desertification.

The United Nations Sustainable Development Goals (SDG) <sup>10</sup> target a number of areas that are touched by the project. The three most pertinent SDGs addressed by the project are:

- Goal 12, Target 12.4: By 2020, to achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment;
- Goal 3, Target 3.3: By 2030 end the epidemics of AIDS, tuberculosis, malaria, and neglected tropical diseases and combat hepatitis, water-borne diseases, and other communicable diseases; and
- Goal 6, Target 6.3: By 2030, to improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally.

The objective of the World Health Organisation “is the attainment by all peoples of the highest possible level of health. Health, as defined in the WHO Constitution, is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity.” <sup>11</sup> Hence any project that improves the safety of staff, patients and visitors in healthcare facilities (see the text box in this section) most definitely aligned with the goals of the organisation.

The organisation Health Care Without Harm works to “transform health care worldwide so that it reduces its environmental footprint, becomes a community anchor for sustainability and a leader in the global movement for environmental health and justice.” Again, reducing the environmental footprint of healthcare facilities is a cornerstone of this project.

The four participating project countries have all have ratified the Stockholm Convention, which calls for “priority consideration” of alternative technologies that avoid the formation of dioxins and furans, such as non-incineration technologies identified in the BAT/BEP guidelines. Hence the countries’ respective National Implementation Plans (NIP) identify medical waste incineration as a source of dioxins/ furans and recommend the application of the BAT/BEP guidelines to help meet with the Stockholm Convention obligations.

All four countries have signed the Minamata Convention on Mercury and all except Tanzania have ratified the convention. This means that these three countries are under the obligation to phase out thermometers and sphygmomanometers that are included in a wider category of non-electronic medical devices regulated under Article 4 of the Convention. The phase-out date is 2020, though the countries can seek and extension till the year 2030 at the latest. Both Ghana and Madagascar have requested an extension till

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<sup>10</sup> See <https://unstats.un.org/sdgs/>

<sup>11</sup> See <http://www.who.int/about/mission/en/>

2025, though only Ghana's request pertains to mercury containing hospital devices.<sup>12</sup> The project has helped the four countries with their (future) obligations under the Minamata Convention in two ways: Firstly, by conducting an inventory of mercury containing medical devices found in HCFs. Seconding, by directly contributing to the phasing-out of these instruments.

It is clear that HCWM has a high priority for the Ministries of Health in all four countries; all are keen to ensure sound healthcare waste management within their borders. Hence, all the project support with policies, regulations, awareness raising, training, model facilities and so forth have been greatly appreciated. Other than reducing UPOPs and mercury releases from the health sector, the health authorities also see a substantial benefit from the project in the form of a decrease in nosocomial infections (see box).

**The benefits of proper healthcare waste management entities in healthcare facilities**

This project tackles healthcare waste management in order to reduce the emissions of UPOPs, but as described in this text box the project also has a large positive impact on public health: With relatively modest means, infectious waste can be properly handled with hospitals and clinics, safely stored and treated. This improvement decreases nosocomial infections within hospitals; greatly increasing the safety of patients, health workers, waste collectors and scavengers; and finally eliminates the pollution caused by this waste stream. Hence, other than the environment, the principal beneficiaries of this project are hospital and clinic patients and workers, as well as any person who comes into contact with the waste stream.

Any decrease in nosocomial infections (“hospital-acquired infections”) through proper management of the infectious waste is a very tangible benefit. Even in the best managed hospitals such infections are a serious threat. The United States *Centre for Disease Control and Prevention* estimates that there are roughly 1.7 million hospital-associated infections, from all types of microorganisms, including bacteria and fungi combined, within the United States every year and that the infections cause or contribute to 99,000 deaths each year.<sup>13</sup> With simple but appropriate waste management measures, this risk can be greatly reduced thereby protecting the wellbeing of healthcare facility staff, patients and those coming into contact with the waste.

The implementation of a healthcare waste management system may impact all population groups equally, but the most logical conclusion is that those with poor health and from lower income groups will benefit the most: Elderly, young children and those with health issues frequent hospitals and clinics more than the average person and will therefore, proportionally benefit more from the safer conditions at healthcare facilities. The best hospitals and clinics are generally sought out by the affluent, whereas people with a lower income are forced to use less costly facilities. These poorer facilities will also be those with the least organised infectious waste management systems and hence have the highest risk of nosocomial infections. Such facilities will gain the most by the implementation of a healthcare waste management system which in turn will make these facilities much safer for their patients and staff.

It is clear from the MTR's meeting with the stakeholders, that all (donors, ministries, NGOs, private sector) found the project's priorities highly relevant and well aligned with their own priorities. The UNDP-GEF Monitoring and Evaluation Unit in New York has expressed an interest in whether the relevant gender issues were raised in the project

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<sup>12</sup> See

[http://www.mercuryconvention.org/Portals/11/documents/Notifications/Ghana\\_Art6\\_mercury\\_added\\_products.pdf](http://www.mercuryconvention.org/Portals/11/documents/Notifications/Ghana_Art6_mercury_added_products.pdf)

<sup>13</sup> See [https://en.wikipedia.org/wiki/Hospital-acquired\\_infection](https://en.wikipedia.org/wiki/Hospital-acquired_infection)

design. As expressed by the projects Gender Expert, Ms. Sabrina Regmi, “gender equality or human rights issues concerns were not fully mainstreamed in the design phase” (see “Gender Issues” on page 62). That said, the project predominantly benefits the vulnerable, in that improved hygiene and HCWM within healthcare facility better the working conditions of the hospital staff (mostly female), the patients (frequently poor women and their children) and the visitors. So, although gender issues were not specifically addressed during the design phase, the project does comprehensively improve the conditions for these groups of people.

It can be noted that the project builds on earlier experience from similar projects, see section 3.1, and the Project Document reflects a very sensible approach to reducing UPOPs and mercury releases from the health sector. The project design is sound and the project is on track to meet its objectives. The project budget and resources are adequate to meet the targets, and this MTR found that there is a very good collaboration amongst all involved parties. This evaluator’s recommendations for improvements can be found in section 5.2.

### Results Framework/Logframe Analysis

The project strategy is well designed good and as can be seen in the logframe analysis in Table 5 the implementation is satisfactory for all identified indicators.

Table 5: Logframe analysis for the Project at MTR

Project Strategy	Indicators	End of Project Target	MTR assessment	MTR rating & justification
<b>Objective:</b> 1. Implement best environmental practices and non-incineration and Mercury-free technologies to help African countries meet their Stockholm Convention obligations and to reduce Mercury use in healthcare;  2. Enhance the availability and affordability of non-incineration waste treatment technologies in the region, building on the outcomes of the GEF supported UNDP/WHO/HCWH Global Medical Waste project.	Non-incineration and Mercury-free technologies introduced in African countries.  Affordable non-incineration technologies available in the African region.	Non-incineration technologies and Mercury-free medical devices introduced at 4 central treatment facilities, 22 hospitals and 24 health posts.	The project is on track to achieve its objectives.	<b>S</b>
	UPOPs releases from the health sector reduced or avoided.	Amount of UPOPs releases from HCW incinerators reduced by 31.8 (g-TEQ/yr).	At present all autoclaves work far below capacity, so the levels of emission avoidance for UPOPs calculated in the 2018 PIR greatly overestimate the current emissions avoidance.	<b>S</b>
	Mercury releases from the health sector reduced.	Amount of Mercury releases from the health sector reduced by 25.3 (Kg/yr).	At present there is no accurate data on the quantity of mercury collected. It must be noted that all 24 model	<b>S</b>

Project Strategy	Indicators	End of Project Target	MTR assessment	MTR rating & justification
			HCFs are now seemingly mercury free.	
	Country capacity built to effectively phase out and reduce releases of POPs	Completed draft, revision or adoption of a national policy, plan, strategy, standard and/or guidelines in each country.	The capacity building and training has been completed. Three of the four countries have completed their regulatory and policy framework. For Zambia, the review of both the Public Health Act and the Environmental Management Act is still ongoing.	<b>S</b>

It can be noted that the indicators in Table 5 are SMART (Specific, Measurable, Achievable, Relevant, Time-bound), as these are well defined, appropriate and easily verified. In the planning of the project, the broader development effects that are of a high priority to the UNDP, such as gender equality, women’s empowerment, improved governance and reduction of inequalities were not carefully considered. It can be said to the defence of those in charge of the project design that an intervention such as this one disproportionately benefits the weak, women and children. As noted under “Gender Issues” (page 62) a majority of hospital staff is female and benefit from the improved HCWM system through safer working conditions, as this reduces nosocomial infections. As explained in the text box in section 4.1 and elsewhere in this report, poor, women and young patients stand to gain the most when a hospital’s HCWM and hygiene improves. Therefore, although the project design did not specifically focus on these issues, they are thoroughly addressed by the project. Progress Towards Results

A fundamental measure of a project’s progress, is to review its outputs to date and assess the progress against the milestones and indicators anticipated during the project planning phase. In the following the progress to date and the outputs to date are evaluated. As requested, the GEF Tracking Tool for POPs and mercury follows this report as a separate file. This section evaluates each of the five components individually using a simplified Progress Towards Results matrix.

For each component the text below will first provide a summary of the component’s objective. Thereafter the simplified Progress Towards Results matrix will be presented, followed by a discussion of the status at the time of the MTR and any observations.

The status of project objectives and outcome delivery in the Progress Towards Results matrix, as per measurable indicators, is rated according to three criteria: completed at the time of the MTR (green); expected completion by the end of the project (yellow); and, unlikely to be completed by the end of the project (red). A complete “Progress Towards

Results” matrix monitoring all project indicators can be found in Annex B. The right-hand column gives the rating, where the Rating Scale can be found in Annex D.

**Component 1: Disseminate Technical Guidelines, establish Mid-Term Evaluation Criteria and Technology Allocation Formula, and Build Teams of National Experts on BAT/BEP at the Regional Level**

Component 1 has several objectives. Firstly, during a regional conference the beneficiary healthcare facilities for the non-incineration HCWM systems and Mercury-free devices would be selected. The Project Document recommendation that each country chose the proposed HCFs based on the following criteria:

- One central or cluster treatment facility;
- Up to two hospitals with up to 300 hospital beds; and
- Three rural health posts or dispensaries.

The participating countries successfully identified the participating healthcare facilities as follows:

- Ghana: Trauma and Specialist Hospital; Komfo Anokye Teaching Hospital; Eastern Region Hospital; Cape Coast Teaching Hospital; and Tegbi Health Centre
- Madagascar: CHU JRB Hôpital Joseph Raseta Befelatanana; CHU JRA Hôpital Joseph Ravoahangy; Andrianavalona Ampefiloha; CHU MET Hôpital Mères et Enfants Tsaralalana; CHRD Hôpital de District Manjakandriana; CSB2 Centre de santé de base Manjakandriana; and CSB2 Centre de santé de base Sambaina Manjakandriana
- Tanzania: Muhimbili National Hospital; Mbagala Hospital; Sinza Hospital; Buguruni Anglican Health Centre; and Mwananyamala Hospital
- Zambia: University Teaching Hospital; Ndola Teaching Hospital; Kabwe General Hospital; Mukonchi Rural Health Centre; Kapiri Mposhi District Hospital; Matero Level 1 Hospital; Chilenje Level 1 Hospital; and Kamuchanga District Hospital

It can be seen that the above list contains a considerable number of teaching hospitals, the Madagascar “CHU” are university hospitals. This is judged a wise choice for two reasons: Firstly, teaching hospitals are generally a country’s best hospitals, so these are ideal for implementing and testing new techniques. Secondly, as the future medical professionals are trained in these facilities, they will be exposed to the proper procedures for managing HCW and using mercury free medical devices during their education.

The countries were basically left to decide, with the assistance of the regional component, what hospitals should receive HCW treatment technology. The use of autoclaving technology (rather than incineration) <sup>14</sup> also avoids the generation of any dioxins or furans, and is hence well in line with the project’s stated objective of avoiding releases of UPOPs. The Project Document foresees “central or cluster” treatment facilities where appropriate. The “central” treatment is a standalone facility where the sole function is the treatment of HCW. The “cluster” treatment means that a HCFs with a waste treatment system serves as a hub and serves surrounding facilities that do not have autoclaves. This is a sensible

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<sup>14</sup> Both are recognised as Best Available Technologies for the treatment of healthcare waste.

solution, as the capacity of the autoclaving system can then be fully utilised and smaller entities can also have their waste sterilised.

The project undertook the core training of the national experts over a two-week period in Nakuru, Kenya from 28 November to 10 December 2016. There were 18 national experts who participated. The quality of the training materials is high<sup>15</sup> and all participants that the MTR interviewed spoke warmly of the quality of the training. The teams underwent comprehensive training in non-incineration HCWM systems, policies, waste assessments, UNDP GEF and WHO tools, national planning, BAT/BEP guidelines, mercury phase-out, international standards, and other technical guidelines and well as project implementation related activities (Gantt charts, critical path analysis, budgeting, monitoring, etc.).

One goal of the training was to train the participants as Master Trainers on Healthcare Waste Management, as the project is to establish national training infrastructures. Therefore, the participants also received an intensive training in content, effective teaching methods, evaluation tools, and Training of Trainers programmes.

This training course also made available to the participants several guidelines, SOPs, and other supporting documents developed by the regional expert team. These documents were intended to help the Master Trainers in developing national curricula and enhancing trainings at national level. These documents included:

- HCWM tools for the set up and operation of advanced healthcare waste management systems at facility level.
- Outline national HCWM plan.
- Guidance on human resource planning, job descriptions and capacity building
- Standard Operation Procedures (SOPs) for segregation of HCWM waste, sharp items; collection of waste, internal transportation of waste, storage of waste; spillage of infectious materials and mercury; maintenance of HCWM equipment; needle stick injuries; pharmaceutical waste management; and treatment for hazardous waste.

As stated above, these materials are of a very high quality. The project has also allowed national experts to participate in other courses, including:

- GIZ training on HCWM, Ghana, August 2016
- WHO four-day national training on WASH FIT in Madagascar, December 2016
- A week-long ICAN, WHO and UNICEF Regional Training Course on IPC - WASH, South Africa, July 2017. Representatives from Ghana, Madagascar and Tanzania attended the workshop.
- A short, refresher training course on WASH FIT and HCWM eco-friendly initiatives took place in Madagascar in September 2017, led by two members from WHO Geneva.
- National training on WASH FIT and HCWM in Tanzania during September 2017 by WHO Experts.

The current status can be found in Table 6 below.

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<sup>15</sup> These can be found in the project's Dropbox.

Table 6: Status for Component 1 at MTR

COMPONENT 1: DISSEMINATE TECHNICAL GUIDELINES, ESTABLISH MID-TERM EVALUATION CRITERIA AND TECHNOLOGY ALLOCATION FORMULA, AND BUILD TEAMS OF NATIONAL EXPERTS ON BAT/BEP AT THE REGIONAL LEVEL <i>[Regional component, with National consultants under National component]</i>			
Indicators	End of Project Target	Status at MTR	Rating
<b>Outcome 1.1</b> Technical guidelines, evaluation criteria and allocation formula adopted.	Mid-term evaluation criteria and formula for the allocation of technologies among countries available.	Technical guidelines/ training materials issued  During the regional inception workshop the countries agreed on mid-term evaluation criteria and a formula for the allocation of technologies.	<b>S</b>
<b>Outcome 1.2</b> Country capacity to assess, plan, and implement HCWM and the phase-out of Mercury in healthcare built.	4 teams of national experts (16 in total) trained at regional level	18 national experts trained at the regional level in Nakuru, Kenya from 28 November to 10 December 2016 (50% men; 50% women).  Ghana: In August 2016, 8 experts (50% men, 50% women) participated in a HCWM training organised by GIZ at Komfo Anokye Teaching Hospital. Ghana 8.  In December 2016, WHO led a four-day national training in Madagascar on WASH FIT for 16 participants (33% men; 67% women).  In July 2017, 3 female national experts attended a Regional Training Course on IPC - WASH organised by Infection Control Africa Network (ICAN), WHO and UNICEF, held in Cape Town-South Africa.	<b>S</b>

Hence, it can be concluded that Component 1 has been satisfactorily completed. All activities have been accomplished professionally and to the satisfaction of all stakeholders.

### **Component 2: Healthcare Waste National Plans, Implementation Strategies, and National Policies in each Recipient Country**

Following the training of the national experts (Component 1), the national PIU were to evaluate and strengthen national policies, regulatory framework, and national plans for HCWM and Mercury. Based on their assessment, a detailed proposal for an intervention supported by the project for improving the policy and regulatory framework was made.



Photo 1: The Madagascar booklets with the technical guidelines for HCWM, the national policy and the handbook (clockwise).

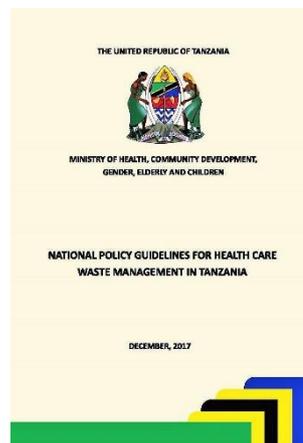


Photo 2: The Tanzania National Policy Guidelines for HCWM.

The national PIUs have all developed implementation plans and been successful in implementing these, see Component 3, so those plans will not be discussed here. The development of the national policies and regulatory improvements for each of the project countries have been a major task with many stakeholders involved in each country. The status for these efforts is briefly summarised for each of the countries in the following:

- The *Health Care Waste Management Policy for Ghana* and the accompanying *National Guidelines for Health Care Waste Management in Ghana* have been finalised in a cooperation between the MoH, the EPA, the Ministry of Local Government and Rural Development and the WHO. The printing and (most probably) the distribution will be undertaken by the WHO Accra Office. The only missing item on 18 October 2018 was for the EPA to give its final approval.
- Madagascar is disseminating the national policy on HCWM, the national technical guidelines on HCWM and a technical instruction booklet for the basic health centres in Malagasy and French.
- Tanzania completed the review of HCWM policy, developed guidelines and standards covering waste minimisation, reuse and recycling; segregation, storage, transportation and treatment, disposal. These documents have been endorsed by MoH and printed, so dissemination is presumably imminent. The review and update of the national strategic plan for HCWM and the development of its implementation strategy have also been completed.
- Zambia is working on finalisation of a revised Public Health Act, so that once the revised Act is adopted and issued, it will cover HCWM. Furthermore, as HCW is a hazardous waste and included under the Environmental Management Act, this Act is currently also under review. There is likewise still a need to complete SOPs and a Training Manual on HCWM.

Table 7: Status for Component 2 at MTR

COMPONENT 2: HEALTHCARE WASTE NATIONAL PLANS, IMPLEMENTATION STRATEGIES, AND NATIONAL POLICIES IN EACH RECIPIENT COUNTRY [National component]			
Indicators	End of Project Target	Status at MTR	Rating
Outcome 2.1			S

<p>Institutional capacities to strengthen policies and regulatory framework, and to develop a national action plan for HCWM and Mercury phase-out enhanced.</p>	<p>See Project Document Ghana: ANNEX I Madagascar: ANNEX II Tanzania: ANNEX III Zambia: ANNEX IV</p>	<p>All PIUs have developed national action plans that enabled them to strengthen national policies, regulatory framework, and national plans for HCWM and Mercury. Project Steering Committees, Working Groups and Technical Groups set up and meeting on a regular basis.</p>	
<p><b>Outcome 2.2</b> Number of National Action Plans for project implementation available.</p>	<p>1 National Action Plan for each project country developed (including the selection of up to 1 central or cluster treatment facility, 2 hospitals and 3 small rural health posts as models)</p>	<p>For each project country, national plans were developed with pilot healthcare facilities selected. The Ghana HCWM Policy is approved. The WHO Country Office will print and disseminate the HCWM policy and guide. Madagascar is disseminating the national policy on HCWM, the national technical guidelines on HCWM and the technical booklet for the basic health centres in Malagasy and French. Tanzania has completed the review of policy guidelines, standards, equipment catalogue and strategic plan and these are endorsed by MoH. The documents have been printing and their dissemination is planned. The review and update of a national strategic plan for HCWM and the development of an implementation strategy has been completed. Zambia is working on finalisation and adoption of the Public Health Act revision with proposed text incorporating HCWM issues, policy review and SOPs.</p>	<p><b>S</b></p>

The national PIUs, in close collaboration with other stakeholders, especially the respective Ministries of Health, selected the model facilities that were to receive non-incineration HCWM systems and mercury-free devices. For each of the selected 24 facilities, the preparatory actions included:

- Establishing a MOU with each model HCFs, where these facilities undertook to receive training, establish a structure to accommodate the autoclave(s) (only for facilities receiving treatment technology), make their staff available to the project, and so forth.

- Conducting a detailed baseline assessment for each of the 24 proposed model facilities covering quantities of waste generated, types of waste, current waste handling, waste storage, transport and disposal routes.
- Establishing HCWM committees at each of the HCFs.
- Developing and implementing HCWM policies and procedures at the facility level.
- Developing and implementing HCWM plans for each of the project facilities.
- Establishing a plan for managing mercury containing medical devices.
- Training staff in best practices related to HCWM.

### **Component 3a: Make available in the region affordable non-incineration HCWM systems and mercury-free devices that conform to BAT and international standards**

The project encourages the use of non-incineration systems for the treatment of healthcare waste and supports the use of mercury-free medical devices. The project selected the non-incineration HCWM management systems from the *Global Healthcare Waste Project* that comply with the Stockholm Convention's BAT/BEP Guidelines and that are considered cost-effective alternatives to incineration by the WHO.<sup>16</sup> The recommended technologies include:

- Autoclaves
- Hybrid autoclaves & continuous steam treatment systems
- Microwave technologies
- Frictional heating systems
- Dry heat treatment systems
- Chemical disinfection systems (e.g., ozonation)
- Alkaline hydrolysis technologies (for anatomical waste and animal carcasses)

The project selected to make use of autoclaving technology. This is the most common and a proven technology. Great efforts were put into ensuring sustainability of the autoclaves: To reduce the need of corrective maintenance, necessary supporting equipment such as water treatment systems and voltage stabilizers were included in the equipment supply to guarantee a problem-free operation of the main equipment. The supplier was also to include sufficient spare-parts to cover at least 2,500 operation hours, provide training on preventive maintenance and supply operating & maintenance manuals. Finally, the technology provider was to guarantee a 10-year spare-part availability and to have a local agent for repair and maintenance available in each country.

Other than autoclaves, the project countries also required bins, containers, trolleys, carts to transport waste, storage boxes, sharps containers, needle cutters, needle smelters, personal protection equipment (PPE), waste bags, voltage stabilizer and so forth for their non-incineration HCWM systems. Therefore, a *Catalogue of HCWM Equipment* was made and provided by the regional component to the four PIUs. Based on the *Catalogue* and on the analysis carried out in each of the model healthcare facilities, the project countries developed Bills of Quantity (BoQ) of the equipment they required whilst remaining within their budget. The developed BoQs were reviewed by the regional expert team and recommendations for changes provided.

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<sup>16</sup> WHO *Safe management of wastes from health-care activities* Second edition by Yves Chartier et al (2014)

The Project Document foresaw that the required autoclaves would be procured by a competitive bidding process led by the UNDP Nordic Office - Procurement Support Unit – Health in Copenhagen. The costs of this office undertaking the procurement was under the GEF’s cap on project management costs (5%), but the anticipated costs of almost 100,000 USD would have greatly limited the overall project management budget. Therefore, it was decided that the procurement should take place through the UNDP IRH.

After agreement of the BoQs, the tender document was developed and published in June 2017 by the UNDP IRH. After two clarification rounds, five bids were received in July 2017. The bids were evaluated according to UNDP requirements and in October 2017 the contract was awarded to the NGO TTM from Germany. The contract covered a total of 57 different products and a total of 2,553 items. Included in this was 18 autoclaves. The purchased equipment was then shipped to the four project countries.

The recipient countries were to supply the building for the autoclave, as well as utilities such as a power connection and water supply. Here the Regional Project Team provided technical assistance such as building designs and layouts.

The project countries were offered the possibility four different mercury-free devices by the Regional Component; (1) mercury-free aneroid sphygmomanometers, (2) automatic sphygmomanometers, (3) digital blood pressure monitors, and (4) digital thermometers. Based on the National Action Plans, the project countries completed their Bill of Quantities for mercury-free devices.

After an evaluation of the received offers from different potential suppliers, the UNDP IRH awarded the contract to the Swiss company Intertrade International Services SA at the end of June 2017. Technical specifications and user manuals for each device, in both in English and French, were provided to all national counter-parts. A total of 2,301 mercury-free devices were procured for the 24 project facilities and all equipment was air couriered to the host countries. This procurement took place prior to the purchase of the non-incineration HCWM systems. The Regional Project Team’s rationale for this was that it was a substantially smaller package and hence gave a good opportunity to eliminate any hitches, such as customs clearance problems or import duties, before procuring and shipping the much larger non-incineration HCWM system packages.

The project also procured three vehicles to help with waste transportation to central treatment facilities in Madagascar. These vehicles are equipped to safely transport infectious waste and follow ADR standards (see Photo 7).

Table 8: Status for Component 3a at MTR

COMPONENT 3A: MAKE AVAILABLE IN THE REGION AFFORDABLE NON-INCINERATION HCWM SYSTEMS AND MERCURY-FREE DEVICES THAT CONFORM TO BAT AND INTERNATIONAL STANDARDS <i>[Regional component]</i>			
Indicators	End of Project Target	Status at MTR	Rating
<b>Outcome 3.a.1</b> Favourable market conditions created for the growth in the African region	HCWM systems and Mercury-free devices for at least 12 health posts, 8 hospitals and 4 central or cluster facilities procured.	Eighteen autoclaves and 2,301 mercury-free devices delivered to the project countries.	<b>S</b>

<p>of affordable technologies that meet BAT guidelines and international standards.</p>	<p>Initial set of HCWM systems and Mercury-free devices given to 3 health posts, up to 2 hospitals and 1 central or cluster treatment facility per country.</p>	<p>Mercury free medical devices and non-incineration treatment equipment provided to 24 model HCFs in four project countries (Ghana: 5; Madagascar: 6; Tanzania: 5; Zambia: 8) with 7,405 beds in total</p> <p>Of the above 24 facilities, 14 received autoclaves (Ghana: 3; Madagascar: 3; Tanzania: 5; Zambia: 3). This consisted of:</p> <ul style="list-style-type: none"> <li>• 3 central treatment facilities (Madagascar: 1; Tanzania: 1; Zambia: 1).</li> <li>• 11 hospitals/ health posts (Ghana: 3; Madagascar: 2; Tanzania: 4; Zambia: 2) which are planned to serve as cluster facilities to treat medical waste from other hospitals/health posts in their close vicinity.</li> <li>• The remaining 10 pilot facilities (Ghana: 2; Madagascar: 3; Zambia: 5) have only received HCWM items (so excluding treatment equipment).</li> </ul> <p>All required bins, containers storage boxes, sharps containers, needle cutters, PPE), voltage stabilizer and so forth procured for the non-incineration HCWM systems.</p> <p>Three central/cluster treatment facilities in Madagascar received a waste transport vehicle, so that waste could be collected from other facilities.</p>	
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All equipment for the first phase was successfully procured, shipped and distributed to the recipients. Today, with one exception, all autoclaves have been installed, commissioned and tested and are operational. Likewise, practically all HCWM equipment and non-Hg devices are distributed and in use.



*Photo 3: The autoclave at the Cape Coast Teaching Hospital in Ghana.*



*Photo 4: The treatment building at the CHU-JRB Befelatanana Hospital, Madagascar.*



*Photo 5: The treatment building at the Sinza Hospital, Tanzania.*



*Photo 6: The refurbished autoclave building at the Kabwe General Hospital, Zambia.*

All autoclave buildings are well-made and were completed within a reasonable timeframe. Most selected to build new buildings based on designs provided by the project. Zambia made use of some existing building and the outcome was good. In Madagascar, at the CHU-JRB, there were some obstacles. As no 380 Volt current was available on the site, the hospital had to construct not only a building for their autoclave, but also a transformer building, so that 380 Volt current could be supplied to the autoclave. Here the regional component helped out by supplying the (very long and costly) cable that now connects the transformer to the autoclave building.

The autoclave at the CHR D Manjakandriana in Madagascar is not yet connected, as the local TTM representative from Hospiteq who was meant to do the work, quit on 15 August 2018, just as the autoclaves were being installed. Due to concerns over the affordability of electricity and the high frequency of power cuts, solar panels have been installed at the CHR D Manjakandriana. Concerns have been expressed as to whether these solar panels supply enough power to operate the autoclave, this concern was expressed both by the TTM representative and by the supplier of the solar panels.<sup>17</sup> Discussions with the

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<sup>17</sup> Stated by the CHR D Manjakandriana management in a meeting on 24 October 2018 with the MTR mission.

Regional Project Team has indicated that these solar panels are to provide enough power to compensate for the consumption of the autoclave and hence it is not the intent that the autoclave be operated without power supply through the grid. According to the hospital management, the power provided through the solar panels is very helpful, providing lighting in the hospital during power cuts.

At Koforidua Eastern Regional Hospital in Ghana one of the two autoclaves was not operational as the local Agent has been unresponsive to calls to provide maintenance services.

At the Mwananyamala Regional Referral Hospital in Tanzania, one of their two autoclaves at had not operated for three weeks when the MTR mission visited. There was an issue with the autoclave control system (programming) and help had been requested from TTM and the facility was still waiting on the trained technician. It was not possible to tell how persistent the hospital had been on obtaining assistance, nor when the first request for service was made.

All other equipment seems to be working well. There is a high satisfaction with the quality of the received equipment in all four project countries.



*Photo 7: One of the three vehicles received in Madagascar for waste transportation. The vehicle pictured was delivered to CHU-JRB.*



*Photo 8: Mercury free medical devices being delivered to the Kabwe General Hospital, Zambia.*

The mercury free medical devices have practically all been distributed to the model HCF, there may be a few that still need to be handed over in Zambia. The Chief Technical Expert had verified the quantity and quality of the supplied items. He found that the supplied digital thermometers did not fulfil the offered specifications. The supplier was informed and the already delivered thermometers were replaced in 2018 by thermometers that met the required specifications.

A validation assessment of the delivered aneroid sphygmomanometers showed that in Ghana 13 pieces (12%) did not show the correct pressure. These items were also replaced by the supplier. The regional component provided this information to all other recipient countries and these countries have verified the quality of their received sphygmomanometers.

**Component 3b: Demonstrate HCWM systems, recycling, mercury waste management and mercury reduction at the model facilities, and establish national training infrastructures**

This component aims to integrate the non-incineration technology into the overall HCWM system and to deploy the Mercury-free devices at the model facilities. These HCF will both serve as the testing ground for these measures and as BAT/BEP demonstration sites. The steps taken by the project to these facilities were as follows:

- Training facility staff in the operation and maintenance of the new non-incineration HCWM system;
- Introducing mercury-free medical devices, and training staff in their use and maintenance;
- Establishment and training of local maintenance teams/ technicians;
- Introducing recycling activities to reduce the waste streams and identify buyers of recovered materials;
- Supporting HCFs in improving the HCWM monitoring; and
- To ensure long-term sustainability, each country was to establish at least one national HCWM course for medical professionals.

All the countries have undertaken these measures and the model facilities are generally operating in a satisfactory manner. The outcome for each country and each visited facility is described below.

Table 9: Status for Component 3b at MTR

COMPONENT 3B: DEMONSTRATE HCWM SYSTEMS, RECYCLING, MERCURY WASTE MANAGEMENT AND MERCURY REDUCTION AT THE MODEL FACILITIES, AND ESTABLISH NATIONAL TRAINING INFRASTRUCTURES [National component]						
Indicators	End of Project Target	Status at MTR				Rating
	Country	GHA	MAD	TAN	ZAM	
<b>Outcome 3.b.1</b> HCWM systems, recycling, Mercury waste management and Mercury reduction at the model facilities demonstrated and national training infrastructures established <b>Outcome 3.b.1</b> HCWM systems, recycling, Mercury waste management and Mercury reduction at the model facilities demonstrated and national training infrastructures established	HCF staff trained in BEP & BAT.	Yes	Yes	On-going	On-going	<b>S</b>
	BAT/BEP implemented at all (24) the model facilities.	Yes	Yes	(Yes)	(Yes)	
	Recycling programs started in each of the model facilities.	Difficult	Yes	Yes	On-going	
	Safe storage sites for Mercury containing medical devices established for each of the project countries.	On-going	Yes	On-going	Yes	
	Mercury-free devices used in each of the model facilities.	Yes	Yes	Yes	On-going	
	At least one national HCWM training programme established in each of the project countries.	Yes	Yes	No	(Needs review)	

In the following, the status is provided for each country, covering the progress made to date toward meeting the end of project targets. For each target, the progress will be described following the order in Table 9, starting with the training of healthcare facility staff, then the status for the HCW management, recycling activities, mercury storage, distribution of mercury-free devices, and finally the establishment of a national HCWM training programme. For all healthcare facilities that were visited during the MTR mission, a brief description is given, these are ordered starting with the largest hospital and the descending to the smaller facilities. The four countries have been ordered alphabetically.

## **Ghana**

The implementation is progressing well in Ghana, all project healthcare facilities have training programmes in place for new staff where all facets seem in place: Qualified trainers, support from management and good training materials. The source separation is fairly implemented and operational with exception of the few weaknesses as noted below under the description of the individual HCFs.

The actual implementation of BAT/BEP in the model facilities is discussed for each visited healthcare facility in the following paragraphs.

The Cape Coast Teaching Hospital is one of the top hospitals in Ghana with 400 beds and a large number of daily outpatients. Healthcare waste is very well managed within the hospital. The hospital received 2 autoclaves each with a capacity of 260 litres and these were commissioned in April 2018. Since May 2018 the hospital has been treating all the HCW generated in its 12 wards in these two autoclaves, coming to about 60 kg per day for five days a week. This corresponds to 15.6 tonnes per year,<sup>18</sup> or 7.8 tonnes per autoclave per year. By comparison, the May 2018 Project Progress Report expects the annual throughput of a 260-litre autoclave to be 37.44 tonnes per year.<sup>19</sup>

The management and staff of the Cape Coast Teaching Hospital is aware that the capacity is far from fully utilised and that their site is designated as a cluster treatment facility for the region. In early October 2018 letters were sent out to surrounding HCFs offering HCW treatment. The hospital's plan is to offer the treatment as a "social service" where the cost for the other hospitals is modest. There are plans for outreach, where the surrounding HCFs are invited to visit the treatment facility. Given this context, and the fact that the Accra School of Hygiene does field trips to see the Cape Coast Teaching Hospital HCWM system, the International Consultant recommended that the housekeeping be improved at the autoclave treatment facility.<sup>20</sup>

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<sup>18</sup> Calculated as 300 kg per week and 52 weeks per year.

<sup>19</sup> See Table 4 in the *Project Progress Report June 2017 – May 2018*

<sup>20</sup> The hospital Director (CEO) was planning to visit the autoclaves immediately after meeting this expert and seemed keen to take remedial action.





*Photo 11: Ward level waste storage at the Koforidua Eastern Regional Hospital.*



*Photo 12: The Zoopak medical waste treatment facility in Accra.*

Zoopak is a waste management service provider in Ghana, focussed on the transportation of domestic, industrial and hazardous waste. In 2015 the company established a 1.4 tonne/hour autoclaving facility for healthcare waste outside Accra; at present the facility operates well below capacity treating only about 8.5 tonnes of infectious waste per month. The company can provide clients with training in HCWM, packaging and the transport of infectious waste in two cooled vehicles to their treatment facility.

The project has helped Zoopak develop its medical waste business and the company attributes 50% of their clients to awareness raising and contacts made through the UPOPs project. The Ghana PIU is planning to implement HCWM training and promote the use of non-mercury medical devices at the 500 bed Accra Military Hospital, in return for the hospital having their HCW treated at the Zoopak Facility. By October 2018, Zoopak's number of clients had increased to 82 and the operators are confident business will greatly increase over the coming years, in a large part due to an increased awareness on the importance of proper HCWM due to the project.

The recycling programme for plastic proposed in the Project Document has proven difficult to implement, as there is little or no market for the recovered plastic in the communities where the project facilities are situated. A possible option would seemingly be to pass the collected plastic to scavengers for free, thereby meeting the environmental goal of ensuring that the materials are recycled. Unfortunately, there is no financial incentive for the hospital in this scenario, so it could be difficult to apply. The PIU is examining the possibilities for ensuring that plastic is recovered and recycled. At present there is only a market for recyclable materials in and around Accra, for other parts of the country the transportation costs are too high for the recycling business to be profitable.

A 20' storage container for mercury containing waste is planned to be procured to store all mercury containing waste collected within the country. At present, the Steering Committee of the project is expected to present this to the National Minamata Convention Implementation Committee who will then engage the EPA and Ghana Health Service (both members of the Committee) to find an appropriate location for the container, as the initial proposal to locate it at the EPA Cape Coast premises has been rejected by EPA Authorities. It is expected that mercury-containing devices stored in the three regional EPA Offices and additional ones to be collected will be stored in the new container which will serve as a national temporary storage for mercury waste.

for the Cape Coast Regional EPA Office, as there is amply space within their compound for such a container. This site is then to store all mercury containing waste collected within the country. At present the Ghana PIU is waiting for the EPA to sign an MOU agreeing on the purpose, use, location and delivery of the storage unit. A signature is anticipated in October 2018 and the mercury storage unit is expected to be completed and delivered by the end of the year. Mercury waste accumulated in the three regional EPA Offices will then be stored in the new container.



*Photo 13: Temporary storage of mercury containing medical devices in a disused laboratory at the Cape Coast Regional EPA Office.*



*Photo 14: Mercury free medical devices at the Cape Coast Teaching Hospital.*

The Ghana PIU has successfully distributed all received mercury-free medical devices to five healthcare facilities in Ghana.<sup>21</sup> For the past four years, as the Ghana Health Service's policy has been to only purchase mercury free equipment, it has therefore not been possible to realise a one-to-one exchange as foreseen in the project implementation strategy, as there were only small quantities of mercury containing equipment to be found within the hospitals. At present all the collected mercury equipment is stored at three regional EPA offices.

Ghana has three schools of hygiene<sup>22</sup> where students receive a certificate or diploma (B.Sc.) in Hygiene. Within these courses, future Environmental Health Officers, Occupational Therapists and Occupational Health and Safety Experts must now all follow a full semester course on HCWM which consists of 3 hours of training per week over a 16-week period. The curriculum for this course was developed through the project and is now part of the national curriculum. This curriculum is now used by the West Africa Health Examination Board, and is the basis for all HCWM training in West Africa.

For the Accra School of Hygiene there are three trained teachers and that is sufficient staffing. Furthermore, a one-week short course has been developed for EHOs who are already employed, the first course already took place and had 26 participants. The second HCWM refresher course is planned for November 2018.

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<sup>21</sup> Trauma and Specialist Hospital; Komfo Anokye Teaching Hospital (KATH); Eastern Region Hospital; Cape Coast Teaching Hospital; and Tegbi Health Center

<sup>22</sup> Tamale School of Hygiene; Ho School of Hygiene; and Accra School of Hygiene.

During the second phase of the project, the Ghana PIU plans to ensure that there is also training on HCWM incorporated into the training of all new nurses. Hence, within a few years, all newly trained EHOs and Nurses will be knowledgeable about the proper handling of HCW.

### **Madagascar**

The project has made good progress in Madagascar, where efforts are undertaken to implement all project components. In Madagascar the health system has three tiers of management: central, regional and district. Health services can be accessed at four different levels:

1. University hospitals (Centres Hospitaliers Universitaires: CHU) including specialised centres.
2. Regional referral hospitals (Centre Hospitalier de Référence Régionale: CHRR);
3. District referral hospitals (Centre Hospitalier de Référence de District: CHRDR); and
4. Primary care facilities (Centre de Santé de Base: CSB) that are subdivided into categories 1 and 2. A “CSB2” is managed by a doctor and a “CSB1” is generally managed by a mid-wife.

Each health district typically contains 10 to 25 primary care facilities and a hospital. The project has worked with university and district hospitals, as well as primary care facilities.

The CHU-Joseph Ravoahangy Andrianavalona Hospital (“CHU-JRA”) is a 650-bed university hospital located in the Ampefiloha neighbourhood in the centre of Antananarivo. It has a well-functioning HCWM system, though it was noted that the instructional posters (as elsewhere in Madagascar) reflect the regulations from 2004. It would help healthcare staff in their work, if the posters were up-to-date and illustrated the current HCWM system. The hospital’s 1,300-litre capacity autoclave is being used, it was treating around 50 kg of infectious waste daily when the MTR mission visited. The hospital has also received a small Renault station wagon fitted to transport waste, at present the hospital receives waste from seven private hospitals and private clinics, where the waste generators pay 40,000 Malagasy ariary (approx. 11 USD) per bag of waste treated (20 kg). It is planned to also treat waste from other public hospitals in the autoclave.

All treated waste is presently stored at the autoclave, as the hospital is not comfortable sending sterilised waste in yellow bags to a landfill. The hospital management is of the opinion that if the treated waste was shredded, it could then be transported to a disposal site.

The hospital is collecting mercury containing items in a dedicated container supplied by the project. All collected items are light fixtures, mostly fluorescent tubes. Long-term these will be disposed of through the Ministry of Environment or the Ministry of Energy.

The hospital has just started collecting source separated general waste in labelled bins in the public areas. It is too early to judge the success of this programme.



*Photo 15: The yellow bags currently owned by the CHU-JRA are generally too small for most bins, so sometimes as illustrated by the right-hand bin in this picture, black bags are used for HCW.*



*Photo 16: Typical set-up for HCW at the CHU-MET.*

The CHU-Mère Enfant Tsaralalàna (CHU-MET) is a teaching hospital that currently has 55 beds; a lot of construction work is ongoing and the hospital will be expanded to 200 beds in 2019. The hospital specialises in maternity and children. The hospital's HCWM system is exemplary, where all facets for the proper segregation of waste are in place: Bins are clearly labelled, equipped with the correct colour liners, sharps containers are in place and an instructional poster (dated!) can be found above the waste station (see Photo 16).

The hospital did not receive an autoclave from the project, as there was no suitable site within the hospital's cramped footprint. It is planned that the waste will be transported elsewhere for autoclaving, right now the treatment contract is being drafted. So, at present the hospital burns the collected infectious waste in its existing incinerator, an obsolete piece of equipment which is solely operated at night, presumably so that any black smoke is invisible to the neighbours. All solid waste generated by the CHU-MET is collected by the city's waste collection service.

During the MTR visit, the hospital was in the process of setting up an ambitious, but well thought out, system for the collection of recyclables (and specific waste). The hospital is planning four fractions (see Photo 17): plastic; diapers (remember, this is a maternity and children's hospital!), food waste; and paper/ cardboard.



Photo 17: Bins for the collection of recyclables at the CHU-MET.



Photo 18: Waste station at the CHU-JRB; note the overfilled sharps container at right.

The CHU-Joseph Raseta Befelatanana (CHU-JRB) is a 397-bed teaching hospital located in Antananarivo. The hospital received a 260-litre autoclave, twenty-two 240-litre wheelie bins, three 660-litre containers; 32 waste bins to collect recyclables and a station wagon for waste collection vehicle. The waste management system was well functioning, though not perfect (see Photo 18). The autoclave was about to be taken into continuous operation when the MTR visited. The working area for the autoclave is well organised, with a storage area where general and healthcare waste are stored separately; the received healthcare waste can be weighed upon reception. There are separate storage areas for treated waste and recovered recyclables.

The hospital has just set up a collection system for recyclables, where four fractions will be collected in colour-coded bins: Food waste; plastics; paper/ cardboard; and metals.

The CHRD Manjakandriana is a 45-bed district referral hospital located about 50 km east of Antananarivo. The hospital has put a lot of effort into their waste management system and it was generally very good, though there were still a few flaws, such as a black bag lining a bin for infectious waste. It is obvious that the project has had a significant impact on the hygiene and HCWM within the hospital, and the positive effect was greatly appreciated by all staff.

As mentioned under Component 3.1, the autoclave has not yet been hooked up and commissioned. The hospital has received a vehicle to collect healthcare waste from the surrounding primary care facilities (two are described below), the hospital doubts that it can cover the all 42 CSBs within the district and intends to start by collecting healthcare waste from facilities to its southeast.

The hospital is technically mercury free, though some doctors still own medical devices containing mercury.

The hospital has set up a collection system for recyclables that is identical to the one at the CHU-JRB. The hospital is concerned that due to its remoteness, it will not be possible to sell the recovered materials. The two visited Manjakandriana CSB2s (see below) have both also set up bins to collect four fractions of recyclable materials.



*Photo 19: The surgery department at the CHR D Manjakandriana.*



*Photo 20: Waste station at the CSB2 Manjakandriana with, left to right, general waste, infectious waste (note the black bag) and a sharps container.*

The CSB2 Manjakandriana is a small primary care facility located next to the district hospital. The facility provides community health services, such as maternity and births, as well as vaccinations. The facility received training in healthcare waste management through the project and was very satisfied. At present the facility burns its infectious waste in a pit behind the clinic, so the future outlook of this waste being autoclaved is promising (the clinic is within 50 metres of the new autoclave at the CHR D Manjakandriana).

The CSB2 Sambaina Manjakandriana is managed by a medical doctor and a mid-wife and there are about 10 consultations in a normal day. The facility is located in a modest settlement about 10 minutes northwest of Manjakandriana by car. The facility has four bins outside for recyclable identical to those shown in Photo 17 at the CHU-MET. Considering the very modest size and appearance of this CSB2, it is clearly overly equipped with bins and other materials. The facility has at least four large bins, a large storage case (for mercury containing devices?) and a wheelbarrow that it has not be able to put to use. At present all collected waste, so recyclables, as well as general and infectious waste, are burnt in a pit behind the facility (see Photo 21).

The intent is that the vehicle provided to the CHR D Manjakandriana will be used to collect waste from the 42 CSBs within the district, given that the district measures 86 km from north to south, the transport distances and times (due to poor roads) will be considerable. Furthermore, given the lack of financial resources in the district, the cost of fuel could be a major issue. Finally, the benefit of sending a vehicle over long distances to collect waste from a facility such as the CSB2 Sambaina Manjakandriana can be questioned. With only ten visitors per day, the quantity of waste generated is minimal. Therefore, the cost-benefit of collecting waste from the CSBs is small.



*Photo 21: The final treatment system for general waste, infectious waste and recyclables at the CSB2 Sambaina Manjakandriana.*



*Photo 22: Sorting of recyclables at the Groupe Adonis Environnement SA facility, one of the many outlets for recovered materials the Madagascar PIU is considering.*

The Madagascar PIU has implemented the collection of recyclable materials at all six model sites (see descriptions above and Photo 17). The Project Technical Advisor has made a thorough survey of about 25 facilities that could purchase the various fractions of recyclable materials. Some of the facilities were visited by the MTR and found very promising (see Photo 22), so it seems clear that any recyclables collected in Antananarivo will be reused. For the healthcare facilities in Manjakandriana, the costs of transport may exceed the value of the recovered materials, so here the shipping of the recyclables to a treatment site for reuse may be a real challenge. If the collected materials cannot somehow be sent for recycling, there is no reason to source separate the general waste at these facilities, and the practice should be discontinued.

The Madagascar PIU has only managed to collect six mercury containing thermometers, all were privately owned by doctors. Otherwise, some fluorescent tubes have been collected in the mercury storage boxes provided by the project. The Madagascar PIU has been in discussions with the Ministry of Environment and the Ministry of Energy, long-term the intent is that all collected mercury containing items will be managed by one of these ministries. A locked cabinet and facilities to permit multiple packing were prepared by the PIU for the temporary storage of the mercury waste at the CHU-JRA.

The six model facilities in Madagascar are only using mercury-free devices. The PIU successfully distributed all received mercury free medical devices, though the intended “exchange” for mercury containing equipment failed, as it was found that the healthcare facilities owned no mercury containing equipment, as all used devices are privately owned by the doctors, nurses or patients. In the second phase of the project, the PIU is planning a one-to-one exchange of devices with private owners. Finally, in 2018 the Ministry of Public Health prohibited the purchase of mercury containing devices for the country’s healthcare facilities.

In Madagascar HCWM was already part of the curriculum in the national training programmes for EHOs, nurses and doctors, but the content was limited, so these courses were redesigned. To do this, the PIU hired the “Groupe InSPNMad” (Institut Supérieur des Paramédicaux Novateurs de Madagascar), a private teaching institution that is responsible for the national curriculum for several medical fields, including nursing, medical laboratories, midwives, kinesitherapy, anaesthesia, resuscitation, and hospital

quality management. The “Groupe InSPNMad” received the training materials prepared by the project, they were impressed by the large quantity and appreciated the high quality. The PIU has also distributed these training materials to all six technical universities involved with training healthcare professionals. In total, about 3,000 students are trained annually using the revised course materials that cover HCWM.

### Tanzania

A training of teachers on healthcare waste management took place at the Centre for Educational Development in Health, Arusha (CEDHA) in northern Tanzania. The teachers have in return provided training at their hospitals. As will be seen below in the description of the visited hospitals, the training may well have been successful but there is still a need for capacity building within HCWM to ensure that infectious waste is properly managed.

In the visited hospitals, all new staff receives a one-week training covering policies, standard operating procedures and also HCWM.

The Muhimbili National Hospital is a 1,500-bed hospital that also serves approximately 1,500 outpatients daily. This is the nation’s leading hospital and it is associated with the Muhimbili University of Health and Applied Science (MUHAS). The source separation of infectious waste has been in place since 2007 and the hospital is equipped with two incinerators. The project provided further training and the management system should be well functioning. In practice, there were many surprises when the hospital was visited. Some of the outdoor waste bins used by visitors were lined with red (i.e. infectious waste) bags and other with black (i.e. general or non-infectious waste) bags. A gardener was seen collecting leaves in a red bag. A similar confusion was found in the wards, as can be seen Photos 23 and 24 (note that both bins are adjacent to sinks, something that can easily cause further confusion!). It was also noted that several wards were overflowing with bins for waste collection, so the planning of the HCWM system was poor. All these weaknesses should not be due to a lack of awareness of the hospital’s procedures: All new staff at the hospital receives a one-week training on hospital SOPs, policies and HCWM.



Photo 23: A black bag lining a bin for infectious waste at the Muhimbili National Hospital.



Photo 24: A red bag used to collect non-infectious waste at the Muhimbili National Hospital.

The 1,300-litre capacity autoclave was commissioned at the end of May 2018 and has operated since. It is only used to autoclave the infectious plastic waste that is generated

within the hospital.<sup>23</sup> The hospital stated that given the manner in which their waste is sorted at the moment, it is unsuited for autoclaving due to liquids and needles. This explanation makes it urgent to re-evaluate the waste sorting at the facility, so that the infectious waste can be autoclaved.

The hospital generates 500 kg/day of infectious waste and this is treated in the hospital's two incinerators, both were in operation during the MTR visit.

Potentially the autoclave located at the Muhimbili National Hospital could also receive waste from the new Muhimbili Unit with 500 beds, as well as a Cardiac Hospital and an Orthopaedic Hospital, each with 300 beds, these healthcare facilities all belong under the Muhimbili Organisation. Obviously, it makes sense to utilise the autoclave's treatment capacity to the fullest extent possible.

The hospital is mercury free, though the one-to-one exchange of non-mercury for mercury devices did not take place, due to poor communication between the participants. The hospital has no programme for recovery of recyclables from the general waste.



Photo 25: Storage of autoclaved plastic waste at the Muhimbili National Hospital. It forms a solid mass and will be sold to a recycler.



Photo 26: Waste bins at the Mwananyamala Regional Referral Hospital.

The Mwananyamala Regional Referral Hospital officially has 254 beds but in practice it hosts twice that number of patients, on top of the 1,600 to 2,000 outpatients received daily. It is located in northern Dar Es Salaam, the staff has been trained in HCWM through the Tanzania PIU, the MoH's training course in Arusha, a WASH course held by WHO and through in-house training. The waste management system was fully functional and the hospital was in the process of drafting a hospital HCWM policy, the current draft is a generic document.

The hospital received a 260-litre autoclave; as the treated waste cannot be compacted, the autoclave is currently only used to treat plastic waste for recycling. The autoclave had last operated three weeks prior to the MTR visit. Generally, it seems an informal Ministry requirement that the treated HCW should change physical form before it can be placed in a landfill, so that it is possible to distinguish between sterilised and non-sterilised waste.

<sup>23</sup> This plastic waste excludes the 50 kg per day of plastic syringes which are generated within the hospital and then incinerated, as the hospital is currently unable to remove the needles.

Therefore, at present HCW is burnt in a 15-year-old incinerator that is only operated at night, due to the quantity of black smoke emitted. The quantity of HCW burnt is 105.2 kg per day; furthermore, the hospital generated 200 kg/day of general waste.

The 79-bed Sinza Hospital is located in the north-western part of Dar Es Salaam, it also receives about 1,000 outpatient visits daily. The hospital's waste sorting system was well-functioning and the records indicate that 114 kg of infectious waste are generated daily, as well as 9 to 12 kilogrammes of infectious plastic waste to be recycled.

At present the 9 to 12 kilogrammes of infectious plastic waste are treated in the hospital's 260-litre autoclave. All other infectious waste is currently transported to another hospital for incineration. The hospital wishes to have the ability to compact the treated healthcare waste before it is taken to landfill, so that the physical form of the waste is changed. So once the hospital has a compactor, it will use the new autoclave to treat the healthcare waste. Long-term, the hospital expects to use the autoclave as a cluster facility, serving surrounding hospitals.



*Photo 27: Waste storage at the Sinza Hospital, note the instructions above the bins.*



*Photo 28: New incinerator under construction adjacent to the new autoclave at the Mbagala Ranji Tatu Hospital.*

The Mbagala Ranji Tatu Hospital is a 55-bed maternity hospital that also receives 1,000 outpatients daily. There are on average 30 births per day within the hospital and the facility is amazingly busy. The HCWM system within the hospital was functioning, though far from perfect, something not surprising given the overcrowded and chaotic nature of the hospital. The EHOs had clearly put a lot of effort into the system and it must certainly be a great improvement over the earlier conditions at the hospital. The records indicate that the hospital generates 143 kg/day of HCW. The EHO staff were of the opinion that the hospital was well equipped with bins, bags and other essential equipment for their HCWM system. They said they were working on both a SOP for HCW for the hospital, as well as instructional posters, these documents would have to be in Swahili.

The hospital has received an 80-litre autoclave that is housed in a dedicated well-planned building. The autoclave was only used to melt/sterilise plastic waste, it was said to complete three cycles per week, each time treating 20 litres of waste. The hospital does not use the supplied water softener, preferring to purchase water for the autoclave's

operation. All other infectious waste is transported to another hospital for incineration. It was noted that the hospital is currently building a new incinerator (see Photo 28), it was not possible to obtain an explanation for this activity. The setting up of a new incinerator is most profoundly at odds with the avoidance of incineration technologies promoted by the project.

Tanzania has focussed on the recycling of plastic that was previously infectious, rather than recovering recyclable materials from the general waste stream. All visited facilities were producing blocks of plastic and the PIU has identified a recycling facility in Mbagala that will collect the plastic blocks from the HCFs and transport these to their sorting facility; the facilities will receive 500 TSH per kg for plastic (0.22 USD/kg).

There were no mercury containing medical devices in use within the HCFs visited in Tanzania and all collected mercury containing equipment is currently stored within the participating hospitals. No location has been identified for a centralised mercury storage.

In Tanzania there is currently little teaching pertaining to the proper procedures for healthcare waste management. The MUHAS is responsible for three schools of hygiene: One at the Muhimbili University campus, as well as the Mpwapwa and Tanga Schools of Hygiene. These three schools all follow the same teaching programme and the curriculum for Environmental Health Officers covers solid waste management. Under the solid waste management training, healthcare waste management is included, together with solid and liquid waste. The extent to which HCWM is included depends on the individual teacher's knowledge and interest. The students' knowledge of solid waste management can be tested at exam time, so intermittently there will be a question pertaining to HCWM in the exams. Furthermore, there are two other schools of hygiene under the Ministry of Health, Community Development, Gender, Elderly and Children these follow a different curriculum.

The training of nurses does not cover HCWM and the future medical doctors receive about 4 hours of teaching on the subject. Here the teaching takes place at the B.Sc. level and covers solid waste, liquid waste and HCW. On healthcare waste, the teaching materials are dated and, for example, they only cover healthcare waste incineration and omit autoclaving as an option.

There is a project review of the curriculum planned, though it seems stalled at present due to a lack of financial resources to organise a committee and cover the costs its associated meetings. Hence, although there is an interest in updating the curriculum to include HCWM, little is happening. The stakeholders also seemed unaware of the technical guidelines/ training materials that have been prepared by the regional component as a basis for developing a national curriculum and associated resources.

## **Zambia**

The introduction of the non-incineration and mercury-free technologies is well under way. The introduction of HCWM at the UTH is still in progress and the exchange of mercury containing medical devices was ongoing during the MTR visit. Further training is still required at some facilities, as can be seen in the facility descriptions below.

The University Teaching Hospitals in Lusaka is Zambia's premier healthcare facility, it consists of a conglomeration of five hospitals with a total of 1,900 beds. The hospital is expanding with several large construction projects ongoing. At present the Hospitals

generates around 1.5 tonnes per day of HCW. The Hospitals already had source separation of waste, but this has been improved within two of the site's five hospitals; namely the Adult & Emergency Hospital and the Mother & Child Hospital, covering approximately 50% of UTH's beds.<sup>24</sup> To achieve this, approximately 25 people followed a three-day training course to become Teachers, and containers for healthcare waste, sharps, diapers and general waste have been distributed to the wards. All new staff and medical students are also instructed in the hospitals' procedures, including waste separation, prior to working in the wards. Despite this, the source separation of waste at the hospital still has flaws, such as whole syringes in sharps containers that should just hold needles and incorrectly sorted waste in the bins. The general waste is taken to skips; these are collected by the local authorities three times per week and taken to the waste disposal site. It was noted that these also held yellow bags (see Photo 29).

It would be desirable to also have instructional posters on how the waste should be sorted. The Hospitals' had Standard Operating Procedures (SOP) that were basically the SOP provided by the project with in institution's name inserted. This reviewer was told that the SOPs will be adapted for use with the UHT. Without adaptation, the SOP is simply a generic document that serves no practical purpose.

The 1,300-litre capacity autoclave was installed in an existing building that already houses one of the UTH's four incinerators. The autoclave has been tested and it ready to operate. The establishment of a waste bin washing station is still outstanding.

The EHO responsible for the operation of the autoclaves still wishes for clearance from the local government to place sterilised waste on local landfill, where after he plans to start treating infectious waste. Both the MoH and ZEMA have voiced concerns over placing sterilised was on a landfill, where scavengers will be unable to distinguish between treated and untreated waste. So, at present the autoclave is not used for treating waste.



*Photo 29: Some yellow bags are found in the skips of general waste at the UHT.*



*Photo 30: Waste storage at the Chilenje Level 1 Hospital.*

The Chilenje Level 1 Hospital<sup>25</sup> in Lusaka received assistance from the project in improving waste management procedures and in phasing out mercury. The hospital has

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<sup>24</sup> It is expected that the source separation with the UTH's other three hospitals will take place during the second phase of this project.

<sup>25</sup> There are five levels of health facilities in Zambia; where Level 3 is a referral hospital such as UHT, Level 2 is also a provincial referral hospital, Level 1 is a District referral hospital, below the district level, there are Health Centres and Health Posts.

950 beds and is a warren of wards. The EHO staff have done a very good job in setting up the HCWM system (see Photo 30). Bins were located strategically, everything was clearly labelled, sharps containers were (generally) used correctly, and so forth. The hospital did not receive waste treatment equipment from the project, though it is the national PIU's intent to supply the hospital with autoclaves during the second phase of the project.<sup>26</sup> At present all infectious waste, about 750 kg per day,<sup>27</sup> is burnt in a defective incinerator that is only operated at night (a tactic presumably utilised so that the surrounding inhabitants cannot see black smoke).

The hospital's management of general waste needs improvement. When black garbage bags are not available, the staff uses yellow bags for general waste. This meant that about ever twentieth bag of general waste in the hospital's very unhygienic solid waste storage area is yellow. The reason given was that when black bin liners are not available, the staff will use yellow bags instead. The general waste is taken to the Lusaka dumpsite. As noted elsewhere, there is currently no recovery of recyclables at the hospital.

The hospital has been without mercury containing equipment since July 2017. The hospital not only received sphygmometers and thermometers from the project; it also purchased such equipment with its own budget.

The Ndola Teaching Hospital is the main hospital for the Copperbelt Province (population 2.5 million) and has 821 beds. Nine EHO work within the hospital but, unfortunately, the HCW management was rather underwhelming: The MTR saw solid waste in infectious waste containers; a scalped blade and blood-soaked bandages in the general waste; and overflowing sharps containers. The two 260 litre capacity autoclaves supplied by the project are in a new dedicated building and fully functional. It can be noted that the bin wash was still to be built, only the water supply pipe was in place. Due to the lack of an approval for the disposal of treated waste, the autoclaves are not in use.<sup>28</sup> Therefore, all the hospital's HCW and some of its general waste is incinerate on-site. There is no recovery on recyclable materials within the Ndola Teaching Hospital.

There are currently 19 smaller HCW generators sending their waste to the hospital's incinerator. Once the autoclaves are treating waste, it would make sense for the project or the Teaching Hospital to ensure that they handle all their infectious waste correctly.

The hospital has received non-mercury equipment and is working its way towards being mercury free.

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<sup>26</sup> It should be verified whether it would make more sense to transport their waste to the UTH autoclave, as there will probably be excess treatment capacity there.

<sup>27</sup> The EHO stated that about 150 bags of HCW (50 litres each) was generated daily.

<sup>28</sup> The hospital applied to the Ndola City Council for permission to send the sterilised waste to the dumpsite. Seemingly the letter should have been sent to ZEMA, something that is now underway (meeting with ZEMA Northern Region Office 1 November 2018).

DATE	MEDICAL WASTE (KG)	MEDICAL WASTE INCINERATED WITHIN 48 HRS (YES/NO)	MODE OF TRANSPORTATION TO INCINERATOR	FUEL AVAILABLE TO (YES/NO)	FUEL COUPON #	WEIGHT OF ASH (KG)	GENERAL COMMENTS
21.8.18	283	YES	TRUCK	YES			
20.8.18	300	YES	TRUCK	YES			
23.8.18	316	YES	TRUCK	YES			
16.8.18	333	YES	TRUCK	YES			
14.8.18	350	YES	TRUCK	YES			
10.8.18	252	YES	TRUCK	YES			
07.8.18	308	YES	TRUCK	YES			
05.8.18	318	YES	TRUCK	YES			
04.8.18	296	YES	TRUCK	YES		223	
11.8.18	240	YES	TRUCK	YES			
11.8.18	310	YES	TRUCK	YES			
13.8.18	304	YES	TRUCK	YES			
13.8.18	250	YES	TRUCK	YES			
14.8.18	264	YES	TRUCK	YES			
13.6.18	220	YES	TRUCK	YES			
16.6.18	306	YES	TRUCK	YES			

Photo 31: The record keeping was very good at the Ndola Teaching Hospital.



Photo 32: A trolley at the Kabwe General Hospital.

The Kabwe General Hospital is the largest hospital in the Central Province, a territory that measures 700 km from east to west. The hospital has 444 beds and receives over 100 outpatients daily. The hospital received two 260-litre capacity autoclaves, equipment for HCWM within the hospital and non-mercury medical devices. The HCWM is well functioning within the hospital, where a lot of effort has been put into the location of bins, labelling and training of staff. All collected HCW is autoclaved through two daily cycles with the new machines. Unfortunately, as the hospital is unsure whether the yellow bags of sterilised HCW can be placed on the local dumpsite, the decision has been to incinerate the treated HCW on-site in the hospital’s incinerator. This is quite contrary to the project’s stated aim of promoting non-incineration technologies, as when the waste is burnt after sterilisation, there will still be the same quantity of dioxins and furans released into the atmosphere.

There is no recycling of plastic, cardboard or paper at the hospital.

Non-mercury medical equipment has been delivered to the hospital and mercury containing devices were collected from there for storage in the Mercury Storage Container at the MoH in Lusaka.

The Kapiri Mposhi District Hospital is located 60 km north of Kabwe along the main road. The hospital has 134 beds and takes care of about 50 outpatients daily. Prior to the project, the hospital only separated sharps from all other waste, today it has a well-functioning HCWM system. Given that the hospital has no autoclave, and as its incinerator is falling apart, the collected HCW is burnt in a pit. Hence the measures taken at the hospital do not contribute to a reduction in the release of unintended dioxins and furans to the atmosphere.



Photo 33: HCWM is well organised at the Kapiri Mposhi District Hospital.



Photo 34: The collected HCW is burnt in this hollow at the Kapiri Mposhi District Hospital.

The hospital is replacing its mercury containing devices with mercury free devices procured by the project. At present there is no recycling system for the recyclables found within the general waste stream.

The Mukonchi Rural Health Centre has reached over one hour of driving on dirt roads. The Health Centre has 27 beds and two clinical officers are the principal medical staff. The clinic generates about 20 kg per day of infectious waste.<sup>29</sup> All waste is burnt in a 200-litre oil drum, as the small on-site incinerator is not functional. The waste sorting at the facility is poor, best exemplified by the laboratory where two yellow pedal bins labelled with infectious waste symbols were both lined with black bags. One bin was used for infectious waste and the other bin was used for general waste!

It is essential that Health Centres have good hygiene and proper healthcare waste management procedures. This is a subject that must be taught to all medical staff and something which is already part of the curriculum for EHOs and nurses in Zambia. In the opinion of this reviewer, the project can easily help such facilities, but the provided assistance will not do much to achieve one of the overarching goals: the reduction of UPOPs emissions. Given the Health Centre's remoteness, it would be very costly to bring the generated HCW to an autoclave (and the required funding would be far better spent on other essentials for the clinic), likewise in the longer run, the facility will probably be troubled to procure bin liners, replacement bins or sharps containers, so the general outlook for a greatly improved HCWM system is bleak. Meanwhile, unless an autoclave is supplied or a (costly) waste transport system is established, the Health Centre's waste will always end up being burned and hence releasing UPOPs - something that is contrary to the project's objectives.

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<sup>29</sup> The EHO states that four 50 litre bags of HCW per day.



Photo 35: Overkill with bins in an examination room at the Mukonchi Rural Health Centre.



Photo 36: Frames that will hold big bags for recyclable materials under manufacture at UTH.

The UTH is about to implement a recycling programme for food waste, cardboard, HDPE, LDPE and PET. At present paper signs have been made, some big-bags purchased and frames made to hold the big bags (see Photo 36). Smaller waste bins will be used to collect the recyclables and these will then be transferred to the big bags. The hospital said that it was preparing a composting bed and hoping to treat 15 m<sup>3</sup> of organic waste per week. The target is food waste from the hospitals' restaurants and wards. The recycling scheme for recovering materials does not seem overly well planned, so a lot of support and adjustment will probably be required to make it fully functional.

The intent is that a large local recycling company Waste Master (Z) will collect the waste in two fractions (one paper/ cardboard and one plastic) and then sort it further prior to resale. At present the sorting at Waste Master (Z) is manual but the company is receiving a license to build and operate a materials recovery facility (MRF). Waste Master (Z) already collects recyclables from three large private hospitals in Lusaka and handles about 10 tonnes of materials per day.

At present there has only been action at the UHT, for the Chilenje and Matero Level 1 Hospitals matters are still at the discussion stage.<sup>30</sup> This seems a shame, as there is obviously an outlet for any recovered recyclable materials. At present the private hospitals supplying Waste Master (Z) in Lusaka receive about 1.15 kwacha per kg of mixed plastic and 0.70 kwacha per kg of paper/ cardboard. The project could have done a lot more to facilitate the establishment of recycling schemes at the two hospitals over the past two years.

Although Zambia's private hospitals seem mostly mercury free, the phasing out of mercury in public hospitals is still on-going. There is at present no directive from the Ministry of Health to healthcare facilities to only purchase non-mercury containing devices, and further compounding the problem, Zambia still receives donations of mercury containing hospital equipment from abroad! The project is currently performing a one-to-one exchange for mercury containing equipment with three Lusaka hospitals. The hospital staff requested time to familiarise themselves with the new equipment and it as planned that the mercury containing equipment will be collected from these three hospitals in November 2018. Four hospitals north of Lusaka received mercury free devices during the

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<sup>30</sup> Meeting with on 2 November 2018 with Mr. Daniel Mukonde, Director of Waste Master (Z)

consultant's visits (digital thermometers, aneroid and automatic sphygmomanometers) and returned mercury containing items (mostly sphygmomanometers and mercury containing amalgam for dental work).



*Photo 37: Mercury containing sphygmometers collected from the Kapiri Mposhi District Hospital.*



*Photo 38: The Mercury Storage Container at MoH, Lusaka.*

A storage site for mercury containing waste has been installed within the Ministry of Health compound. It is a converted 20' container complete with shelving, lighting, a spill response kit and a containment area below its base in case of spills. It is intended to warehouse all mercury containing waste collected within the country. The storage unit was licensed by ZEMA.

The national curriculum in Zambia for Environmental Health Officers and Nurses both incorporate a teaching module on healthcare waste management. The classes are similar and the course content for Environmental Health Officers is discussed here. EHOs have a 64-hour course on Health-care Waste Management, where half the course is lectures and the other half practical work during the first half of their third year of studies. This course was updated within the last five years and covers both the incineration of HCW, as well as “non-incineration treatment options: steam treatment technologies e.g. autoclaves; microwave treatment technologies, ...”<sup>31</sup> This curriculum is followed at all of the country's health science schools (there are approximately ten). Other than EHO and Nurses, Environmental Health Technologists and Clinical Officers (“night physicians”) are also taught comprehensively about HCWM.

It can be noted that there is no refresher course on HCWM available of EHOs, something that the public health experts the MTR Consultant met recommended. Likewise, an orientation/ information package for HCW transporters would be desirable and is currently lacking.

### **Meeting the project objectives for UPOPs and Mercury avoidance**

The project aims to reduce the amount of UPOPs releases from HCW incinerators by 31.8 g-TEQ/yr. The current calculations by the project indicate that 1,048.3 tonnes per year of HCW can be treated in the autoclaves installed by the project; resulting in a total amount of dioxins (UPOPs) releases reduced/avoided of 42.1 g-TEQ per year for the four project countries. This calculation is based on all autoclaves operating 6 treatment cycles per day

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<sup>31</sup> Quoted from the curriculum.

for 260 days per year. As noted in section 0, most of the autoclaves currently only treat a few batches of waste per week, so the above figure of 42.1 g-TEQ per year is overestimated. This especially applies, if it is considered that some HCFs incinerate the autoclaved waste!

The end-of-project target is that the amount of mercury releases from the health sector is reduced by 25.3 Kg/yr. At present it is not possible to gain an overview of the total amount of mercury collected in the project countries,<sup>32</sup> though the end result could well be around 25 kg. That said, it seems clear that all HCF involved in the project will most likely be mercury free by 2020, so even if the target is not met, the overriding goal of eliminating mercury containing medical devices from the hospitals will be achieved.

### **Gender Issues**

Both the UNDP and the *Guidance for Conducting Midterm Reviews of UNDP-Supported, GEF-Financed Projects* place a high priority on gender balance. The training of the national experts over a two-week period in Nakuru, Kenya included a session on gender inequality which introduced the key conventions which ensure women's rights in Africa. This was followed by discussion session on gender inequality issues in the healthcare waste sector and an interactive session with the participation of the national experts which emphasised the need of an introductory assignment to analyse gender inequality gaps in HCWM and to develop recommendations for action.

The project also underwent a Social and Environmental Screening in 2016 and in August 2018 a Gender Expert, Ms. Sabrina Regmi, visited Ghana to evaluate the situation. Her report<sup>33</sup> is quite critical of the project, noting that “gender equality or human rights issues concerns were not fully mainstreamed in the design phase.” She faults the project with not including dumpsite scavengers in their consultations, as these are one of the groups most affected by HCWM. It is also recommended that the project collaborate with academic institutions to reduce gender-specific norms of behaviour in the workplace that leads to gender segregation of work. Her suggestion is that schools teaching environmental health and selected healthcare facilities raise “awareness by sharing success stories of women performing work considered masculine (e.g. doctor, engineering, machine operation, driving/transportation etc.) and that of men performing work considered feminine (e.g. nursing, cleaning).” Another recommendation is that waste collectors, waste pickers, and women/children living near dumpsites receive training on gender equality, human rights and the risks posed by infectious waste. These recommendations are accurate, but addressing the abovementioned issues requires large resources to educate relatively few people.<sup>34</sup> In the opinion of this consultant, using similar resources to strengthen the HCWM systems in HCFs would offer a considerably greater benefit to vulnerable groups. As explained in the text box in section 4.1 and elsewhere, female staff and patients (including elderly and children) benefit the most when a hospital's HCWM and hygiene improves.

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<sup>32</sup> There are no records.

<sup>33</sup> *Social and Environmental Injustice Analysis in Healthcare Waste Management in Ghana, including Gender Dimensions*

<sup>34</sup> In the case of landfill scavengers, they work on dumpsites where almost all the waste is municipal solid waste. To reach these people (who depending on the situation), could just be scavenging or, as inferred by the recommendation, be families living on the dumpsite, requires a lot of resources.

Given the predominance of women in the medical profession, the majority of those trained by the project are women and as indicated in the 2018 Project Implementation Report, during the reporting period, 24 members of regional/national project teams and partners (WHO, HCWH) took part or made presentations at 13 international conferences/events. Of these 24 participants, 18 were women.

### **Country Specific Topics**

Each country investigated one or two topics, with the aim of gaining experience and sharing the conclusions with the other project countries.

Ghana 1: Assessment of hepatitis B and C at the pilot HCF and support provision of vaccine. For the project model facilities in Ghana, all workers were screened for hepatitis B. No screening was done for hepatitis C due to costs. The screening covered all workers, including new employees and especially focussed on those involved with waste management. Other employees are also exposed to a higher risk, for example laundry workers, as needles are common in the dirty linen. It was found that only 14 of the 800 screened workers tested positive. The screening was paid for by the HCFs, and for those who tested positive, the first vaccination was also free of charge.

Ghana 2: Review of key regulation on HCW. Under the PIUs guidance, several working groups conducted a comprehensive review of Ghana's legislation, making sure that the various pieces of legislation covered the requirements to handling, storage, transport, treatment, and disposal of healthcare waste. The review activity also covered Ghana's hazardous waste regulations, and recommendations were made to ensure the section on HCWM was comprehensive.

Ghana G3: Evaluation of sharp management tools. The PIU made a survey in five project hospitals on the use of safety boxes, sharps containers and needle cutters. A total of 166 staff responded and evaluated the ease of use and safety of these three sharps management tools.

Madagascar 1: Introduce WASH FIT and GGHH in the health care facilities supported. The staff at Madagascar's six model health facilities received training by Global Green and Healthy Hospitals (GGHH) in August 2017 by Mr. Luqman Yesufu, where the objective is to reduce the environmental footprint of the health sector. National goals for improving the management of healthcare waste were formulated; a focal point was identified in each of the six model health facilities and now they participate in the regular webex offered by GGHH.

All the model health facilities were trained in the Water And Sanitation for Health Facility Improvement Tool (WASH FIT) by Ms. Arabella Hayter, a WHO Expert, in 2017, and subsequently by the national trainers in 2017 and 2018. The WASH FIT first assessment has been performed for each model health facility, a WASH FIT committee was created and an annual improvement plan developed. To date there have been two follow-up meetings with the model health facilities and the national Technical Working Group.

Madagascar 2: Identify and prepare a central treatment of health care waste management. The hospital CHU-JRA was identified for central treatment of healthcare waste, this facility has been identified as a cluster facility and received a big 1300 litre capacity autoclave.

Madagascar 3: Autoclave maintenance video. During the training provided by the Mediclave technicians in August 2018, a video on the autoclave operation and maintenance was shoot and the first draft of the videos is under review. The video will be made for both English and French speaking audiences.

Tanzania 1: Introduction of bio-digestion plant in one of the project facilities. A bio-digester was established at the Mwananyamala Regional Referral Hospital in 2018 (see Photo 39). It has in operation since September 2018 and substantial gas production is expected by December 2018. During the MTR visit on 17 October there was already gas production and it was demonstrated how the gas can be used to heat water. The digester is fed with placenta from the maternity ward, rice and vegetables. The system seemed to be working well, so it will be interesting to see if this remains true in the long-term. The initial intuition was that this system is sustainable.



*Photo 39: Bio-Digestion Plant (below ground) at the Mwananyamala Regional Referral Hospital.*



*Photo 40: Syringes for recycling at the Kabwe General Hospital.*

Zambia 1: Initialize recycling of non-infectious waste. The PIU is initiating the collection of recyclables at UHT, for the Chilenje and the Matero Level 1 Hospitals, as described earlier in this section. The PIU is also working to establish a local production of safety boxes from recycled materials. This initiative is still at an early stage: The Kabwe General Hospital has collected five bags of discarded syringes (see Photo 40) and the intent is that a plastic recycler in Kabwe named Solid Tech will utilise the collected materials to produce sharps safety containers. It seems a matter of bringing the syringes to Solid Tech, so that the pilot production can be initiated.

**Component 4a: Evaluate the capacities of each recipient country to absorb additional non-incineration HCWM systems and mercury-free devices and distribute technologies based on the evaluation results and allocation formula**

Table 10: Status for Component 4a at MTR

COMPONENT 4A: EVALUATE THE CAPACITIES OF EACH RECIPIENT COUNTRY TO ABSORB ADDITIONAL NON-INCINERATION HCWM SYSTEMS AND MERCURY-FREE DEVICES AND DISTRIBUTE TECHNOLOGIES BASED ON THE EVALUATION RESULTS AND ALLOCATION FORMULA [Regional component]			
Indicators	End of Project Target	Status at MTR	Rating
<b>Outcome 4.a.1:</b> Capacities of project countries to absorb additional technologies evaluated.	Evaluation conducted of all the 4 project countries and all the HCFs, which have received project support.	At the draft report stage (this report)	
<b>Outcome 4.a.2:</b> Additional technologies distributed depending on evaluated capacities for absorption.	Additional HCWM systems and Mercury-free devices procured and distributed, based on the evaluation results and allocation formula.	To be undertaken in next phase of project.	

### Capacity to absorb additional technologies

One task to be conducted during the mid-term evaluation is an assessment of the capacity of each country to absorb additional technologies (Outcome 4.a.1). It was agreed during the Inception Workshop and confirmed during the subsequent Project Board Meeting, both took place in September 2016 in Johannesburg, South Africa, that the allocation of resources for the second round of procurement would be based on aggregate national performance by each country during the first phase. It was agreed that the evaluation would be based on the following five factors as recommended in the Project Document:

1. The promulgation of HCWM and Mercury reduction policies
2. Successful implementation of BAT/BEP in the model facilities
3. Proper operation and maintenance of the initial batch of non-incineration HCWM systems and Mercury-free devices
4. Safe storage of healthcare Mercury waste
5. Effective national training programmes

It should be clarified that item “2” in the listing is taken to refer to the successful source separation of infectious waste within healthcare facilities, as the actual treatment system is covered under “3.” No scoring system was agreed, and the MTR reviewer has decided to score all five evaluation components equally, as any other weighting of the scores could be perceived to favour one PIU over another.<sup>35</sup> Each of the five components are scored out of “10,” where:

“0” represents no progress

<sup>35</sup> How is the MTR to decide that policies are more important than national training programmes, etc.?

- “2’ means a very poor performance
- “4” equals a sub-par result
- “6: signifies an outcome that is likely to be successful
- “8” equals a good result that is most likely sustainable
- “10” mean an excellent outcome

An outcome the is between two scores, for example halfway between a “6” and an “8,” will be scored as a “7.” The results are then weighed, and the funds will be distributed according to the weighting in Table 11.

*Table 11: The Project Information*

Country	Ghana	Madagascar	Tanzania	Zambia
Policies	8	8	8	7
Source Separation	8	9	7	6
Autoclaves & Hg	8	7	6	8
Hg Storage	8	8	6	10
Training	10	10	7	6
Total	42	42	34	37
<b>Weighted Score</b>	<b>27%</b>	<b>27%</b>	<b>22%</b>	<b>24%</b>

The above weighing will be used to allocate the funds to purchase equipment by the regional component. It must be remembered that several PIUs overspent during the Phase 1 procurement, so any cash advance from the Phase 1 procurement will obviously have to be deducted for the Phase 2 purchases.

#### **Component 4b: Expand HCWM systems and the phase-out of mercury in the recipient countries and disseminate results in the African region**

The second phase of this project continues after this MTR. Here, following the recommendations from this report, each country will seek to improve its existing system and expand the system to more facilities. Likewise, as indicated under the description of Component 3b, the coverage of the national training program will be further expanded.

The Project Document foresees that the project results and replication tools are disseminated nationally and regionally through existing conferences on environment and health, such as the annual WHO and infection control conferences.

*Table 12: Status for Component 4b at MTR*

COMPONENT 4B: EXPAND HCWM SYSTEMS AND THE PHASE-OUT OF MERCURY IN THE RECIPIENT COUNTRIES AND DISSEMINATE RESULTS IN THE AFRICAN REGION <i>[National and regional components]</i>			
Indicators	End of Project Target	Status at MTR	Rating
<b>Outcome 4.b.1:</b> HCWM systems expanded to other facilities in the country	14 additional HCFs with an average of 150 beds or a total of about 2,100 beds supported as well as an additional 12 rural health posts.	Phase 2 of project	

<b>Outcome 4.b.2:</b> Country Capacity to Manage Mercury and to phase-in Mercury-free devices improved.		Phase 2 of project	
<b>Outcome 4.b.3:</b> National Training Expanded.	HCF staff of the additional HCFs trained in BEP/BAT.	Phase 2 of project	
<b>Outcome 4.b.4:</b> Information disseminated at environment and health conferences in the region.	8 national project representatives disseminated project results at conferences in the region.	The project results are already been presented at regional conferences. The Ghana national HCWM curriculum developed under the project is now used by the West Africa Health Examination Board, and is the basis for all HCWM training in West Africa.	

The project is already disseminating its results and the Ghana national HCWM curriculum developed under the project is now used by the West Africa Health Examination Board and is the basis for all HCWM training in West Africa.

### Component 5: Monitoring, adaptive feedback, outreach and evaluation

This component covers the project’s reporting, monitoring and evaluation. The present status can be found in Table 13 below.

Table 13: Status for Component 5 at MTR

COMPONENT 5: MONITORING, ADAPTIVE FEEDBACK, OUTREACH AND EVALUATION			
Indicators	End of Project Target	Status at MTR	Rating
<b>Outcome 5.1</b> Project’s results sustained and replicated	<p>1 annual APR/PIR submitted to UNDP each year.</p> <p>1 Mid-term project review. M&amp;E results and insights are applied to provide feedback to the project coordination process and have informed/redirected the design and implementation of the second phase of the project.</p> <p>The MTE will inform on how many additional technologies would have to be purchased and how much additional capacity building would have to be carried out in the second half of the project.</p> <p>1 Final evaluation.</p> <p>MTE and FE must include a lessons learned section and a strategy for dissemination of project results.</p> <p>Lessons learned and best practices are accumulated, summarized and replicated at the country level.</p>	<p>The project is reporting in accordance with the requirements of the Project Document and its donors.</p> <p>The project has been very active in collaborating with other healthcare waste projects in both African and the Middle East, doing joint training, exchanging experiences and knowledge.</p> <p>The project has conference calls every second week between the Regional Project Team and the four national PIUs where progress and problems are discussed. This leads to an exchange of knowledge and experience, helping each PIU address any problems or difficulties they may be experiencing.</p>	<b>S</b>

	20 knowledge products on project results disseminated in workshops, conferences, social media or other relevant channels.		
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To summarise, the project is well on track to achieving the developmental objective.

### **Remaining barriers to achieving the project objectives**

A key difficulty for the project is the disposal of the treated healthcare waste. The placement of sterilised waste on a dumpsite or landfill, without any change of physical form is clearly a concern in all project countries. This issue greatly hampers the project’s ability to meet its goals. It has also made it difficult to sell autoclaving as the best option for healthcare waste treatment to health authorities, even though they understand the health and environmental implications of using unacceptable incinerators currently being used in most health facilities. To fully utilise the autoclaves, it is clear that a solution must be found and implemented.

Project experience to date indicates that rural health posts may be able to properly segregate and handle their infectious waste, but the quantities of waste they generate is very small and the costs of bringing their infectious waste to an autoclave facility are prohibitive. Hence, it is at present unrealistic to expect that HCW collected in rural health posts can be transported to an autoclave, as the financial means are simply not there. Much better results have been achieved by the project when working with larger hospitals.

During the MTR, it was clear that there were issues with the availability of a local service technicians from TTM, the autoclave provider. To ensure that the project objectives can be met, the service technicians must be available for autoclave maintenance and repair.

In some hospitals the source separation of healthcare waste is poor. It is paramount that the waste is correctly separated for the installed waste management system to work.

## **4.2 Project Implementation and Adaptive Management**

**Rating: S** (see Annex D for an explanation)

### Management Arrangements

The Project consists of five components: One regional component managed by the UNDP IRH and four national components, one for each project country. The regional component is being implemented by the UNDP IRH in close cooperation with the Montreal Protocol/ Chemicals Unit team based in Istanbul. The regional project component is carried out using the Direct Implementation Modality (DIM). The DIM is the approach when the UNDP takes on the role of Implementing Partner, meaning that it assumes the responsibility for mobilising and applying the required inputs in order to reach the expected outputs. In other words, the UNDP IRH has the overall management responsibility and accountability for the project implementation. Accordingly, the UNDP IRH must follow all policies and procedures established for its own operations.

The regional component has a Project Manager who is responsible for running the project on behalf of the Implementing Partner and who is under the overview of the Project Board. The Project Manager is responsible for day-to-day management and decision-making for the project. The Project Manager is supported by a Project Assistant, a part-time Chief Technical Expert and part-time Senior Experts provided by the WHO and HCWH

The Regional Project Team has been very supportive to the Implementing Partners in ensuring an effective accomplishment of the project components. This applies to all activities from the training of the national PIUs and stakeholders, through the provision of high-quality documentation and technical assistance, and to direct support of the in-country execution of project activities. These efforts have at times been pre-emptive, where the Chief Technical Expert through his visits to the project countries has identified and addressed potential problems before they could trouble or delay the project's implementation. The reports made by both the Project Manager and the Chief Technical Expert reflect the actual situation and do not gloss over any difficulties or shortcomings faced by the project.

The National Project Components are executed following the National Implementation Modality (NIM) and are implemented by the project's national implementing entities which are the following:

- Ghana: Ministry of Health
- Madagascar: Ministry of Environment, Ecology and Forests; and Ministry of Public Health
- Tanzania: Ministry of Health, Community Development, Gender, Elderly and Children
- Zambia: Ministry of Health; and Ministry of Lands, Natural Resources and Environmental Protection

The NIM means that the responsibility for the project execution lies with the national governments. Here the national implementing entities (see above) assume full responsibility for the effective use of UNDP resources and the delivery of outputs in the signed project document. The implementing entities report on project progress against the agreed work plans, following the reporting schedule and formats laid out in the Project Document.

Within each country, the project is directly managed through the Project Implementation Unit, these are generally located in an office within the Ministry of Health, the exception being in Tanzania where the team now has an office within the UN Compound in Dar Es Salaam. The Tanzania PIU had an office within the Ministry of Health, Community Development, Gender, Elderly and Children till August 2018, then the Ministry moved to Tanzania's new capital Dodoma, a one-hour plane ride from Dar Es Salaam. As all the project activities are around Dar Es Salaam, it would have made no sense for the PIU to follow the Ministry of Health to Dodoma.<sup>36</sup>

Each PIU is led by a National Project Coordinator who has the overall responsibility for the implementation of project activities within the country and the achievement of planned

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<sup>36</sup> Though a project office has been made available (or at least offered) to the PIU.

project outputs. The National Project Coordinator reports to the National Project Director and to the UNDP Country Office. A Project Assistant provides administration, management, accounting and financial support to the Project Coordinator as required. The national Technical Advisor <sup>37</sup> works under the direction of the Project Implementation Unit.

Under NIM, the UNDP is responsible for the effective and efficient use of resources to achieve the project objectives in collaboration with the implementing partner. The UNDP makes sure that funds are made available to the project, monitor the project, and take any required corrective actions. Once the National Project Board has selected the national Project Implementing Unit, i.e. the National Project Coordinator, the Project Technical Advisor and the Project Assistant, the UNDP Country Office pays their salaries and is also responsible for the local procurement according to the specifications of the PIU.

The National Project Boards and the PIUs have been highly focused on the successful implementation of the project. Here their engagement has been strongly supported by their national Ministries of Health and Environment, as these are very engaged to ensure a positive outcome, as the project's objectives match their own national goals. Their strong interest is founded in the expected positive impact on hospital safety, on the environment (elimination of POPs and mercury) and in the meeting of national obligations with respect to international conventions (Stockholm and Minamata). The countries' reporting is generally sound and reliable, though a few of these documents occasionally overstate the progress. <sup>38</sup>

#### Regional Project Board

The Regional Project Board is chaired by the Manager of the UNDP IRH who also serves as the Project Executive. The Project Board makes the management decisions for the project, such as approving project plans and revisions. The Project Board has seven members:

- UNDP IRH Manager
- A senior level official designated by each of the Project Participating Governments
- A representative from HCWH
- A representative from WHO

The voting members of the Regional Project Board are the IRH Executive, the Country Representatives, and the representatives for UNDP MPU/Chemicals and UNDP HHD. Other donors and partners can participate in the Board meetings as observers.

#### National Project Board

The National Project Board makes decisions for the project at national level, especially when the National Project Coordinator requires guidance. A representative from the project's national implementing entity (i.e. the Ministry) chairs the Board which meets at least twice every year.

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<sup>37</sup> The actual title of the Technical Expert varies from country to country.

<sup>38</sup> It would be surprising if it was otherwise.

### Work Planning

To date all major project decisions have been taken in close cooperation with the key stakeholders and approved by the Regional Project Board. Hence the Regional Project Board has advised and guided the project as intended. All interviewed people were satisfied with the project management arrangements and felt that the lines of communication within the project worked well.

The National Project Boards all seem to promote a close cooperation between the Ministries of Health and Environment, as these seek to address concerns that have a high national priority. The Ministries of Environment are keen to address their obligations under the Stockholm and Minamata Conventions, whilst the Ministries of Health are eager to improve hygiene and safety in their healthcare facilities. Hence the project acts as a catalyst, making the two ministries closely collaborate to address issues that are of national importance.

It can be observed that there are clear benefits to implementing these activities as a regional project rather than as a national project. The most obvious advantage is the economies of scale: There are clear benefits to purchasing autoclaves, HCWM equipment and non-mercury medical devices in bulk, as this lowers the unit cost. Likewise, the cost for the preparation of training materials or of organising a training course are mostly independent of the number of recipients or participants, so again there are significant savings in a regional project. Two other benefits were observed: Firstly, the four countries are keen to exchange experiences and lessons learned. These interactions assist the project countries in resolving any difficulties they may face. Secondly, there is clearly a competitive spirit between the four countries and all are eager to make good progress, as not to be outdone by others. It must be remarked that this project builds on earlier experiences (see section 3.1), so the proposed solutions are “proven” technology and not at risk of unexpected obstacles.

The regional component has acted in a very professional manner throughout the project implementation: Training materials and training courses have been of a high quality. Advice to the four countries, procurement and technical support has all been excellent. The MTR commends the Ghana PIU for not planning any autoclaving facilities for Accra, as the private company Zoompak already owns a large autoclave facility designed to serve the capital. Instead of installing competing autoclaves within the city, the Ghana PIU has supported Zoompak in raising awareness about the facility and about the importance of good HCWM systems, helping Zoompak double their number of clients over the past two years.

At present the project has one significant shortcoming. All four countries are reluctant or unwilling to directly landfill sterilised waste. It is felt that the waste should be physically altered and the consensus is that all sterilised waste should be either shredded or compacted. There is a logic to this: If yellow (or red) bags are used as a warning, telling all people that the bag contains dangerous (infectious) waste, then using the same colour bag when placing sterilised waste on a landfill, could lead scavengers (and others) to believe that the waste in yellow or red bags is not dangerous. This would be a very dangerous situation for those handling the waste at the disposal site.

The most common measure is to have a special fenced off area at the landfill where the healthcare waste is placed. Unfortunately, such a solution only works at a controlled

landfill where there are guards, otherwise scavengers will simply cut through the fence to access the waste (the plastics in hospitals waste have a good value when recovered for recycling). At present all the sterilised waste is destined for uncontrolled dumpsites with scavengers, and hence the reluctance to use these for the sterilised waste.

The regional component is now making shredders available to the project countries. One could ask why this was not done during the first phase. This reviewer would say that this difficulty was difficult to predict. For example, earlier experiences in Kyrgyzstan, where the sterilised waste was deposited in dumpsites, did not require any shredding. In Kyrgyzstan the sterilised waste was simply buried on the dumpsite using a backhoe and then covered. There are several sound arguments for avoiding shredding of the waste: Firstly, if infectious waste is shredded, the repair and maintenance of the shredder is difficult, unless the device is designed so that it can be sterilised. When shredding sterilised waste, as is planned for Phase 2 of this project, there is no danger to technicians working on the shredder. That said, shredders are expensive to purchase and, due to the nature of their operation, their maintenance costs are high as wear parts have to be replaced. Hence, the shredding of the waste is costly and thereby makes the overall costs higher. This in turn decreases the sustainability, as some HCFs may be unable to afford the increased costs. Hence, if at all possible, the shredding of the waste should be avoided to keep capital and operational costs at a minimum.

#### Finance and Co-Finance

The project has undertaken purchasing activities in a timely manner. The project did face one difficulty: All major purchases were to be through the UNDP Regional Hub in Istanbul in close collaboration with the UNDP Nordic Office and its Global Procurement support Unit-Health in Copenhagen. The Nordic Office was to assume the procurement of the non-incineration technologies for each of the project countries. Unfortunately, the cost of procuring through the Nordic Office was almost 100,000 USD, thereby severely limiting the funds available for project management. Therefore, UNDP IRH undertook the procurement. First procuring the lesser package of non-mercury medical devices and thereafter undertaking the more complex procurement of the HCWM systems for the 24 model HCFs. As a result, any difficulties with shipping, customs, import duties and so forth could be identified on the smaller and simpler procurement package.

To date the project is strictly adhering to the budgets set out in the planning documents. There are strong financial controls in place, as all expenditures are undertaken by the UNDP IRH and by the UNDP Country Offices.

Almost all procured materials are of a high quality. There were some issues with the quality of the non-mercury medical devices: The supplied digital thermometers did meet the specifications and it was found that some of the provided sphygmomanometers were inaccurate. These issues were identified by the regional component and the defective items were replaced by the supplier.

Two PIUs remarked that UNDP purchasing procedures through the Country Office are slow and at times a little cumbersome. This is probably a correct observation in some instances, but on the other hand these procedures are designed to ensure the procurement is undertaken in a competent and transparent manner.

### Project Level Monitoring and Evaluation Systems

The project has a well-functioning monitoring and evaluation system. The PIUs use their contact persons within the 24 model facilities, especially the responsible EHOs, to report back whenever assistance or other support is required. All hospital staff the MTR talk to found the support from the PIUs effective and said that it was provided in a timely manner.

Every second week there are conference calls between the Regional Project Team and the four national PIUs where progress and problems are discussed. This allows the Regional Project Team to closely monitor and evaluate each PIU's progress. Each PIU submits a monthly Progress Report. Furthermore, the International Chief Technical Expert makes frequent visits to all four countries, allowing for a close monitoring of the implementation and hence also an early warning when a PIU encounters difficulties. The Regional Project Team has been very proactive in rapidly following up and taking action when possible difficulties were identified.

In turn, the Regional Project Team must submit both Project Implementation Reviews (PIRs) and Project Progress Reports. Furthermore, a Gender Equality and Human Rights Consultant has monitored the project for social, environmental and gender issues.

### External Monitoring and Evaluation

This MTR provides a thorough external and independent review of the project, offering a comprehensive assessment of the performance and progress to date. This is a strength of the GEF-UNDP programme, as these impartial appraisals can be submitted no matter what the findings are. This also applies to other programmes (for example the Belgian Development Agency), but other organisations only expect positive reviews of their projects/ programmes, something that is, in the long-term, very detrimental to the quality of their work.

This project has a sufficient budget to ensure that both the mid-term and final evaluations are thorough and of a good quality. Likewise, the UNDP IRH and the Regional Project Team are clearly intending to carefully consider the recommendations of these reviews.

### Stakeholders Engagement

The project is close to the needs and goals of all stakeholders. The project's objectives are well aligned with the donors' objectives. In each country, the Ministries of Environment wish to meet their obligations under the Stockholm and Minamata Conventions, this project serves to meet these goals, building skills within the Ministries in the process. The engagement is best demonstrated by the fact that all fourteen buildings that were to house the new autoclaves have been completed. The recipient countries were responsible for the supply of these structures, as well as utilities such as a power connection and water supply. That all 14 HCFs were successful in achieving this in a timely manner indicated a very high level of engagement in all four countries.

### Reporting and Communications

As previously indicated, the levels of both reporting and communication are good.

## **4.3 Sustainability**

**Rating: L** (see Annex D for an explanation)

The regulatory and policy framework has been developed to strengthen healthcare waste management and for the phase-out of mercury containing products. These instruments are already largely in place and all components are likely to be adopted. The training of healthcare professionals, especially EHOs and nurses, is well on the way to being strengthened in Schools of Hygiene and other teaching institutions in the four countries. This will greatly improve the HCWM skills of the future medical professionals, which in turn will support the future operation and expansion of the HCWM systems.

#### Financial risks to sustainability

The Project Document also focusses on income generation to help support the cost of operating the HCWM systems. Two revenue streams are foreseen: the sale of recyclables and for cluster facilities, other HCFs paying to have their waste treated in the autoclaves. These revenues will obviously help, but the revenue is likely to only cover a modest percentage of the expenses.

Prior to the project, only Ghana and Tanzania had made efforts to implement HCWM systems. Following the increased awareness at the decision-making level due to the project, proper HCWM is now a high priority with the MoHs and the Ministries are evidently keen to continue and expend their HCWM programmes. Hence, the four countries have a strong ownership of the systems, these are something that the countries wished for and that filled a gap in their healthcare system.

It seems very likely that the Ministries of Health and the HCF managements will allocate sufficient resources for the continued operation of the 24 model facilities. All countries also expressed plans to implement HCWM systems in more healthcare facilities. Therefore, all the necessary structures are in place for long-term sustainable solution and the recipient countries have a strong ownership of the HCWM systems.

#### Socio-economic risks to sustainability

As already mentioned in this report, the principal socioeconomic risk factor is for the remote rural health posts. These operate on a very limited budget and could well face difficulties in keeping their HCWM system operational, as there may be insufficient funds to pay for bin liners, transport of the collected HCW to a treatment centre and so forth.

#### Institutional framework and governance risks to sustainability

There are no institutional framework and governance risks to the sustainability of the project. In all four countries the health sector has a strong institutional framework and good governance. Considering the number of highly skilled professionals working in these facilities, operating a highly desired HCWM system will not be an issue.

#### Environmental risks to sustainability

There are no direct risks to sustainability. Although the HCFs are unwilling to place sterilised waste in a landfill without altering its physical form, there are no environmental or regulatory clauses that prevent this. So once the physical form for the treated HCW is physically altered to the satisfaction of the autoclave operators, the waste can be reliably disposed of.

The project collects mercury containing medical devices and places these in temporary storages. Long-term this waste will have to be disposed of as a hazardous waste. Although this future disposal does not pose a sustainability risk to the project, it will have to be addressed and resolved at some stage by the national governments.

All countries are on track to become nations where all HCFs are mercury free within a few years.

## 5 Conclusions and Recommendations

### 5.1 Conclusions

The MTR has found this to be a well-managed and successful project. The project can be judged as follows:

**Progress toward results** - The project is on schedule and set to complete its objectives. As will be seen in section 5.2, some small adjustments are required and in the case of some countries, it may be advisable to reinforce the existing system and provide HCWM systems to facilities that can have their waste treated in the already established autoclaves. Where autoclaves are installed during the second phase of the project, there will be a certain risk that all activities cannot be completed prior to the project's completion date.

**Relevance** – The project objective is reducing UPOPs and mercury releases from the health sector, which directly links it to the Stockholm and Minamata Conventions. All four countries are signatories of these conventions and keen to fulfil their obligations under these treaties. The project directly contributes to the execution of the four National Implementation Plan on POPs by reducing the release of dioxins and furans. For mercury the same applies for three of the countries, the exception is Tanzania which has not yet ratified the Minamata Convention.

The project is also well aligned with the GEF strategy for chemicals, where the programme has focussed on persistent organic pollutants and ozone layer depletion for many years. Two newer focal areas are sound management of chemicals and the phase-out of mercury.

Finally, the Ministries of Health in all four countries place a high priority on HCWM, so all the support with policies, regulations, awareness raising, training, model facilities and so forth has been well received. Other than reducing UPOPs and mercury releases from the health sector, the health authorities also see a substantial benefit from the project in the form of a decrease in nosocomial infections.

**Effectiveness** – The original Project Document was comprehensive and well thought out. There have been no changes to the original outcomes or objectives. One can commend all stakeholders on their close and productive collaboration.

**Efficiency** – The project has been well managed and financially effective. As repeatedly mentioned, the implementation of HCWM in hospitals gives “a big bang for the buck” due to the decrease in hospital acquired infections. There are two areas where the expenditures may not be 100% efficient (see section 5.2 Recommendations): Firstly, proving HCWM systems to health posts seem offers an insoluble waste disposal problem. They are too small to have their own autoclave and the cost of transporting the tiny quantities of HCW generated to a treatment facility are disproportionally high. Secondly, thought should be

given to fully utilising the treatment capacity of the autoclaves. Hence, it does not seem logical to establish treatment facilities in close proximity to each other, where neither facility makes full use of its treatment capacity. To the extent possible, the facilities with autoclaves should be cluster facilities and help ensure that waste from neighbouring hospitals and clinics also receives appropriate treatment.

**Sustainability** - As stated in section 4.3, all necessary structures are in place for long-term sustainable solution and the countries are eager to expand their HCWM systems.

The financially largest part of the project is the establishment of HCWM systems in large hospitals, these efforts have a very high probability of being effective and sustainable. In these facilities the awareness is (or will soon be) high and the management understands the importance of good HCWM practices for the safety of patients, staff and visitors. For the smaller and more remote HCFs, especially health posts, the HCWM system may be sustainable. Unfortunately, it is unlikely that the collected infectious waste can be autoclaved due to the high transportation costs, so these facilities will still not meet the project's goals of reducing UPOPs emissions, even if their HCWM system is sustainable. For the mercury-free objective, these small and more remote HCFs will meet the project's goals in a sustainable manner.

The project's impact with regards to **gender** and the **poor** should also be briefly discussed. Those most directly involved with HCWM in HCFs are generally nurses and women. When the management of infectious waste is improved, this not only improves their working conditions and safety, it also empowers them with the control of a system that is very important to the good performance of their facility.

Generally, people with a good income will tend to use well management hospitals where the hygiene and risk of nosocomial infections is relatively low. Poor city dwellers and populations in rural areas are frequently forced to use lower standard facilities. This project has a large component in teaching hospitals and it has also improved the curriculum for EHOs and (in some cases) nurses, this means that the next generation of healthcare professionals will have a greatly improved knowledge of hygiene and HCWM. These professionals will start the careers throughout their home countries and it can be expected that their efforts will ensure that the hygienic standards are raised throughout their nations.

For the second phase of this project, it is important that the national PIUs work to ensure that the HCWM systems work properly in all 24 model facilities. Some facilities still require additional training. Still, it is recommended that all facilities be monitored, as there could be a decline even at the best functioning model facilities.

## **5.2 Recommendations**

As previously described, this is a sound project that is likely to meet all the objectives set out in the Project Document. To ensure that the project goals are met, the MTR does have some recommendations for the second phase of the project. These recommendations are given here, starting with suggestions for the Regional Project Team, then general recommendations for the national PIUs and finally advice directed at specific country PIUs.

### Regional Project Team

The following are measures that should be taken by the Regional Project Team:

1. The placement of sterilised waste on a dumpsite or landfill, without any change of physical form is clearly a concern in all project countries. These concerns are discussed in section 0 and at present this issue greatly hampers the project's ability to meet its goals. To fully utilise the autoclaves, it is clear that the sterilised waste must be shredded or otherwise altered prior to landfilling. The Regional Project Team is already aware of this and shredders are included in the new *Catalogue of HCWM Equipment*, so that the countries will receive shredder during the second project phase.  
In some countries, there are several autoclaving facilities within one city, this especially applies to Tanzania where all the treated waste comes from hospitals in the greater Dar Es Salaam area. It should be examined whether one shredder <sup>39</sup> (or compactor, as is preferred by Tanzania) could be installed at either the landfill or a central location, and handle all the sterilised waste. There could be considerable savings by not installing compaction/ shredding equipment at each hospital.
2. The Project Document states that “an additional 12 rural health posts are to be supported during the second phase of the project.” It is strongly recommended that the project focusses on larger hospitals in the second phase. Rural health posts may be able to properly segregate and handle their infectious waste, but the quantities of waste they generate is small and the costs of bringing this waste to an autoclave facility are prohibitive. Hence, it is at present unrealistic to expect that HCW collected in rural health posts can be transported to an autoclave, as the financial means are simply not there (and as the facilities have far more pressing problems).
3. There are clearly issues with the availability of a local service technicians from TTM. During the MTR visits, this was an issue in Ghana, Madagascar and Tanzania. The service technicians must be available for autoclave maintenance and repair, and should be readily available. The autoclave at the CHRD Manjakandriana should have been started up in mid-August, but as the TTM local service technician quit his job, this machine had still not been connected in October 2018. It is essential that this issue is resolved with the TTM main office.
4. The Project Document recommends to “Increase composting activities, which will significantly reduce the volume of the waste that needs to be transported to the landfill/dump site. Organic waste makes up the majority of HCF waste. By developing composting activities on the premises, HCFs could reduce waste collection rates charged by the municipal service providers, while generating some additional income through the sale of compost.” This advice should be disregarded. While it is environmentally sound guidance to collect and treat organic waste, this activity, like other forms of waste treatment, costs money and it is very unlikely that the compost can be sold. Therefore, the Regional Project Team should only encourage the on-site composting of garden waste (not food waste) for use within the hospitals' green areas.

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<sup>39</sup> Or two, so that there is always a shredder available, for example during maintenance or breakdowns.

At least one project country (Madagascar) is initiating the collection of organic waste. The collected organic waste can be composted on-site in a pile that is turned at least once a week and the product can be used within the facility's green areas. It seems unlikely that large amounts of organic waste will be collected and hence have to be treated.

### National PIUs

The following are the recommendations for a Phase 2 of the project for all countries:

1. The Project Document expects the introduction of non-incineration and mercury-free technologies at more HCFs during the second phase of the project. It is recommended to consider the installation of more autoclaves very carefully, as the project's completion date is in April 2020. This leaves little time of the time consuming and complex issue of establishing structures to house the new autoclaves. So, if the PIU decides to purchase one or more autoclaves, very great care must be taken in selecting the receiving HCFs, so that it is certain that all necessary resources are available to rapidly establish a building for the new autoclaves.
2. In planning the second phase of the project, it is important that measures are taken to ensure that the treatment capacities of the installed (and any future) autoclaves are fully utilised. These autoclaves can complete six treatment cycles in an eight-hour working day. This means that several treatment facilities should not be placed within one city, unless there is sufficient waste to keep all the autoclaves busy. Some of the already installed autoclaves can be expected to operate at well below capacity, i.e. their waste treatment capacity is far greater than the quantity of waste generated by their host facility. To utilise this excess capacity, the PIU should work toward ensuring that all surrounding HCFs send their infectious waste to the hospitals equipped with treatment systems. Here the project can help these new model facilities with training, equipment, workshops and other actions to bring about a collaboration between the HCFs within each project region.
3. The project must ensure that the non-incineration and mercury-free technologies introduced under Phase 1 of the project become or remain (as applicable) sustainable in the long-term through periodic follow-up visits.

### Madagascar

The following are the recommendations for a Phase 2 of the project in Madagascar:

- It is essential that the solar panel system at the CHR D Manjakandriana provides enough power to compensate for the consumption of the autoclave. A meter shall be installed and the PIU shall regularly check if the electricity produced is sufficient to compensate the electricity consumed by the autoclave.
- The instructional posters for hospitals and clinics on how to properly manage HCW should be updated, so that they reflect the existing system.

### Tanzania

The following are the recommendations for a Phase 2 of the project in Tanzania:

1. Currently the source separation in most of the project hospitals is poor. It is paramount that the waste is correctly separated for the installed waste management

system to work. This will require engagement with the hospital's top management and an endeavour to ensure that staff at all levels are aware of the benefits of proper HCWM. Hereafter, the training will have to be repeated and it should target a broader group of staff, so that doctors, nurses and EHOs all work together to make the system work. The difficulties currently experienced, for example at the Muhimbili National Hospital (see section 0), are most likely due to insufficient awareness amongst the senior staff. Hence the EHOs (and nurses) are not supported in the waste separation by doctors, and the management may be reluctant to provide the necessary materials (e. g. bin liners, protective equipment) and other support (e.g. training) to ensure that all HCW is managed properly.

2. The Muhimbili hospital stated that given the manner in which their waste is sorted at the moment, it is unsuited for autoclaving due to liquids and needles. This explanation makes it urgent to re-evaluate the waste sorting at the facility, so that the infectious waste can be autoclaved.
3. To date little progress has been made in establishing a national training programme for HCWM, it is suggested that a determined effort be made to incorporate HCWM in the curriculum of Tanzania's five schools of hygiene, so that all future Environmental Health Officers receive instruction. The best approach is probably to set up a working group with the key stakeholders (Ministry of Health, MUHAS, schools of hygiene, the PIU, WHO, etc.) to develop a curriculum covering HCW for these five schools. The working group should develop the teaching materials, organise a training of teachers in the material (e.g. a one-week course for all lecturers who are to teach HCWM). Ideally, a shorter course, say 3 or 5 days, for existing Environmental Health Officers should also be developed and taught, so that EHOs who have already graduated also receive training. Longer-term, outside the scope of this project, Tanzania should also put into effect modules teaching HCWM in the curriculum for nurses and medical doctors.

### Zambia

The following are the recommendations for a Phase 2 of the project in Zambia:

1. The HCWM system at the UTH must be fully implemented and made functional. It is essential that the country's premier teaching hospital has a well-functioning HCWM system. See recommendation no. 1 for Tanzania for suggestions as to how this issue is best addressed.
2. The recycling company Waste Master (Z) is a perfect opportunity to easily recover recyclable materials from hospitals in Lusaka. Efforts are starting at the UHT, for the Chilenje and Matero Level 1 Hospitals matters are still at the discussion stage. The PIU should encourage and facilitate the process, so that plastic, paper and cardboard are recovered at these three hospitals.

### **Lessons Learnt and Exit Strategy**

The project strategy is clearly well suited to the needs and goals of all stakeholders. The project's objectives are well aligned with the donors' objectives. In country, the Ministries of Environment wish to meet their obligations under the Stockholm and Minamata Conventions, this project serves to meet this goal, building skills within the Ministries in the process. In all four countries, the Ministries of Health's aspiration to improve HCWM within their hospitals have been accelerated by this project. Hence, the constellation of

stakeholders and the project's objectives are well matched and could be replicated elsewhere with equal success.

There are obvious economies of scale through the regional implementation. Procurement becomes more efficient, as equipment can be purchased in bulk. The resources required to develop training materials and to conduct training are similar, no matter if one or five countries are involved. Furthermore, the exchange of experiences between the recipient countries has a positive impact.

Sterilised waste cannot be directly landfilled in some countries, when this is the case, the physical form of the waste can be changed through shredding. This is not a recommended step (see section 4.2), as it increases the overall HCW management costs. Other solutions, such as a fenced off area for HCW at the landfill or burying the waste at the landfill are alternatives. It is clear from the experience of this project that the disposal of the sterilised waste must be carefully considered during such a project's inception phase.

For small remote HCFs, there is no easy solution to ensure that collected infectious waste is sterilised, due to the high costs of transportation. Therefore, the priority of implementing non-incineration HCWM systems should be as follows:

1. Teaching hospitals are the best place to start. Firstly, they have the most skilled professionals and hence these are the facilities where it is easiest to implement a successful system. Secondly, these are the locations where medical professionals are trained. So, if the future doctors, nurses and EHOs are trained in hospitals with a well-functioning HCWM system, they will have a better understanding of the importance of good hygiene and be able to bring this knowledge to their future work places.
2. Large hospitals.
3. Smaller facilities where it is generally a greater challenge to implement HCWM systems, as these facilities have less skilled staff, frequently lack resources and often have a hectic environment, as the number of patients greatly exceeds the handling capacity.

So future projects should focus on teaching hospitals and other larger hospitals to the extent possible. This is where there is the greatest return on the investment in the form of a well-functioning HCWM system.

Finally, when planning the installation of autoclaves (or other non-incineration treatment technology), it is paramount to consider the treatment capacity of the equipment. It is essential that the autoclave capacity is used to the extent possible. This means that a hospital with an autoclave should also treat waste from other health facilities (cluster treatment). This also means that facilities located close to one another should not all be equipped with autoclaves. Hence, cluster or central treatment is to be prioritised, as this offers an economy of scale (obviously taking into account transport costs).

During the second phase of this project, the first priority must be to ensure sustainability in the already established 24 model facilities. For the 14 facilities that were equipped with autoclaves, efforts should be made to maximise the amount of waste treated. Hence to make sure that the capacity of the already installed autoclaves is used fully, and the national PIUs could target hospitals close to these autoclaves as model facilities for Phase

2, so that more waste is conveyed to the existing treatment facilities. This also means that new autoclaves should not be established close to existing treatment systems that are working below capacity.

Through its stakeholders, such as UNDP, WHO and HCWH, the project has excellent access to regional training courses, workshops and conferences. These are excellent opportunities both for learning and also to disseminate experiences and lessons learnt. The project has already joined many international events and it is recommended that the project participants continue the dissemination of the project's results during the second phase.

# Annex A: Terms of Reference

## Terms of Reference International Consultant: Midterm Review of UNDP-GEF Project (Updated 14 August 2018)

<b>Type of Contract:</b>	Individual Contract
<b>Languages Required:</b>	English
<b>Duration:</b>	Estimated August 2018-February 2019 (app. 55 working days over 7 months)
<b>Location:</b>	Home based with missions
<b>Application Deadline:</b>	29-March-2018

### 1. Background

In accordance with UNDP and GEF Monitoring & Evaluation policies and procedures, all full and medium-sized UNDP-supported GEF-financed projects are required to initiate a midterm review (MTR) process before the submission of the second Project Implementation Report (PIR). These terms of reference (TOR) sets out the expectations for this MTR of the full-sized project titled *“Reducing UPOPs and Mercury Releases from the Health Sector in Africa.”* The overall objective of this full-size project, implemented by UNDP Istanbul Regional Hub (IRH) in partnership with WHO and the NGO Health Care Without Harm (HCWH), is to implement best environmental practices and introduce non-incineration healthcare waste treatment technologies and mercury-free medical devices in four Sub-Saharan African countries (Ghana, Madagascar, Tanzania and Zambia) to reduce harmful releases from the health sector.

The project promotes best practices and techniques for healthcare waste management (HCWM) with the aim of minimizing or eliminating releases of Persistent Organic Pollutants (POPs) to help countries meet their obligations under the Stockholm Convention on POPs. The project also supports these countries in phasing down the use of Mercury-containing medical devices and products, while improving practices for Mercury-containing wastes with the objective to reduce releases of Mercury in support of countries’ future obligations under the Minamata Convention. Finally, because the project improves healthcare waste management systems (e.g. through improved classification, segregation, storage, transport and disposal) the project also contributes to the reduction of the spread of infections both at healthcare facility level as well as in places where healthcare waste is being handled.

The project document has been designed to address the following components (regional and national):

- Activity 1. Disseminate technical guidelines, establish mid-term evaluation criteria and technology allocation formula, and build teams of national experts on BAT/BEP at the regional level (Regional component - implemented by UNDP Istanbul Regional Hub and national component);
- Activity 2. Health Care Waste National plans, implementation strategies, and national policies in each recipient country (National component);

- Activity 3a. Make available in the region affordable non-incineration HCWM systems and mercury-free devices that conform to BAT and international standards (Regional component);
- Activity 3b. Demonstrate HCWM systems, recycling, mercury waste management and mercury reduction at the model facilities, and establish national training infrastructures (National component);
- Activity 4a. Evaluate the capacities of each recipient country to absorb additional non-incineration HCWM systems and mercury-free devices and distribute technologies based on the evaluation results and allocation formula (Regional component);
- Activity 4b. Expand HCWM systems and the phase-out of mercury in the recipient countries and disseminate results in the Africa region (National component and regional component).

## **2. Description of Responsibilities**

The objectives of the MTR are to assess progress towards the achievement of the project objectives and outcomes as specified in the Project Document, and assess early signs of project success or failure with the goal of identifying the necessary changes to be made in order to set the project on-track to achieve its intended results. The MTR will also review the project's strategy, its risks to sustainability.

The MTR consultant will first conduct a document review of project documents (i.e. PIF, Project Document, ESSP, Project Inception Report, PIRs, Finalized GEF focal area Tracking Tools, Financial and Administration guidelines used by Project Team, project operational guidelines, manuals and systems, etc.) provided by the Project Team. The MTR mission will then consist of interviews and visits to UNDP Istanbul Regional Hub and project sites in Ghana, Madagascar, Tanzania and Zambia.

The MTR consultant will assess the four categories of project progress and produce a draft and final MTR report. See the Guidance for Conducting Midterm Reviews of UNDP-Supported, GEF-Financed Projects for these categories and requirements on ratings.

([http://web.undp.org/evaluation/documents/guidance/GEF/mid-term/Guidance\\_Midterm%20Review%20 EN 2014.pdf](http://web.undp.org/evaluation/documents/guidance/GEF/mid-term/Guidance_Midterm%20Review%20 EN 2014.pdf))

The MTR consultant will include a section in the MTR report setting out the MTR's evidence-based conclusions, in light of the findings. The MTR consultant will also rate the countries' and pilot facilities' progress based on the criteria (approved by the project board) to decide on which countries would be able to accept additional non-incineration HCWM systems and mercury-free devices during the second procurement round of the project. Additionally, the MTR consultant is expected to make recommendations to the Project Team. Recommendations should be succinct suggestions for critical intervention that are specific, measurable, achievable, and relevant. A recommendation table should be put in the report's executive summary. The MTR consultant should make no more than 15 recommendations total.

### **Duration**

The Contract will enter into effect upon signature by both parties, expected for 7 (seven) months of duration. The international consultant is expected to start in August 2018.

### **Travel requirements**

The evaluator is expected to conduct field missions, 3 days to Istanbul-Turkey and 5 days each, to Accra-Ghana, Antananarivo-Madagascar, Dar es Salaam-Tanzania and Lusaka-Zambia as primary locations with additional visits to projects sites as deemed necessary in each country; and 2 days mission (venue/date TBC) to present final MTR report during the regional project meeting in December 2018 or January 2019. Additional travels may be requested by the IRH over the duration of the assignment within the estimated workload (such as annual project meetings, etc.) All missions will be arranged by IRH and will be covered

separately as per UNDP Rules and Regulations; therefore, related travel costs should be excluded from the financial proposal.

#### **Schedule of payments and expected outputs**

The total number of days of work is estimated approximately 55 working days. The breakdown corresponds to the expected outputs and schedule of payments as follows:

- 20% of payment upon submission of the MTR inception report and mission travel plan;
  - Inception report: Evaluator provides clarifications on timing, method and mission plan of the evaluation (approx. 4 working days; due date –31 August 2018)
- 30% of payment upon submission of evaluation mission reports;
  - Completion of evaluation missions and submission of mission reports: 3 days mission to Istanbul-Turkey; 5 days missions to each of Ghana, Madagascar, Tanzania and Zambia; and 5 days for mission reports (approx. 28 working days; due date –30 November 2018)
- 50% of payment upon approval of the final MTR report and presentation of the MTR report;
  - Draft final report: Full report with annexes (approx. 18 working days; due date – 31 December 2018);
  - Final report: Revised report after comments/feedbacks (approx. 2 working days; due date – 31 January 2019);
  - Presentation: 2 days mission (venue/date TBC) to present final MTR report during the regional project meeting (approx. 3 working days; due date – 28 February 2019)

### **3. Competencies**

#### **Corporate competencies:**

- Demonstrates integrity by modeling the UN's values and ethical standards;
- Promotes the vision, mission, and strategic goals of UNDP;
- Displays cultural, gender, religion, race, nationality and age sensitivity and adaptability;
- Treats all people fairly without favoritism;
- Fulfills all obligations to gender sensitivity and zero tolerance for sexual harassment.

#### **Functional competencies:**

- Ability to analyze policy documents and make constructive policy suggestions;
- Strong interpersonal skills, communication and diplomatic skills, ability to work in a team;
- Capacity building skills and flexibility depending on the public;
- Demonstration of commitment to the Project's mission, vision and values;
- Good writing and reporting skills;
- Good presentation skills;
- Ability to work under pressure and stressful situations, and to meet tight deadlines.

### **4. Qualifications**

#### **Education:**

- Minimum Master's degree in Environmental Engineering, Public Health or a closely related field is required;

**Experience:**

- At least 5 years' relevant experience in health-care waste management;
- Previous experience with results-based management evaluations;
- Previous experience in gender sensitive evaluation and analysis is an asset;
- Previous work experience in non-incineration medical waste treatment technologies is an asset;
- Previous work experience in mercury elimination in health sector is an asset;
- Work experience with the requirements of the Stockholm Convention on POPs, Minamata Convention on Mercury and Best Available Techniques/Best Environmental Practices guidelines is an asset;
- Previous experience in environmental health, infection control and prevention, and health delivery systems is an asset;
- Experience working with the UN and GEF is an asset.
- Relevant work experience in Africa is an asset;

**Languages:**

- Excellent writing and oral communication skills in English;
- Proficiency in written and spoken French is an asset.

**Consultant Independence:**

- The consultant cannot have participated in the project preparation, formulation, and/or implementation (including the writing of the Project Document) and should not have a conflict of interest with project's related activities.

**5. Evaluation of Applicants**

Individual consultants will be evaluated based on a cumulative analysis taking into consideration the combination of the applicants' qualifications and financial proposal. The award of the contract should be made to the individual consultant whose offer has been evaluated and determined as:

- 1) Responsive/ compliant/acceptable;
- 2) Having received the highest score out of a pre-determined set of weighted technical (P11 desk reviews) and financial criteria specific to the solicitation.

Only the highest ranked candidates who would be found qualified for the job will be considered for the Financial Evaluation.

Technical Criteria - 70% of total evaluation – max. 70 points:

Criteria A	Educational background – max points: 5;
Criteria B	Relevant experience in health-care waste management (preferably with non-incineration treatment technologies and mercury elimination in health sector) – max points: 20;
Criteria C	Relevant experience with results-based management evaluations and gender sensitive evaluations – max points: 20;
Criteria D	Experience with Stockholm Convention (on POPs), Minamata Convention (on Mercury) and Best Available Techniques/Best Environmental Practices guidelines – max points: 5;
Criteria E	Relevant experience in environmental health, infection control and prevention, and health delivery systems – max points: 5;
Criteria F	Relevant experience working with the UN and GEF – max points: 5;

- Criteria G Relevant work experience in Africa – max points: 7;  
Criteria H Proficiency in French – max points: 3.

Financial Criteria - 30% of total evaluation – max. 30 points.

## 6. Application procedures

Qualified candidates are requested to apply online via this website. The application should contain:

- **Cover letter** explaining why you are the most suitable candidate for the advertised position. Please paste the letter into the "Resume and Motivation" section of the electronic application.
- **Filled P11** form including past experience in similar projects and contact details of referees (blank form can be downloaded from [http://www.eurasia.undp.org/content/dam/rbec/docs/P11\\_modified\\_for\\_SCs\\_and\\_ICs.doc](http://www.eurasia.undp.org/content/dam/rbec/docs/P11_modified_for_SCs_and_ICs.doc)); please upload the P11 instead of your CV.
- **Financial Proposal\*** - Total lump sum amount in USD for tasks specified in this announcement. Mission related costs must **NOT** be included in the price offer as they will be covered separately as per UNDP rules and regulations.
- **Incomplete applications will not be considered. Please make sure you have provided all requested materials. Please combine all your documents into one (1) single PDF document as the system only allows to upload maximum one document.**

*\* Please note that the financial proposal is all-inclusive and shall take into account various expenses incurred by the consultant/contractor during the contract period (e.g. fee, health insurance, vaccination, personal security needs and any other relevant expenses related to the performance of services...).*

**Payments** will be made only upon confirmation of UNDP on delivering on the contract obligations in a satisfactory manner.

*Individual Consultants are responsible for ensuring they have **vaccinations**/inoculations when travelling to certain countries, as designated by the UN Medical Director. Consultants are also required to comply with the UN **security directives** set forth under [dss.un.org](http://dss.un.org)*

*General Terms and conditions as well as other related documents can be found under: <http://on.undp.org/t7fJs>.*

*Qualified women and members of minorities are encouraged to apply.*

*Due to large number of applications we receive, we are able to inform only the successful candidates about the outcome or status of the selection process.*

## Annex B: MTR Evaluative Matrix

Evaluative Questions	Indicators	Sources	Methodology
<b>Project Strategy: To what extent is the project strategy relevant to country priorities, country ownership, and the best route toward expected results?</b>			
Does the project objective fit within the national priorities?	Level of coherence between project objective and national policy priorities and strategies as stated in official document, as well as stated priorities of the healthcare facilities	National healthcare waste management policies and laws. State of signing and ratification of relevant international conventions (Minamata and Stockholm). Relevant regional and local planning documents Discussions with stakeholders at national, regional and local level.	Field visit interviews Desk reviews
Did the project concept originate from local or national stakeholders, and/or were relevant stakeholders sufficiently involved in project development?	Level of involvement of HCF and national stakeholders in project, origination and development as indicated through the number of planning meetings, inclusiveness of all stakeholders and the level of incorporation of stakeholder feedback in the project planning	Project documents Minutes of meeting Project staff Local and national stakeholders	Field visit interviews Desk reviews
Does the project design and project strategy seem adequate for the achievement of the declared objective?	HCWM system in place Collected HCW treated and safely disposed of. Mercury containing medical criteria Is the project designed in a way that the route towards achievement of the expected results is evident? Are the project interventions planned to contribute to the achievement of the overall objectives?	HCF HCWM systems Autoclaving Systems Mercury storage units Project documentation.	Site visits Interviews with recipients Interviews with key stakeholders Desk review of documents

## Annex C: Questions to be used in interviews

1. What is your role/relationship with the project?
2. What are the main achievements of the project?
3. So you have any recommendations as to what could have been done better or more efficiently?
4. Would there be reasons to prolong the project? If yes, why and what activities should be undertaken?
5. What steps have been taken to ensure replication of the concept?
6. Who pays for the operation of the new systems? Who supplies equipment, spare parts, transport and so forth?
7. Who is responsible for ensuring that the systems work?
8. Was staff trained? If yes, who, where and how?
9. Do you have standard operating procedures, record of quantities treated, instructive posters on the walls (for source separation), etc.?
10. Is the system cost effectiveness?
11. Please provide all information on co-finance to date, including both cash and in-kind expenditure and a summary of the items on which the co-finance has been spent.
12. What are you doing to ensure sustainability of the project's processes and impacts?
13. Do you think that the system(s) are sustainable?
14. Budget for consumables for next year?
15. Are the autoclaves equipped with electricity meters?
16. Who are the partners (i.e., people actively working to the same goals) on the project?
17. Who would you say *owns* the project?
18. Who are the stakeholders in the project (i.e., people that are involved in the project, either actively or passively or will be affected by the project in some way)?
19. Who are the main beneficiaries?
20. Have there been sufficient meeting and other communication regarding the project?
21. Has experience been exchanged with the other three project countries? If yes, please provide details.
22. Did the project listen to your advice/ concerns/ requests for information?
23. Who prepares the TOR for all contracting?
24. Who signs the contracts?
25. Is the project having any unexpected positive or negative impacts?
26. How has it been working with a UNDP-GEF project?
27. What are the strengths and weaknesses of the Project Document?
28. Who are the project's champions?

29. Standard issues:

- Project Management
- Procurement rules and efficiencies
- UNDP training/support
- Financial audits
- Backing up data and digital information
- Team functionality
- Staff turn over
- If training is provided, how is training is now being used in job?
- Gender issues?
- Need to provide all information, including equipment, inputs, infrastructure, tracking tool data.
- Reasons or any delays in the project implementation.

30. How is the project aligned to the Ministry of Health's policies?

31. How is the project aligned to the Ministry of Environment policies?

32. How is the project aligned to the UNDP and GEF goals?

33. The project has worked to train people and raise awareness? Who were the target groups?  
How is the project monitoring the outcome of their efforts?

34. How has any changes in attitude and awareness affected project implementation, and how is it being used in the daily, professional lives of the target groups?

## Annex D: Ratings Scales

### Ratings for Progress Towards Results:

<b>Highly Satisfactory (HS)</b>	The objective/outcome is expected to achieve or exceed all its end-of-project targets, without major shortcomings. The progress towards the objective/outcome can be presented as “good practice”.
<b>Satisfactory (S)</b>	The objective/outcome is expected to achieve most of its end-of-project targets, with only minor shortcomings.
<b>Moderately Satisfactory (MS)</b>	The objective/outcome is expected to achieve most of its end-of-project targets but with significant shortcomings.
<b>Moderately Unsatisfactory (MU)</b>	The objective/outcome is expected to achieve its end-of-project targets with major shortcomings.
<b>Unsatisfactory (U)</b>	The objective/outcome is expected not to achieve most of its end-of-project targets.
<b>Highly Unsatisfactory (HU)</b>	The objective/outcome has failed to achieve its midterm targets, and is not expected to achieve any of its end-of-project targets.

### Ratings for Project Implementation & Adaptive Management:

<b>Highly Satisfactory (HS)</b>	Implementation of all seven components – management arrangements, work planning, finance and co-finance, project-level monitoring and evaluation systems, stakeholder engagement, reporting, and communications – is leading to efficient and effective project implementation and adaptive management. The project can be presented as “good practice”.
<b>Satisfactory (S)</b>	Implementation of most of the seven components is leading to efficient and effective project implementation and adaptive management except for only few that are subject to remedial action.
<b>Moderately Satisfactory (MS)</b>	Implementation of some of the seven components is leading to efficient and effective project implementation and adaptive management, with some components requiring remedial action.
<b>Moderately Unsatisfactory (MU)</b>	Implementation of some of the seven components is not leading to efficient and effective project implementation and adaptive, with most components requiring remedial action.
<b>Unsatisfactory (U)</b>	Implementation of most of the seven components is not leading to efficient and effective project implementation and adaptive management.
<b>Highly Unsatisfactory (HU)</b>	Implementation of none of the seven components is leading to efficient and effective project implementation and adaptive management.

**Ratings for Sustainability:**

<b>Likely (L)</b>	Negligible risks to sustainability, with key outcomes on track to be achieved by the project's closure and expected to continue into the foreseeable future.
<b>Moderately Likely (ML)</b>	Moderate risks, but expectations that at least some outcomes will be sustained due to the progress towards results on outcomes at the Midterm Review
<b>Moderately Unlikely (MU)</b>	The objective/outcome is expected to achieve most of its end-of-project targets but with significant shortcomings.
<b>Unlikely (U)</b>	The objective/outcome is expected to achieve its end-of-project targets with major shortcomings.

## Annex E1: Mission Programme UNDP IRH Istanbul

### MISSION AGENDA

4 - 5 OCTOBER 2018

Date	Activity	Participants	Venue	Remarks/Comments
<b>Thursday, October 4, 2018</b>				
9:00 – 12:00	Meeting with the GEF regional project team	Peder Bisbjerg, <i>MTR Consultant</i> Jan Gerd Kühling, <i>Chief Technical Expert</i> Etienne Gonin, <i>Programme Analyst, MPU Chemicals</i> Selimcan Azizoglu, <i>Project Manager</i> Zuhre Guven, <i>Project Assistant</i>	6 <sup>th</sup> floor, UNDP IRH conference Room	Regional overview
12:30-13:30	Green Bag Lunch	UNDP IRH Team	10 <sup>th</sup> floor, UNDP IRH conference room	Minamata Convention on Mercury
14:00- 17:00	Meeting with the GEF regional project team	Peder Bisbjerg, Jan Gerd Kühling, Etienne Gonin, Selimcan Azizoglu, Zuhre Guven	6 <sup>th</sup> floor, UNDP IRH conference room	Country specific overview
18:00- 20:00	Dinner	Peder Bisbjerg, Jan Gerd Kühling, Etienne Gonin, Selimcan Azizoglu, Zuhre Guven	Mangiamao Cafe & Bistro, Sisli	
<b>Friday, October 5, 2018</b>				
9:00-10:00	Meeting with project team	Peder Bisbjerg, Jan Gerd Kühling, Etienne Gonin, Selimcan Azizoglu, Zuhre Guven	6 <sup>th</sup> floor, TBC	Financial overview of the project components
10:00- 11:00	Meeting with UNDP HDD	Rosemary Kumwenda, <i>HIV, Health and Development Coordinator</i> Peder Bisbjerg, Jan Gerd Kühling, Etienne Gonin, Selimcan Azizoglu, Zuhre Guven	12 <sup>th</sup> floor, TBC	
11:00-11:30	Operations/Procurement	Andrey Pogrebnyak, <i>Operations Advisor</i> Tugce Akpek, <i>Procurement Officer</i> Peder Bisbjerg, Jan Gerd Kühling, Etienne Gonin, Selimcan Azizoglu, Zuhre Guven Selimcan Azizoglu, <i>Project Manager</i>	10 <sup>th</sup> floor, TBC	

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Date	Activity	Participants	Venue	Remarks/Comments
11:30-15:30	Meeting with project team	Bisbjerg Peder, Jan Gerd Kühling, Etienne Gonin, Selimcan Azizoglu, Zuhre Guven	6 <sup>th</sup> floor, UNDP IRH Conference Room	
15.30-16:00	Meeting with UNDP IRH Manager	Gerd Trogemann, <i>UNDP IRH Manager</i> Bisbjerg Peder, Jan Gerd Kühling, Etienne Gonin, Selimcan Azizoglu, Zuhre Guven	12 <sup>th</sup> floor, TBC	
16:30-17:00	Meeting with PSU/ QA Unit	Ekaterina Paniklova, <i>Senior Programme Coordinator</i> Marina Ten, <i>Head of Programme Support Unit</i> Pelin Kihdir, <i>Programme Monitoring Associate</i> Bisbjerg Peder, Etienne Gonin, Selimcan Azizoglu, Zuhre Guven	13 <sup>th</sup> floor, TBC	

## Annex E2: Mission Programme Ghana

### MISSION AGENDA GHANA

8 - 12 OCTOBER 2018

#### Responsible staff from UNDP:

Paolo Dalla Stella, Head, Sustainable Development Cluster, 0302 2215670 Ext. 5629, 0546260994, [paolo.d.stella@undp.org](mailto:paolo.d.stella@undp.org)

Joel Ayim Darkwah, Assistant Programme Officer, 0302 2215670 Ext. 5640, 0247781163, [joel.darkwah@undp.org](mailto:joel.darkwah@undp.org)

Date	Activity	Participants	Venue	Remarks/Comments
<b>Saturday, October 6, 2018</b>				
18.45	Arrival in Ghana	Peder Bisbjerg	Accra Airport	Flight TK 629 from Istanbul landing at 18.45
<b>Monday, October 8, 2018</b>				
9.00 – 10.00	Meeting with project management unit	Abena Dedaa Nakawa, National Project Coordinator Richard Amfo-Otu, Project Technical Advisor Gifty Henrieta Amuah, Project Assistant	PMU office, Liberia Road	Pick-up from hotel at 08:45
10:00 – 11:00	Meeting with UNDP Focal Person	Richard Amfo-Otu, Project Technical Advisor Abena Dedaa Nakawa, National Project Coordinator Joel Ayim Darkwa, Assistant Programme Officer/Project Focal Person	UNDP Ghana Country Office, near Fire Service Headquarters	Project Vehicle to be used
11:00 – 12:00	Meeting with Ministry of Finance	Richard Amfo-Otu, Project Technical Advisor Abena Dedaa Nakawa, National Project Coordinator Collins Kabuga, Economic Analyst		Project Vehicle to be used

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Date	Activity	Participants	Venue	Remarks/Comments
	Meeting with Former Project Director	Richard Amfo-Otu, Project Technical Advisor Abena Dedaa Nakawa, National Project Coordinator Dr. Edith Clarke, Former Project Director		Yet to confirm date and venue
13:00 – 14:00	Meeting with Accra School of Hygiene	Richard Amfo-Otu, Project Technical Advisor Abena Dedaa Nakawa, National Project Coordinator Isaac Dzahene Newton, Chief Health Tutor	Korle Bu, Accra	Project Vehicle to be used
14:00 – 15:00	Meeting with Environmental Protection Agency	Richard Amfo-Otu, Project Technical Advisor Abena Dedaa Nakawa, National Project Coordinator Dr. Sam Adu-Kumi, Director, Chemical Control Management Centre (CCMC)	Victoriaborg, Starlets 91 Rd	Project Vehicle to be used
15:00 – 18:00	Travel to Cape Coast Teaching Hospital	Richard Amfo-Otu, Project Technical Advisor Ernest Dorlah, Project Driver		Project Vehicle to be used
<b>Tuesday, October 9, 2018</b>				
09:30 – 12:30	Meeting with Project Focal Person, Visit treatment site	Richard Amfo-Otu, Project Technical Advisor Nancy Waaley, Project Focal Person	Cape Coast Teaching Hospital, Cape Coast	Project Vehicle to be used
13:00 – 14:00	Meeting with Environmental Protection Agency to view collected mercury storage	Richard Amfo-Otu, Project Technical Advisor Peter Ackon, Principal Programme Officer		
14:00 – 14:45	Travel to Trauma & Specialist Hospital	Richard Amfo-Otu, Project Technical Advisor Ernest Dorlah, Project Driver	Winneba	Project Vehicle to be used

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Date	Activity	Participants	Venue	Remarks/Comments
15:00 – 16:00	Meeting with Project Focal Person	Richard Amfo-Otu, Project Technical Advisor Justice Abakah, Project Focal Person	Winneba	
<b>Wednesday, October 10, 2018</b>				
08:30 – 11:30	Travel to Eastern Regional Hospital	Richard Amfo-Otu, Project Technical Advisor Ernest Dorlah, Project Driver	Koforidua	Project Vehicle to be used
11:30 – 14:30	Meeting with Eastern Regional Hospital, Visit treatment site	Richard Amfo-Otu, Project Technical Advisor Francisca Akorfa Adika- Bensah, Project Focal Person	Koforidua	
14:30 – 16:30	Return to Accra	Richard Amfo-Otu, Project Technical Advisor Ernest Dorlah, Project Driver	Accra	Project Vehicle to be used
<b>Thursday, October 11, 2018</b>				
10:00 – 11:00	Meeting with Environmental Service Providers Association	Abena Nakawa, National Project Coordinator Gifty Henrieta Amuah, Project Assistant Ama Ofori-Antwi, Executive Secretary	East Legon, 7 Papaya Street	Project Vehicle to be used
11:00 – 12:30	Meeting with Zoopak Ghana Limited, tour their facility	Abena Nakawa, National Project Coordinator Gifty Henrieta Amuah, Project Assistant Senam Tengey, Waste Facility Manager Sarah Kyei, General Manager	Teshie SSNIT Greda Estates	Project Vehicle to be used
13:15 – 14:00	Meeting with Environmental Protection Agency	Abena Nakawa, National Project Coordinator Gifty Henrieta Amuah, Project Assistant	Victoriaborg, Starlets 91 Rd	Project Vehicle to be used

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Date	Activity	Participants	Venue	Remarks/Comments
		Lovelace Sarpong, Programme Officer		
14:00 – 15:00	Meeting with Ministry of Health	Abena Nakawa, National Project Coordinator Gifty Henrieta Amuah, Project Assistant Doris Serwaa Gyamfi, Deputy Director, Legal and Administration Alhaji Inusa Yusuf, Legal Department	Starlets 91 Road	Project Vehicle to be used
15:00 – 16:00	Meeting with Former Municipal Directorate, Keta	Abena Nakawa, National Project Coordinator Gifty Henrieta Amuah, Project Assistant Dr. Andrews Ayim, Training Coordinator/Public Health Physician	Ghana College of Physicians & Surgeons Public Faculty, Liberation Circle	Project Vehicle to be used
<b>Friday, October 12, 2018</b>				
10:00 – 11: 00	Meeting with World Health Organization	Abena Nakawa, National Project Coordinator Gifty Henrieta Amuah, Project Assistant Edward Gyepi Garbrah, Programme Officer Akosua Kwakye, Programme Officer	Kofi Annan St, Accra	Project Vehicle to be used
11:00 – 12:00	Meeting with Ministry of Environment, Science Technology and Innovation	Abena Nakawa, National Project Coordinator Gifty Henrieta Amuah, Project Assistant Kwamena Quaison, Deputy Director, Environment/Head, Oil and Gas Unit	Liberia Lake, Accra	Project Vehicle to be used
13:00 – 14:00	Meeting with Ghana Health Service	Abena Nakawa,	Dodoo Lane, Accra	Yet to confirm date and time

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Date	Activity	Participants	Venue	Remarks/Comments
		National Project Coordinator Gifty Henrieta Amuah, Project Assistant Dr. Nicholas Adjabu, Ag. Project Director		
20.45	Departure	Bisbjerg Peder, International Consultant	Accra Airport	Flight KQ 503 departing at 20.45

## Annex E3: Mission Programme Tanzania

### MISSION AGENDA TANZANIA

15 - 19 OCTOBER 2018

#### Responsible staff from UNDP & MOH:

Deogratias Mkembela, Project Manager, UNDP, +255755194544, [deogratias.mkembela@undp.org](mailto:deogratias.mkembela@undp.org)

Bwijo, Practice Specialist, UNDP, [bwijo.bwijo@undp.org](mailto:bwijo.bwijo@undp.org)

Honest Anicetus, Project Director, Ministry of Health, [hanicetus@gmail.com](mailto:hanicetus@gmail.com)

Date	Activity	Participants	Venue	Remarks/Comments
<b>Saturday, October 13, 2018</b>				
08.20	Arrival in Tanzania	Bisbjerg Peder, International Consultant	Dar Es Salaam Airport	Flight KQ 480 from Nairobi landing at 8.20 (morning)
<b>Sunday, October 14, 2018</b>				
	Travel to Dodoma	Peder, Deo & Bwijo	Hotel	Travel to Dodoma
	Meeting with project management unit	Peder, Deo & Bwijo	Hotel	
<b>Monday, October 15, 2018</b>				
9.00am – 04:30pm	Meeting with MOHCDGEC	Asst. Director Environmental Health, Director Preventive Services, Director Curative Services, President's Office, National Environmental Management Council.	MOHCDGEC & President's Office, National Environmental Management Council	Have biodigester & private HCW incinerator
<b>Tuesday, October 16, 2018</b>				
	Travel to Dar es Salaam	Peder, Deo & Bwijo	Dar Es Salaam Airport	
<b>Wednesday, October 17, 2018</b>				
	Courtesy Call UNDP Site Visit: <ul style="list-style-type: none"> <li>Muhimbili Hospital</li> </ul>			

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Date	Activity	Participants	Venue	Remarks/Comments
	<ul style="list-style-type: none"> <li>• Mbagala Hospital</li> </ul>			
<b>Thursday, October 18, 2018</b>				
	Site Visit: <ul style="list-style-type: none"> <li>• Buguruni Hospital</li> <li>• Mwananyamala Hospital</li> </ul>			
<b>Friday, October 19, 2018</b>				
	Site Visit: <ul style="list-style-type: none"> <li>• Sinza Hospital</li> </ul>			
	Exit/ Feedback Meeting with Project Management Unit & UNDP			Meeting set up with UNDP Country Director
<b>Saturday, October 20, 2018</b>				
04.25	Departure	Bisbjerg Peder, International Consultant	Dar Es Salaam Airport	Flight ET 826 departing at 04.25 (night)

## Annex E4: Mission Programme Madagascar

### MISSION AGENDA MADAGASCAR

22 - 26 OCTOBER 2018

#### Responsible staff from UNDP:

Sandrine Andriantsimietry, National Coordinator, 032 23 468 01, [sandrine.andriantsimietry@undp.org](mailto:sandrine.andriantsimietry@undp.org)

Mbolatiana Ratefinjatovo, Project Assistant, 032 23 468 00, [Mbolatiana.ratefinjatovo@undp.org](mailto:Mbolatiana.ratefinjatovo@undp.org)

Manantena Rakotoarivelo, Driver, 032 81 573 68

Date	Activity	Participants	Venue	Remarks/Comments
<b>Saturday, October 20, 2018</b>				
13.40	Arrival in Madagascar	Bisbjerg Peder, International Consultant	Antananarivo Airport	Flight ET 853 from Addis Ababa landing at 13.40
<b>Monday, October 22, 2018</b>				
8.20 – 9.00	Meeting with the UPOPs project team	Bisbjerg Peder Sandrine Andriantsimietry, Mbolatiana Ratefinjatovo, Dr Liliane Randrianomenjanahary- National Director, Ministry of Environment (MOE) Dr Hanta Ravaosendrasoa- deputy national director, Ministry of Health (MOH)	UPOPs Office Mahamasina	Pick-up from hotel at 8.15 by the driver Manantena with UNDP vehicle 206PE755
9.00- 12.00	Visit CHU-JRA Ampefiloha	Bisbjerg Peder, People to meet: Management team, Focal point Mrs Fanja & Holy, Mr Michaël and technicians team, other relevant persons	CHU-JRA Ampefiloha	Dr Hanta, deputy national director works there and will facilitate the visit, in a office at the hospital, a locked cabinet contains 6 thermometers containing mercury collected from the six model health facilities

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Date	Activity	Participants	Venue	Remarks/Comments
15.00- 16.00	Visit to CHU-MET Tsaralalàna	Bisbjerg Peder People to meet: Management, Focal point Dr Hanta Ratsitohaina, Dr Lalaina	CHU-MET Tsaralalàna	Pick-up at Hôtel La Ribaudière at 14:30pm
<b>Tuesday, October 23, 2018</b>				
9.30	Courtesy visit UNDP Office	Bisbjerg Peder, Sandrine Andriantsimetry UNDP Office- People to meet: DRRP (confirmed), team leader, specialist environment	UNDP CO Andraharo	Pick-up at 8.20
10.45- 12.00	Visit CHU-JRB Befelatanana	Bisbjerg Peder People to meet: Management team, Focal point Mrs Noëline& Clairette, Mr Nary& Joella and technicians' team, other relevant persons	CHU-JRB Befelatanana	Mahamasina to Andraharo: expected more than hour due to traffic
14.00-15.30	Visit to SENV MOH	Bisbjerg Peder People to meet: Mr Tata Venance Head of Environment Health- Service Santé Environnement SENV & team	SENV Office Tsaralalàna	SENV (DPS) leads the national technical working group (TWG), in charge of the national in-service training in best environmental practices in HCWM, supports the model hospitals in environmental friendly practices in health care waste management
<b>Wednesday, October 24, 2018</b>				
7.30-9.00	Travel Antananarivo- Manjakandriana	Bisbjerg Peder Manantena driver		Antananarivo to Manjakandriana: 1h30min
9.00-9.20	Visit to Head of Manjakandriana Health District	Bisbjerg Peder Dr Andriamahazo Marie Josée- Médecin Inspecteur/Chef de Service de District sanitaire Manjakandriana	SDSP Manjakandriana office	
9.20-9.35	Visit CSB2 Manjakandriana	Bisbjerg Peder People to meet: Dr Andriamahazo Marie Josée - Médecin Inspecteur/Chef de Service de District sanitaire, Physician and paramedic at CSB2 Manjakandriana	CSB2 Manjakandriana	Due to the mother and child health's week-specific activity in CSB (SSME), the CSB team will be very busy but a brief visit is possible
9.35-11.00	Visit CHRD Manjakandriana	Bisbjerg Peder Dr Andriamahazo Marie Josée – Management- Médecin Chef: Dr Rasoanaivo Elie, Focal points Dr John & Dr Elisoa, other relevant persons	CHRD Manjakandriana	The autoclave of CHRD Manjakandriana is not yet installed by the new local agent representing TTM (due to the change of local

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Date	Activity	Participants	Venue	Remarks/Comments
				agent- the former hired pull out in August) A solar energy is available to support the electricity consumption of the district hospital
11.10-11.25	Visit CSB2 Sambaina Manjakandriana	Bisbjerg Peder Dr Andriamahazo Marie Josée - Médecin Inspecteur/Chef de Service de District sanitaire Physician and paramedic at CSB2 Sambaina Manjakandriana	CSB2 Sambaina Manjakandriana	Due to the mother and child health's week-specific activity in CSB (SSME), the CSB team will be very busy but a brief visit is possible
11.25-14.00	Travel Manjakandriana-Antananarivo			Travel & Meal
14.00-14.40	Meeting with the UPOPs project team	Bisbjerg Peder Sandrine Andriantsimietry, Dr Hanta Ravaosendrasoa- deputy national director, Ministry of Health (MOH)	UPOPs Office Mahamasina	10min Mahamasina to Ambohidahy
15.00-15.30	Courtesy visit MOH	Directeur de cabinet Bisbjerg Peder Dr Hanta Ravaosendrasoa- deputy national director, Ministry of Health (MOH) Sandrine Andriantsimietry, Dr Hanta Ravaosendrasoa	MOH Ambohidahy	
<b>Thursday, October 25, 2018</b>				
8.30-13.30	Meeting with national TWG and M&E committee of the project	Bisbjerg Peder Project staff Members of national TWG, Members of M&E committee	Venue in Antananarivo	Key national stakeholders in TWG, WHO as a technical reference of TWG, NGOs, key private partners, members of M&E committee (the co-financing actors in prodoc)
14.00-14.20	Meeting with WHO	Bisbjerg Peder Mrs Malala Ranarison- HIP WHO	WHO Office Andraharo	If WHO officer cannot attend the meeting with TWG
15.00- 16.00	Visit of Private Institution training of paramedics or Courtesy visit MOH	Please see details above	INSPNMAD Ambatoroka or MOH Ambohidahy	INSPNMAD agreed to be visited on Wednesday or on Thursday pm
<b>Friday, October 26, 2018</b>				

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Date	Activity	Participants	Venue	Remarks/Comments
8.30-12.00	Visit of a recycling company	Bisbjerg Peder, Solofo Raberahona, person in charge of Association Miharisoa	Association Miharisoa Ambohidratrimo	Recycling actor of PET and plastics from the model hospitals
<b>Saturday, October 27, 2018</b>				
15.30	Departure	Bisbjerg Peder, International Consultant	Antananarivo Airport	Flight KQ 257 departing at 15.30

N.B: Visits can be interchanged according to the confirmation of the availability of the people to meet.

## Annex E5: Mission Programme Zambia

### MISSION AGENDA ZAMBIA 29 OCTOBER - 2 NOVEMBER 2018

#### Responsible staff from UNDP:

Brian Nkandu, National Project Manager, +260 97 594 9623, +26096 981 6535, brian.nkandu@undp.org

Mazuba Mwambazi, Project Admin, +260 97 7788 375, mazuba.mwambazi@undp.org

Date	Activity	Participants	Venue	Remarks/Comments
<b>Sunday, October 28, 2018</b>				
00.05 (just after midnight, so almost Saturday!)	Arrival in Zambia	Bisbjerg Peder, International Consultant	Lusaka Airport	Flight KQ 734 from Nairobi landing at 00.05
<b>Monday, October 29, 2018</b>				
9.00 – 10.30	Meeting with project management unit	Brian Nkandu, National Project Manager Chilekwa Mibenge, MoH focal point Tsibu Bbuku, local technical expert Mazuba Mwambazi, project admin Caoimhe Hughes, UNDP focal point	PMU office, MoH	Pick-up from Grand Palace hotel Driver will be assigned for the duration of the mission
10.30 – 11.00	Meeting with Director of DHESD, MoH	Dr Kalabo, Director DHESD Cheleka Mulenga, Deputy Director DHESD Florence Mwale, MoH focal point	Directors office, MoH	
11.00 – 11.30	Tour of mercury storage container	Brian Nkandu, National Project Manager	MoH	

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Date	Activity	Participants	Venue	Remarks/Comments
		Florence Mwale, MoH focal point Tsibu Bbuku, local technical expert		
11.30 – 12.30	Meeting with UNDP	Ms. Mandisa UNDP Country Director, Velice Nangavo, UNDP	UN House	
12.30 – 1.30	Meeting with WHO and MoH on Policy Review	Mr. Kagulura, WHO focal point Chilekwa Christabel Mibenge, MoH	UN Annex / MoH	Mr. Kagulura 0977 105888 Ms. Chilekwa 097 4 261920
1.30 – 2.30	Lunch		Cafeteria UN House or other	
2.30 – 3.30	Meeting with Waste Master	Mr Mukonde, Director Waste Master	UN House	Cell: 0977 546291
4.00 – 5.00	Meeting with training institutions	UNZA, Chainama and Evelyn Hone Brian Nkandu, National Project Manager	UN House	Dr. Nkhama 0955 044601 Mr. Mbewe 0977 453107 Ms. N. Muyunda 096 9 436241
<b>Tuesday, October 30, 2018</b>				
08:30 – 09:30	Meeting with Zambia Environmental Management Agency	Perine Kasonde	ZEMA	Cell: 095 5 887112
10.00 – 1.00	Meeting with participating hospital in Lusaka – UTH <ul style="list-style-type: none"> <li>• Meeting with hospital management</li> <li>• Meeting with EHT team</li> <li>• Observation of waste management and treatment</li> <li>• Mercury elimination and replacement devices</li> <li>• Sharps management</li> <li>• Recycling</li> </ul>	Bisbjerg Peder, International Consultant	UTH	Mr. Musonda 095 3 727235

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Date	Activity	Participants	Venue	Remarks/Comments
1.00 – 2.00	Lunch			
2.00	Travel to Kabwe	Bisbjerg Peder, International Consultant		
<b>Wednesday, November 1, 2018</b>				
9.00 – 9.30	Meet with Central Province Provincial Health Director	Bisbjerg Peder, International Consultant	PHD Office	
9.30 – 10.00	Meet with Provincial Environmental Health Technologist (EHT)	Bisbjerg Peder, International Consultant	Provincial Office	
10.00 – 1.00	Meeting with participating hospital in Central Province – Kabwe General Hospital <ul style="list-style-type: none"> <li>• Meeting with hospital management</li> <li>• Meeting with EHT team</li> <li>• Observation of waste management and treatment</li> <li>• Mercury elimination and replacement devices</li> <li>• Sharps management</li> <li>• Recycling</li> </ul>	Bisbjerg Peder, International Consultant	Kabwe General Hospital	
1.00 – 2.00	Lunch			
2.00 – 3.30	Meet with Central Province recycling company – Solid Tech	Bisbjerg Peder, International Consultant	Solid Tech office	
3.30 – 5.00	Travel to Ndola	Bisbjerg Peder, International Consultant		
<b>Thursday, November 2, 2018</b>				
9.00 – 9.30	Meet with Copperbelt Province Provincial Health Director	Bisbjerg Peder, International Consultant	PHD Office	
9.30 – 10.00	Meet with Provincial EHT	Bisbjerg Peder, International Consultant	Provincial Office	
10.00 – 1.00	Meeting with participating hospital in Copperbelt Province – Ndola Teaching Hospital <ul style="list-style-type: none"> <li>• Meeting with hospital management</li> </ul>	Bisbjerg Peder, International Consultant	NTH	

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Date	Activity	Participants	Venue	Remarks/Comments
	<ul style="list-style-type: none"> <li>• Meeting with EHT team</li> <li>• Observation of waste management and treatment</li> <li>• Mercury elimination and replacement devices</li> <li>• Sharps management</li> </ul>			
1.00 – 2.00	Lunch			
2.00 – 3.30	Travel to Kapiri Mposhi			
3.30 – 5.00	Meeting with participating hospital in Central Province – Kapiri Mposhi District Hospital <ul style="list-style-type: none"> <li>• Meeting with hospital management</li> <li>• Meeting with EHT team</li> <li>• Observation of waste management and treatment</li> <li>• Mercury elimination and replacement devices</li> <li>• Sharps management</li> </ul>	Bisbjerg Peder, International Consultant	Kapiri Mposhi District Hospital	
5.00 – 6.00	Travel to Kabwe			Overnight in Kabwe
<b>Friday, November 2, 2018</b>				
8.00 – 10.00	Travel to Lusaka			
10.00 – 12.00	Meeting with participating hospital in Lusaka – Chilenge Level 1 Hospital <ul style="list-style-type: none"> <li>• Meeting with hospital management</li> <li>• Meeting with EHT team</li> <li>• Observation of waste management and treatment</li> <li>• Mercury elimination and replacement devices</li> <li>• Sharps management</li> <li>• Recycling</li> </ul>	Bisbjerg Peder, International Consultant	Chilenge Level 1 Hospital	
12.00 – 2.00	Time to consolidate information and have lunch	Bisbjerg Peder, International Consultant	UN House	Workspace to be made available

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Date	Activity	Participants	Venue	Remarks/Comments
2.00 – 4.00	Presentation of initial findings	All Project stakeholders UNDP, MoH, WHO, ZEMA, WasteMaster	UN House	
<b>Saturday, November 3, 2018</b>				
13.25	Departure	Bisbjerg Peder, International Consultant	Lusaka Airport	Flight ET 863 departing at 13.25

**Acronyms**

MoH	Ministry of Health
ZEMA	Zambia Environmental Agency
UTH	University Teaching Hospital
KGH	Kabwe General Hospital
NTH	Ndola Teaching Hospital

## **Annex F: List of persons met and site visits**

### **Istanbul, Turkey**

Mr. Gerd Trogemann	<i>UNDP IRH Manager</i>
Mr. Etienne Gonin	<i>UNDP Programme Analyst, MPU Chemicals</i>
Mr. Selimcan Azizoglu	<i>UNDP Project Manager</i>
Ms. Zuhre Guven,	<i>UNDP Project Assistant</i>
Mr. Jan Gerd Kühling	<i>Chief Technical Expert</i>
Ms. Rosemary Kumwenda	<i>UNDP HIV, Health and Development Coordinator (Skype conversation)</i>
Ms. Tugce Akpek	<i>UNDP Procurement Officer</i>
Ms. Ekaterina Paniklova,	<i>UNDP Senior Programme Coordinator</i>

### **Republic of Ghana**

Mr. Louis Kuukpen	<i>UNDP Deputy Country Director</i>
Mr. Paolo Dalla Stella	<i>UNDP Head Sustainable Development Cluster</i>
Mr. Joel Ayim Darkwah	<i>UNDP Assistant Programme Officer</i>
Ms. Abena Dedaa Nakawa	<i>National Project Coordinator</i>
Ms. Gifty Henrieta Amuah	<i>Project Assistant</i>
Mr. Richard Amfo-Otu	<i>Project Technical Advisor</i>
Mr. Collins Kabuga	<i>Ministry of Finance Economic Analyst</i>
Dr. Michael Affordofe	<i>Accra School of Hygiene Chief Health Tutor</i>
Dr. Isaac Dzahene Newton	<i>Accra School of Hygiene Chief Health Tutor</i>
Dr. Sam Adu-Kumi	<i>EPA Director, Chemical Control Management Centre</i>
Dr. Eric Kofi Ngyedu	<i>Cape Coast Teaching Hospital CEO</i>
Ms. Nancy Waaley	<i>Project Focal Person at Cape Coast Teaching Hospital</i>
Mr. Peter Ackon	<i>Cape Coast EPA Principal Programme Officer</i>
Nurse Manager, IPC Officer, Eric	<i>Winneba Trauma &amp; Specialist Hospital</i>

Francisca Akorfa Adika- Bensah	<i>Project Focal Person at Koforidua Eastern Regional Hospital</i>
Director, Deputy Director, Nurse Manager, Isaac, Michael	<i>Koforidua Eastern Regional Hospital</i>
Dr. Ernest Konadu Asiedu	<i>Head, National Quality Management Unit, PPMED, Ministry of Health (Skype conversation)</i>
Ms. Ama Ofori-Antwi	<i>Environmental Service Providers Association Executive Secretary</i>
Mr. Senam Tengey	<i>Waste Facility Manager at Zoompak Ghana Limited</i>
Mr. Johannes Boakye	<i>Technical Expert at Zoompak Ghana Limited</i>
Mr. Lovelace Sarpong	<i>Principal Programme Officer EPA Chemical Control &amp; Management Centre</i>
Dr. Andrews Ayim	<i>Training Coordinator/Public Health Physician at the Ghana College of Physicians &amp; Surgeons Public Health Faculty</i>
Mr. Edward Gyepi-Garbrah	<i>WHO National Professional Officer</i>
Ms. Akosua Kwakye	<i>WHO Programme Officer</i>
Mr. Kwamena E. Quaison	<i>Deputy Director, Environment, Ministry of Environment, Science, Technology &amp; Innovation</i>
Dr. Nicholas Adjabu	<i>Deputy Director, Clinical Engineering Department, Ghana Health Service</i>
<u>Sites visited in Ghana:</u>	
Cape Coast Teaching Hospital	
Site of future Mercury Storage at Cape Coast EPA	
Cape Coast Dumpsite	
Winneba Trauma & Specialist Hospital	
Koforidua Eastern Regional Hospital	
Koforidua Dumpsite	
Zoompak Ghana Limited	
<b>Republic of Madagascar</b>	
Ms. Marie Dimond	<i>UNDP Deputy Resident Representative in charge of Programme</i>

Ms. Holi Andriamandimbisoa	<i>UNDP Team Leader for Environment &amp; Poverty</i>
Dr. Hanta Ravaosendrasoa	<i>Deputy National Director, Ministry of Health</i>
Dr. Sandrine Andriantsimietry	<i>National Project Coordinator</i>
Ms. Mbolatiana Ratefinjatovo	<i>Project Assistant</i>
Mr. Solofonirina Raberahona	<i>Project Technical Advisor</i>
Professor Rakoto Alson	<i>Director, CHU-JRA Ampefiloha</i>
Mrs Fanja & Holy	<i>Project Focal Point, Environmental Health Officers, CHU-JRA Ampefiloha</i>
Dr Hanta Ratsitohaina	<i>Project Focal Point, CHU-MET Tsaralalàna</i>
Mrs Noëline & Clairette	<i>Project Focal Point, Environmental Health Officers, CHU-JRB Befelatanana</i>
Mr Tata Venance	<i>Chair of the Project's Technical Working Group, Head of the Environmental Health Department, Ministry of Public Health</i>
Ms. Ony	<i>Sanitary Technician responsible for HCW, Ministry of Public Health</i>
Dr Marie Josée Andriamahazo	<i>Head of Manjakandriana Health District</i>
Responsible Doctor and Nurse	<i>CSB2 Manjakandriana</i>
Dr Elie Rasoanaivo	<i>Médecin Chef, CHRD Manjakandriana</i>
Dr John & Dr Elisoa	<i>Focal points, CHRD Manjakandriana</i>
Mid-Wife in charge and Nurse	<i>CSB2 Sambaina Manjakandriana</i>
Pr Arsène Ratsimbasoa	<i>Secrétaire Général, Ministry of Health</i>
All members of the Project's Technical Working Group and 2 members of Monitoring and Evaluation Committee (Voahary Salama, Adonis) (approx. 20),	<i>Technical Working Group &amp; Monitoring and Evaluation Committee</i>
Mrs Malala Ranarison	<i>WHO Health Promotion Officer - Focal Point for Health &amp; Environment (by telephone)</i>
Mr Rakotondravelo Harison Roger	<i>Managing Director, InSPNMad – Institution Supérieure Paramédicaux Novateurs de Madagascar (Private Institution for training of paramedics)</i>
Ms. Noëline (responsible for the HCWM training curriculum)	<i>InSPNMad – Institution Supérieure Paramédicaux Novateurs de Madagascar</i>

Mr. Denis Freliger	<i>Technical Director, Groupe Adonis Environnement SA</i>
<u>Sites visited in Madagascar:</u>	
CHU-JRA Ampefiloha	
CHU-MET Tsaralalàna	
CHU-JRB Befelatanana	
CSB2 Manjakandriana	
CHRD Manjakandriana	
CSB2 Sambaina Manjakandriana	
Association Miharisoa in Ambohidratrimo	<i>A facility that makes paving bricks from waste plastic</i>
Groupe Adonis Environnement SA	<i>A large recycling company</i>
<b>United Republic of Tanzania</b>	
Ms. Natalie Boucly	<i>UNDP Country Director</i>
Mr. Honest Anicetus	<i>Project Director and National Coordinator for Healthcare Waste Management, Ministry of Health</i>
Mr. Deogratias Mkembela,	<i>UNDP Project Manager</i>
Mr. Hussein Mohamed	<i>National Technical Expert and Environmental Health Lecturer at the Muhimbili University of Health and Applied Sciences</i>
Mr. Bwijo	<i>UNDP Practice Specialist</i>
Mr. Ernest Salla	<i>UNDP Programme Specialist and Head Inclusive Growth &amp; Sustainable Livelihoods Pillar</i>
Ms. Jacqueline Makupa	<i>Ministry of Health, Assistant Director for Environmental Health</i>
Dr. Leonard Subi	<i>Ministry of Health, Director of Preventive Services</i>
Mr. Gerald Manase	<i>President's Office Regional Administration and Local Government Health Services</i>
Veila Matee	<i>Head of Environmental Services, Muhimbili National Hospital</i>
Ms. Miriam Mongi	<i>Project Focal Person, Head of Environmental Services, Sinza Hospital</i>

Ms. Sifa Mgaya	<i>Environmental Health Officer and Project Focal Person, Mwananyamala Regional Referral Hospital</i>
Mr. Rammy Kesengem	<i>Environmental Health Officer, Mwananyamala Regional Referral Hospital</i>
Ms. Rose Musa	<i>QA Manager, Mwananyamala Regional Referral Hospital</i>
Mr. Salumu Harunea	<i>Environmental Technician, Mwananyamala Regional Referral Hospital</i>
Mr. Musa Wambura	<i>Mwananyamala Regional Referral Hospital</i>
Mr. Mohammed Nassor Juma	<i>Technical Director, Wastewater Solution (supplier of the bio-digester)</i>
Ms. Nancy Shushu	<i>Vice President's Office, National Environmental Management Council</i>
Ms. Margaret Mntenga	<i>Vice President's Office, Department of Environment (Skype conversation)</i>
Dr Simon Mamuya	<i>Head of the Department of Environmental and Occupational Health, MUHAS</i>
Dr Mtebe Majigo	<i>Lecturer and Head of the Department of Microbiology and Immunology, MUHAS</i>
Ms. Amin Hussein	<i>Environmental Health Officer, Mbagala Ranji Tatu Hospital</i>
Ms Erika	<i>Health Secretary, Mbagala Ranji Tatu Hospital</i>
Ms. Rabia	<i>Lecturer, School of Hygiene, MUHAS</i>
Mr. Nassor	<i>Lecturer, School of Hygiene, MUHAS</i>

Sites visited in Tanzania:

Muhimbili National Hospital

Sinza Hospital

Mwananyamala Regional Referral Hospital

Mbagala Ranji Tatu Hospital

Plastic Recycling Facility, Mbagala

**Republic of Zambia**

Ms. Winnie Musonda	<i>UNDP Assistant Resident Representative (telephone conversation)</i>
Ms. Caoimhe Hughes	<i>UNDP Focal Point &amp; Climate Change Mitigation Officer</i>
Mrs. Mulenga Cheleka	<i>Project National Director &amp; Assistant Director - Ministry of Health</i>
Mr. Brian Mwape Nkandu	<i>National Project Manager</i>
Mr. Tsibu Bbuku	<i>National Project Technical Advisor</i>
Ms. Mazuba Mwambazi	<i>Project Administrative Assistant</i>
Dr. Abel N. Kabelo	<i>Director Health Promotion, Environment and Social Determinants, Ministry of Health</i>
Dr. Kaonga Wezi	<i>Deputy Director Health Promotion, Environment and Social Determinants, Ministry of Health</i>
Ms. Chilekwa Christabel	<i>Chief Environmental Health Officer</i>
Mr. Solomon Kagulula	<i>WHO Focal Point &amp; National Professional Officer</i>
Dr. Emmy Nkhama	<i>Lecturer, Chainama College of Health Sciences</i>
Mr. Allan Mbewe	<i>Assistant Dean, School of Public Health, University of Zambia</i>
Ms. Nosiku. Muyunda	<i>Lecturer, School of Public Health, University of Zambia</i>
Ms. Perine Kasonde	<i>Senior Inspector - Waste Management, Zambia Environmental Management Agency</i>
Dr. Clarence Chiluba	<i>Senior Medical Superintendent, University Teaching Hospitals (UTH)</i>
Mr. Mwamba Musonda	<i>Project Focal Point &amp; Environmental Health Officer, UTH</i>
Ms. Alphonsina Hamalala	<i>Environmental Health Officer, UTH</i>
Mr. Shadreck Mufwaya	<i>Principal Environmental Health Officer, Central Province Health Office</i>
Dr. Banda Alick	<i>Acting Provincial Health Director, Central Province Health Office</i>

Dr. Kusweji B	<i>Medical Superintend - Kabwe General Hospital</i>
Mr. Hamweene H	<i>Project Focal Point &amp; Environmental Health Technician Kabwe General Hospital</i>
Mr. Jeff Mumba	<i>Environmental Health Officer, Kabwe General Hospital</i>
Ms. Elizabeth Chiolowa	<i>Environmental Health Officer, Mukonchi Rural Health Centre</i>
Dr. Chipeta M	<i>Acting – Medical Officer Kapiri Mposhi District Hospital</i>
Mr. Danny Sinyengwe	<i>Project Focal Point &amp; Environmental Health Officer, Kapiri Mposhi District Hospital</i>
Ms. Christine C. Malesu	<i>Chief Environmental Health Officer, Copperbelt Province Health Office</i>
Dr. Stephen. Mukosai	<i>Acting SMS - Ndola Teaching Hospital</i>
Mr. Allan Kamboyi	<i>Project Focal Point &amp; Environmental Health Officer, Ndola Teaching Hospital</i>
Mr. Frederik Muyano	<i>Manager, ZEMA Northern Region Office, Ndola</i>
Mr. Moses Mutambala	<i>Principal Inspector, ZEMA Northern Region Office, Ndola</i>
Mr. Zulu Phillip	<i>Solid Tech (plastic recycler in Kabwe) (telephone conversation)</i>
Ms. Lydia Somali	<i>Project Focal Point &amp; Environmental Health Officer, Chilenje Level 1 Hospital, Lusaka</i>
Mr. Daniel Mukonde	<i>Director Waste Master (Z) (large recycling company in Lusaka)</i>

Sites visited in Zambia:

Mercury Storage Container at MoH,  
Lusaka  
University Teaching Hospitals, Lusaka  
Kabwe General Hospital  
Mukonchi Rural Health Centre  
Kapiri Mposhi District Hospital  
Ndola Teaching Hospital

Chilenje Level 1 Hospital, Lusaka

**Other**

Dr. Ute Pieper

*WHO International Expert for the Project  
- by Skype*

## Annex G: List of documents reviewed

- The Project Document *Reducing UPOPs and Mercury Releases from the Health Sector in Africa* (various versions)
- Regional Inception Workshop Minutes, Johannesburg, South Africa, 22 - 24 September 2016
- Minutes of the Project Board Meeting, Johannesburg, South Africa 23 September 2016
- Regional Project Meeting Minutes, Istanbul, Turkey, 1 - 3 June 2017
- Minutes of the Project Board Meeting, J Istanbul, Turkey, 2 June 2017
- Minutes of the Project Board Meeting, Zanzibar, Tanzania, 14 May 2018
- Project Implementation Review (PIR) *UPOPs/Mercury from Health Sector in Africa* (2018)
- Project Implementation Review (PIR) *UPOPs/Mercury from Health Sector in Africa* (2017)
- Project Progress Report *Reducing UPOPs and Mercury Releases from the Health Sector in Africa - Regional Component* June 2017 - May 2018
- Project Progress Report *Reducing UPOPs and Mercury Releases from the Health Sector in Africa - Regional Component* June 2016 - May 2017
- *Implementation and Monitoring Stage Quality Assurance Report* for the Project, 2017
- Chief Technical Expert's *Interim Report I & Progress Report* 3 March 2018
- GEF POPs Tracking Tool for the Project (Final) 2014 [Mercury not included in this document]
- Regional Monthly Progress Report for August 2018
- Regional Monthly Progress Report for September 2018
- *Social and Environmental Injustice Analysis in Healthcare Waste Management in Ghana, including Gender Dimensions* by Ms. Sabrina Regmi. the Project's Gender Equality and Human Rights Consultant, 2018
- Ghana Progress Report and Work Plan from 1 July 2018
- Ghana Progress Report from 1 July 2018
- *Health Care Waste Management Policy for Ghana*, Final Draft, Ghana Health Service, 2017
- *National Guidelines for Health Care Waste Management in Ghana*, Final Draft, Ministry of Health, 2017
- *Analysis of Sharp Satisfaction Survey*, First Draft, Ghana PIU, 2018
- *Summary of Hepatitis B and C Survey for Pilot facilities*, Ghana PIU, 2018
- Madagascar Progress Report and Work Plan from 1 July 2018

- Madagascar Monthly Progress Report for August 2018
- Report on the *Introduction and Training of Trainers in Global Green Healthy Hospitals in Madagascar*-22-24 August 2017
- *Rapport de l'atelier de création du groupe technique national du projet de réduction des émissions non intentionnelles de pops et de mercure dans le secteur sante en Afrique Madagascar* 14 - 16 February 2017
- *Politique Nationale de Gestion des Déchets des Etablissements de Soins et de Sécurité des Injections* Ministère de la Santé Publique, Madagascar (2017 edition)
- *Guide Technique de Gestion des Déchets Médicaux* Service de Santé et Environnement, Madagascar (2017)
- *Livret de Gestion des déchets médicaux* Service de Santé et Environnement, Madagascar (2017)
- Tanzania Progress Report and Work Plan from 1 July 2018
- *National Policy Guidelines for Health Care Waste Management in Tanzania*, Ministry of Health, Community Development, Gender, Elderly and Children, December 2017
- *National Standards and Procedures for Health Care Waste Management*, Ministry of Health, Community Development, Gender, Elderly and Children, December 2017
- *National Strategic Plan for Healthcare Waste Management (2018 - 2022)*, Ministry of Health, Community Development, Gender, Elderly and Children, January 2018
- Zambia Progress Report and Work Plan from 1 July 2018
- *Training Manual for Health Care Waste Management*, Directorate of Health Promotion, Environmental Health and Social Determinants, Zambia, July 2017
- Handover documents for equipment, materials and goods (all countries)
- *Health Care Waste Management Policy for Ghana* Final Draft - Ghana Health Service (2017)
- *National Guidelines for Health Care Waste Management in Ghana* Final Draft - Ministry of Health (2017)
- *Ghana Analysis of Sharp Satisfaction Survey* First Draft (2018)
- *Zambia National Curriculum in Environmental Health Technologies*
- WHO *Safe management of wastes from health-care activities* 2<sup>nd</sup> edition (2014)
- GEF-5 *Focal Area Strategies* (2010?)
- *Global Project on Demonstrating and Promoting Best Techniques and Practices for Reducing Health-Care Waste to Avoid Environmental Releases of Dioxins and Mercury* Terminal Evaluation (16 September 2015)
- *Social and Environmental Screening* for the Project 2015



## Annex H: Co-financing table

### Project co-financing table

<b>REGIONAL<sup>40</sup></b>			
<b>Name of Entity</b>	<b>In-kind (US\$)</b>	<b>Cash (US\$)</b>	<b>Total (US\$)</b>
1. UNDP	0	400,000	400,000
2. Health Care Without Harm (HCWH)	2,081,000	219,000	2,300,000
3. WHO	TBC	TBC	0
<b>TOTAL</b>	<b>0</b>	<b>619,000</b>	<b>2,700,000</b>
<b>GHANA</b>			
<b>Name of Entity</b>	<b>In-kind (US\$)</b>	<b>Cash (US\$)</b>	<b>Total (US\$)</b>
1. Ministry of Health	762,000	848,000	1,610,000
2. Ministry of Local Government and Rural Development	1,900,000	0	1,900,000
3. Zoomlion Ghana Limited	800,000	450,000	1,250,000
4. Environmental Protection Agency	450,000	0	450,000
5. School of Hygiene	100,000	0	100,000
6. Cape Coast Teaching Hospital	50,000	20,000	70,000
7. Eastern Regional Hospital	50,000	40,000	90,000
8. Tegbi Health Center	10,000	15,000	25,000
<b>TOTAL</b>	<b>4,122,000</b>	<b>1,373,000</b>	<b>5,495,000</b>
<b>MADAGASCAR</b>			
<b>Name of Entity</b>	<b>In-kind (US\$)</b>	<b>Cash (US\$)</b>	<b>Total (US\$)</b>
1. Direction Générale de l'Environnement- Environnement general division- Ministry of Environment and sustainable development	78,950	0	78,950
2. Ministère de la Santé Publique (MSP) - Direction de la Promotion de la Santé - Service de Santé et Environnement- Ministry of Public Health-Health	290,900	0	290,900

<sup>40</sup> Co-financing data from WHO will be confirmed at later stage.

Promotion Division- Health and environment service			
3. Hôpital Universitaire Mères Enfants TSARALALANA- CHU MET Mother and Child Hospital Tsaralalàna	19,700	0	19,700
4. Groupe Adonis Environnement S.A.	11,400	0	11,400
5. MSP-Hôpital Universitaire Joseph Ravoahangy Andrianavalona CHU JRA Ampefiloha	41,128	0	41,128
6. MSP - Hôpital Universitaire Joseph Raseta BEFELATANANA CHU JRB Befelatanana	35,100	0	35,100
7. MSP - Centre Hospitalier de Référence de District CHRD MANJAKANDRIANA	23,800	0	23,800
8. Fonds d'Appui pour L'Assainissement (FAA), Madagascar	12,000	0	12,000
9. Voahary Salama	18,000	0	18,000
10. MSP - Direction de Vaccination (GAVI)- vaccination division	5,000	0	5,000
11. OMS- WHO Madagascar	20,000	0	20,000
12. World Bank - Madagascar	30,000	0	30,000
<b>TOTAL</b>	<b>585,978</b>	<b>0</b>	<b>585,978</b>

**TANZANIA**

Name of Entity	In-kind (US\$)	Cash (US\$)	Total (US\$)
1. Jhpiego (International NGO)	1,200,000	0	1,200,000
2. Agenda for Environment and Responsible Development (CSO)	10,000	0	10,000
3. MOHCDGEC/World Bank (National Government)	0	500,000	500,000
4. PASADA (Local NGO-Faith Based)	18,000	0	18,000
5. Department of Health & Human Services - Centers for Disease Control and Prevention (CDC) (Bi-lateral Aid Agency)	1,200,000	0	1,200,000
<b>TOTAL</b>	<b>2,428,000</b>	<b>500,000</b>	<b>2,928,000</b>

**ZAMBIA**

Name of Entity	In-kind (US\$)	Cash (US\$)	Total (US\$)
1. UNDP -CO	15,000	90,000	105,000

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2. Ministry of Health	65,500	80,700	146,200
3. ZEMA	7,500	0	7,500
4. Waste Master (Z) Ltd	8,500	3,500	12,000
<b>TOTAL</b>	<b>96,500</b>	<b>174,200</b>	<b>270,700</b>
<b>TOTAL REGIONAL + GHA + MDG + TZA + ZMB</b>	<b>9,313,478</b>	<b>2,666,200</b>	<b>11,979,678</b>

# Annex I: Signed UNEG Code of Conduct form

ToR ANNEX D: UNEG Code of Conduct for Evaluators/Midterm Review Consultants<sup>52</sup>

## Evaluators/Consultants:

1. Must present information that is complete and fair in its assessment of strengths and weaknesses so that decisions or actions taken are well founded.
2. Must disclose the full set of evaluation findings along with information on their limitations and have this accessible to all affected by the evaluation with expressed legal rights to receive results.
3. Should protect the anonymity and confidentiality of individual informants. They should provide maximum notice, minimize demands on time, and respect people's right not to engage. Evaluators must respect people's right to provide information in confidence, and must ensure that sensitive information cannot be traced to its source. Evaluators are not expected to evaluate individuals, and must balance an evaluation of management functions with this general principle.
4. Sometimes uncover evidence of wrongdoing while conducting evaluations. Such cases must be reported discreetly to the appropriate investigative body. Evaluators should consult with other relevant oversight entities when there is any doubt about if and how issues should be reported.
5. Should be sensitive to beliefs, manners and customs and act with integrity and honesty in their relations with all stakeholders. In line with the UN Universal Declaration of Human Rights, evaluators must be sensitive to and address issues of discrimination and gender equality. They should avoid offending the dignity and self-respect of those persons with whom they come in contact in the course of the evaluation. Knowing that evaluation might negatively affect the interests of some stakeholders, evaluators should conduct the evaluation and communicate its purpose and results in a way that clearly respects the stakeholders' dignity and self-worth.
6. Are responsible for their performance and their product(s). They are responsible for the clear, accurate and fair written and/or oral presentation of study limitations, findings and recommendations.
7. Should reflect sound accounting procedures and be prudent in using the resources of the evaluation.

## MTR Consultant Agreement Form

Agreement to abide by the Code of Conduct for Evaluation in the UN System:

Name of Consultant: PEDER BISBJERG

Name of Consultancy Organization (where relevant): \_\_\_\_\_

**I confirm that I have received and understood and will abide by the United Nations Code of Conduct for Evaluation.**

Signed at Istanbul (Place) on 4. October 2018 (Date)

Signature: Peder Bisbjerg

## **Annex J: Audit Trail**

The Audit Trail is annexed as a separate file

## Annex K: Evaluation Report Clearance Form

**Project ID:** 00096344  
**Project Title:** "Reducing UPOPs and Mercury Releases from the Health Sector in Africa"  
**Consultant Name:** Peder Bisbjerg  
**MTR completion date:** 05.03.2019

### UNDP-GEF Regional Technical Advisor

Etienne Gonin, Programme Analyst, MPU/Chemicals, UNDP Istanbul Regional Hub for Europe and the CIS

Signature:

 19.3.2019

### Commissioning Unit

Ekaterina Paniklova, Senior Programme Coordinator, UNDP Istanbul Regional Hub for Europe and the CIS

Signature:

 19.3.19