



REDUCING UPOPS AND MERCURY RELEASES FROM THE HEALTH SECTOR IN AFRICA (GEF ID: 4611; UNDP ID: 4865)

TERMINAL EVALUATION REPORT



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Acronyms and Abbreviations

APR/PIR	Annual Project Review / Project Implementation Review
AWP	Annual Work Plan
BAT	Best Available Technologies
BEP	Best Environmental Practices
BoQ	Bill of Quantity
CDC	Centres for Disease Control and Prevention
CO	Country Office
CP	Country Programme
CTF	Centralized Treatment Facility
DIM	Direct Implementation Modality
EHO	Environmental Health Officer
GEF	Global Environment Facility
GGHH	Global Green and Healthy Hospitals
GPU	Global Procurement Unit
HCWM	Healthcare Waste Management
HC	Health Centre
HCF	Healthcare Facility
HCW	Health Care Waste
I-RAT	Individualized Rapid Assessment Tool
IRH	Istanbul Regional Hub
M&E	Monitoring and Evaluation
MIA	Minamata Initial Assessment
MoE	Ministry of Environment
MoH	Ministry of Health
MoHSW	Ministry of Health and Social Welfare
MoU	Memorandum of Understanding
MSW	Municipal Solid Waste
MTR	Mid-Term Review
NGO	Non-Governmental Organization
NAP	National Action Plan
NIE	National Implementing Entity
NIM	National Implementation Modality
NIP	National Implementation Plan for the Stockholm Convention
PIU	Project Implementation Unit
POP	Persistent Organic Pollutant
PPG	Project Preparation Grant
PPE	Personal Protection Equipment
PPP	Public Private Partnership
PPR	Project Progress Report
PRF	Project Results Framework
PTS	Persistent toxic substance

PSU	Procurement Support Unit
PVC	Polyvinyl Chloride
QPR	Quarterly Progress Reports
RPB	Regional Project Board
RTE	Regional Technical Expert
SOP	Standard Operation Procedure
TE	Terminal Evaluation
TEQ	Toxic Equivalent
TOR	Terms of Reference
TWG	Technical Working Group
UNDAF	United Nations Development Assistance Framework
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization
UNICEF	United Nations Children Education Fund
UPOPs	Unintended Persistent Organic Pollutants
WHO	World Health Organization

Glossary of Evaluation-related Terms

Term	Definition
Baseline data	Data that describe the situation to be addressed by an intervention and serve as the starting point for measuring the performance of the intervention
Beneficiaries	The specific individuals or organizations for whose benefit an intervention is undertaken
Capacity development	The process by which individuals, organizations, institutions and societies develop their abilities individually and collectively to perform functions, solve problems and set and achieve objectives
Conclusion	A reasoned judgement based on a synthesis of empirical findings or factual statements corresponding to a specific circumstance
Effect	Intended or unintended change due directly or indirectly to an intervention
Effectiveness	The extent to which the development intervention's objectives were achieved, or are expected to be achieved
Efficiency	A measure of how economically resources/inputs (funds, expertise, time, etc.) are converted to results
Finding	A factual statement about the programme or project based on empirical evidence gathered through monitoring and evaluation activities
Impact	Positive and negative, intended and non-intended, directly and indirectly, long term effects produced by a development intervention
Indicator	Quantitative or qualitative factors that provide a means to measure the changes caused by an intervention
Lessons learned	Generalizations based on evaluation experiences that abstract from the specific circumstances to broader situations
Logframe (logical framework approach)	Management tool used to facilitate the planning, implementation and evaluation of an intervention. It involves identifying strategic elements (activities, outputs, outcome, impact) and their causal relationships, indicators, and assumptions that may affect success or failure. Based on RBM (results-based management) principles
Outcome	The likely or achieved (short-term and/or medium-term) effects of an intervention's outputs
Output	The product, capital goods and/or service which results from an intervention; may also include a change resulting from the intervention which is relevant to the achievement of an outcome
Rating	An instrument for forming and validating a judgement on the relevance, performance and success of a programme or project through the use of a scale with numeric, alphabetic and/or descriptive codes
Recommendation	A proposal for action to be taken in a specific circumstance, including the parties responsible for that action
Relevance	The extent to which the objectives of an intervention are consistent with beneficiaries' requirements, country needs, global priorities and partners' and donor's policies
Risk	Factor, normally outside the scope of an intervention, which may affect the achievement of an intervention's objectives
Sustainability	The continuation of benefits from an intervention, after the development assistance has been completed
Stakeholders	The specific individuals or organizations that have a role and interest in the objectives and implementation of a programme or project
Theory of Change	A set of assumptions, risks and external factors that describes how and why an intervention is intended to work.

Acknowledgement

The Evaluator would like to express his appreciation to all project stakeholders whom he interviewed during the two phases of the evaluation. In particular, the gratitude is extended to the regional and national project implementation teams for sharing all relevant documentation on the project and for availing themselves for discussion about key findings and pertinent issues of the evaluation. Through provision of their valuable insights and candid opinions on the project implementation and results, they have collectively contributed to the smooth conduct and effective completion of this evaluation.

Furthermore, the appreciation is conveyed to the relevant staff in the UNDP Istanbul Regional Hub for organizing international travel and staff in the UNDP Country Offices in Ghana, Madagascar, Tanzania and Zambia for effectively planning and arranging in-country travel. These arrangements enabled the evaluator to reach remote project sites and make direct observations of the project results on the ground.

Overall, the cooperation with the project teams and all national project partners was very effective and provided the Evaluator with all information needed.

EXECUTIVE SUMMARY

Project Information Table

Project Title	Reducing UPOPs and Mercury Releases from the Health Sector in Africa		
UNDP Project ID (PIMS #):	4865	PIF Approval Date:	5 June 2012
GEF Project ID (PMIS #):	4611	CEO Endorsement Date:	25 September 2014
ATLAS Business Unit, Award # Project 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 (date project began):	Regional component: 9 December 2015 Ghana: 14 October 2015 Madagascar: 12 April 2016 Tanzania: 25 February 2016 Zambia: 19 January 2016
Countries):	Ghana, Madagascar, Tanzania, Zambia	Date project manager hired:	Regional component: December 2015
Region:	Africa	Inception Workshop date:	Regional component: 22 September 2016 Ghana: 24 February 2016 Madagascar: 15 November 2016 Tanzania: 07 September 2016 Zambia: 13 June 2016
Focal Area:	GEF-5 Chemicals and Waste	Midterm Review completion date:	March 2019
GEF Focal Area Strategic Objective:	CHEM-1: Outcome 1.3: POPs releases to the environment reduced CHEM-1: Outcome 1.5: Country capacity built to effectively phase out and reduce releases of POPs CHEM-3: Outcome 3.1: Country capacity built to effectively manage mercury in priority sectors	Planned planned closing date:	30 April 2020
Trust Fund [indicate GEF TF, LDCE, SCCF, NPIF]:	GEF TF	If revised, proposed op. closing date:	31 December 2020
Executing Agency/Implementing Partner:	Regional component: UNDP Istanbul Regional Hub for Europe and the CIS 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		
Other execution partners:	UNDP Country Offices in Ghana, Madagascar, Tanzania and Zambia World Health Organizations (WHO) Health Care Without Harm (HCWH)		
Project Financing	<u>at CEO endorsement (US\$)</u>	<u>At Terminal Evaluation (US\$)</u>	
GEF financing:	6,453,195	6,295,712	
In-kind contribution (UNDP, WHO, HCWH)	7,897,400	2,700,000	
Governments	15,680,822	9,928,663	
Other partners (national partners)	5,357,942		
Total co-financing	28,936,164	14,857,663	
PROJECT TOTAL COSTS	35,389,359	21,153,375	

Project Description

The regional project aims to reduce the reliance of African countries on the heavily polluting low-cost incineration and demonstrate use of non-incineration technologies which will generate significantly less air pollutants than incinerators and other HCW combustion processes. Secondly, the use of non-incineration technologies can also provide the opportunity to recycle disinfected waste fractions, in particular plastics, and allow HCFs to recover part of their costs for HCW treatment by selling disinfected plastics to recyclers.

Furthermore, the project aims to support the beneficiary project countries in phasing-out the use of mercury-containing medical devices and adopting measures for reducing releases of mercury and meeting thus the obligations of the Minamata Convention.

The two objectives of the regional project were as follows:

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 was extended by 8 months to address the implementation challenges posed by the COVID-19 pandemic and ensure that critical support is provided to the project countries on HCWM dimensions of the COVID-19 pandemic.

Summary of project results

HCW policies and institutional capacity building

The project assisted the four beneficiary countries in revision and further development of the national Healthcare Waste Management Plans that proposed solutions for improving health care waste management (HCWM) in the countries. Apart from the review and critical assessment of the existing HCWM situation, the plans identified targets and pathways for improvement through outlining options for improving all specific components of the national HCWM systems and describing the best approaches as well as presenting a capacity building concept for facilitating implementation of proper HCWM practices.

Provision of equipment and tools for HCWM contributed to improvement of the practices on HCW classification, segregation, labelling, internal storage and transportation at the level of 27 designated model health care facilities (HCFs). With the assistance of the project, the model HCFs either conducted major revisions of their existing plans or prepared first ever HCWM plans by adopting the national HCWM plans to the HCF level.

The project helped to change behaviour of health care workers at the model HCFs and improve their awareness of the risks associated with improper management and disposal of HCW. Although practical implementation of the HCWM systems was found way off perfection at some HCFs, the existence of the HCWM policies and the awareness of the health workers suggest improvements are only a matter of time.

Provision of HCW treatment technology

The project provided non-incineration health care waste (HCW) treatment technology to 17 HCFs in the four beneficiary countries. The aim of the project to promote a shift from HCW incineration to autoclave treatment followed by waste recycling and landfilling was achieved only partially. Despite the successful introduction and commissioning of the autoclaves, some

HCFs were unable to abandon the incineration for disposal of infectious waste due to concerns about disposal of the autoclaved waste through landfilling.

The supply of equipment and technical assistance with development of the HCWM systems were complemented by series of trainings that cut across all spheres of staff considered to be key stakeholders to operation of the HCWM systems, including doctors, nurses, cleaners, maintenance staff and liaison officers.

Some but not all the model HCFs initiated recycling programmes that focus in particular on recycling of plastics. The key challenge for the recycling of HCW is that the market for recyclables is not yet developed in the four countries with a vast majority of active recycling companies based in the capital cities. Therefore, the recycling programme for plastics was successfully initiated in the model HCFs located in the capitals city but was found difficult to implement in the model HCFs in remote regions where little or no market currently exists for the recovered plastic fraction of HCW.

Reduction of mercury in the health care facilities

Replacement of medical devices containing mercury was successfully implemented through two rounds of procurement of mercury-free equipment and all beneficiary model HCFs were declared using only mercury-free medical gadgets. Construction of the central storage for mercury-waste was completed only in Zambia while the other three countries experienced various challenges related to selection of the permanent storage location. No decision on the method of final disposal of the collected mercury waste was adopted in any of the four countries.

The project supported each of the four countries to pilot specific strategies on selected HCW issues and sharing of results and lessons learned with the other countries in order to facilitate replication of the strategies. The supported strategies included cooperation with a private HCW treatment company in Ghana, use of photovoltaic panels for HCW treatment at rural HCFs; construction of biodigesters for pathological waste treatment in Tanzania and close-loop recycling of HCW in Zambia.

National training on HCWM and information dissemination

In all four countries the project assisted in establishment of national training programmes on HCWM for inclusion in the national training curricula for the health professionals.

With the help of international partners, the project teams successfully disseminated information on the project at more than 20 regional and international environment and health conferences and organized a photo contest to raise awareness for a greener healthcare and promotion of sound practices in HCWM.

Response to the COVID-19 pandemic

As a short-term response to COVID-19 pandemic, the project supported development of a technical support tool for integration of HCWM into national response to the pandemic. The tool included sample specification of PPE, consumables and small items for COVID-19 early response and information on availability of equipment already provided under relevant previous and ongoing UNDP projects. The regional expert team of the project also prepared a summary of Frequently Asked Questions on COVID-19 waste management.

The medium/long-term response was directed on provision of new waste treatment equipment in the immediate post-crisis context as a way of strengthening of the health care systems and their preparedness for future waves of the epidemics.

The project allocated a sizeable budget to the four national components to facilitate national activities/closure plans supporting COVID-19 responses and prepare a leaflet on contributions of UNDP and their respective national project components to the COVID-19 response.

As a response to the request from the GEF Secretariat, the regional team supported development of a medium size GEF project titled “Promoting a Coordinated Approach to the Sustainable Management of Healthcare Waste During and Beyond the COVID-19 Pandemic”.

Sustainability and progress to impact

The project assisted in establishment or revision of the respective national policies on HCWM as well as in elaboration of related technical guidelines and standards. Apart from describing approached for waste minimisation, separation at source, storage, transportation, treatment (including non-incineration technologies) and disposal, these documents defined the necessary institutional arrangements for implementation of the national policies and outlined roles and responsibilities of the main stakeholders to ensure a concerted effort towards improving the HCWM situation in the three countries.

These documents have been endorsed by the respective line ministries and printed for dissemination throughout the countries. Therefore, the established institutional and governance frameworks will be used in the four project countries in the foreseeable future.

The main challenge to financial sustainability is related to the capacities of the designated model HCFs to continue the established HCWM systems and sustain operation of the non-incineration HCW treatment technologies. Sustainability of operation of the non-incineration technologies, is dependent on regular maintenance and timely repair of the installed equipment as well as accessibility and affordability of spare parts. The importance of ensuring availability of financial resources to keep the HCW management and treatment systems functional cannot be overemphasized. It is hoped that the relevant government agencies in the four countries will include management, treatment and disposal of HCW amongst their top priorities and consequently make budgetary allocations necessary for continued operation of the HCW management and treatment on an on-going basis.

Various socio-economic factors influence willingness to introduction of recycling actions into HCWM practices in the four countries, including slow progress towards establishment of markets for recyclables, absence of recycling companies in remote regions as well as logistical challenges for transport of recyclables between the originator HCFs and recyclables’ processing facilities.

Summary of evaluation ratings

The summary of evaluation ratings¹ according to the required evaluation criteria is displayed in the Box 1 below.

¹ Performance ratings of GEF projects are given in Annex 5.

Box 1: Summary of TE ratings

Evaluation Criteria	Evaluator's Rating
Monitoring and evaluation: design at entry	Satisfactory (S)
Monitoring and evaluation: implementation	Moderately Satisfactory (MS)
Overall quality of monitoring and evaluation	Satisfactory (S)
Implementation (regional components)	Satisfactory (S)
Execution (national components)	Satisfactory (S)
Overall quality implementation / execution	Satisfactory (S)
Relevance	Relevant (R)
Effectiveness	Satisfactory (S)
Component 1	Satisfactory (S)
Component 2	Satisfactory (S)
Component 3	Moderately Satisfactory (MS)
Component 4	Satisfactory (S)
Component 5	Highly Satisfactory (HS)
Efficiency	Satisfactory (S)
Overall Project Objective	Moderately Satisfactory (MS)
Introduction of HCW management and treatment	Moderately Satisfactory (MS)
Reduction of UPOPs releases	Moderately Satisfactory (MS)
Reduction of mercury releases	Satisfactory (S)
Country capacity to phase-out POPs releases	Satisfactory (S)
Overall likelihood of sustainability	Moderately Likely (L)
Institutional framework and governance	Likely (L)
Financial	Moderately Likely (ML)
Socio-political	Likely (L)
Environmental	Likely (L)

Summary of conclusions and recommendations

The Terminal Evaluation makes two types of recommendations. Recommendations on substantive matters are provided for consideration of the project partners in order to ensure the project results are fully consolidated with the key project stakeholders. These recommendations are suggested for implementation as soon as possible using the existing institutional capacities and frameworks that had been created by the current project.

The implementation experience from the UPOPs project allows that some conclusions could be generalized for all UNDP programming areas. Recommendations of the second type are provided for consideration of UNDP in order to improve programming and project preparation in general.

Recommendations to follow-up and/or reinforce initial benefits from the project:

Recommendation	Responsible party
1. Before the completion of the project, the four project teams should engage in intensive consultations with relevant local authorities (such as district/regional environmental authorities, public health offices and district/local councils). In particular, they should arrange visits of the autoclave treatment facilities by the local authorities and share with them reports and other information on testing of performance of the HCW sterilization.	National PIUs
2. Before the completion of the project, the UNDP COs in the four countries in cooperation with the national PIUs should establish institutional mechanisms for a post-project monitoring of performance of the autoclaves and periodic collection of information about amounts of HCW treated. The monitoring, led by the national health authorities, should start immediately upon closure of the project with monthly periodicity.	UNDP COs National PIUs
3. As part of the post-project monitoring, UNDP COs in the four countries should evaluate merits of the post-treatment on final disposal of autoclaved HCW and gather experience from operation and maintenance of the shredding and compacting devices. The lessons learned should be disseminated through relevant UNDP outreach channels.	UNDP COs
4. Relevant health authorities in the project countries should collect and disseminate experience from working cluster HCW treatment systems including formulas for calculation of tariffs for transportation of HCW and treatment at the autoclave cluster treatment centres.	National Health Authorities
5. In order to ensure continued after-warranty repair service of the installed autoclaves, the national health authorities and the project model HCFs in the four countries should establish national autoclave maintenance teams and/or contracting local external repair service companies. UNDP COs should be of assistance for identification of reliable local suppliers of necessary spare parts for the autoclaves.	National Health Authorities UNDP COs
6. Relevant health authorities in the four countries should establish procedures for sound post-project management of the central storage of mercury HCW and cooperate with holders of mercury waste in other sectors in order to identify final disposal option in line with provisions of the Minamata Convention.	National Health Authorities
7. Relevant health authorities in the four countries should assist national health training institutions to secure financing for continuation of training and re-training courses with HCWM modules for health workers.	National Health Authorities
8. UNDP IRH should ensure maintenance of the web repository containing the project knowledge products after closure of the project.	UNDP IRH
9. UNDP IRH should collect all technical reports, market studies and other results of the Lighthouse Projects and make them available through the web repository of the knowledge products.	UNDP IRH

Recommendations to improve programming and preparation of projects

Recommendation	Responsible party
10. For preparation of multi country projects with sizeable and staged equipment procurement components UNDP should plan minimum 5-years implementation period.	UNDP
11. For preparation of future multi-country projects with regional and national components, UNDP should follow the standard Objective-Outcome-Output-Activity pattern and construct project logframe matrix according to substantive topics and assign national or regional responsibility for implementation of individual Outcomes in the results matrix without clustering them according to the implementation responsibility.	UNDP
12. UNDP should ensure that updated information on actually materialized co-financing for GEF projects is reported in the last two PIRs.	UNDP
13. UNDP should carefully plan the conduct of Terminal Evaluations. In case TE mission is included in the TE plan, the TE mission should not be conducted earlier than three months before the project planned completion date.	UNDP

INTRODUCTION

In line with the GEF Evaluation Policy, a Terminal Evaluation (TE) is undertaken at completion of the GEF-funded projects to assess their performance (in terms of relevance, effectiveness and efficiency), and determine outcomes and impacts (actual and potential) stemming from the project, including their sustainability. It is conducted to provide a comprehensive and systematic account of the performance of a completed project by assessing its design, implementation, and achievement of objectives. TE is also expected to promote accountability and transparency, facilitate synthesis of lessons learned, and provide feedback to allow the GEF to identify issues that are recurrent across the GEF portfolio.

This document presents results of the Terminal Evaluation of the UNDP/GEF project “Reducing UPOPs and Mercury Releases from the Health Sector in Africa”. As a standard requirement for all projects financed by GEF, this terminal evaluation has been initiated by the Lead Implementing Agency, in this case UNDP Istanbul Regional Hub (IRH). The evaluation was conducted in accordance with the GEF Monitoring and Evaluation Policy², the Guidelines for GEF Agencies in Conducting Terminal Evaluations³, and the UNDP Evaluation Guidelines⁴.

Objective of the evaluation

The objective of the evaluation is to provide the project partners, i.e., GEF, UNDP and the Governments of the four beneficiary countries with an independent assessment and comparison of planned *vis-à-vis* actually achieved outputs and outcomes, identify the causes and issues which contributed to the degree of achievement of the project targets, and draw lessons that can improve the sustainability of benefits from the project, as well as contribute to overall enhancement of UNDP programming.

The Terms of Reference for the Terminal Evaluation is provided as Annex 1 to this report.

Scope and methodology

The evaluation covers all activities undertaken in the framework of the project. The time scope of the evaluation is the implementation period of the project, namely from April 2016 to April 2020. The geographic scope of the evaluation is Ghana, Madagascar, Tanzania and Zambia.

The Evaluation used a combination of approaches to assess the achievements of the project from several perspectives and a mix of quantitative and qualitative methods of data collection and analysis. Desk reviews, face-to-face meetings, and follow up with key stakeholders were applied as necessary. The evaluation was conducted in three phases as follows:

Preparatory phase: The first step in the evaluation was a desk review of the most important documents covering project design and implementation progress that provided the basic

² The GEF Monitoring and Evaluation Policy, Global Environmental Facility, November 2010

³ Guidelines for GEF Agencies in Conducting Terminal Evaluation for Full-sized Projects, Global Environmental Facility, April 2017

⁴ Evaluation Guidelines, UNDP, January 2019

information regarding the activities carried out to attain the desired outcomes and outputs and the actual achievements. The review was followed by preparation of questions and discussion points aiming at gathering information from chosen respondents about attitudes, preferences and factual information linked to the performance indicators in the evaluation matrix.

Evaluation Matrix: An evaluation matrix was constructed based on the evaluation scope presented in the TOR. The matrix is structured along the five GEF evaluation criteria for TEs and included principal evaluation questions. The matrix provided overall direction for the evaluation and was used as a basis for interviewing stakeholders and further review of the project implementation reports.

Apart from the evaluation questions on the relevance, efficiency, effectiveness, sustainability and progress to impacts, the evaluation matrix also included evaluation questions on cross-cutting issues relating to the promotion of values from a human development perspective, namely questions on gender equality and on social inclusion. The Evaluation Matrix is provided as Annex 2 to this report.

Evaluation Field Mission: Evaluation field mission to IRH and the four countries were conducted in order to conduct perform face-to-face consultations and individual/group discussions with the project stakeholders who have project responsibilities. This included the IRH project management team, the UNDP Country Offices, responsible partners (WHO, HCWH), national Project Implementation Units (PIUs), the Ministries of Health and Environment, management and staff of Health Care Facilities, project consultants, representatives of local governments, medical universities, private sector and NGOs.

The purpose of the mission was to verify the information from the project implementation reports, collect missing data and learn about the opinions of stakeholders and project participants. To the extent possible, visit of relevant project sites to make direct observations of selected project outputs were also conducted during the evaluation mission. 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 the collected information.

The preparation of the evaluation field missions was done in close coordination with IRH and the four PIUs in order to agree the timing of the missions as well as schedules of visits of the key informants. To the extent possible, visits of relevant project sites to make direct observations of selected project outputs were also conducted during the evaluation missions. The mission also served the purpose of collecting some additional documents to support the evidence base of the evaluation.

The missions to the four countries started with a briefing by the PIUs and the project team. Interviews with key stakeholders and project participants were planned in advance with the objective to obtain a critical sample of stakeholders' views during the time allocated to the evaluation missions. The interviews aimed at soliciting responses to predetermined questions using semi-structured interviews based on the discussion points in a conversational form. The interviews were designed to obtain in-depth information about the key informants' impressions and experiences in the project implementation. Through this approach, information obtained in

the document review phase was verified and some missing data were obtained including opinions of stakeholders and project participants. As some important stakeholders and/or beneficiaries could not be visited during the evaluation missions, their responses were solicited via other means such as e-mail communications or skype calls. The missions concluded with a presentation of initial findings to the UNDP and the project teams.

The itinerary of the evaluation missions and list of people interviewed during and after the evaluation mission are provided as respective Annexes 3 and 4 to this report.

During the extension phase, the evaluator gathered additional information through virtual interviews with the regional project team and the national project teams in the four beneficiary countries.

Assessment of Evidence: After the data collection phase, data analysis was conducted as the third and final phase of the evaluation through review of documents that were made available to the team by the project implementing partners as well as of other documents that the Evaluator obtained through web searches and contacts with relevant projects stakeholders and beneficiaries. This process involved organizing and classifying the information collected, tabulation, summarization and comparison of the results with other appropriate information to extract useful information that relates to the evaluation questions and fulfils the purposes of the evaluation. Contextual information was also gathered to assess the significance and relevance of the recorded performance and results.

Since the original Project Document did not contain any gender-specific activities, there was no upfront plan to explore gender issues in details. However, the gender-related study produced by the project was assessed in the course of TE.

The list of documents reviewed is provided as Annex 5 to this report.

Structure of the evaluation report

The structure of the TE report follows the “Evaluation Report Outline” presented in Annex F of the Terms of Reference for the assignment (contained in Annex 1 to this report).

The ‘Executive Summary’ of the report is provided in the beginning of the report. The body of the report starts with introduction and development context of the project and continues with a short project description. This is followed by the chapter that sets out the evaluation findings presented as factual statements based on analysis of the collected data. The findings are structured around the five essential evaluation criteria and include assessment of the project performance against the performance indicators and their target values set out in the project results framework (as provided in the Project Document). This part further includes assessment of the project management arrangements, financing and co-financing inputs, partnership strategies and the project monitoring and evaluation systems.

The final part of the report contains conclusions and recommendations substantiated by the collected evidence and linked to the evaluation findings. While the conclusions provide insights into identification of solutions to important issues pertinent to the project beneficiaries, UNDP and GEF, the recommendations are directed to the intended users in terms of actions to be taken and/or decisions to be made. This part of the report concludes with lessons that can be taken

from the evaluation, including best (and worst) practices that can provide knowledge gained from the particular project circumstances (such as programmatic methods used, partnerships, financial leveraging, etc.) that are applicable to similar UNDP interventions.

Limitations of the evaluation

A main constraint for this terminal evaluation is timing of the TE field missions. TE was commenced six months after completion of the Mid-Term Review (March 2019) and six months before the official closure date of the project (April 2020). According to the relevant GEF Guidelines, terminal evaluations should ideally be scheduled so that the evaluation mission occurs during the last three months prior to project operational closure, allowing the evaluation mission to proceed while the project team is still in place, yet ensuring the project is close enough to completion for the evaluation team to reach conclusions on key aspects such as project sustainability.

The evaluation field missions to the four beneficiary countries were conducted in the period 9 November – 13 December 2019, i.e., it started six months before the original project completion date 30 April 2020. Given the fact that the implementation of the 2nd phase of the project, based on the results of MTR, had commenced only in spring 2019, there were numerous activities still on-going during the data collection period of TE, including the 2nd round of procurement of HCWM equipment, tools and consumables conducted centrally by IRH and the decentralized procurement of mercury-free devices conducted in the countries. Consequently, TE could only obtain full information and feedback from the project stakeholders and capture of lessons learned regarding implementation of the 1st phase of the project. Since the 2nd phase activities were not completed during the field mission phase, the evaluation could not make observations and assess experience and lessons learned from key activities in the 2nd phase of the project, in particular from commissioning of additional model treatment facilities for Health Care Waste (HCW), installation and operation of HCW shredders, replacement of mercury-containing medical devices as well as from consolidation of results of country-specific projects.

The second limitation relates to the fact that within the standard one-week format of the evaluation field missions it was not possible to visit all model Health Care Facilities (HCFs) designated by the project. However, with the assistance of the four project teams, the evaluator tried to diminish the negative impact of the time constraints by making physical visits of as many as possible designated model HCFs and skip only those located far away from the capital cities of the participating countries. Consequently, the evaluator visited 20 out of the 24 model HCFs supported in the 1st phase of the project, in particular all 14 HCFs that received equipment of the non-incineration HCW treatment technology from the project.

PROJECT DESCRIPTION AND DEVELOPMENT CONTEXT

Project Context

To reduce the spread of HIV/AIDS and other infectious diseases from healthcare waste, and waste resulting from immunization campaigns, sub-Saharan countries have started to rely heavily on incineration. In the last few years though, there has been growing controversy over the incineration of health-care waste. Under certain circumstances, in particular when healthcare wastes that often contain polyvinyl chloride (PVC) plastics are incinerated at temperatures below 800 Celsius, dioxins, furans and co-planar polychlorinated biphenyls (PCBs) as well as other toxic air pollutants are produced as air emissions or end up as solid residues in the bottom or fly ash.

Long-term, low-level exposure of humans to dioxins and furans may lead to several adverse health effects, such as impairment of the immune system, deficiencies in the development of the nervous system, the endocrine system and the reproductive functions. Short-term, high-level exposure may result in skin lesions and altered liver function. Exposure of animals to dioxins has resulted in several types of cancer⁵.

Dioxins, furans and co-planar PCBs are persistent substances that do not readily break down in the environment, bio-accumulate in the food chain, and are able to travel long distances far away from the place of their origin. As they are considered a global threat to human and environmental health worldwide, these substances are controlled under the Stockholm Convention on POPs.

Waste treatment technologies that meet the Stockholm Convention's guidelines on Best Available Technologies (BAT) and Best Environmental Practices (BEP) and fit local circumstances are simply not affordable for the facilities and Governments in the sub-Saharan countries. Consequently, countries opt for low-cost medical waste incinerators, such as "De Montfort incinerators". Unfortunately, such incinerators, even if they are properly operated, emit significant levels of dioxins and furans. Moreover, poor maintenance and inadequate operation of the low-cost incinerators result in incineration at even lower temperatures and further aggravate the environmental pollution caused by such technologies.

Healthcare facilities are also a significant source of atmospheric releases of mercury that originate from mercury spills and disposal of mercury-containing devices, such as thermometers and sphygmomanometers. The use of mercury-containing devices in healthcare is widespread in the African region, mostly due to limited availability of low-cost mercury-free alternatives and lack of knowledge about their use.

Mercury used in the healthcare sector in the form of dental amalgam is a significant source of mercury discharge into the environment, including scrap amalgam and amalgam waste. In most sub-Saharan countries such wastes are predominantly discharged with wastewater into the sewerage, as there are often no solutions available to deal with such waste streams.

Mercury is a neurotoxin existing in various forms with different severe toxic effects on human and environmental health. Exposure to elemental mercury, mercury in food, and mercury vapors may pose significant health problems including kidney, heart and respiratory problems, tremors, skin rashes, vision or hearing problems, headaches, weakness, memory problems and emotional changes. Like POPs, mercury remains in the environment for decades, it is

⁵ WHO, Fact sheet N°281 (2011) <http://www.who.int/mediacentre/factsheets/fs281/en/>

transported long distances and is deposited in the air, water, sediments, soil and biota in various forms. Atmospheric Mercury can be transported long distances, is incorporated by microorganisms and is concentrated up the food chain. It is because of these characteristics, that Mercury is regarded as a global pollutant.

Because of the global threats to human health and the environment, the Minamata Convention on Mercury, which was adopted in October 2013, aims to reduce emissions of mercury from all sources, including gold mining, dental amalgam, chlor-alkali plants, coal combustion, waste incineration, smelting and many products containing mercury. In particular, the Convention prohibits the manufacture, import and export of mercury thermometers and sphygmomanometers by the phase-out date of 2020.

Project start and duration

The regional project aims to reduce the reliance of African countries on the heavily polluting low-cost incineration and demonstrate use of non-incineration technologies which will generate significantly less air pollutants than incinerators and other HCW combustion processes. Secondly, the use of non-incineration technologies can also provide the opportunity to recycle disinfected waste fractions, in particular plastics, and allow HCFs to recover part of their costs for HCW treatment by selling disinfected plastics to recyclers.

Furthermore, the project aims to support the beneficiary project countries in phasing-out the use of mercury-containing medical devices and adopting measures for reducing releases of mercury and meeting thus the obligations of the Minamata Convention.

The regional project request was received by GEF on 29 August 2011. For elaboration of the project, a Project Preparatory Grant (PPG) was approved on 5 July 2012 and the Project Concept on 1 June 2013. The project was approved for implementation as a full-size project on 25 September 2014. The project was endorsed by the four beneficiary governments between October 2015 and April 2016 and the last endorsement has officially marked the start of the project implementation.

The GEF project grant approved for the regional project amounts to US\$ 6,453,195 complemented with expected total co-financing US\$ 28,936,164 composed of contributions from various stakeholders such as UNDP, WHO, national governments and private sector. The total commitment of resources at the project inception was thus US\$ 35,389,359.

The project was executed by the UNDP Istanbul Regional Hub (IRH) through the Direct Implementation Modality (DIM) under technical oversight by the UNDP Montreal Protocol/Chemicals Unit. Under DIM, IRH assumed the role of the Implementing Partner that included the overall management responsibility and accountability for delivery of the planned project outputs under the regional component.

The national project components were executed according to the National Implementation Modality (NIM) where responsibility for the implementation of the national project components was vested in National Implementing Entities (NIEs) designated by the four National Governments. NIEs assume full responsibility for the effective use of project resources and the delivery of delivery of the national components' outputs.

Problems that the project sought to address

The baseline presented in the approved project document identified numerous challenges pertaining to Health Care Waste Management (HCWM) encountered in the four project beneficiary countries. Although these challenges vary from country-to-country, in general they can be summarized into the following categories:

Inadequate financial resources allocated to HCWM

Low prioritization for HCWM among the national stakeholders (e.g., including ministries in charge of health and finance, regional governments and HCFs) results in allocation of insufficient financial resources for proper management of healthcare waste as HCFs are often unaware of real costs, resulting in too low or even no budget allocation for HCWM.

There has also been lack of international development assistance. Even though numerous donors support health sector programmes in Africa, many development partners in the health sector are not primarily interested in HCWM hence only few aspects related to HCWM if any are taken up in these programs. The lack of donor interest is caused by relatively high capital investment for HCW treatment and disposal options that meet international BAT/BEP standards.

Policies and regulations

There is a general lack of a specific national policies on HCWM that causes insufficiencies in legislation/regulations governing the management of HCW and other hazardous discharges and reluctance of HCFs to adopt and implement HCWM procedures. Wherever some national standards and procedures governing HCWM exist, they are not adequately enforced due to lack of specific fees and penalties those acting in contrary to the existing standards and procedures. Moreover, insufficient institutional capacity of national enforcement agencies causes lack of oversight and monitoring of HCFs and waste transportation/ disposal companies as well as prevent observation and proper implementation of the best HCWM practices.

Low awareness and low capacity

Generally, the in-country knowledge on HCWM is low and relevant technical guidelines and Standard Operation Procedures (SOPs) on HCWM are not available at many HCFs. This causes low awareness among health workers on the risks related to handling of infectious waste and insufficient knowledge and skills on how to manage HCW streams. Healthcare professionals, including Environmental Health Officers (EHOs), often do not receive formal training on HCWM (pre-service training, training upon entry-into service for new staff, and regular refresher courses) but have to learn by doing the daily work instead. The above deficiencies result in:

- Lack of standard procedures for collection, segregation and transportation of HCW;
- Poor separation and/or pre-treatment of highly infectious waste before final treatment/disposal;
- Inadequate operation of waste treatment technologies;

Poor quality or absence of HCW treatment technologies

Technologies for HCW treatment meeting BAT/BEP requirements are expensive and therefore not affordable for many HCFs in the African region. In the absence of standardized methods or guidelines for the treatment of HCW, the preferred methods of HCW disposal are open burning, using old-fashioned single chambered burners or dual-chambered incinerators without pollution control equipment. Many of these technologies are poorly maintained and operated thereby exacerbating the problem.

Insufficient maintenance and repair

Poor operation, bad maintenance and absence of repair capacity remain the main reasons for sub-optimal functioning of the existing HCW disposal technologies and cause frequent breakdowns of the HCW treatment facilities. This problem is further impaired by either completed absence or low capacity of maintenance teams at national/regional/district level as

well as at HCFs level in terms of manpower, know-how, spare parts and funding for periodic servicing and repair.

Inadequate infrastructure and lack of disposables

Very often there are no separate storage facilities available on HCFs' premises for infectious and municipal waste. Some HCFs simply mix their infectious waste with municipal waste for disposal at dumpsites designated for municipal waste. HCW is sometimes placed in an open space or next to the incinerator and is exposed to the effect of weather and scavenging animals. Also, personal protective equipment (PPE) is either not available or only few items of the recommended PPE are used by the HCW handlers. The inappropriate procedures cause significant releases of UOPs and mercury.

Due to lack of waste segregation posters, access to incinerators and waste storage points is often not restricted, creating opportunities for unauthorized personnel and animals to access. This is complemented by inadequate HCWM equipment and consumables as such items are not included in the catalogues maintained by the national health authorities.

Lack of mercury baseline data

At the project preparation stage, none of the project countries had undertaken a detailed Mercury Inventory (Level 2) or started a Minamata Initial Assessment (MIA), although Madagascar and Zambia had conducted a Level 1 Mercury Inventory (in 2008 and 2012 respectively). In Ghana and Tanzania where no inventories had been undertaken, auxiliary tools for estimation of mercury releases were used for the regional project preparation, such as the UNEP's Simplified Toolkit for Identification and Quantification of Mercury Releases for calculation of the amount of mercury used and the average release factor per hospital bed for mercury releases from the breakage of medical devices (thermometers and sphygmomanometers).

Immediate and development objectives of the project

A project's theory of change provides a basis for evaluation of the project resources, activities, outputs, outcomes, intended long-term environmental impacts of the project, causal pathways for the long-term impacts as well as implicit and explicit assumptions.

In order to address the above listed baseline deficiencies, the regional project seeks to:

- Implement best environmental practices and non-incineration and mercury-free technologies to help the beneficiary countries meet their Stockholm Convention obligations and to reduce mercury use in healthcare;
- 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 intends to achieve these objectives through the following main interventions:

- Build national capacities to enable the assessment, planning, and implementation of healthcare waste management (HCWM) systems;
- Develop/improve the national policies and regulatory frameworks pertaining to HCWM;
- Make available affordable non-incineration HCWM systems and mercury-free devices that conform to BAT and international standards;
- Demonstrate HCWM systems, recycling, mercury waste management and mercury reduction at selected project HCFs;
- Establish national HCWM training infrastructures; and

- Create awareness on HCWM;

The project was designed for phased implementation. The initial stage aimed at provision of support for HCWM systems and mercury-free devices to one central/cluster treatment facility, two hospitals (up to 300 hospital beds) and three rural health posts or dispensaries in each of the four countries, i.e., in total 24 facilities, to be taken as “model” facilities for the next stage. The second stage focused on improved HCWM in additional facilities (14 additional HCFs averaging 150 beds each and 12 additional rural health posts) selected after the Mid-Term Review (MTR) on grounds of criteria agreed upon by the project countries.

Because the HCWM situation in the four project countries is different, the size and type of HCFs supported by the project varied from country to country and so do their locations and the circumstances under which they operate.

Furthermore, the project aimed at reduction of the reliance of the beneficiary countries on heavily polluting low temperature incineration and create a tipping point for the use of non-incineration technologies which will generate significantly less air pollutants than incinerators and other high-heat thermal processes. The use of non-incineration technologies is expected to provide an opportunity to recycle disinfected waste fractions, in particular plastics, and allow HCFs reduce their costs for waste treatment by selling shredded plastics to recyclers.

The second major component of the project was designed to support efforts for introduction of measures to reduce the import and use of mercury-containing medical devices in the four countries.

Baseline indicators established

Table 1 below provides a summary of the project baseline and expected results.

Table 1: Baseline and expected results at the level of the project objective

Baseline	Expected results
In the project countries, 1 nonworking technology present in Tanzania, 1 working autoclave in Ghana and none in Madagascar, the status could not be assessed in Zambia Affordable non-incineration technologies not available to African HCFs	Non-incineration technologies and mercury-free medical devices introduced at 4 central treatment facilities, 22 hospitals and 24 health posts
UPOPs baseline: Ghana: 19.8 g-TEQ/y (preselected hospitals) Madagascar: 4.0 g-TEQ/y (preselected hospitals) Tanzania: 1.7 g-TEQ/y (preselected hospitals) Zambia: 6.3 g-TEQ/y (preselected hospitals)	Amount of UPOPs releases from HCW incinerators reduced by 31.8 (g-TEQ/y)
Mercury baseline: Ghana: 8.2 kg/y (pre-selected hospitals) Madagascar: 2.8 kg/y (preselected hospitals) Tanzania: 6.3 kg/y (pre-selected hospitals) Zambia: 8.0 kg/y (pre-selected hospitals)	Amount of mercury releases from the health sector reduced by 25.3 (Kg/y)
The regulatory and policy frameworks in the four project countries do not cover all medical waste management challenges facing the project countries	Completed draft, revision or adoption of a national policy, plan, strategy, standard and/or guidelines in each country

Project components

The project consists of 4 substantive components and 15 substantive outcomes as summarized in Table 2 below. The 5th Component and corresponding Outcome is related to monitoring,

learning, adaptive feedback and evaluation. The complete project results framework as it was incorporated in the approved Project Document is provided as Annex 7 to this report.

Table 2: Components and outcomes of the project

Component No. and Title	Outcome No. and Description
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)	1.1. Technical guidelines, evaluation criteria and allocation formula adopted 1.2. Country capacity to assess, plan, and implement HCWM and the phase-out of mercury in healthcare built
2. Healthcare Waste National plans, implementation strategies, and national policies in each recipient country (national)	2.1. Institutional capacities to strengthen policies and regulatory framework, and to develop a national action plan for HCWM and Mercury phase-out enhanced 2.2. National Plan with Implementation Arrangement adopted
3a. Make available in the region affordable non-incineration HCWM systems and mercury-free devices that conform to BAT and international standards (regional)	3a. Favourable market conditions created for the growth in the African region of affordable technologies that meet BAT guidelines and international standards
3b. Demonstrate HCWM systems, recycling, mercury waste management and mercury reduction at the model facilities, and establish national training infrastructures (national)	3b.1. HCWM systems demonstrated at the model facilities 3b.2. Reduction in greenhouse gas emissions through recycling demonstrated 3b.3. Mercury reduction in the model facilities demonstrated 3b.4. Institutional capacities for national training strengthened
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)	4a.1 Capacities of recipient countries to absorb additional technologies evaluated 4a.2. Additional technologies distributed depending on evaluated capacities for absorption
4b. Expand HCWM systems and the phase-out of mercury in the recipient countries and disseminate results in the Africa region (national and regional)	4b.1: HCWM systems expanded to other facilities in the country 4b.2: Country capacity to manage mercury and to phase in mercury-free devices improved 4b.3: National training expanded 4b.4: Information disseminated at environment and health conferences in the region
5. Monitoring, learning, adaptive feedback, outreach, and evaluation (regional)	5: Project's results sustained and replicated

Main project stakeholders

Primary stakeholders are those directly involved in implementation of the project. National Implementing Entities/Responsible Partners for the national components in three countries were the Ministries responsible for the health area and in Madagascar jointly the Ministries responsible for the areas of environment and health.

In general, responsibility of the Ministry of Health includes organizing a safe and environmentally sound system for the management of healthcare waste generated by all government, mission, private and health facilities in the country and facilitate and support various measures directed towards managing environmental impacts from the health sector.

Responsibility of the Ministry of Environment includes providing policies pertaining to environmental protection e.g., such as national environmental policies, environmental management acts and their regulations, programmes and projects.

Apart from the primary stakeholders, there are a significant number of other stakeholders involved in HCWM at national level. The original Project Document contains a generic list of types of stakeholders to be involved in the implementation of the project. A concrete list of national stakeholders had been provided in each of the national Project Documents that served as source documents for compilation of the regional Project Document.

FINDINGS

Project design/formulation

This section provides a descriptive assessment of the achieved results. In addition, several evaluation criteria are marked in line with the requirements for GEF Terminal Evaluations.

Analysis of the project results framework

As mentioned at the end of the previous section, the project results framework is composed of 4 substantive components and total of 15 substantive outcomes.

There are logical links between the project overall objectives and the four substantive project components. Specifically, Component 1 is related to the establishment of necessary institutional and policy frameworks through capacity building and Component 2 to revision of policy and regulatory frameworks required for implementation of improved HCWM systems and mercury phase-out.

Component 3 is dedicated to introduction and demonstration of innovative HCWM systems, non-incineration HCW treatment technologies and mercury-free medical devices to an initial set of designated model HCFs. Component 4 is devoted to expansion of the HCWM systems to additional HCFs based on thorough evaluation of absorption capacities of the four beneficiary countries for additional HCW management and treatment systems.

Despite the overall sound structure, a more detailed analysis of the project results framework revealed several internal inconsistencies within the logframe.

Firstly, instead of the standard array Objective-Outcome-Output this results framework uses different order, namely Objective-Component-Outcome-Output. This appears to be a deviation from the standard project results framework template that contributes to the internal project logframe inconsistencies summarized in Table 3 below.

Table 3: Internal inconsistencies in the UOPs project results framework

Project result	Indicator	Comments
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	Mid-term evaluation criteria and formula for allocation of technologies amongst countries available 4 teams of national experts trained at regional level	The Component 1 appears to be a mix up. While technical guidelines and training of teams of national experts belong to the capacity building that is the contents of Component 1, development of mid-term evaluation criteria for allocation of additional technologies fits better under Component 4 (evaluation of the countries' capacities for absorption of additional technologies). The text of Component 1 is formulated as description of activity than of a project result The second indicator is not an indicator but target value of the indicator. There is no indicator defined for the dissemination of technical guidelines.
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 Outcome 2.2. National Plan with Implementation Arrangement adopted	Indicators in country annexes National action plans for each project country developed	While Outcome 2.1 is related to development of national (i.e., country-wide) Action Plan on HCWM and mercury-phase-out, Outcome 2.2. is related to the project specific action plans for designation of model HCFs and implementation of the specific project interventions in the four countries Use of the wording "Action Plan" at both levels makes a confusion. Outcome 2.2 would better fit under Component 3B (demonstration of HCWM systems, recycling and mercury waste management) that is related to the project specific interventions
Outcome 3a: Favourable market conditions created for the growth in the African region of affordable technologies that meet BAT guidelines and international standards	Number of HCWM systems and mercury-free devices procured and installed/distributed	The indicator does not measure achievement of the Outcome since the latter is formulated as a far distant result (impact) not achievable by this project intervention. In other words, it is not possible to create favourable market conditions for affordable technologies in the African region by a relatively small demonstration project implemented in four countries only.
Outcome 3b.1: HCWM systems demonstrated at the model facilities Outcome 3b.2 Reduction in greenhouse gas emissions through recycling demonstrated Outcome 3b.3: Mercury reduction in the model facilities demonstrated Outcome 3b.4: Institutional capacities for national training strengthened	Number of project HCFs that have introduced BEP Number of HCF staff trained in BEP & BAT Number of project HCFs that have operational BAT Number of project HCFs that have recycling programmes in place No. of project countries that have storage sites for phase-out Hg-containing devices Number of mercury-free project HCFs Number of institutions that offer HCWM training/certificate courses	The Outcomes 3b.1 – 3b.3 are related to the main focus of Component 3B (demonstration of HCWM and mercury reduction while Outcome 3b.4 would better fit under the capacity building Component 4
Outcome: 4a.1 Capacities of recipient countries to absorb additional technologies evaluated Outcome: 4a.2 Additional technologies distributed depending on evaluated capacities for absorption	Evaluation report (incl. recommendations for each project country and HCF) Number of HCWM systems and mercury-free devices procured	Outcome 4a.1 is not a result but a milestone on the way towards the procurement and distribution of additional HCWM and mercury-free systems
Outcome 4b.1: HCWM systems expanded to other facilities in the country Outcome 4b.2: Country capacity to manage mercury and to phase in mercury-free devices improved Outcome 4b.3: National training expanded Outcome 4b.4: Information disseminated at environment and health conferences in the region	Number of HCFs supported in addition to the initial set of HCFs Number of mercury-free project HCFs in addition to the initial set Number of people trained in addition to the initial set of trained HCF personnel List of environment and health conferences in the region	Outcomes 4b.1 and 4b.2 would be better aggregated under a single Outcome (similar to Outcome 3a) Outcome 4b.3 is related to capacity building and would therefore better fit to Component 1 Outcome 4b.4 is related to project outreach hence it would better fit under Component 5

It follows from Table 3 that the project Components were formulated too broadly and the project results framework does not fully follow the overall structure and main focus described

in the title of each individual project component. It appears that at the preparation of the results matrix too much attention was paid to grouping of the substantive Outcomes into regional and national clusters and this resulted in loss of internal consistency in the logframe matrix.

The division into four substantive and one non-substantive Component had been outlined at the project concept stage (PIF) and the same structure of the project results framework was followed in preparation of the full-size Project Document with the exception that while PIF had total 18 Outcomes, the Project Document has only 15 Outcomes. The original 4 separate Outcomes in PIF (3.b.1 – 3.b.4) were clustered into a single composite Outcome 3.b.1 in the Project Document that appears to be too multifaceted. The original division into the four separate Outcomes would have made monitoring and reporting on progress towards their achievement easier and more straightforward.

It is understood that the split Components 3A/3B and 4A/4B were created for the purpose of separation of the regional (A) and national (B) Outcomes. While this intention was achieved for Components 3A/3B, the split of Component 4A/4B resulted in a mix-up. Component 4A contains two regional Outcomes while Component 4B is a conglomerate of three national and one regional Outcomes.

Although the title of Component 5 reads “Monitoring, Adaptive Feedback, Outreach and Evaluation”, it contains only the single Outcome 5 that does not contain any outreach element and indicator as outreach is included under Component 4 (Outcome 4.b.4).

Indicators selected for measurement of achievement of the project Outcomes are SMART (Specific, Measurable, Achievable, Relevant, Time-bound) with exception of Outcome 3a that was formulated as a result too distant in the results chain that is not measurable by the proposed indicator.

Contrary to the standard practice of preparation of project results matrices, the logframe matrix table in the Project Document does not contain outputs and the latter are only mentioned in the text prior to the matrix table. However, there is only one output under each of the outcome and the outputs are characterized by almost identical description as the parent outcome.

Participants of the 1st RPB meeting decided that each country would undertake one or two specific activities on piloting strategies on selected waste streams (so called country flagship activities or “light tower” projects). The additional agreed activities were not added to the original project result matrix together with indicator(s) and target value(s) to enable measurement of progress in their implementation. This could had been done immediately at the same RPB that had approved the country flagship activities or at the following RPB meeting. This standard practice had not been followed. Moreover, although MTR made a descriptive assessment of progress under the country flagship projects two years later, the MTR report did not recommend amendment of the results framework either.

In summary, the project results matrix contains several inconsistencies that impede reporting on project progress (in particular the PIRs and use of the results matrix as a tool for monitoring the project progress).

Assumptions and risks

Identification of risks enables project managers to recognize and address challenges that may limit the ability to achieve planned performance outcomes. Annex VI of the Project Document provides overview of risks to achievement of this project’s goals including risk rating as well as corresponding risk mitigation measures. A deviation from the standard practice of GEF-funded projects was noted as the level of risks should be rated in terms of impact and probability.

Out of the total eight risks identified at the project inception stage, two relate to adoption and implementation of national HCWM policies by the project participating countries, two to procurement of HCWM technologies, three to implementation of BAT/BEP practices by the beneficiary HCFs and one to achievement of local and global benefits of the project. The above analysis of the original risk matrix is summarized in Table 4 below.

Table 4: Analysis of the UPOPs Project original risk matrix

Description of risk	Rating	Risk area
1. Lack of clarity of the roles and responsibilities of the two key ministries (Ministry of Health and the Ministry of Environment/National Environment Protection Agency) related to aspects of HCWM resulting in no leadership, conflicting decisions, duplication, or slow implementation of project components	M	HCWM policies
2. Slow or no enhancement, adoption and implementation of national policies, plans and strategies (including guidelines and standards) on HCWM which are key in creating an enabling environment for replication of BAT/BEP across the country	M	HCWM policies
3. Slow or poor implementation of BAT/BEP practices in healthcare facilities, related infrastructures, technologies, mercury phase-out, and/or training programs	M	HCWM practices
4. Technology procurement beset by delays, inadequate equipment, wrong specifications, lack of transparency, or non-compliance with UN bidding requirements and procedures	L	Procurement
5. Healthcare facilities discontinue the use of Best Environmental Practices after the project comes to an end, and discontinue the maintenance of BAT resulting in their ultimate breakdown and return to open burning and incineration	? ⁶	HCWM practices
6. Insufficient number of technology suppliers involved in the bidding and/or high purchase costs	M	Procurement
7. Little confidence of healthcare facilities and providers in non-incineration and mercury-free technologies, resulting in continued use of inadequate incinerators and mercury devices	L	HCWM practices
8. The open burning of HCW at landfills or hospital sites creates greenhouse gas (GHG) emissions in the form of CO ₂ , CH ₄ , etc. In addition, the transportation of large amounts of HCW waste to landfill and dump sites, due to insufficient segregation practices, results in additional unnecessary GHG emissions. Finally, certain hospitals sell PVC containing medical plastics to recyclers, however inadequate thermal processes, both practiced at healthcare facilities and by recyclers, are sources of GHGs releases. All these aspects contribute to climate change risks	L	Local and global benefits

The majority of the above risks did not materialize and therefore no mitigation actions were required to be taken. The risk No. 7, namely limited confidence in use of mercury-free medical devices was experienced amongst health professionals in some model HCFs but this was well addressed by intensive and targeted advocacy efforts of the national project teams.

Technical assessment of the introduction of the non-incineration HCW treatment to the selected model HCFs proved that poor operation, bad maintenance and absence of repair capacity remain the main reasons for sub-optimal functioning and frequent breakdowns of the installed equipment. This is caused by low capacity of local maintenance teams in terms of manpower, technical skills and capacity as well as insufficient funding for regular preventive and corrective maintenance. The project teams have taken a number of measures to address this issue, such as provision of auxiliary equipment for optimal water and electricity supply to the autoclaves,

⁶ Rating not provided in the original Project Document

arrangements with the equipment supplier for provision of spare parts, training and re-training of autoclave operators and local maintenance teams, as well as elaboration of SOPs for communication of technical problems between the beneficiary HCFs and local representatives of the equipment supplier. Despite these efforts, the interviews with representatives of the model HCFs and other relevant stakeholders indicated that equipment maintenance capacity and affordability of the spare parts remain as the main challenges for the future operation of the autoclaves. The same concern has also been expressed in the final report of the Regional Technical Advisor.

Based on the above, probability of discontinuation of the non-incineration technology and return to the old practice of open burning of medical waste is relatively high if smooth running of the autoclaves can't be guaranteed beyond the project completion date. Therefore, the risk No. 5 in Table 5 is persisting and should have been designated and addressed as critical for sustained use of the autoclave technology.

As a standard practice of UNDP-implemented projects, submitted, the risk log based on the initial risk analysis shall be regularly updated in UNDP ATLAS and new risks (if identified) added to the risk matrix. Risks rated as critical (i.e., when both impact and probability are high) and corresponding mitigation measures are reported in annual Project Implementation Reports (PIRs).

The 2017 PIR has identified one critical risk to the project implementation as follows:

Insufficient/inadequate infrastructure in health care facilities could delay procurement action

Provision of the non-incineration HCWM technology under the project is based on a premise that each model facility designated to receive the autoclave technology will either re-furbish the existing or construct a new infrastructure that will accommodate the autoclave(s). Since that requires substantive investments from the facilities, the above risk was considered critical as the selected pilot HCFs facilities in all four project countries face infrastructural challenges as well as budgetary limitations.

Mitigation of this risk was brought to the level of the Regional Project Board and the latter recommended that the project should prepare a Memorandum of Understanding (MoU) with each designated model HCF as an expression of mutual agreement on division of responsibilities between the project and the beneficiary HCFs. Since the MoUs had been approved by the Ministries of Health, signing of the MoUs also exposed the respective MoHs to the need of infrastructural adjustments that require allocation of additional funding for the model facilities.

The project provided technical support on designs for the construction works, guidance on human resource needs and assisted with obtaining necessary environmental permits. The national project teams closely monitored the preparatory activities at the level of the model HCFs in monthly progress reports.

No additional critical risks were identified or reported in the 2018 and 2019 PIRs.

While the way of management of the above critical risk is commendable, it is the opinion of the evaluator that this risk should have been identified at the PIF/PPG stage when several of the HCFs later selected as model HCFs had been visited by the project preparation teams.

Lessons from other relevant projects incorporated into project design

The design of the project learned from implementation of the UNDP/GEF/WHO Global Health Care Waste (GHCW) project⁷ in several ways. Firstly, as recommended by the GHCW TE report from GHCW, the project teams from the four countries and national technical consultants were brought together at the project start for training on technical issues and project implementation. This approach facilitated interactive discussions on work plans and enabled uniform approach as well as collective understanding of the project goals and implementation modalities.

Secondly, the UPOPs project had built upon and taken full advantage of the GHCW project results and incorporated lessons learned in terms of setting up cost-effective models of central or cluster HCW treatment facilities and providing support to improve the existing HCWM practices in the model HCFs through carefully planned allocation of technical assistance, equipment for HCW segregation and transport, as well as training of health professionals.

Thirdly, based on the cost data related to HCWM and treatment scenarios recorded in GHCW project, the funding levels of each of the activities proposed as part of the regional UPOPs project were based on actual costs incurred under GHCW project. This enabled comparable calculations of the funding level of the current project proportional to the level of activities planned while considering local conditions.

Last but not least, this project incorporated lessons learned from organization of procurement for multiple countries. In order to avoid problems originating from the countries' different procurement policies and procedures, a centralized procurement approach was adopted including procedure for common agreement on technical specification by all ultimate beneficiaries before issuing the procurement documents.

In order to ensure timely and cost-effective central procurement of non-incineration technologies, the Procurement Support Unit – Health (PSU – H) of the UNDP Nordic Office was designated to assume the central procurement function in order to benefit from the extensive experience and expertise in the procurement of health sector supplies and achieve cost reductions resulting from long-term agreements with health care equipment suppliers and bulk purchasing. However, this intention did not materialize due to the reasons explained in the text under “Adaptive Management”.

Planned stakeholder participation

Throughout the project's preparation phase (PPG/PIF), a wide range of stakeholders involved in HCWM at national level had been consulted through bi-lateral meetings, national stakeholder and consultation meetings, as well as HCF assessments.

The project's principal stakeholders are the Ministries of Health in the four beneficiary countries, as well as the Ministries responsible for Environment in Madagascar and Zambia. Other primary stakeholders that are involved include UNDP IRH, as well as the four UNDP Country Offices, the designated model HCFs, the World Health Organisation (WHO), the NGO Health Care Without Harm (HCWH) and national educational institutions with educational programmes for health care professionals. Peripheral stakeholders included private clinics and/or health centres, recycling companies, and local NGOs.

⁷ Global Project on Demonstrating and Promoting Best Techniques and Practices for Reducing Health-Care Waste to Avoid Environmental Releases of Dioxins and Mercury, GEF/UNDP, implemented in 2008-2012.

In the section on description of project components, outcomes and outputs, the Project Document contains concrete suggestions for involvement of various national stakeholders in implementation of the project.

The entry point for involvement of the key project stakeholders were meetings of the National Project Board (NPB) that oversaw all activities of the project at the level of the beneficiary countries. Typically, membership of NPBs included designated senior representatives from the Ministries in charge of the health and environment areas, the country WHO and UNDP offices, and usually also included representation from the national health care sector facilities.

A broader stakeholder participation was ensured through meetings of the National Working Group (NWGs) composed of individuals from relevant governmental agencies and HCFs with interest and/or practical involvement in the project activities. Typically, the NWGs included representatives from the health and environment ministries, UNDP and WHO Country Offices, regional directorates of the health sector, designated model health care facilities, and eventually also representatives of waste service providers. The NWGs served the purpose of consultations with the wider range of stakeholders and provision of expertise and advice on project-related policy and technical issues.

Replication approach

The project replication approach is based on three substantive pillars, namely i) capacity building for introduction of HCWM systems, ii) improvement of national HCWM policies and legal frameworks and iii) practical demonstration of the non-incineration HCW treatment technology and mercury phase-out at the level of designated model HCFs.

The replication approach in the capacity building pillar was based on creation of a pool of qualified national trainers through the train-the-trainers model and cascading the training on best practices in HCWM down to health care workers and environmental technicians at the regional and in some cases also district levels. Specific practices of the pilot HCFs were evaluated and incorporated into training curricula developed by national training and educational institutions.

The replication in the area of national policy and legal frameworks focussed on elaboration and/or revision of HCWM policies, technical guidelines and SOPs at the country level and their adoption by the project model HCFs and beyond. Lessons learned from the model facilities also provided valuable experience from implementation of the HCWM practices and technologies for integration into national legislation, policies and/or regulations.

For the pillar of demonstration of the HCWM systems and technologies including mercury phase-out, the project replication strategy was to focus on selected pilot model HCFs. The designated model HCFs included teaching/university hospitals or cluster of hospitals. This selection was done on purpose as teaching hospitals usually belong to prime national HCFs often are affiliated with medical schools that provide education and training to future and current health professionals. Hence using teaching hospitals as the model HCFs in the project ensures continued exposure of medical students and trainees to properly implemented HCWM systems and procedures and to use of mercury-free medical devices.

Large-scale rollout of the training for health care and waste management professionals coupled with demonstration of effective functioning of HCWM systems and technologies provides a solid foundation for future extension and replication as well as for further health care sector development in the project beneficiary countries.

UNDP comparative advantage

In general, UNDP is well equipped to assist the developing countries in addressing their needs and priorities due to its focus on poverty reduction, pro-poor economic policies and environmental sustainability. Hence, the organization has tools to support countries in pursuing a balanced inclusive and sustainable growth patterns.

The essence of UNDP's comparative advantage for the GEF-funded projects is embedded in its global network of country offices, its experience in integrated policy development, human resources development, institutional strengthening, and non-governmental and community participation. In addition to UNDP proven track record on promoting, designing and implementing activities consistent with the GEF mandate and national sustainable development plans of the developing countries, UNDP also has extensive inter-country programming and implementation experience.

A key part of UNDP's comparative advantage is the role of knowledge management broker, i.e., in accumulation of first-hand experience from implementation of projects in specific technical areas. As one of the implementing agencies for GEF, UNDP has been expanding its work on elimination of UPOPs and promotion of human health protecting and environmentally friendly solutions for achievement of the Sustainable Development Goals (SDGs). Specifically, UNDP has acquired substantive experience from introducing to West Africa a South African state-of-the-art autoclave technology for treatment of infectious Ebola healthcare wastes and from pioneering non-incineration healthcare waste treatment technologies and mercury-free medical devices in Kazakhstan and Kyrgyzstan.

Besides the specific technical areas of POPs and health care waste management, UNDP has a long-standing experience in developing and implementing coherent packages of "hard" and "soft" interventions that make technology transfer successful when complemented by targeted strengthening of relevant human and institutional capacities.

UNDP's specific strengths include a proven ability to influence policy and develop national capacities through its focus on cross-sectoral approaches and collaboration with a wide range of national stakeholders. In this regard, UNDP has built a very good reputation with diverse stakeholders in the four project beneficiary countries. Such high esteem was found very conducive for facilitating access to and cooperation with the project partners and stakeholders in the implementation phase of this project.

Linkages between project and other interventions within the sector

The UPOPs Project has been closely linked with the Sustainable Health in Procurement Project (SHiPP) developed by United Nations Development Programme (UNDP) in collaboration with Health Care Without Harm (HCWH) and funded by the Swedish International Development Agency. SHiPP began its implementation in January 2018 and its main objective is reducing the harm to people and the environment caused by the manufacture, use and disposal of medical products and by the implementation of health programs.

In its first phase, SHiPP engages with a group of lower and middle-income countries with the aim to develop and pilot a set of sustainable health procurement practices and policies that synergize with the Sustainable Procurement in the Health Sector (SPHS) initiative of greening the global health sector through UN Agencies and other international organizations, multilateral agencies and bilateral donors. Two of the UPOPs Project beneficiary countries, namely Tanzania and Zambia, are amongst the SHiPP project countries.

Furthermore, the UPOPs Project was linked to the Water, Sanitation and Hygiene (WASH) in health care facilities launched jointly by WHO and UNICEF that aims to ensure that by 2030

all health-care facilities have basic services, including safe healthcare waste management consisting of waste segregation, collection, transportation, treatment and disposal.

Management arrangements

The project was implemented by the United Nations Development Programme (UNDP), under the guidance of the UNDP Montreal Protocol Unit/Chemicals. The latter provided project oversight through the UNDP Istanbul Regional Hub (IRH).

The regional components of the project were executed applying the Direct Implementation Modality (DIM) through the UNDP Istanbul Regional Hub. According to the original Project Document, procurement of the non-incineration technologies for each of the project countries and healthcare facilities was to be delegated to PSU - H under the UNDP Nordic Office. However, due to the high costs of the involvement the entire procurement role was assumed by IRH Procurement Unit.

The day-to-day management of the UOPs Project was carried out by the Regional Project Team (RPT) composed of the Regional Project Coordinator (RPC), Regional Technical Adviser (RTA) and Regional Administrative Assistant (RAA). RPT managed the project under overall guidance of the Regional Project Board (RPB) that was established to oversee and guide the project implementation processes, monitor the project progress, and to support the project in achieving targeted outputs and outcomes.

RPB was composed of the following:

- Executive: UNDP IRH Manager
- Senior Supplier: Montreal Protocol and Chemicals Unit, UNDP IRH and HIV, Health and Development Unit, UNDP IRH
- Regional Technical Expert UNDP IRH
- Senior Beneficiary: Representatives from the Governments and UNDP Country Offices of the 4 participating countries
- Project Coordinators: Regional Project Coordinator and 4 National Coordinators
- Cooperating Agencies: Healthcare Without Harm (HCWH) and World Health Organization

RPB meetings were organized annually as summarized in the Table 5 below.

Table 5: Summary information on meetings of the Regional Project Board

Meeting No.	Date	Venue
1	23 September 2016	Johannesburg, RSA
2	1 June- 3 June 2017	Istanbul, Turkey
3	14 May 2018	Zanzibar, Tanzania
4	12-15 December 2018	Cape Coast, Ghana
5	5 September 2019	Antananarivo, Madagascar
6	4-11 December 2020	Virtual through e-mail ⁸

RPB meetings were open to all project stakeholders but the voting rights had been assigned only to the UNDP IRH representatives, one senior level official designated by each of the

⁸ The PB meeting in Lusaka, Zambia could not be organized in March 2020 as planned due to COVID-19 pandemics. The last regional PB was scheduled as an email-based on 4-11 December 2020, back-to-back with the virtual Regional Closure Workshop on 1-3 December 2020.

participating Governments and one representative each from the international partner agencies (WHO and HCWH).

In line with the DIM rules and regulations, UNDP assumed the dual role of the implementing partner and the execution agency that included implementation of the regional components of the project, facilitation of regional coordination, oversight and reporting to GEF on all aspects of the project, as well as provision of guidance on GEF and UNDP rules and regulations and financial management of GEF project resources.

National Project Components were executed in line with the established UNDP procedures for the National Implementing Modality (NIM) by the following National Implementing Entities (NEIs):

- Ghana: Ministry of Health;
- Madagascar: Ministry of Public Health and Ministry of Environment and Sustainable Development;
- Tanzania: Ministry of Health, Community Development, Gender, Elderly and Children (MoHCDGEC);
- Zambia: Ministry of Health;

The above national entities assumed full responsibility for the effective use of UNDP resources and the delivery of outputs under the national Components of the project.

National Project Boards (NPBs) were established in the four participating countries with responsibility to oversee and guide project management decisions at the national level, including appointment of the National Project Coordinators, approval of Annual Work Plans (AWPs), and endorsement of any essential deviations from the original plans. Meetings of NPBs were usually held in the 1st quarter of a calendar year to review the implementation progress and acknowledge the achievements of the previous year.

A Project Implementation Unit (PIU) for day-to-day management of the project was established in each country, located within the respective NEI. In Tanzania, this arrangement was followed until relocation of MoHCDGEC to the new capital city in 2018. The Tanzania PIU was moved to the UNDP CO in Dar es Salaam.

In addition to the above, National Technical Working Groups (NTWGs) were established composed of individuals from relevant ministries, governmental agencies and other stakeholders that have practical involvement or interest in the project. The exact composition and mode of operation of the NTWGs varied from country to country and reflected needs and conditions of the individual countries. The role of NTWGs was to advise NPBs and assist by providing expertise and advice on project-related policy, economic, and technical matters.

The evaluator found the established managerial arrangements in line with the Project Document and considers them adequate for the size and complexity of the project.

Project implementation

Adaptive management

GEF evaluations assess adaptive management in terms of ability to direct the project implementation through adapting to changing conditions outside of control of the project implementing teams. The adaptive approach involves exploring alternative ways to meet project objectives and implementing one or more of these alternatives.

Several significant changes to the original project plan can be presented as cases of successfully applied adaptive management approaches during the project implementation period. The

Project Document envisaged the procurement to be conducted by UNDP Global Procurement Unit (GPU) in Copenhagen due to their experience in procurement of medical equipment for health technology projects and on assumption that IRH would not have sufficient manpower capacity during and shortly after relocation of IRH from Bratislava to Istanbul.

In 2016, the regional project team approached UNDP GPU for a quotation of cost of the procurement services for the project and received a proposal with the total processing fee of USD 98,975. The proposal was assessed by the IRH administration and the latter concluded that the IRH procurement capacity had reached a level that would allow to run the project-related procurement centrally by IRH at a lower cost.

Another example of adaptive management was the decision of the regional project team to allocate up to 5% of the procurement budget under the 1st phase for use by national components to encourage testing of local technologies. This was requested by the beneficiary countries amidst concerns that local technology suppliers might face challenges to meet the very high requirements of the international tender processes. Both above changes were approved by the 1st Regional Project Board meeting in September 2016.

Another example of an adaptive approach was the decision to provide extra support from the regional component to national implementation activities, mainly on procurement, consultancy and training and make thus available additional expertise, if and when needed, to the national components. Requests for such support were considered by the regional project team on a case-by-case basis and requests exceeding the threshold of 10,000 US\$ were referred for approval to the Regional Project Board.

In the above cases, action was taken on issues that resulted from the implementation process rather than from any review of the project review procedures. They were pronounced in writing through the progress reports presented to the Project Steering Committee and duly approved by the project governing body.

The project was effectively scheduled to be terminated in April 2020. However, the outbreak of COVID-19 pandemic and related project implementation challenges prompted another case of adaptive management. UNDP IRH as the Implementing Agency requested GEF to extend the project until the end of 2020. The immediate purpose of the extension was to complete several overdue project activities, such as installation of HCW treatment systems that had already been delivered to HCW facilities in the 2nd phase of the project, provision of additional equipment maintenance training and additional time for preparation of the project's exit strategy.

Moreover, the extension was also requested for granting substantial support to the project countries on HCW management specifically in relation to the COVID-19 pandemic and initiate several new activities that expected to yield highly relevant experience essential for UNDP's response to the pandemic.

Partnership arrangements

The project was implemented by UNDO IRH with two international cooperating partner agencies, namely the World Health Organization (WHO), on behalf of the WHO member states participating in the Project, and the international NGO coalition Healthcare Without Harm (HCWH).

Working with 194 Member States across six regions, and from more than 150 offices, WHO is the leading agency of the United Nations system focussing on the primary health care to improve access for all to quality essential services. Participation of WHO in the project ensured focus on key aspects of safe HCWM and sensitization of policy-makers, health practitioners

and HCF managers in the four project countries to relevant World Health Assembly (WHA) resolutions, other UN documents and emerging global and national developments on water, sanitation and hygiene (WASH) and infection prevention control (IPC).

Healthcare Without Harm (HCWH) is an international coalition whose Global Green and Healthy Hospitals network has 1,300 members in 65 countries who represent the interests of over 36,000 hospitals and health centres working on transformation of the healthcare achieving health-care delivery systems that contribute to overall ecological sustainability without compromising patient safety and/or care. The partnership with HCWH was a sound arrangement as the coalition works to phase-out incineration of medical waste and mercury devices, minimize the amount and toxicity of all HCW generated, promote safer HCW treatment practices and secure a safe and healthy workplace for healthcare workers.

WHO involvement in the project was based on a UN Agency to UN Agency Contribution Agreement between UNDP and WHO that covers the entire project implementation period. HCWH involvement was based on a sequence of three Micro-capital Grant Agreements (MGAs) between the partners that broadly cover the entire project implementation.

Matrix of responsibilities among the project partners for activities at the regional level that was discussed and approved at the 1st Regional Board meeting in 2016 is shown in Table 6 below.

Table 6: Matrix of responsibilities for the regional component of the project

Component/Outcome	UNDP	WHO	HCWH
1. Technical guidelines, evaluation criteria, teams of experts			
1.1 Guidelines, evaluation criteria, formula adopted	Lead	Support	Support
1.2 National experts trained	Lead	Support	Support
2. HCW National plans, strategies and policies			
2.1 National policy and framework for HCWM and mercury review	Review	Lead	Support
2.2 National action plan + site selection	Lead	Support	Support
3a Non-incineration HCWM systems and mercury-free device			
3a.1 Procurement of HCW systems and mercury free devices	Lead	Review	Support
3a.2 Deliver and installation of equipment	Lead	Review	Support

A WHO focal point for the project was appointed in each WHO Country Office to ensure WHO participation in NTWG meetings and facilitation of national dialogue on strengthening health care waste management. WHO participation was instrumental for implementation of the capacity building and policy formation components of the project.

Under Component 1, WHO and HCWH provided substantive input for preparation of the training materials for the initial Master Trainers programme in Nakuru, Kenya. This ensured that the 12-day training covered not only topics related to safe and environment-friendly HCWM practices but also step-by-step guidance to implementation of mercury-free policy and products as well as introduction to WHO/UNICEF's Water and Sanitation for Health Facility Improvement Tool (WASH FIT), a risk-based framework for monitoring water and sanitation (including HCWM) services and making improvements to the quality of health care.

Under Component 2, WHO took lead on development of national HCWM policies and guidelines for achievement of national targets set under the Stockholm and Minamata Conventions. Through collaboration between the International Solid Waste Association and WHO, the latter agency facilitated access to global norms and examples of targeted actions at the national and sub-national level on safe HCWM.

A summary version of WHO's "Safe management of wastes from health-care activities" (2014) was edited and published using project funds in 2017. Through this document, WHO provided a brief overview and introduction to safe healthcare waste management for policymakers,

practitioners and health care facility managers. The summary version provided a more accessible document for the four project countries in order to improve practices and develop national HCW policies and guidelines. HCWH supported this effort with critical review of draft national policies and technical guidelines on HCWM.

Apart from support to the regional component of the project, WHO also rendered specific technical assistance to the four project countries. In Ghana, WHO provided technical support and leadership to the process of drafting a National Strategy for WASH in HCF (including HCWM) in 2019 as one of the first countries. After the final round of revision, the publication of the document was delayed due to the COVID-19 outbreak.

In Madagascar, WHO provided technical assistance for effective and appropriate disposal of HCW generated from a large vaccination campaign related to measles outbreak in 2019. This experience was useful in subsequent vaccination campaigns in 2020. Also, having conducted a situational analysis with the Ministry of Health, WHO assisted with development of a national strategic plan on healthcare waste management in Madagascar that was completed in 2020.

In Tanzania, WHO assisted in revision of the National Policy Guidelines for HCWM and in development of a set of HCWM standards (on minimization, re-use and recycling; segregation, storage, transportation and treatment, disposal including equipment and tools required). The project HCFs adopted the revised national guidelines for development of facility-based policies and guidelines, using a set of SOPs prepared with support from the project.

Under technical guidance from WHO, the project helped to address national priorities for HCWM in Zambia as expressed in the Public Health Act and the Environmental Management Act and assisted in revision, printing and dissemination of the HCWM guidelines. WHO review was instrumental for drafting of National Standards for WASH in HCFs in January 2020.

Under Component 3, both WHO and HCWH contributed to development of the catalogue of equipment for HCWM that was used to facilitate the procurement process and ensure selection of appropriate equipment items for the participating countries. Specifically, HCWH developed new materials on implementation of mercury-free devices and piloted the use of the materials in Zambia.

Apart from assistance with policy review of national and hospital-specific policies on medical waste management, HCWH acted as an interface between the project and HCWH's Global Green and Healthy Hospitals (GGHH) network and ensured that the model HCFs designated under this project benefited from participation in the GGHH network. In this manner, HCWH assisted the model HCFs in utilization of HCWH and GGHH online and offline tracking tools on waste, recycling, resource consumption and climate footprint, and facilitated participation in GGHH Challenges. Moreover, HCWH provided a link to the Sustainable Health in Procurement Project (SHiPP) and ensured that two project countries, namely Tanzania and Zambia, were included in SHiPP and received support for development of procurement criteria for the HCW technologies used in this project.

Both WHO and HCWH were influential for wide dissemination of information on the UPOPs project activities and goals, training materials and other information, as well as for presentation of the project-related materials and information at international and regional meetings.

By the time of TE, 4 progress reports from WHO (up to April 2020) and 3 progress reports from HCWM (up to December 2019) were available for review. The evaluator found the reports structured and informative, in particular the reports by HCWH that contained comparison of planned and actually completed activities broken by the project components. However, the final reports by both partners were not available at the time of completion of this report.

The project also technically supported the virtual rapid HCWM assessment that was coordinated by UNDP and conducted by NGO Engineers Without Borders in the context of COVID-19 in 10 countries with technical inputs from a team of experts working with the Global Fund, GEF, Sustainable Health in Procurement Project (SHiPP) and Sustainable Procurement in the Health Sector (SPHS).

Further substantive matters related to the above partnerships are described in the text under the section Effectiveness and Efficiency.

Project finance

The GEF grant for this project was approved at 6,453,195 US\$ and together with expected co-financing of 28,936,164 US\$ the total funding required was 35,389,359 US\$. Table 7 below displays dynamics of the implementation by years of the project implementation period.

Table 7: Expenditures by years of implementation in US\$ (as of November 2020)

	2015	2016	2017	2018	2019	2020	2015-2020
Regional	4,610.91	307,173.24	295,280.08	1,926,700.36	312,494.55	1,011,917.20	3,858,176.34
Ghana		123,982.41	145,289.19	143,361.79	145,914.49	46,021.01	604,568.89
Madagascar		7,612.75	135,057.37	136,337.63	232,569.40	79,370.48	590,947.63
Tanzania		36,842.12	280,571.86	170,533.96	105,632.40	25,499.94	617,873.63
Zambia		58,185.39	150,982.60	268,961.34	118,591.72	27,424.64	624,145.65
Total	4,610.91	533,795.91	1,007,181.10	2,645,895.08	915,202.56	1,190,233.27	6,295,712.14
%	0.07%	8.27%	15.61%	41.00%	14.16%	18.44%	97.56%

According to the budget table in the approved Project Document, about 63.4% of the GEF grant was to be implemented by the regional component while the remaining 36.6% was earmarked for the national components. The actual ratio of the regional to national components was 61.27% to 38.73%. The slightly higher share of the national components reflects the decision of RPB to decentralize the 2nd round of procurement of mercury-free devices to the countries.

The breakdown of the project expenditures by years demonstrates relatively even expenditure pattern over the entire project period with the exception of the year 2018 when the 1st round of procurement of HCW management and treatment equipment and mercury-free devices was conducted centrally by IRH.

It has to be noted that Table 7 contains only actual disbursements but not obligations from open Purchase Orders in total amount of US\$ 127,124.73. If all POs are considered paid, the total expenditure level will increase to 6,424,043.56 US\$ that is 99.55% with the remaining unspent amount of 29,153.44 US\$.

Table 8 below provides comparison of the planned and actual expenditures by the project components.

Table 8: Planned and actual expenditures by the project components⁹

	Planned (US\$)	Actual (US\$)	%
Component 1	401,172.00	477,027.00	118.91
Component 2	423,235.00	359,159.03	84.86
Component 3A	2,792,026.00	2,762,081.48	98.93
Component 3B	976,470.00	985,484.48	100.92
Component 4A	435,082.00	408,588.41	93.91
Component 4B	961,552.00	881,958.89	91.72
Component 5	141,000.00	201,347.69	142.80
Component 6	322,660.00	219,878.87	68.15
Total	6,453,197.00	6,295,525.85	97.56

According to the comparison, the actual expenditures for the substantive Components 1-4 show variances within normal budget revisions. Considerably higher were expenditures on outreach, adaptive feedback and monitoring & evaluation (Component 5) while the project management costs (Component 6) were only 68.15%.

Overall, Tables 7 and 8 demonstrate sound financial management of the project.

The regional UPOPs project was designed to attract substantive amounts of co-funding from various levels of the government as well as from private sector. Table 10 below compares the planned co-funding at the project inception with the actually achieved co-funding at the completion of the project.

Table 9: Comparison of planned and actual co-financing by sources

Source	At Inception (US\$)	At Completion (US\$)
Ghana	5,210,000	5,513,700
Madagascar	4,686,764	1,216,263
Tanzania	2,928,000	2,928,000
Zambia	8,214,000	270,700
Sub-Total	21,038,764	9,928,663
UNDP, WHO, HCWH	7,897,400	4,929,000 ¹⁰
Grand Total	28,936,164	14,857,663

The figures in Table 9 are total actual co-financing amounts at the country level composed of contributions from the participating governments as well as other national partners. It follows from the above comparison that the initial co-financing amounts were realized only in Ghana and Tanzania while substantively lower amounts were achieved in Madagascar and Zambia.

⁹ Unliquidated obligations not included.

¹⁰ Due to operational reasons, WHO could not provide actual co-financing figures. WHO's co-financing commitment at the project inception was 3,497,400 US\$.

The lower actual co-financing amounts from UNDP and other international partners do not include WHO co-financing since WHO was not able to provide actual co-financing data for operational limitations.

Overall, the actual co-financing declared at project completion reached only 51.34% of the amounts pledged at the project inception. The available project documentation does not specify the expected purpose of the co-financing hence does not allow to make conclusion to what extent the reduced co-financing had an effect on the project results.

Monitoring and evaluation: design at entry and implementation

M&E design at project entry

The Monitoring & Evaluation (M&E) Framework was in details described in the Project Document. The Framework consisted of the Project Inception Workshop, meetings of the Project Steering Committee, quarterly and annual Project Implementation Reports as well as the Mid-Term Review and the Terminal Evaluation.

Principal responsibility for monitoring of the project implementation was given to the regional project team based on the project's Annual Workplans and related indicators. Periodic monitoring of implementation progress of the national components was the responsibility of the national project teams with support of the UNDP Country Offices.

The evaluator found the M&E design suitable to monitor results and track the progress toward achieving the objectives, with the exception of the project logframe deficiencies discussed in the section "Analysis of the project results framework" above. Also, the budgetary allocations for the M&E activities were found adequate.

The design of M&E framework followed the standard M&E template for projects of this size and complexity and therefore is rated **Satisfactory (S)**.

M&E at implementation

The main subject of the discussion here is the implementation of the originally planned components of the M&E plan.

The Inception Workshop (IW) was held on 22-24 September 2016 in Johannesburg. The meeting hosted the regional and all 4 national project teams; representatives of the beneficiary Governments, UNDP COs and IRH; representatives of the project international partners, as well as invited resource persons. IW agenda included various presentations with discussions amongst the participants. The first meeting of RPB took place on the 2nd day (23 September 2016).

IW fulfilled a majority of objectives listed in the Project Document, namely:

- a) Assisted all partners to fully understand and take ownership of the project through detailing the roles, support services and complementary responsibilities of the project teams and partners and outlined the roles, functions, and responsibilities within the project's decision-making structures, including reporting and communication lines
- b) Based on the project results framework, the first annual work plan was developed and approved by PSC that was organized on the margins of IW.
- c) A detailed overview of reporting, monitoring and M&E requirements was presented to the IW participants including financial reporting procedures and obligations as well as plan and schedule of PSC meetings.

d) Key technical issues of the project were presented by the Regional Technical Expert and discussed through a session of questions and answers.

In particular, a specific template for reporting on project progress was agreed at IW to provide reports of key activities from the countries to the regional component and enable the latter to obtain an overview of the progress on a monthly basis for priority setting and corrective actions.

Periodic Monitoring of the project implementation was conducted through a visual monitoring tool introduced at IW in order to ensure timely delivery of all planned outputs. Several key activities were identified and monitored on a monthly basis and each country PIU had to send their monthly reports to the IRH to indicate progress on the particular project components. The received reports were evaluated and progress in the four countries was visualized in a comparison chart. This allowed each country PIU to understand the status of implementation progress in the other three countries. This monitoring practice was followed until the completion of installation of the autoclaves in fall 2018. After that, the monitoring tool was revised to emphasize importance of sustainability aspects of the project and to include other tasks as agreed during the RPB meeting in Tanzania in May 2018.

Annual Project Reports/Project Implementation Reviews (APRs/PIRs): Five APRs were prepared in the standard UNDP format during the project implementation, for the respective periods April-September 2016, October 2016-May 2017, June 2017-May 2018, June 2018-December 2018 and January-August 2019.

Furthermore, three PIRs in the GEF format were prepared for the GEF fiscal years (July to June) 2017, 2018 and 2019. In line with the requirements, the PIRs contain inputs provided by the UNDP-GEF Regional Technical Advisor and the Regional Project Manager.

Having reviewed all nine above reports the evaluator found them compliant with the standard UNDP/GEF project cycle reporting tools and particularly detailed. Apart from the large section on development progress and concise summaries on implementation progress, PIRs also addressed management of critical risks, adjustments to project implementation plans and description of several cross-cutting issues.

An independent Mid-Term Review (MTR) was planned to be undertaken at mid-point of the project. The data collection phase of MTR including the MTR field missions to IRH and the four beneficiary countries took place in October – November 2018. The draft MTR report was presented by the MTR consultant at the RPB meeting in December 2018. After receiving comments and other feedback from all project stakeholders, the final MTR Report was completed in March 2019.

In addition to the standard focus on the effectiveness, efficiency, timeliness of project implementation and initial lessons learned about project design, implementation and management, MTR in this project also fulfilled another important function, namely assessment of the aggregate national performance following the first procurement round by each country as an objective basis for allocation of resources for the second round of procurement, in line with the decisions of the Inception Workshop and the concurrent 1st Project Board Meeting.

This assessment was based on the following five criteria:

1. Promulgation of HCWM and mercury reduction policies;
2. Successful implementation of BAT/BEP in the designated 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 on HCWM

Aggregates of scoring for each country on the above five criteria served as basis for allocation of resources earmarked for the 2nd phase of procurement through the weighted scoring. The latter approach resulted in Ghana and Madagascar ranked jointly the best and each received 27% of the funds while Tanzania and Zambia received 22 and 24% of the funds, respectively.

Terminal Evaluation: The Project Document stipulated TE to be conducted three months prior to the project completion date. In reality, the TE data collection phase and field missions to the four project countries were conducted six months prior to the original project completion date - started on 30 October – 2 November with the mission to IRH and continued with the evaluation missions to the four countries between 16 November and 14 December 2019.

Because of delays in implementation of the 2nd round of procurement, the field missions could not reflect and evaluate any real achievements of the 2nd phase of the project, in particular expansion of the HCWM systems to additional HCFs (Outcomes 4.a.2 and 4.b.1). Moreover, the early conduct of the TE mission did not allow to conduct a thorough assessment (including lessons learned) of important interventions that had not been included in the 1st phase, namely impact of procurement of waste shredders and provision of HCW transport vehicles/tricycles on routes for ultimate disposal of autoclaved HCW and therefore on overall achievement of planned UOPs reduction targets.

TE ratings of Components/Outputs delivered under the 1st phase are generally in agreement with the ratings given on the PIRs and MTR reports (HS and S), with the exception of the rating for Component 3 that is Moderately Satisfactory in TE.

Feedback from M&E activities used for adaptive management

The discussion under this section is based on observations whether the logical framework was used during implementation as a management and M&E tool and the extent to which follow-up actions, and/or adaptive management were taken in response to monitoring reports (APR/PIRs).

MTR made total 14 recommendations targeted on different project stakeholders: 4 recommendations for the regional component, 3 common recommendations for the national PIUs, and 7 specific recommendations for the particular country PIUs (3 for Tanzania PIU, and 2 each for Madagascar and Zambia PIUs). A summary of the MTR recommendations is in Table 10 below.

Table 10: List of MTR recommendations

No.	Recommendation	Recipient
1	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. 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
2	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
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.	National PIUs
4	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
5	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
6	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 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.	Tanzania PIU
7	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.	Tanzania PIU
8	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.	Tanzania PIU
9	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.	Zambia PIU
10	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.	Zambia PIU
11	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.	Regional Project Team
12	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	Regional Project Team
13	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	National Project Teams
14	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 Project Teams

Although provision of shredders to the pilot HCFs had been discussed at the early stage of the project, it was finally decided not to provide shredders for destruction of autoclaved waste due to concerns about shredders' maintenance. However, the MTR Report found that placement of sterilised waste on a dumpsite or landfill, without any change of physical form, constituted a major concern in all project countries and therefore a key challenge for achievement of the

project objectives. Following the MTR Recommendation 1, shredder systems were added to the updated catalogue of HCWM equipment and included in the BoQs for the 2nd round of central procurement for three project countries (Ghana, Madagascar and Zambia). Tanzania opted for local procurement of compactors/balers on the same purpose, i.e., alter the physical appearance of the autoclaved HCW.

Availability of local servicing technicians authorized by the supplier of autoclaves (TTM) to provide maintenance and repair services was another major issue identified by MTR. Recommendation 2 was extensively followed by the regional project team through organization of virtual meetings with participation of TTM representatives and the four national project teams to discuss issues related to operationalization and maintenance of the autoclave equipment. Consequently, a procedure for communication and action was agreed with TTM and the national teams to be followed in case of lack of response from the supplier's local agents to any service request. Additionally, an SOP was prepared to clarify roles and responsibilities of the supplier, its local agents and service requesters for the provision of maintenance service and establish communication pathway among the different stakeholders.

The original plan envisaged support for additional 12 rural health posts during the second phase of the project. However, based on the initial experience on operation of autoclaves installed in the 1st phase, the recommendation 11 strongly recommended the project to focus on larger hospitals as quantities of infectious waste generated by rural HCFs were too small to justify the relatively high costs of transportation of this waste to a central/cluster treatment facility and ensure thus functionality of the cluster HCW treatment model. This recommendation was followed through decision of the RPB meeting in December 2018 to include only 6 large hospitals as additional pilot HCFs in the 2nd phase (3 hospitals in Ghana, 2 in Madagascar and 1 in Tanzania).

MTR recommendation 4 that advocated against composting organic waste at the level of the pilot HCFs was discussed at the RPB meeting in December 2018 and support for construction of biodigesters in Tanzania and Madagascar was followed instead.

Recommendation 13 called for careful planning of the procurement in relation to the remaining time available for implementation of the project. In the follow-up, Ghana PIU conducted due diligence in the selection and monitoring of one additional HCF to receive new autoclave from the project in order to ensure completion of the necessary on-site works before arrival of the autoclave. In Madagascar, one addition the teaching hospital was selected to receive an autoclave for treatment of its own HCW as well as HCW from a nearby hospital. Instead of selecting additional model HCF, the Tanzania PIU decided to use the 2nd phase resources to strengthen support to the five designated model HCFs from the 1st phase and provide assistance to Mnazi Mmoja Hospital in Zanzibar. Zambia PIU leveraged financial support from UNDP CO for construction works for a new autoclave housing at one additional model HCF.

Recommendation 14 demanded the national PIUs to ensure more extensive use of the installed autoclave capacity through support for establishment of HCW cluster treatment systems. Ghana PIU responded through procurement of tricycles for HCFs to support the transportation of infectious waste to the cluster central HCF and through supporting the model HCFs in development of cluster management plans. Similarly, as a follow-up to the above Recommendation, each of the 4 model HCFs in Madagascar that had been equipped with the autoclave received also a vehicle for safely transport of HCW from neighbouring public and private HCFs. Tanzania PIU responded through ordering of waste compactors/ballers to facilitate disposal of autoclaved HCF in a municipal landfill. Zambia PIU supported the country's model HCFs in engagements with local authorities in order to secure a designated part for the autoclaved waste within the used dump sites.

In response to Recommendation 3, all four country PIUs established comprehensive monitoring plans based on intensive communication with the model HCFs (including quarterly visits by the national technical experts) and extensive use and analysis of the Waste Tracker reporting tools.

As a response to the two specific recommendations for Madagascar, the service provider was requested to adjust the installation of the solar panel system in the district referral hospital in Manjakandriana and a workshop was organized to validate updated instruction posters on proper HCWM followed by printing of the updated posters.

Following the country-specific specific recommendations for Tanzania, the national PIU decided to procure additional HCWM equipment, conduct more training sessions and strengthen supportive oversight for proper HCW segregation at source. Also, the PIU conducted a meeting with the Health Department of the Dar es Salaam City Council to ensure conformity with all regulations regarding autoclaved medical waste materials and facilitate disposal of autoclaved waste materials at a municipal landfill.

As a follow-up to the two country-specific recommendations for Zambia, a new focal point to oversee the utilization of the autoclave at UTH and support was provided to the private company Waste Master to conduct training at the Chilenje Level 1 hospital and conclude MoU with the latter on for making specific arrangements for receipt and segregation of recyclable waste.

The conduct of the TE field missions 5 months before the originally planned completion and prior to completion of a majority of activities in the 2nd phase of the original project period is considered a factor negatively influencing the entirety of the evaluation data collection. During the extension phase of the project, the evaluator gathered additional data from the project counterparts and international partners but due to delays due to the pandemic few activities were still on-going at the time of completion of the TE report.

Based on the above findings, **the quality of M&E implementation is rated Moderately Satisfactory (MS).**

UNDP and implementing partner implementation / execution

The project followed the management arrangements presented in the Project Document that were based on a common scheme for project management arrangements under the UNDP Direct Implementation Modality (DIM) and National Implementation Modality (NIM). The project has fully followed the management arrangements as described in the Project Document.

The project management arrangements had been established and implemented in the way that ensured transparency and accountability for the results and use of GEF resources, while at the same time they fostered national ownership of the project by the four beneficiary governments through continued alignment of the project to the national needs and priorities.

The designated national entities had duly fulfilled their roles of the National Implementing Partners and had provided overall guidance and leadership for soliciting support of key officials at various levels of the participating Governments as well as for raising awareness of the project profile and objectives in the four countries.

Apart from hosting the project management function, IRH performed also a project quality assurance role through objective and independent project oversight and monitoring. The IRH QA unit fulfilled this role through advice for improvement of the quality of management for results, including planning, monitoring and reporting on annual workplan and other corporate

tools, review and approval of the ToRs for MTR and TE as well as through review of the final draft MTR and TE reports prior to their finalization.

Furthermore, IRH and the UNDP Country Offices in the four beneficiary countries provided administrative and financial oversight of the regional and national project components in accordance with the common UNDP procedures and tracking tools.

The regional component established and nurtured partnership with WHO and HCWH with the aim to bring the best of international expertise on implementation of HCWM systems, promotion of non-incineration technologies and reduction of UPOPs and mercury releases. This was achieved through active participation of the two international partners in the project implementation and outreach.

Establishment of regular communication between the Regional Project Team, the National Implementing Partners, UNDP COs and the cooperating agencies proved to be an essential building block of timely and effective project implementation. This was executed through regular meetings over internet conducted as follows:

- Monthly calls of the Regional Expert Team on the general project development issues with the aim to keep all partners updated (participants UNDP, WHO, HCWH and SPHS);
- Up to installation of HCW treatment equipment - bi-monthly calls focussing on the equipment supply and preparation of HCFs for installation, with participation of the project manager from each country, the RET team, the autoclave manufacturer (Mediclave) and the supplier (TTM);
- From completion of the HCW treatment equipment installation onwards - bi-monthly operation calls to help the countries to exchange experiences on the operation of the new treatment systems (with the same participation as above);

Based on the above findings, the overall quality implementation/execution is rated **Satisfactory (S)**.

Project results

The information presented in this section was sourced from the various project implementation reports and verified with information collected through interviews with key informants during the evaluation missions to IRH and the four countries. Additional sources of information were technical reports by the project RTE and other international experts, as well as progress reports by the international project partners. The list of documents consulted is provided as Annex 5 to this report.

Relevance

The questions to be discussed under this section are to what extent is the project linked to the national development priorities of the four beneficiary countries and how is it in line with the GEF operational programs and UNDP strategic priorities.

All four countries have ratified the Stockholm Convention on Persistent Organic Pollutants (POPs) and with the assistance of GEF funding have developed the respective National Implementation Plans (NIP). Medical wastes comprise a sizeable portion of total hazardous wastes in the four countries that is mostly incinerated or in some cases dumped together with other municipal waste at public landfill sites. For example, the Tanzania NIP points out that hospital wastes comprise about 12 % of total hazardous wastes generated in the country and estimates that the prevailing HCW incineration processes represent 23.4% of the total U-POPs emissions. Releases from waste incineration had been established as the third highest source of U-POPs emissions to air and residue in the respective NIPs for Ghana, Madagascar and Zambia.

Reduction of releases of PCDD/F, HCBs and PCBs from incineration of medical waste has been taken up as one of the priority measures under the four NIPs. Phasing out of old methods of incineration in hospitals and health centers and development of institutional and human resource capacities for implementation of national medical waste management policies and guidelines are listed amongst the priority actions for addressing the reduction of UPOPs.

Similarly, all four countries have completed the Minamata Convention Initial Assessment (MIA) aimed at determination of the national requirements and needs for the ratification of the Convention and establish a solid ground for undertaking future work towards the implementation of the Convention. Consequently, all four countries have ratified the Minamata Convention.

Based on the above, it can be concluded that the project is highly relevant to the four countries as it assisted the Governments in implementation of their obligations under the Stockholm and Minamata Conventions.

The project has direct link to the following objectives of the GEF-5 Chemicals Strategy:

Objective 1: Phase out POPs and reduce POPs releases

Outcome 1.3. POPs releases to the environment reduced. Following NIP priorities, investments supported by the GEF will address implementation of best available techniques and best environmental practices (BAT/BEP) for release reduction of unintentionally produced POPs, including from industrial sources and open burning

Objective 3: Pilot sound chemicals management and mercury reduction

Outcome 3.1 Country capacity built to effectively manage mercury in priority sectors

The four beneficiary countries are signatories of the Libreville Declaration on Health and Environment in Africa (2008) and the project is linked to the following commitments of the signatory parties:

.....

2. Developing or updating our national, sub-regional and regional frameworks in order to address more effectively the issue of environmental impacts on health, through integration of these links in policies, strategies, regulations and national development plans; and

.....

7. Effectively implementing national, sub-regional and regional mechanisms for enforcing compliance with international conventions and national regulations to protect populations from health threats related to the environment.

In relation to the UN Sustainable Development Goals (SDGs) of the 2030 Agenda for Sustainable Development, HCWM is a crosscutting issue that affects and impacts various areas of sustainable development in each of the three sustainability domains: ecology, economy, and society. The affected areas include living conditions, sanitation, public health, water and terrestrial ecosystems, access to decent jobs, as well as the sustainable use of natural resources. Accordingly, out of the 17 Sustainable Development Goals (SDGs) of the 2030 Agenda for Sustainable Development, at least 7 SDGs and their pertinent targets have a direct link to HCWM, as it is demonstrated in Table 11 below.

Table 11: Relationship between the UN SDGs and their specific targets and HCWM

Drivers	SDG	Specific Target
Protection of public health	SDG 3: Ensure healthy lives and promote well-being for all at all ages	Reduce illnesses from hazardous chemicals and air, water and soil pollution, and contamination through access to safe and affordable HCW collection services
Protection of environment	SDG 6: Ensure availability and sustainable management of water and sanitation for all	Improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous materials
Protection of environment	SDG 7: Ensure access to affordable, reliable, sustainable and modern energy for all	Derive renewable energy from organic HCW
Inclusivity	SDG 8: Promote inclusive and sustainable economic growth, employment and decent work for all	Improve livelihoods of SMEs engaged in recycling of medical waste
Protection of public health	SDG 11: Make cities and human settlements inclusive, safe, resilient and sustainable	Ensure access to adequate, safe, and affordable HCW collection and treatment
Protection of environment and resource value	SDG 12: Ensure sustainable consumption and production patterns	Reduce the amount of HCW through prevention, reduction, recycling, and reuse
Protection of environment	SDG 15: Protect, restore and promote sustainable use of terrestrial ecosystems	Avoid pollution of terrestrial and inland ecosystems by untreated HCW and ensure their continued services

Not being a high-level SDG on its own could potentially have a negative impact on prioritization of HCWM at the political level. On the contrary, the crosscutting nature of HCWM, namely the fact that it affects not just one but the above 7 SDGs, should only highlight its importance and increase visibility of HCWM on the political agendas.

The project has contributed to SDG 3 through improvement of the HCWM chain at the model HCFs. This included improved procurement, HCW classification, collection and segregation, on-site transport and storage and finally treatment, disposal and recycling. The improvements of the HCWM chain result not only in a reduction of environmental pollution and negative health impacts caused by UPOPs and mercury but also in prevention and reduction of infections originating from contacts with infectious medical waste.

The contribution to SDG 6 was realized through the partnership with WHO through promotion of interventions on water, sanitation and hygiene (WASH) in the pilot healthcare facilities.

Through demonstration of technologies for deriving energy from organic waste, the project made contribution to SDG 7. Specifically, the project assisted Tanzania in piloting construction of biodigesters for controlled degradation of organic medical waste and avoidance of methane releases to the atmosphere through burning it for energy. Because methane has about 20-25 times higher global warming potential (GWP) than carbon dioxide, burning methane actually reduced the GHG emissions from the organic waste. Furthermore, according to research conducted by HCWH, autoclaving HCW produces at least fifteen times lower CO₂ emissions than incineration of waste.

In the project beneficiary countries, services for HCW management are often provided by individuals and small or microenterprises. Despite carrying out a task vital to society, waste workers are too often underpaid, under-educated and under-protected. In many cases, not only do workers lack a living wage, but working conditions violate their human right to a safe working environment. The project contributed to recognition of HCW as an essential public service, with standards, vaccinations, training, and decent working conditions for the health care waste workers and contributed to improving the livelihoods in line with the goals and targets of SDG 8.

Prior to the project, the principal method of treatment of HCW in the four beneficiary countries was waste incineration or burning in the open air thus causing local air contamination. As a result of introduction of the autoclave technology, several HCFs have abandoned the use of incineration for HCW which has improved quality of air in their respective settlements and thus contributed to SDG 11.

Regarding SDG 12, the project enabled reduction of UPOPs releases from the healthcare sector and phase down of mercury in the four project countries. SDG 12 includes targets on reducing pollution and health impacts through environmentally sound management (ESM) of all waste throughout the product life cycle, promoting waste prevention, reduction, and recycling and reuse, including procurement of goods. Through connection to the Sustainable Health in Procurement Project (SHiPP), the current project assisted two countries (Tanzania and Zambia) to ensure that the materials purchased by HCFs generate as little as possible of toxic, non-recyclable and/or unnecessary waste. Advocating for the replacement of these products with safer alternatives, the healthcare system can help kick-start the global circular economy.

Under SDG 15, the project interventions facilitated reduction of pollution of terrestrial ecosystems from HCW in order to preserve their continuous services.

Based on the above, the relevance of the project is rated Relevant (R).

Effectiveness

The principal questions to be discussed in this section are whether and how the project outcomes as well as its objective have been achieved and whether the project results have been delivered with the least costly resources possible. The further text will also highlight positive and negative, foreseen and unforeseen changes and effects produced by the project intervention.

In the series of tables below, the project results and achievements have been summarized and compared against the target indicators listed in the project's logical framework. The initial information about the project results/achievements was extracted from the project's PIRs and verified and updated through interviews and meetings held during the evaluations to IRH and the four beneficiary countries. Additional information was supplemented from the project-related documentation provided by the Regional Project Manager and the country project teams. Tables 12 – 16 list the indicator targets for the individual outputs, summarizes the delivery status at the Terminal Evaluation and provides rating for the Outputs delivery.

Each table below contains an overview of the actually achieved project results in bullet points followed by a short narrative with additional insight and details on how and why the results have or have not been achieved. At the end, the narrative also explains the basis for rating of each project outcomes. The text following each table summarizes some important facts related to the project results that could not be captured in the tables but were considered important for the justification of the rating of the project outcomes.

Table 12: Deliverables for Component 1

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				
Outcome	Indicator	End of Project Targets	Delivery Status at TE	Rating
1.1: Technical guidelines, evaluation criteria and allocation formula adopted	Mid-term evaluation criteria and formula for the allocation of technologies among countries available	First Regional Conference organized Evaluation criteria and allocation of technologies among project countries agreed upon	Inception Workshop on 22-24 September 2016 in Johannesburg, South Africa Criteria for allocation of resources to HCFs agreed in the 1 st meeting of RPB	S
1.2: 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	16 national experts trained in non-incineration HCWM systems, policies, waste assessments, UNDP GEF and WHO tools, national planning, BAT/BEP guidelines, mercury phaseout, international standards, and other technical guidelines. Master trainers trained in content, effective teaching methods, evaluation tools, and training of trainers' programs	Train-the-Trainers Workshop on 28 November – 10 December 2016 in Nakuru, Kenya	S

Outcome 1.1: The Regional Inception Workshop was carried on 22-24 September 2016 in Johannesburg, South Africa and focused on implementation of activities under the regional component and regional coordination of the project initial activities at the national level.

The Inception Workshop (IW) provided a platform for introduction of the regional project team, partners, and for establishing project support and oversight structures. It ensured a clear understanding by the project team and other stakeholders of the project goals, objectives and deliverables, their roles in the project implementation, and established procedures for project oversight and adaptive management. The 1st meeting of the Regional Project Board was organized concurrently during IW.

The participants of IW finalized preparation of the project's annual work plans (AWPs) for the rest of 2016 and for the entire year 2017. This included a review of the project log frame (performance indicators, means of verification, assumptions) in a manner consistent with the expected outcomes of the project.

Based on a proposal by the Regional Technical Expert, the 1st meeting of the Regional Project Board (organized along with IW) approved the criteria for selection of model HCFs and the formula for technology evaluation. It was agreed to base resource allocation for the second round of procurement on aggregate national performance by each country in the first round of procurement. However, it was also decided to consider needs of the designated 1st round model HCFs in order to address demands of HCFs already supported instead of assisting additional HCFs.

Outcome 1.2: Participants of the 1st meeting of RPB agreed on the format for the train-the-trainers workshop targeting employees of the middle and higher management level of the project with direct or indirect responsibility for monitoring and management of the safe handling of HCW. The approved format of the workshop included 4 participants per country, included per country, namely the National Project Director, the National Project Coordinator and 2 Technical Advisors/Experts designated to become master trainers on HCWM systems.

An intensive 12-day train-the-trainers workshop was organized from 28 November 2016 until 10 December 2016 in Nakuru, Kenya. The main objective of the workshop was to educate selected participants on safe and environmental-friendly HCWM practices and systems including related Water, Sanitation and Hygiene (WASH) principles and enable them to become master trainers for delivery of trainings on HCWM for medical staff from HCFs in their countries. The other objectives of the workshop were to create a common understanding of the regional UOPs project objectives and related deliverables, foster regional cooperation and information exchange, create common grounds for the project planning and ensure consistency with international standards and guidelines.

Zambia decided to send additional two persons and covered the cost of their participation from other funding sources. Furthermore, the UNDP-GEF project in Kenya sponsored participation of six persons from the Kenya project and provided opportunity for establishment of links between the two projects.

The workshop curriculum comprised a combination of informative theoretical lectures/presentations and interactive sessions and covered topics such as HCW assessments, non-incineration HCWM systems and technologies, relevant policy and planning instruments, UNDP, GEF and WHO tools, BAT/BEP guidelines, mercury phase-out, international standards, and technical guidelines and well as project implementation related activities (Gantt charts, critical path analysis, budgeting, monitoring, etc.).

The participants of the training benefited from the contribution of trainers from the international implementation partners. In particular, two resource persons from HCWH provided 37 lectures and made a substantive contribution towards skill building of the participants as future master trainers.

Overall Assessment of Component 1:

From the available documents it is obvious that the regional project team devoted a lot of efforts to ensure training of the highest possible quality. In order to fulfil the expectations of the training programme and to allow adjusting the training to the trainees' needs, the participant's satisfaction was evaluated three times during the two-week training. The first evaluation took place after the end of the first week, the second evaluation in the middle of the second week, and the third evaluation at the end of the training.

Based on the results from the first evaluation, the training concept and modules were reviewed and fine-tuned to better fit the requirements of the participants. This proved to have addressed a majority of the participants' comments as the final evaluation resulted in increased participants' rating in comparison with the first evaluation (an average score 4.42 raised to 4.62 of maximum 5).

As a follow-up to the master training, the regional project team organized missions to the participating countries in the period January – May 2017. During the missions, strategies for roll out of the HCW training were developed and agreed with the national project partners in the four countries.

There is ample evidence that the criteria for allocation of resources to HCFs were effectively used in the implementation of the project and that the 4 national teams of master trainers successfully cascaded down the HCWM training to health professionals in their respective countries.

Based on the above, the achievement of Component 1 is rated Satisfactory (S).

Table 13: Deliverables for Component 2

COMPONENT 2: HEALTHCARE WASTE NATIONAL PLANS, IMPLEMENTATION STRATEGIES, AND NATIONAL POLICIES IN EACH RECIPIENT COUNTRY				
Outcome	Indicator	End of Project Targets	Delivery Status at TE	Rating
2.1: Institutional capacities to strengthen policies and regulatory framework, and to develop a national action plan for HCWM and mercury phase-out enhanced	Sets of country specific indicators outlined in the annexes to the Project Document	Sets of country specific targets listed in the annexes to the Project Document	Outline for the national Healthcare Waste Management Plan developed National Healthcare Waste Management Plans revised and further developed in all four countries	S
2.2: National plan with implementation arrangements adopted	Number of National Action Plans for project implementation available	National Action Plans 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)	National action plans for h designated model HCFs were developed in all four countries	S

Outcome 2.1: In line with the matrix of responsibilities approved by the 1st meeting of RPB, WHO took the lead for preparation of an outline for developing a National Healthcare Waste Management Plan (NHCWMP). The objective of this task was to make assessment of the present HCWM status in the project countries and propose solutions for improvements with account of local circumstances.

The NHCWMP outline was structured into 3 parts. Part I included a review and assessment of the existing health care system, basic data on HCFs and estimated quantities of waste generated therein, as well as overview of valid national legislation regarding waste classification. Part II included formulation of a strategy and targets for improving HCWM, including description of the best approaches and discussion of necessary capacity building for implementation of improved HCWM practices. Part III contained a phased improvement programme, an action plan for the years 2017 to 2021, as well as estimated budget required for implementation of the Plan.

Moreover, a summary version of the WHO handbook “Safe management of wastes from health-care activities” (2014) was prepared and published using the project funds. This document provided a brief overview and introduction to safe HCWM for policymakers, health practitioners and HCF managers. The summary version also made reference to relevant World Health Assembly (WHA) resolutions, other UN documents and emerging global and national developments on WASH and IPC and served as a more accessible document for the four project countries, to help improve practices and develop national HCW guidelines.

Both documents were used as a template for development of national HCWM policies and technical HCW guidelines and served as a roadmap steering national approaches towards meeting the national targets set under the Stockholm and Minamata Conventions. They also served as a foundation for development of Standard Operating Procedures (SOPs) to be applied in HCWM to ensure high quality of work.

With the support of the project and the international implementing partners, the following documents on HCWM were developed in the four beneficiary countries:

Ghana: The project was instrumental for conduct of a revision of the National HCWM Policy and Guideline (2006) in Ghana that serve as a basis for establishment of a sector-wide waste management system. The revision resulted in two separate documents. The revised National HCWM Policy introduces new technical and administrative policy issues to enhance waste management in HCFs. The revision was a collaborative effort between multiple national stakeholders, namely the Ministry of Health, the Ghana Health Service, the Ministry of Local

Government and Rural Development (MLGRD) and the Environmental Protection Agency (EPA), that all contributed under the lead of WHO.

The National Guideline for Health Care Waste Management was developed as a separate document to ensure that HCW is managed effectively in compliance with the relevant international conventions as well as the existing national laws and regulations. The Guideline contains recommendations for better management of HCW in the HCFs and established a foundation for development of standard operating procedures (SOPs) as specific guidance to various levels of HCFs.

Printing of both documents was organized in December 2019 with support of the WHO local office in order to disseminate them amongst HCFs throughout the country.

Madagascar: The National Policy on HCWM in Madagascar, developed in 2014, was reprinted in 2017 and disseminated across the country. Furthermore, the project supported development of the national technical guidelines on HCWM and of a simplified version as a technical booklet for the basic health centres. Both documents have been prepared in Malagasy and French versions, printed out and distributed into HCFs in 112 districts in all 22 regions of the country. For the model HCFs, the project assisted with development of updates of the existing SOPs on HCWM reflecting the best environmental practices and non-incineration of infectious waste. Another reprint of all documents was conducted at the end of 2019 and followed by further distribution across the country.

Furthermore, the project has supported the Environmental Health Service to conduct formative supervision of medical waste management in 6 regions of the country (Menabe, Ihorombe and Morondava regions in 2017, Atsimo Andrefana and Boemy regions in 2018, and Diana region in 2019). Similar assessments in 2-3 additional regions are tentatively planned until the project completion date. The supervision has been conducted to identify the current situation related to the medical waste management of all health facilities at commune, district and regional level; assess the knowledge and current practices of the medical waste management system in individual health facilities, as well as analyse discrepancies between the norms and the current practice and propose corrective actions in case of deviations from the norms.

Tanzania: Under this project component, Tanzania completed revision of the National Policy Guidelines for HCWM and developed of a set of HCWM standards on minimization, re-use and recycling, segregation, storage, transportation, treatment and disposal of HCW, that contain also equipment and tools required. The project beneficiary HCFs adopted the revised National Policy Guidelines and developed facility-based policies and guidelines, using a set of SOPs prepared with support from the project. Under a parallel project funded by the World Bank, a review and update of the National Strategic Plan for HCWM was completed that includes a strategy for implementation of the Plan.

Zambia: Due to the different legislative setup, the project supported a substantive revision of the Public Health Act (PHA), particularly of its part that covers HCWM. The final revision was submitted to the Ministry of Justice in order to facilitate the preparation of the Act for parliamentary debate and eventual presidential ascent into national law. It is expected that PHA could be approved by Parliament in early 2020. The project also helped to review the National Technical Guidelines (TGs) on Sound Management of Healthcare Waste that outline safe, efficient, sustainable, affordable and culturally acceptable methods for the treatment and disposal of HCW, both within and outside health-care facilities. The project support allowed for printing and dissemination of TGs.

HCW is considered a hazardous waste and therefore is included under the Environmental Management Act (EMA) of 2011 that was also under review. Approval of TGs by the Zambia Environmental Management Agency (ZEMA) was pending upon completion of EMA review. There was still a need to complete SOPs and a Training Manual on HCWM. Also, a set of WASH standards were drafted in January 2020 and reviewed by WHO.

In all four countries, the project helped the Governments with obligations under the Minamata Convention by conducting an inventory of mercury-containing medical devices in the model HCFs, collecting the old devices for placing at temporary storage, as well as replacing them with new digital thermometers and sphygmomanometers. Therefore, the project directly contributed to the phasing-out of the mercury-containing equipment under Article 4 of the Convention.

Outcome 2.2: In the preparatory phase of the project, all four countries identified potential beneficiary HCFs and conducted assessment of the pre-selected HCFs with use of the Individualized-Rapid Assessment Tool (I-RAT) that had been developed under the GEF-funded Global Health Care Waste (GHCW) project¹¹. In this way, the countries collected initial information on the status of HCWM at the level of the individual HCFs.

The Project Document envisaged that each country selects the model HCFs according to the following format:

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

Having completed the I-RAT assessments, each country revised the list of the pre-selected HCFs based on feedback received from the candidate HCFs regarding their willingness to participate in the project.

With the assistance and under the supervision of the regional component, the countries had a freedom to decide deployment of the non-incineration HCW treatment technology to individual hospitals and designate either a standalone central facility where the sole function is the treatment of HCW or a cluster HCF with a waste treatment system as a hub to serve surrounding facilities that do not have autoclaves.

The technology allocation formula for the 1st phase, pre-defined in the Project Document, required designation of 3 health posts, up to 2 hospitals, and 1 central or cluster treatment facility in each of the four countries.

As a result, the countries designated the model HCFs for participation in the project as follows:

Ghana: Cape Coast Teaching Hospital (CCTH), Eastern Regional Hospital Koforidua (ERHK), Winneba Trauma & Specialist Hospital (WTSH), Komfo Anokye Teaching Hospital (KATH), and Tegbi Health Centre / Keta Municipal Hospital; (THC/KMH).

Madagascar: Centre Hospitalier Universitaire Joseph Ravoahangy Andrianavalona (CHU-JRA), Centre Hospitalier Universitaire Joseph Raseta Befelatanana (CHU-JRB), Centre Hospitalier Universitaire Mère Enfant in Tsaralalàna (CHU-MET), Centre Hospitalier de Référence de District, Manjakandriana (CHRDM), Centre de Santé de Base Manjakandriana (CSB2M), Centre de santé de base Sambaina Manjakandriana (CSB2SM);

¹¹ Global Project on Demonstrating and Promoting Best Techniques and Practices for Reducing Health-Care Waste to Avoid Environmental Releases of Dioxins and Mercury, implemented in 2008-2012.

Tanzania: Muhimbili National Hospital (MNH), Mwananyamala Hospital (MH), Sinza Hospital for Women and Children (SHWC), Mbagala Ranji Tatu Hospital (MRTH), and Buguruni Anglican Health Centre (BAHC).

Zambia: University Teaching Hospital in Lusaka (UTH), Kabwe General Hospital (KGH), Ndola Teaching Hospital (NTH), Kapiri Mposhi District Hospital (KMDH), Kamuchanga District Hospital, Mukonchi Rural Health Centre, Chilenje Level 1 Hospital (CL1H), and Matero Level 1 Hospital (ML1H).

Due to differences in stratification of HCFs in the four project countries, the size and type of facilities supported by the project varied from country to country as well as their locations and circumstances under which they operate. Total 24 pilot HCFs (5 each Ghana and Tanzania, 6 in Madagascar and 8 in Zambia) were selected for the 1st phase of the project, including 11 health posts, 8 hospitals and 5 cluster/central hospitals. All 24 HCFs were designated to introduce BAT/BEP practices into HCWM and to pilot use of mercury-free devices. Moreover, 14 out of the selected HCFs (3 each in Ghana, Madagascar and Zambia and 5 in Tanzania) were selected to receive equipment for non-incineration HCW treatment. The selection included 5 hospitals with cluster treatment facility (serving to additional 7 HCFs), another 5 hospitals with on-site treatment facility and 4 rural health posts with on-site treatment facility.

In order to facilitate connection of the project model HCFs to the GGHH network, HCWH assisted in provision of GGHH membership to the project model HCFs and creation of accounts on the GGHH Connect on-line platform for 2 members of each of the model HCFs project teams as well as for the National Technical Consultants.

Overall Assessment of Component 2:

The project provided a template for development of the national Healthcare Waste Management Plans and enabled the four countries to conduct further work on revision of the existing national HCWM policies as well as on development of national strategies for future management of mercury-containing waste. The project assistance resulted in inclusion of the non-incineration HCW treatment technologies in the revised national HCWM policies and development of up-to-date technical guidelines and SOPs for practical use of the autoclave techniques.

The documents were instrumental for revision, further development and implementation of the HCWM policies and procedures (including monitoring) at the HCF level as well as plans for management of mercury waste. Training of health workers from the model HCFs was integral part of implementation of this Component.

All four PIUs developed action plans that included detailed baseline assessments of each of the project model that enabled further systematic work with the designated model HCFs and paved a way towards successful introduction of best practices in HCWM and installation and commissioning of the non-incineration technology.

Connection to the GGHH network allowed the project model HCFs to access the collective resources of the GGHH members, made possible connection with other members and experts from around the globe and provided link to events of interest, important research publications and GGHH webinars focusing on specific topics. This facility supplied the project HCFs with technical information, information about real world examples and cutting-edge approaches to improving HCWM strategies and practices.

Based on the above, the overall achievement of the Component 2 is rated Satisfactory (S).

Table 14: Deliverables for Component 3

Outcome	Indicator	End of Project Targets	Delivery Status at TE	Rating
3.a.1: Favourable market conditions created for the growth in the African region of affordable technologies that meet BAT guidelines and international standards	Number of HCWM systems and mercury-free devices procured Number of HCWM systems installed and mercury-free devices distributed	HCWM systems and mercury-free devices for at least 12 health posts, 8 hospitals and 4 central or cluster facilities procured 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	A catalogue of 78 HCWM equipment items developed and used in procurement Contract for supply of 2,553 items of HCWM systems, including 18 autoclaves Contract for supply of 2,301 items of mercury-free devices Equipment for HCWM systems and mercury-free devices delivered to the model HCFs in the four countries	S
Outcome	Indicator	End of Project Targets	Delivery Status at TE	Rating
3.b.1: HCWM systems, recycling, mercury waste management and mercury reduction at the model facilities demonstrated and national training infrastructures established (National Component)		HCF staff trained in BAT/BEP BAT/BEP implemented at all (24) the model facilities Recycling programs started in each of the model facilities Safe storage sites for mercury-containing medical devices established for each of the project countries Mercury-free devices used in each of the model facilities At least one national HCWM training programme established in each of the project countries	Hundreds of health care workers trained in BAT/BEP in HCWM HCWM systems based on BAT/BEP implemented, however to a variable degree Recycling of plastic fraction of HCW implemented only in few model HCFs Central storage of mercury medical waste constructed in Zambia All HCFs from the 1 st phase declared using only mercury-free medical devices National training programmes developed and implemented in all four countries (for further details refer to the relevant sections of the text below)	MS

Outcome 3.a.1: In order to facilitate central procurement of HCWM equipment, it was agreed to develop a catalogue of typical equipment items for set up and operation of a conventional HCWM system. The technical specifications for each item were prepared considering relevant international standards in order to ensure high quality. The final catalogue contains technical specifications and cost estimations for 78 items, ranging from simple equipment such as plastic bags up to complex equipment items as turn-key treatment plants including auxiliary equipment. It was reviewed with the representatives of the participating countries and the international implementing partners before finalization. Based on the catalogue and the allocated budget, the countries and the pilot HCFs could individually select required items based on their needs.

Further to analysis of the baseline HCWM situation in the designated pilot hospitals, the countries prepared Bills of Quantity (BoQ) for procurement of HCWM equipment items chosen by the pilot HCFs. The regional expert team reviewed and technically cross-checked the proposed BoQs and provided recommendations for procurement of auxiliary equipment if needed, such as a water booster pump to ensure adequate pressure and water flow for smooth operation of the autoclaves.

An international tender for the procurement was launched in June 2017. The tender included 57 different products (total 2,553 items) including non-incineration treatment equipment (autoclaves) with maintenance toolboxes and testing tools, auxiliary equipment including voltage stabilizers and water booster pumps, safety and personal protective equipment (PPE), internal HCW collection equipment such as collection bins and liners, needle cutters, consumables including sharp containers, logistic equipment including HCW transport bins and trolleys, mechanical scales and high-pressure water cleaners, as well as waste storage equipment including freezers for pathological waste.

Technical and financial offers were received from three qualified suppliers and were evaluated by the IRH Procurement Unit in cooperation with the regional expert team. In October 2017, a

contract worth of 1,539,101 US\$ was awarded to the Technologie Transfer Marburg (TTM), a registered voluntary association from Germany, with more than 30 years of experience in supply and installation of medical equipment under international projects in developing countries.

TTM is a supplier and partner of the autoclave manufacturer Medi-Clave from South Africa that has a standing reputation as supplier of robust HCW treatment systems designed for use under difficult conditions in Africa, with a track record of several hundred autoclaves which TTM had supplied worldwide and documented by letters of successful projects provided by UN and bilateral agencies such as UNOPS and GIZ.

Supply of total 18 autoclaves of size ranging from 80 to 700/850 litres was requested under this procurement event. For the largest autoclaves, the supplier offered autoclaves with a chamber size of 1,300 litres. Since the largest autoclaves were destined for establishment of central and/or cluster HCW treatment facilities in Madagascar, Tanzania and Ghana, this offer was accepted as bigger autoclave size would enable HCFs to either treat more waste. The list of autoclaves allocated to the four countries is shown in Table 15 below.

Table 15: Size and quantities of autoclaves procured

Volume	Ghana	Madagascar	Tanzania	Zambia	Total
80 l	0	1	1	0	2
130 l	0	0	1	0	1
260 l	5	1	2	4	12
1,300 l	0	1	1	1	3
					18

Installation of the autoclaves and basic training of the autoclave operators by a mix of national and international trainers and experts was included in the contract with TTM.

The necessary infrastructure for installation and operation of the autoclaves, in particular housing and storage space for the internal HCW handling and treatment as well as adequate media supply (water, electricity, etc.) was part of the beneficiaries' co-financing contribution. For preparation of the sites, the regional project team adopted a piecemeal approach to ensure everything was in place before the arrival of the equipment, consisting of the following steps:

1. Provision of a general design for the infrastructure setup;
2. Adaption of the general design to the selected treatment technology and local circumstances;
3. Final cross check before the equipment delivery and installation;

A general design for the infrastructure setup was prepared by the regional project team and consulted with the country representatives during the regional meeting. This served as a basis for adaption of the general design to the selected treatment technology and local circumstances and preparation of a detailed design by each pilot HCF. The regional team provided the beneficiaries with information about fundamental prerequisites for installation and commissioning of the procured equipment, in particular requirements for water and electricity supply. The final design was discussed and approved during on-site missions of the regional technical expert and the construction works were performed by local contractors tendered by the pilot HCFs.

During the last three months prior the installation of the equipment, bi-monthly calls between the national PIUs and the supplier were organized by the regional project team to ensure the site readiness and to provide a platform for discussion between the supplier and the beneficiary HCFs. A check list for readiness of the sites was developed in cooperation with the international

equipment supplier (TTM), including the site photo documentation, and served as a condition for triggering shipment of the equipment.

The installation of the autoclaves started in Ghana in April 2018, followed by Tanzania in May 2018 and Zambia in July 2018, and was completed in Madagascar in August 2018. Commissioning of the autoclaves was carried out either by the technicians of the supplier or by RTE and included performance tests with an empty as well as loaded autoclaves. All installed autoclaves passed the performance tests. A testing procedure was agreed for future regular performance testing. During the commissioning, operators of the autoclaves at all 14 selected pilot HCFs were trained in basic operation and preventive maintenance.

Following the commissioning of the autoclaves, the regional project team organized monthly common calls with members of the four national project teams to discuss pertinent issues related to operation/maintenance of the autoclaves as well as collection and management of data on autoclaves operation. From March 2019 onwards, these calls were organized separately for each country with variable periodicity in order to better respond to specific needs of the individual countries.

In line with the RPB recommendations, the regional component supported additional local procurement of specific items that had been requested by the national project teams to reinforce operation of the HCWM systems at the pilot HCFs. In order to facilitate functioning of the central/cluster HCW treatment system, four HCW transport vehicles were procured in Madagascar and five HCW transport tricycles in Ghana. In Tanzania, the regional component supported procurement of three HCW compactors/balers as well as contracting of a national expert on the training curriculum development. Support from the regional component was also provided for construction of a bio-digester at one HCF each in Tanzania and Madagascar.

In order to assist the countries with development of their mercury-containing equipment exchange plan, the project prepared a guidance document *“Recommendations on the replacement of mercury containing medical devices”*. Following this guidance, the national project teams conducted inventories of mercury-containing medical devices used in the pilot HCFs. Upon consultations with the national project teams, the regional component assembled a list of proposed mercury-free blood pressure instruments and thermometers and compiled BoQs for the requested mercury-free devices with the help of the equipment catalogue.

Tender for the mercury-free alternative devices was launched in April 2017. The IRH Procurement Unit in collaboration with the regional project team conducted evaluation of the received technical and financial offers at the end of June 2017 and awarded a contract worth of 49,944 US\$ (on DDP conditions) to Intertrade International Services SA (IIS) from Switzerland.

Shipment of the procured mercury-free medical devices to Ghana, Tanzania and Zambia was realized in the period September-October 2017. During a mission in Zambia, the quantity and quality of the supplied items were controlled. The inspection showed that the supplied digital thermometers did not comply with the required technical specifications. The supplier replaced the already delivered thermometers with new thermometers compliant with the specification. A validation assessment of the delivered aneroid sphygmomanometer in Ghana indicated that 13 pieces displayed incorrectly the blood pressure. These items were replaced by the supplier. based on the contract amendment to 48,909 US\$.

The shipment to Madagascar had to be postponed until January 2018 due to delays in obtaining necessary custom clearance for the cargo. Although the equipment items were imported under the UNDP project and therefore supposed to be eligible for exemption from indirect taxes, including custom duties, the national customs did not grant the import tax exemption since the

imported devices were not destined for use by the UNDP CO but the pilot HCFs. Finally, MoH agreed to pay the import tax and the shipment was released for delivery to the beneficiary HCFs.

Total 2,301 pieces of mercury-free medical devices were procured and distributed to the four countries in the first phase of the project as shown in Table 16 below.

Table 16: 1st round of procurement and distribution of mercury-free medical devices

Item	Ghana	Madagascar	Tanzania	Zambia	Total
Aneroid sphygmomanometer	148	146	283	208	785
Automatic sphygmomanometer	47	145	20	213	425
Digital blood pressure monitor	24	-	3	-	27
Digital thermometer	225	963	160	953	2,301

The regional component also provided support for procurement of interim storage of the collected mercury waste in Ghana and Tanzania.

Outcome 3.b1: This outcome is composed of several interventions discussed in the text below.

HCF staff trained in BAT/BEP:

In Madagascar, altogether 236 health workers from all 22 regional divisions of public health and environmental technicians were trained on BAT/BEP in HCWM as of November 2019. The trainees represented 13 out of 22 university hospitals, 14 of 16 regional referral hospitals and 8 of 90 district referral hospitals. The training curricula were introduced into all 6 existing public training institutions for paramedics and into private training institutions in 8 regions.

In Ghana, the project liaised with the Accra School of Hygiene (ASH) for revision of the existing training curriculum and inclusion of current trends and international requirements for HCWM. In July 2018, ASH conducted a specific modular course on HCWM in July 2018 for 26 trainees from hospitals, district and municipal assemblies as well as consultants working the environmental management. Facilitators for the training were drawn from the national experts and tutors from ASH. In 2019, the course was repeated at the Ho School of Hygiene for additional 26 trainees.

The project in Tanzania identified 18 national trainers and organized a national train-the-trainers workshop on HCWM in December 2017. The national trainers have in return provided training at their respective hospitals. With the support of national experts, the project developed training materials for a 12-day course for HCWM focal points at HCFs. Centre for Educational Development in Health Arusha (CEDHA) agreed to include this HCWM course as part of short courses offered by the institution.

As there was no refresher course on HCWM for EHOs in Zambia, the project recruited a national expert to develop a 3-day short refresher training course on HCWM for EHOs that includes BAT/BET. The first draft of the short courses was already prepared and shared with key stakeholders and adopted in July 2019. University of Zambia (UNZA) – Medical School under the Department of Public Health agreed to undertake the training and certify recipients of the training in HCWM.

BAT/BEP implemented at all model facilities:

Several model HCFs had already in place a HCWM Plan at the time of the project inception. These HCFs conducted a major revision of their respective HCWM Plans with the assistance of the project. In Ghana and Tanzania, the common practice was that the general National HCWM Policy and National Guidelines on HCWM, developed under the project, were

subsequently adopted for use at the level of the model HCFs. Four model HCFs in Zambia used the assistance from the project to develop their first ever HCWM Plans.

The revised and/or newly developed HCWM Plans in all model HCFs include application of BAT/BEP. Furthermore, the project enabled set up and operation of advanced HCWM systems at HCF level through provision of equipment and tools for waste segregation, handling and transport as well as documentation, including standards and forms for collection of waste, informational and educational materials.

In almost all visited model HCFs, commendable efforts were noted in segregation, handling as well as on-site aggregation and transport of HCW. Majority of the model HCFs have a system of HCW segregation at source (the hospital wards) into general waste (placed in labelled black bins and plastic bags) and clinical/ infectious waste (placed in labelled yellow puncture-resistant containers and plastic bags). Sharps are collected separately into special labelled yellow puncture-resistant containers. In Ghana, Madagascar and Tanzania, the project introduced use of needle cutters to enable separation of needles from syringes and facilitate recycling of the plastic portion of HCW. However, several HCFs complained about low durability of the needle cutters provided by the project. In Tanzania, needle smelters were used instead as these had previously been provided as a private company donation to several HCFs.

A majority of the visited HCFs had clear instructions and guidelines for the practice of waste segregation visibly exposed above the waste collection area in the form of instructional posters. The Environmental Health Officers, responsible for HCWM in the model HCFs, reported that majority of the staff were familiar with the colour codes used for different categories of waste and adequately practiced the waste segregation. In few HCFs, however, some hospital workers, namely short-term (daily) workers and students, reportedly did not have correct understanding of the waste classification and segregation requirements. Training and re-training of hospital staff and provision of sufficient quantities of waste bin liners were mentioned as the two most critical premises of proper HCW segregation at source.

In the 1st phase, the project provided the non-incineration (autoclave) technology to 14 model HCFs in the four countries. Successful installation and commissioning of the autoclaves were supported by provision of preventive maintenance schedules, instructions for emergency response, and a guideline for the operation and monitoring of central treatment plants as well as on-the-job training of autoclave operators. With the assistance of HCWH, standardized forms for reporting of quantities of autoclaved waste were developed and supplied to the 14 HCFs and regular (monthly) reporting commenced as of January 2019.

After two years of operation of the autoclaves, establishing of the central/cluster HCW systems in all four countries was still in its infancy. The main obstacles to proper functioning of the central/cluster treatment were challenges in transport of infectious waste to the designated central/cluster HCFs from neighbouring hospitals and clinics. In order to solve this issue, four vehicles were procured in Madagascar and five tricycles in Ghana for transport of HCW to the designated central or cluster treatment facilities. These vehicles were equipped to safely transport infectious waste by road in line with the relevant international standards. However, as of late 2020, the waste transport vehicles were not used at full capacity and did not produce a visible impact on organization of the central/cluster treatment systems. The designated central HCFs continued lengthy negotiations with client HCFs on determination of appropriate tariffs to be charged per kg of HCW to compensate for the electricity and water use at the central treatment facility and for the transport fuel cost.

HCW Recycling:

The national HCWM policies prepared and adopted with the assistance of the project call to develop and implement measures for waste reduction, re-use, recycling and recovery. HCW recycling is considered as an option for reducing the volume of waste and for generating sustainable revenue through recycling of certain portions of the segregated HCW.

The project countries have developed some interesting examples of HCW recycling. One model HCF in Madagascar launched a pilot production of pavement tiles made of recycled plastic syringes and glass ampoules. Since the quantities of plastics and glass recyclables from the hospital's own waste is not sufficient for a larger scale production, it intends to make agreement with private clinics in the vicinity to bring additional HCW for treatment and recycling. Here the HCW recycling has actually become a driver for establishment of the HCW treatment cluster.

In Tanzania and Zambia, model HCFs embark on recycling schemes that generate a modest income from sales of the recyclable fractions and provide incentives to improve effectiveness of the waste segregation in HCFs. Three out of the five model HCFs in Tanzania sell the plastic fraction of the sterilized HCW based on permanent contracts with established recycling companies or sell to small waste trackers on an ad-hoc basis. They get a nominal fee about 0.20 US\$ per kg of sterilized plastic waste. In Zambia, the biggest model HCF prepares to contract a private recycling company for collection of the plastic waste and paper cardboard fractions for recycling.

As part of the project activities, the project teams in the four countries made a research into the existing waste recycling companies in order to facilitate possible collaboration. The project model HCFs located in the regions found it difficult to identify any active recycling companies in their neighbourhood. This experience proves there is only a market for recyclable materials in and around the capital cities while for the remote parts of the countries the transportation costs of the HCW recyclable fractions are too high for the recycling businesses to be profitable.

Storage of mercury waste: In relation to the collection of old mercury-containing medical devices, the Project Document envisaged improved practices for mercury waste management, including setting up one storage site for mercury HCW per country and training of model HCFs staff in the clean-up, storage and safe management of mercury wastes.

In implementation of this sub-component, the most remarkable progress was seen in Zambia where the project team had engaged with the country's focal point for Minamata Convention in order to establish a central storage of mercury-containing medical devices. An agreement was concluded between the national project partners to locate the central storage of mercury-containing devices within the MoH headquarters in Lusaka. The project procured a converted 20-feet metal container complete with shelving, lighting, an emergency spill response kit inclusive a containment area underneath its base in case of spills. The container was licensed by the relevant environmental authority (ZEMA) and designated to store all mercury-containing waste collected within the country.

The main challenge that hampered progress in the other three countries was reaching agreement between the relevant authorities about location of the central storage of mercury waste. For example, ToR for procurement of a 20-feet container was prepared in Ghana but the procurement could not be advanced as the relevant authority (EPA) had cancelled the initial agreement about location of the central storage at its regional office in Cape Coast. In Tanzania, the progress was hampered by the relocation of MoH from Dar-es-Salaam to the new capital city to Dodoma that presented some logistical and financial challenges for the location of the central storage within MoH. In Madagascar, construction of the central storage was not

completed either. As no final solution on the central storage was reached in the three countries, they arranged for an interim storage of the collected mercury waste at one of the model HCFs.

Experience from implementation of this component shows that difficulties to reach agreement between ministries responsible for health and relevant environmental agencies about location of the mercury waste storage were due to the reluctance of the environmental authorities to assume responsibility for storage of the mercury HCW as the latter authorities were convinced that the waste originator (i.e., health service) should also be the custodian for the mercury waste.

Use of mercury-free devices:

The 14 model HCFs from the 1st phase as well as 3 selected model HCFs from the 2nd phase (see Component 4 below) were provided with mercury-free medical devices. In the 1st round, the planned 1:1 exchange was not possible in some countries, could not be achieved some countries due to the fact that some hospitals had already started the shift to mercury-free alternatives before the intervention of this project. In Madagascar, the exchange was found impossible as the model HCFs did not own any mercury-containing devices and had been using devices privately owned by the doctors, nurses, paramedical students or patients.

TE was able to get feedback from the 14 model HCFs equipped with the new devices in the 1st phase of the project. All 14 model HCFs from the 1st phase reportedly used only mercury-free devices. However, some facilities expressed dissatisfaction with the supplied new devices that they described as “domestic quality”, i.e., not fit for use in the professional health care. These concerns were usually reported by major hospitals due to relatively high frequency of use of the new devices. Major concern in smaller HCFs and rural health posts was availability of replacement rechargeable batteries for the new devices. Few model HCFs also complained about lack of accuracy of the readings compared with the old devices. The numbers of distributed mercury-free devices and collected mercury-containing devices in the 1st phase is in Table 17 below.

Table 17: Overview of exchange of mercury-containing medical devices in the 1st phase

Device	Ghana		Madagascar		Tanzania		Zambia		Total	
	Distr.	Coll.	Distr.	Coll.	Distr.	Coll.	Distr.	Coll.	Distr.	Coll.
Digital Thermometer	225	225	963	6	160	33	950	352	2,298	616
Sphygmomanometer	219	219	291	0	306	52	523	448	1,339	719

It follows from Table 17 that 100% replacement of mercury-containing devices was achieved only in Ghana while the rate of exchange ranged from almost zero in Madagascar to 85.5 % in Zambia. The overall rate of exchange for all countries in the 1st phase was 53.7%.

National training programmes in HCWM:

Future Environmental Health Officers, Occupational Therapists and Occupational Health and Safety Experts in Ghana must now follow a full semester course on HCWM that 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 that is also used by the West Africa Health Examination Board as a basis for HCWM trainings in West Africa.

Three types of Learning Resource Packages (LRPs) for in-service health care professionals were developed in Madagascar, i) for health care providers (physicians, paramedics including nurses, midwives and laboratory technicians (in French), ii) for operators and support staff (in local language) and iii) for national decision makers from relevant divisions at MoPH and HCF managers (in French).

The project liaised with training institutions in Tanzania to revise existing curriculums to include HCWM with mercury-free and non-incineration technologies and initiated revision of training curricula at key national training institutions including CEDHA, Muhimbili University of Health and Allied Sciences (MUHAS), Muhimbili University School of Hygiene, Tanga School of Hygiene and Mpwapwa School of Hygiene. Along with MoH, MUHAS and CEDHA led consultations for revision national HCWM curriculum. The three schools of hygiene, namely the Muhimbili University School of Hygiene, the Mpwapwa and Tanga Schools of Hygiene follow the same teaching programme under which the curriculum for Environmental Health Officers covers solid waste management, including healthcare waste management.

A teaching module on HCWM has been part of the national curriculum for Environmental Health Officers (EHOs) and nurses in Zambia. The 64-hour course for EHOs on healthcare waste management was updated with the assistance of the project and covers now both the incineration as well as non-incineration HCW treatment technologies. This curriculum is followed at all of the country's health science schools.

Summary assessment: Provision of equipment and tools for HCWM contributed to improvement of the practices on HCW classification, segregation, labelling, internal storage and transportation at the level of the model HCFs. With the assistance of the project, the model HCFs either conducted major revisions of their existing plans or prepared first ever HCWM plans by adopting the national HCWM plans to the HCF level.

The supply of equipment and technical assistance with development of the HCWM frameworks were complemented by series of trainings that cut across all cadres of staff considered to be key stakeholders to operation of the HCWM systems, including doctors, nurses, cleaners, maintenance staff and liaison officers.

The HCWM systems were operational at all model HCFs, however to a variable degree. Improper HCW segregation at the wards had been observed and reported by MTR for several HCFs in all four countries. It is not ambition of this evaluation to make a detailed assessment of the operation of the HCWM systems. Such assessment would require much more systematic approach that was not possible during the relatively short visits of the beneficiary HCFs.

Autoclaves at all 14 HCFs designated in the 1st phase were successfully installed and commissioned, despite few challenges caused by slow progress of HCF site preparation works or lack of response from local agents of the autoclaves' supplier. Operation of the autoclaves has been sustained by the recipient HCFs and standardized regular reporting on the quantities of infectious waste treated in the autoclaves has been in place since January 2019.

It appears that the lack of progress in the central/cluster waste treatment by the project HCFs is due to complicated negotiations about contractual relations between the constituent HCFs, particularly the fact that all designated central or cluster treatment facilities are public HCFs unable to establish fees for treatment of HCW from other public HCFs. In Ghana, the central HCW treatment facility run by the private company Zoompak (not supported by the project) has been working well for more than one year and has substantially increased the number of client HCFs.

The issue related to concerns on landfilling that had been highlighted during MTR in late 2018, was solved in Tanzania through provision of locally manufactured waste compactors to three model HCFs in mid-2019. In the other three countries, the concerns regarding placing the autoclaved waste on landfills were reported during the TE missions and remained unresolved at the project closure.

The possibility of provision of waste shredders had been discussed in the initial phase of the project but a decision was taken against procurement of shredders due to doubts about

sustainability of this option at the project HCFs (intensive requirements for shredder blades maintenance). While this was a legitimate concern in the early phase of the project, MTR conducted in late 2018 strongly recommended the procurement of shredders as the only available solution to the challenges with disposal of autoclaved waste. Nine shredder systems were included in the 2nd round of procurement but they were delivered only in early 2020 and their installation and commissioning was delayed due to the COVID-19 pandemic. Initial experience with operation of the shredders reported from Ghana indicated that although the shredders were successfully commissioned, they had too big blades for the treated HCW hence the shredding operation was not very effective. Given the lack of experience with waste shredding at the level of HCFs and extensive maintenance requirements, the project has not been able to consolidate and share the experience from use of shredders and comparison of shredders with compactors before its completion in December 2020.

Prior to the project, all pilot HCFs were using de-Montfort or modified incinerators for treatment of infectious HCW. Due to the lack of the central/cluster treatment functionality and inability to dispose of the autoclaved waste through landfilling, some HCFs were unable to abandon the incineration for disposal of infectious waste. More on this is in the text on Achievement of project objectives below.

Some but not all the model HCFs initiated recycling programmes that focus in particular on recycling of plastics. The key challenge for the recycling of HCW is that the market for recyclables is not yet developed in the four countries with a vast majority of active recycling companies based in the capital cities. Therefore, the recycling programme for plastics proposed in the Project Document was successfully initiated in the countries with the model HCFs located in the capital city (e.g., Tanzania) but was found difficult to implement in the model HCFs in remote regions where little or no market currently exists for the recovered plastic fraction of HCW.

The replacement of mercury-containing medical devices was implemented through centralized procurement of mercury-free equipment and all beneficiary model HCFs were declared using only mercury-free medical gadgets. Specification of the equipment for the decentralized 2nd round of procurement was done considering the experience and lessons learned from use of the 1st batches of the new equipment.

The construction of the central storage for mercury-waste was completed only in Zambia while the other three countries experienced delays due to selection of the storage location. Madagascar adopted decision to export the mercury HCW while no decision on the method of final disposal of the mercury waste was adopted in the other three countries.

In all four countries the project successfully assisted in establishment of national training programmes on HCWM that have been entrenched in the national training curricula for the health professionals.

Based on the above findings, the overall achievement of Component 3 is rated Moderately Satisfactory (MS).

Table 18: Deliverables for Component 4

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				
Outcome	Indicator	End of Project Targets	Delivery Status at TE	Rating
4.a.1: Capacities of project countries to absorb additional technologies evaluated	Evaluation report (including recommendations for each project country and HCF) available	Evaluation conducted of all the 4 project countries and all the HCFs, which have received project support	Evaluation of country performance in the 1 st phase of the project completed during MTR Allocation of funds for 2 nd round procurement of HCWM systems and mercury-free devices approved	S
4.a.2: Additional technologies distributed depending on evaluated capacities for absorption	Number of HCWM systems and Hg free devices procured	Additional HCWM systems and mercury-free devices procured and distributed, based on the evaluation results and allocation formula	48 different HCWM products (total 1,822 items) procured	S
COMPONENT 4B: EXPAND HCWM SYSTEMS AND THE PHASE-OUT OF MERCURY IN THE RECIPIENT COUNTRIES AND DISSIMINATE RESULTS IN THE AFRICAN REGION				
Outcome	Indicator	End of Project Targets	Delivery Status at TE	Rating
4.b.1: HCWM systems expanded to other facilities in the country	Number of HCFs supported in addition to the initial set of HCFs	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 ¹²	3 autoclaves delivered to 3 additional designated model HCFs supported with installation and testing	S
4.b.2: Country capacity to manage mercury and to phase-in mercury-free devices improved	Number of mercury-free project HCFs in addition to the initial set		Mercury-free devices procured and distributed in the designated model HCFs	S
4.b.3: National training expanded	Number of people trained in addition to the initial set of trained HCF personnel	HCF staff of the additional HCFs trained in BEP/BAT	Corrective and preventive maintenance trainings for additional model HCFs completed on-site and remotely Spare parts provided for all pilot HCFs	S
4.b.4: Information disseminated at environment and health conferences in the region	List of environment and health conferences in the region		Presentation and/or showcasing of the Project at more than 10 international health and environment conferences and workshops Participation in informal HCWM Taskforce	S

Outcome 4.a.1: It was suggested during the Inception Workshop and approved by the concurrent 1st RPB meeting in September 2016 that allocation of resources for the second round of procurement would be based on aggregate performance by each country during the 1st phase rated according to the following criteria:

1. 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;

Evaluation of the aggregate country performance was conducted as part of MTR. Apart from the five criteria above, no guidance on the rating was provided by RPB, and the MTR consultant decided to attribute equal importance to the five evaluation criteria use the performance rating scale 0-10 representing “no progress” to “excellent outcome”. The country performance evaluation was presented by the MTR evaluator to the RPB meeting in December 2018 and on this grounds the distribution of project funds for the 2nd round of procurement was approved.

¹² The EoP target was revised upon recommendation of MTR as explained in the text below for Outcomes 4.b.1 and 4.b.2.

The MTR ratings and allocated funding for the 2nd phase are summarized in Table 19 below.

Table 19: Aggregate rating of country performance in the 1st phase of the project

Evaluation criteria	Ghana	Madagascar	Tanzania	Zambia
Promulgation of HCWM and mercury reduction policies	8	8	8	7
Implementation of BAT/BEP in the model HCFs	8	9	7	6
Operation and maintenance of the 1 st batch of equipment	8	7	6	8
Safe storage of healthcare mercury waste	8	8	6	10
Effective national training programmes	10	10	7	6
Total	42	42	34	37
Weighted score	27%	27%	22%	24%
Allocation of funds for the 2nd phase (US\$)	275,746.14	275,746.14	224,682.04	245,107.68

Outcome 4.a.2: Based on the above allocation of project funds for the 2nd round procurement of HCWM items and non-incineration technologies, the regional component initiated an international tender for 48 different HCWM products (total 1,822 items). This included additional 3 autoclaves (one each for new pilot facilities in Ghana, Madagascar and Zambia). Total funding allocated to this procurement event was 611,627.50 US\$.

The tender was announced in March 2019 and bids from two qualified suppliers was received by the submission deadline in April 2019. The best bid was submitted by TTM, Germany. Based on requests received from the countries, the regional project team updated the BoQ with increased quantities of several items (e.g., waste shredders and equipment items for waste logistic). With the updated BoQ, the total tender value raised to 749,756.30 US\$. TTM provided a revised financial offer without any change in the unit prices. Moreover, the original quotation of transportation/delivery costs by TTM remained unchanged despite the 22.58% increase in the tender value.

The increase of the tender value was approved the Regional Advisory Committee on Procurement (RACP) of UNDP as the increase was below the maximum 25% increase threshold stipulated in the UNDP procurement policy.

The timeline for this procurement event is in Table 20 below.

Table 20: Timeline of the 2nd round of centralized procurement of HCWM equipment

Procurement Action	Date
Announcement of bidding documents	21-Mar-2019
Deadline for submission of bids	17-Apr-2019
Completion of evaluation of updated bids and RACP submission	25-Jun-2019
RAC approval	12-Sep-2019
Contract signature	8-Oct-2019

It follows from Table 16b that the entire process of the 2nd round of procurement up to the contract signature took 6.5 months, i.e., more than 2 months longer than the 1st round, although the number of items procured was 30% lower compared to the 1st round and included only 3 autoclaves compared to 18 autoclaves procured in the 1st round. Most of the time in this procurement event was consumed by updates of BoQ (3 months) and the lengthy process of obtaining the RACP approval 2.5 months).

Outcome 4.b.1: The original results framework in the approved Project Document envisaged that in the 2nd phase the project would support additional 14 HCFs and 12 rural health posts. However, MTR recommended a careful planning of a decision was taken to support only 3

additional model HCFs and focus the efforts on further improvements of HCWM systems implementation at the model HCFs from the 1st phase.

The actual delivery and installation of the additional 3 autoclaves was negatively affected by various restrictions related to the COVID-19 outbreak. The 450-litre autoclave unit destined to Analakinina University Hospital in Toamasina, Madagascar, arrived as planned in April 2020 but on order of the local authorities had to stay several weeks unloaded in the shipment container following COVID-19 quarantine requirements. As Madagascar was considered unsafe destination for travel, Medi-Clave could not send technicians for installation. At the time of the autoclave arrival, the city of Toamasina became epicentre of the COVID-19 in the country and the Ministry of Health dispatched a local team of technicians from the Ampefiloha University Hospital in Antananarivo (that had an autoclave installed in the 1st phase) to Toamasina to carry out the installation. As the local technicians could not perform the task, the deadlock was resolved in an unprecedented manner and the installation was carried out through a 4-day videoconference under supervision of the Medi-Clave team based in Johannesburg, who guided the two local technician teams with support of an interpreter.

The 400-litre autoclave unit for the St. John of God Hospital in Duayaw Nkwanta, Ghana, arrived in February 2020 but the hospital refused to accept the delivery as there were visible cracks on the autoclave indicating possibility of damage during the shipment. Upon consultation with the equipment manufacturer (Medi-Clave. Ltd. from South Africa), the extent of damage was confirmed by an ultrasound scan. It was established that shipment back to the manufacturer for repair and return to Ghana would not be economically feasible, the manufacturer agreed to replace the damaged unit. A new autoclave arrived in June 2020 but the installation had to be delayed as the Medi-Clave technicians were not allowed to travel due to the COVID-19 travel restrictions. Installation was finally conducted remotely in August 2020 by the local agent of the supplier with the remote support from Medi-Clave engineers.

The Chilenje Level 1 Hospital in Lusaka, selected to receive one 400-litre autoclave unit, was in delay with construction of the housing required to accommodate the autoclave due to lack of funds. As soon as the funding was secured, the hospital contracted a local construction company in April 2020. Soon after that, the hospital was designated as a COVID-19 hospital with special restrictions that prevented external workers to enter the hospital complex and the construction had to be put on hold until September 2020 when the restriction was lifted. The housing for the autoclave was completed in early November 2020. Installation and commissioning of the autoclave was performed on-site by Medi-Clave engineers that visited Zambia in mid-November to provide additional maintenance training workshops to staff of the pilot HCFs from the 1st phase (see Outcome 4.b.3 below).

Outcome 4.b.2: The concerns on the new devices expressed by the model HCFs in the 1st round of procurement were considered by the respective UNDP COs that organized the 2nd round of procurement in a decentralized manner. Although the 2nd round was already initiated in all four countries before the TE missions in November/December 2019, completion in all 4 countries was negatively affected by the COVID-19 pandemic and shipment of mercury-free devices and their exchange were delayed. The numbers of distributed mercury-free devices and collected mercury-containing devices in the 2nd phase is in Tables 21 and 22 below.

Table 21: Summary of the 2nd round of procurement of mercury-free medical devices

Item	Ghana	Madagascar	Tanzania	Zambia	Total
Digital thermometer	0	3000	0	140	3140
Aneroid sphygmomanometer	165	40	0	150	355
Automatic sphygmomanometer	0	167	0	100	267
Digital blood pressure monitor	0	0	0	0	0

Table 22: Overview of exchange of mercury devices in the 2nd phase

Device	Ghana		Madagascar		Tanzania		Zambia		Total	
	Distr.	Coll.	Distr.	Coll.	Distr.	Coll.	Distr.	Coll.	Distr.	Coll.
Digital Thermometer	0	0	3000	2335	0	0	140	0	3,140	2,335
Sphygmomanometer	165	100*	207	6	0	0	250	139	622	139

*Estimate

The data in Table 23 show improved exchange rate of digital thermometers in Madagascar in comparison with the 1st phase but the overall exchange rate for all 4 countries remained about the same as in the 1st round. Because of the delays in the procurement, feedback from HCFs on the 2nd round of procurement of medical devices was not available for the TE report.

Following MTR recommendation to ensure that the established HCWM systems in the 24 model facilities work properly, the regional component focussed on capacity building for monitoring and data collection from the 24 HCFs. With the technical support of HCWH, the project developed a Waste Generation Tracker (WGT) as a set of spreadsheets intended to standardize HCF recording and reporting on progress in HCWM. From January 2019 onwards, the 14 model HCFs equipped with autoclaves have been submitting the WGT spreadsheets on a monthly basis to their respective national PIUs and the latter conveyed the results for summarization at the regional level.

Outcome 4.b.3: Based on an international tender, IRH awarded a contract to Medi-Clave for additional training workshops for autoclave technicians in the four countries. The schedule of trainings included one workshop per country on basic (weekly and monthly) as well as advanced (semi-annual) preventive maintenance and two practical 1-day ad-hoc training workshops per country on corrective maintenance work. The design of the workshops included capacity building on spare parts management based on improved inventory of spare parts for the installed autoclaves and provision of spare part packages to the pilot HCFs. Included in the contract was also provision of spare part packages for all HCFs with autoclaves.

On-site maintenance trainings were completed in Ghana and Zambia. In the other two countries, Medi-Clave engineers supported by local technicians conducted the trainings remotely due to protracted COVID-19 travel limitations.

Outcome 4.b.4: With the assistance of the international partners, the project was presented and/or showcased at a number of regional and international events, including the following:

- o One-day training workshop on WASH in health care facilities at the WASH Futures Conference, Brisbane (March 2018)
- o Regional inception workshop of SIDA financed UNDP-HCWH supported project, Sustainable Health in Procurement Project (SHiPP), Istanbul, Turkey (April 2018)

- WHO workshop on the concept development for the implementation of the Minamata Convention, Kuala Lumpur (March 2017);
- WHO/UNICEF global learning event on WASH in HCFs in Nepal (March 2017);
- GGGH Webinar Series, Reducing UPOPs and Mercury Releases from the Health Sector in Africa: A report back from Tanzania and Madagascar, Online (July 2017);
- Keynote address at the International Workshop on Infection Prevention and Control, Arusha, Tanzania (September 2017)
- Presentation at the Public Health Association of South Africa (PHASA) meeting during the launch of the environment and health working group, Johannesburg, South Africa (September 2017)
- European Regional Meeting on Water and Sanitation in Health Care Facilities, Bonn, Germany (September 2017)
- Presentation at the Asian Regional Global Green and Healthy Hospitals Conference, Taipei, Taiwan (October 2017)
- Report on project at the International Solid Waste Association health care working group meeting, Oman, by WebEx (November 2017) SPSH Webinar on Effective Communication, Online (December 2017);
- First Scientific and Technical Committee Meeting on GEF financed UN Environment supported project, ChemObs Africa, Dakar, Senegal (March 2018)
- One-day training workshop on WASH in health care facilities at the WASH Futures Conference, Brisbane (March 2018)
- Regional inception workshop of SIDA financed UNDP-HCWH supported project, Sustainable Health in Procurement Project (SHiPP), Istanbul, Turkey (April 2018)
- World Health Assembly in Geneva (May 2018) - the Project was presented as an example for implementation of the WHO Roadmap on Chemicals during the side event for health sector civil society representatives;
- Asian Suppliers Forum in Manila (June 2018) – the Project was presented with elements on mercury substitution, lessons for suppliers on HCW treatment technologies, as well as the bio-digestion component of the project;
- Global Chemicals Outlook II (GCOII) expert workshop, (June 2018) – the Project was presented as a case study and an example of south-south technical cooperation;
- International Solid Waste Association HCF Working Group (June 2018) - lessons learned from the Project were presented as a case study for the technology procurement process for a HCWM system;
- Regional meeting on WASH in HCFs in Ghana (September 2018) – the Project was showcased at this meeting with a particular focus on safe HCWM;
- Conference of Parties (COP) of Basel, Rotterdam and Stockholm Conventions in Geneva (April 2019) - the Project was presented at a side event;
- WHO Quality of Care Global Network Learning Event, Addis Ababa, (March 2019);
- Global Manufacturers/Suppliers Forum in Africa, Dar es Salaam, (July 2019);
- WHO/UNICEF global meeting on WASH in Healthcare conference in Zambia, September 2019 (presentation on bio-digestion as an element of climate smart healthcare)
- Infection Control African Network (ICAN) meeting in Madagascar in September 2019:

To the extent possible, the regional component supported participation of representatives of national PIUs in some of the above events.

Since April 2020, the project represented UNDP in an informal taskforce on HCWM streamlining and through regular meetings exchanged information and experience with a number of global partners active in the health care area (CDC, Gavi, GEF, Global Fund, HCWH, Stop TB Partnership, WHO, UNEP, UNDP, UNICEF, UNIDO, WaterAid).

It was decided to use the website of the predecessor global UNDP/GEF project on medical waste (www.gefmedwaste.org). The project contracted a resource person who collected and classified some of technical resource documents (already produced under the global project) for use at the UOPOs project's website.

In order to further enhance the operational capacity for communication/outreach activities at the regional and national levels, an international expert on knowledge management and communication was recruited by the project in December 2018. However, the contract was terminated by mutual agreement at the end of July 2019. At the regional level, two interns were recruited to support the communication and outreach activities. Further support was provided through national technical experts.

In cooperation with the participating Ministries from the Government of Madagascar, the project organized an international photo contest on "Greener Healthcare Waste Management". The aim of the photo contest was to raise awareness for a greener healthcare through visual and artistic medium and to promote BAT/BEP in HCWM.

The photo contest was held between April-July 2019. The project could outreach over 100 different stakeholders and countries. 1750 users from 119 countries visited the contest website, <http://www.greenhealthcarewaste-photos.org/>. In total, 231 photos, from 44 countries, were submitted into 2 categories of the contest. The winners were announced in August 2019, including 2 winners in each category and 4 special nominations. More than 30 websites with overall reach of several million users contributed to wide dissemination of information about the contest.

Additionally, the project was covered by a newsletter and website of UNDP Ghana (<http://www.gh.undp.org/content/ghana/en/home/presscenter/articles/2018/05/02/02.html>) and at the website AllAfrica.com: <http://allafrica.com/stories/201805040251.html>

In Madagascar, the project was introduced in a TV programme, Morning Day: Dream'in <https://www.youtube.com/watch?v=2-rrZE9AOo8>

Summary assessment:

Due to the slow progress in the 2nd round of procurement, the additional autoclaves as well as the shredder post-treatment systems were delivered and installed between mid-February and beginning of March 2020, i.e., less than 2 months before the scheduled operational completion of the project. The extension until December 2020 provided the project with more time for installation of autoclaves from the 2nd round of procurement and organize related capacity building events. However, travel and quarantine restrictions imposed in the project countries in relation to COVID-19 outbreak proved to be additional implementation challenge. The remote installation of autoclaves and virtual maintenance training courses showed the regional and country project teams rose to the occasion with innovation and use of IT technology.

Procurement of HCWM equipment and autoclaves was a repetition of the same from the 1st phase but the supply of the shredder systems to selected model HCFs from the 1st phase was a new element. Installation and operation of shredders is not complicated and does not require additional adjustments of the existing autoclave housing, however, as discussed above, provision of shredders is expected to have a huge positive impact on final disposal of autoclaved HCW. However, due to the provision of the shredder systems so close to the project completion,

this evaluation is unable to assess the expected merits of the shredders on final disposal of autoclaved HCW and therefore on full achievement of the project objectives. For the same reason, it is also unable to capture any lessons learned from operation and maintenance of the shredder systems.

The project was successful in introduction of standardized tools for performance monitoring of the installed autoclaves including tracking of quantities of HCW treated therein by all participating model HCFs. As data from the monitoring is collected by the national PIUs that will be disbanded at the project completion, the monitoring function at the national level will have to be delegated to an alternative body.

With the help of the international partners, UNDP IRH successfully disseminated information on the project at more than 20 regional and international environment and health conferences and contributed to efforts for HCWM streamlining with a number of global partners.

Based on the above findings, the overall achievement of the Component 4 is rated Satisfactory (S).

Table 23: Deliverables for Component 5

COMPONENT 5: MONITORING, ADAPTIVE FEEDBACK, OUTREACH AND EVALUATION				
Outcome	Indicator	End of Project Targets	Delivery Status at TE	Rating
5.1 Project's results sustained and replicated	Number of high-quality monitoring and evaluation documents prepared during project implementation	1 annual APR/PIR submitted to UNDP each year 1 Mid-term project review M&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 MTE will inform 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 1 Final evaluation MTE and FE must include a lessons learned section and a strategy for dissemination of project results Lessons learned and best practices are accumulated, summarized and replicated at the country level	3 PIRs produced in GEF format and 5 APR produced for the RPB meetings MTR conducted in fall 2018 and with recommendations for the 2 nd phase of the project TE conducted in October-December 2019 with review update until March 2020 National exit strategies in the 4 beneficiary countries (2020) Sustainability assessments at HCF level in the 4 countries (2020) Lessons learned study (2020) Replication and upscaling tool (2020) Economic assessment of autoclaves' operation (2020) Repository website greenhealthcarewaste.org Shared HCWM folder	HS

Outcome 5.1: The evaluator reviewed 3 PIRs from the respective GEF fiscal years 2017, 2018 and 2019 and found that they were compiled in the prescribed GEF/UNDP format and contained sufficient information on advancement in the project implementation, progress towards the project development objective, management of critical risks, collaboration with international partners, external communication as well as cross-cutting issues. As a basis for the progress monitoring, all PIRs used the approved results-based framework and completed the RBF matrix with relevant information about achievements in the reporting period as well as cumulative achievements since the project start.

The evaluator also reviewed 5 APRs that had been prepared for the annual meetings of RPB and reported progress in implementation and achievements between two consecutive RPB

meetings. Due to the variable timing of the RPB meetings, the individual APRs cover variable time periods from 8 to 12 months. The format of the APR is less uniform compared to PIRs as it is determined by the main purpose of APRs, i.e., reporting to RPB. All APRs were found structured and informative. Although the progress was reported by RBF outcomes, no relation was made to the agreed indicator targets under the individual outcomes. At the end, all APRs contained section on lessons learned in the reporting period.

In the view of expected project closure in April 2020, the RPB meeting in August 2019 held sessions to discuss several topics related to the project exit strategy at all levels (regional, national, HCF), namely cooperation with HCWM donors active in the region to identify possible cooperation/synergy areas and experience with sustainability of other similar projects, in order to kick-start elaboration of a project exit strategy.

In the extension phase, the project contracted an international consultant to provide guidance and navigate preparation of national exit strategies. Under this guidance, each country developed its own exit strategy through discussions with relevant national stakeholders and experts from WHO, HCWH and UNDP in order to ensure commitment of the national project beneficiaries to sustain the established technical capacities and HCWM infrastructures after the project closure.

Therefore, the exit strategies were conceived in a broader sense as the sustainability strategies to be accomplished through transitioning and/or upscaling from specific project areas to associated or new projects or programming in relevant areas. Furthermore, the project encouraged the designated model HCFs to develop their own sustainability plans in order to prepare for life beyond the project completion date.

The exit strategies were complemented with a sustainability assessment conducted at the pilot HCF level in all four countries using a special sustainability assessment tool developed by the project. The tool can be used by local project teams or independent consultants to conduct a quick assessment of sustainability in 10 key specific areas.

The international consultant also produced two technical reports. The first report compiles lessons learnt from the project that can be considered for preparation of future similar projects. The report is structured according to the main project interventions (elaboration HCWM policies, provision and demonstration of affordable HCWM systems, capacity building and awareness raising). The report also summarizes experience from the country specific flagship activities, project set-up and management including adaptive management and cooperation with international and national partners and projects.

The second report is a guidance for translating the experiences and lessons learned into replication and scaling-up of the project activities. In addition to the road maps to sustainability presented in the exit strategies, the second report summarizes approaches and necessary conditions for future interventions after the project closure, either as a replication in another location or upscaling in the same location in order to enlarge the scope.

An important assistance to future similar project was provided in the form of an economic assessment study of autoclaves operated in Madagascar and Ghana. This analysis advocates for a thorough *a-priori* onsite assessment of generated waste amounts as a foundation for calculation of the needed autoclave capacity.

For a wider group of partners and national stakeholders the project established externally shared HCWM folder that contains key WHO guidance documents, training materials and technical specifications for key HCWM equipment (including PPEs). For that purpose, the project used online spaces (Dropbox, Google Drive) to ensure exchange/availability of key technical resources for the use of project teams and national stakeholders.

In November 2020, UNDP started to upload the knowledge products to the new website – www.greenhealthcarewaste.org that provides a central space of key knowledge products resulting from the project in order to make them available/accessible not only to the project countries and stakeholders but beyond that after the project closure. The internal structure of the website (e.g., classification and filtering functions) is compatible with WHO/UNICEF's knowledge management platform on WASH.

While the initial aim of the project website was to focus on this project, it was modified to become a consolidated repository as a response to GEF requirement to include resources and products from other relevant GEF-financed projects with HCWM components. At the project closure, administration of the website will be handed over to the new 4-year GEF medium size project on HCWM Knowledge Management.

Through a collaborative approach, the project teams identified the following gaps in the integrated HCWM systems that had not been covered in the current project:

- Further strengthening of the national maintenance capacities for the non-incineration technology;
- Approaches and strategies for coverage of recurrent cost for HCW management and treatment;
- Inclusion of HCWM training in the national education curricula;
- Affordable solutions for small HCFs in remote areas;
- Final disposal of the collected mercury-containing devices;
- Waste streams not covered by the current project such as pharmaceutical waste, waste impregnated bed-nets, laboratory waste, waste from vaccination campaigns and amalgam waste;

Building on the experience and lessons learned and responding to a request from GEF Secretariat, the project supported the development of medium size GEF financed project “*Promoting a Coordinated Approach to the Sustainable Management of HCW during and beyond the COVID-19 Pandemic*”. Furthermore, the participating countries were encouraged to prepare follow-up national proposals.

Zambia prepared a follow-up national project “*Scaling up the reduction of emissions (GHGs & UPOPs) from the health sector in Lusaka Province*” and put it for discussion about potential support by the Government of Italy. The essence of the proposal is rollout of the autoclave technology in the Lusaka province through cluster HCW treatment approach accompanied by improved HCWM practices. The proposal reached advanced stage of consultations with the donor Government.

Summary assessment: The project reporting was fully compliant with the reporting formats as required by GEF and UNDP and followed the reporting approach outlined in the Project Document.

In addition to elaboration of the country-level exit strategies and lessons learned that had been envisaged in the Project Document, the project used the additional 8 months from the extension period to elaborate tools for assessment of sustainability at the HCF level and for replication and upscaling. The project also practically demonstrated the use of the sustainability assessment tool in the 4 project countries, although in a remote modality due to the COVID-19 travel restrictions.

Based on the above findings, the overall achievement of the Outcome 5 is rated Highly Satisfactory (HS).

Country-specific topics

The improvement of the overall HCWM requires tailor made strategies for management of specific waste streams, e.g., sharp waste, pathological waste and plastic waste for recycling. Participants of the 1st RPB meeting decided that each country would pilot specific strategies in a form of so-called Lighthouse Projects on selected HCW issues and share results and lessons learned with the other countries in order to facilitate replication of the strategies.

In addition to the activities planned in the Project Document, the following country projects were agreed and implemented:

Ghana: (1) Cooperation with the private HCW treatment sector; and (2) Identification of user-friendly sharp management systems.

Madagascar: (1) Photovoltaic solar panels for HCW treatment facility.

Tanzania: Advanced pathological waste treatment (Bio-digester).

Zambia: Close-loop recycling of HCW.

The main results of the country flagship projects are summarized in the text below.

Ghana: The project provided support to Zoompak, the only private company licensed for HCW treatment in Ghana and agreed that the Zoompak brand new HCW treatment facility, established in 2016 in Accra and equipped with one giant autoclave of 1.5 tonne/hour capacity and a shredder, shall be the designated as the central HCW treatment facility for Accra. This arrangement enabled to channel the project funds for introduction of the non-incineration technology to other HCFs in the regions. In line with the agreement, Zoompak was included in capacity building measures and the project assisted to increase the quantities of HCW treated by Zoompak by supporting development of new HCW regulatory measures and guidelines.

There are notable benefits of this public-private partnership (PPP) at the end of the project. Since 2016, the number of Zoompak HCF clients has rapidly increased and at the time of the TE mission reached 126 HCFs. Over the four years, the amount of HCW treated by Zoompak increased from zero to about 10 tonnes/month in November 2019. This consequently contributes to reductions in U-POPs emissions at the level of almost 5 grams/year. At the end of November 2019, Zoompak finalized a service agreement with the Korle Bu Teaching Hospital in Accra that reportedly generates about 15 tonnes of infectious waste per month. Implementation of this agreement will more than double the total quantity of HCW treated by Zoompak and make a sizeable contribution to further reduction of UPOPs emissions.

The above facts demonstrate the value of PPPs for promotion and replication of non-incineration HCW treatment. There is no doubt that the private sector entities are much more flexible and can make decisions about introduction of new technologies and extension of the existing ones more quickly than the public sector as they have necessary financial resources at their disposal. There is a specific role for public entities in the PPPs, namely monitoring in order to ensure the desired quality of the services.

In the other flagship activity, the Ghana PIU conducted interviews with 166 health workers of all categories on identification of preferable solutions for the collection and management of sharp waste that had been distributed in the pilot facilities. The alternative options included imported safety boxes (size 5l), imported safety containers (size >2l), usage of needle cutters and combination of the above. After the involved health professionals could test the practical use of the different options, user opinion was collected by standardized questionnaires.

A majority of the collected responses preferred plastic sharp containers while maintenance problems with the needle cutters were reported. However, at the end, the exercise proved to be inconclusive as more interviews with users was deemed necessary.

The Ghana PIU also conducted another survey assessment to ascertain the Hepatitis B and C status of health workers in the model facilities. The findings showed that generally about 76.6% of health workers sampled from all model facilities have undergone screening for the Hepatitis B virus and 21.3% have been screened for Hepatitis C. Of those who tested negative, about 51.1% had been previously vaccinated. Those who tested positive (about 2.1%) received necessary treatment. This activity facilitated sensitization of this issue and resulted in increased screening and vaccination of health care workers.

Madagascar: A system of solar PV panels of total 3 kW capacity based on a Si monocrystal technology was installed on the roof of the hospital operations building at the District Referral Hospital (CHRD) Manjakandriana in rural Madagascar. The system including four 200 A batteries was installed in summer 2018 and since then has been running well and provides not only about 25% of the total electricity consumption of the hospital but also ensures emergency electricity supply for the hospital during power cuts.

Madagascar was selected as the first project country to implement the WASH FIT initiative (WHO/UNICEF Water and Sanitation for Health Facility Improvement Tool) that had been introduced to the project countries during IW in Johannesburg, in September 2016. Under the project, a follow-up training-of-trainers on WASH FIT took place in Madagascar in December 2016, which trained 16 local experts. The project further supported introduction of WASH-FIT in two model HCFs facilities (CHRD Manjakandriana and the University Hospital in Antananarivo) completed an initial WASH FIT assessment, created a WASH FIT committee and developed the first annual improvement plan. Further WASH FIT trainings were conducted in Tanzania (2017) and in Ghana (2019).

The national technical consultant in Madagascar produced two studies related to the potential of HCW recycling. The first study focussed on mapping the recycling industries and provided a directory of about 25 recycling industries that could purchase the various fractions of recyclable materials collected in the country. This was followed by a market research study that examined possible channels for valorisation of the fractions obtained from segregation of non-infectious and autoclaved HCW and studied profitability of model HCFs in relation to the recycling of plastic fractions of autoclaved waste.

The latter study found that cost of transportation of the autoclaved waste to recycling sites is the main factor influencing profitability of the scheme and concluded that it is essential for the cluster HCFs to maximize collection of waste for treatment from nearby hospitals. It concluded that treating only own HCW and conveying the autoclaved plastics to the recycling industries could ensure profitability only for the two model HCFs in the capital city Antananarivo. It also recommended that the two HCFs should actively search for waste from other HCFs and suggested a moderate fee for the HCW treatment in the autoclaves in order to enhance financial sustainability of the scheme.

Tanzania: With technical support provided by HCWH, the project supported pilot construction of a biodigester for disposal of pathological wastes (placentas, food scraps and garden waste) and production of biogas in the Mwananyamala Hospital in Dar-es-Salaam.

Since October 2018, the biodigester has been in full operation for treatment of pathological waste and the produced methane gas is used for heating water at the hospital's maternity ward. The Tanzania PIU has hired a national consultant for evaluation of the 1st year of the biodigester operation. The biogas production was measured at 2,5 m³/day which a bit less than expected probably due to the relatively high water and low organic matter content of placentas. Nevertheless, the consultant highlighted several economic benefits of the biodigester operation.

In addition to harvesting the methane gas from the biodigester for water heating, the hospital saves energy that had previously been used for incineration of placenta waste. Total monetary benefits (value of biogas, saved energy for disposal of placenta and food wastes) were calculated at TZS 3,285,000 per year (about 1,400 US\$). As the energy output of the biodigester currently exceeds the need of the maternity ward, the national consultant suggested the excess biogas to be used for cooking in the hospital cafeteria that is under construction.

The report of the national consultant highlighted several challenges and lessons learned from the construction and operation phases that are worth of dissemination to wider audiences. The successful demonstration of the biodigester operation prompted construction of a double chamber biodigester at another HCF, namely the Sinza Hospital for Women and Children in Dar-es-Salaam.

To stipulate recycling of waste materials (in particular decontaminated syringes) and at the same time to enable the safe separation and collection of sharps, Zambia suggested to pilot local production of safety sharp containers through a PPP approach. It was expected that a private entity would be contracted for production of safety containers for separation of needles from syringes at the pilot HCFs. After decontamination, the separated syringes would be sold to the private contractor for further production of safety containers.

The Zambia PIU issued a local tender for the procurement of 15,000 locally produced safety containers with a size of about 2-litre made from recycled plastic. However, the bids received far exceeded the allocated budget hence the national project team decided not to pursue the activity any longer.

During the meeting of the evaluator with representatives of Waste Master Zambia, Ltd. (one of the bidders that had participated in the tender), the latter explained that the amount required for investment into a suitable mould for production of the safe containers was very high. Since the bidder considered return of the upfront investment under this project risky and therefore uncertain, they included full cost of the mould into the financial offer hence the latter exceeded the amount budgeted by the project.

The experience from the Zambia PPP shows that a necessary condition for involvement of private sector partners is confidence about security of the contribution to PPP through guaranteed returns of the investment. Private companies in LDC countries involved in waste recycling usually do not have ample resources at their disposal and therefore would require either upfront support from a donor project or some sort of incentives from the government in order to ensure a sustainable future profit return on their investment.

Response to COVID-19 pandemic

In addition to completion of all activities planned in the Project Document, the 8-month extension from April to December 2020 allowed the project to implement specific activities as UNDP response to the COVID-19 pandemic. There was no results framework for the COVID-19 element and the following text summarizes the activities and products delivered during the project extension period.

Firstly, a short note HCWM Programme Offer was prepared to support UNDP Country Offices and health-related project teams and summarized essential time-differentiated reactions to the COVID-19 crisis. The short-term response was conceived as a technical support tool to national COVID-19 teams for integration of HCWM into national response to COVID-19 pandemic. It included sample specification of PPE, consumables and small items for COVID-19 early response and information on availability of equipment already provided under relevant previous

and ongoing UNDP projects. The project assisted with translation of the note to French and Spanish and with wide distribution within UNDP's internal knowledge management systems.

The medium/long-term response was directed on provision of new waste treatment equipment in the immediate post-crisis context as a way of strengthening of the health care systems and their preparedness for future waves of the epidemics.

Preventing and controlling of the COVID-19 outbreak was the priority of the international and national project team and national stakeholders. Lack of PPE and waste logistic equipment was a huge problem in all target countries. The international and national UNDP project teams supported the national stakeholders with additional PPE, waste logistic equipment, key guidance, and additional training on HCWM. Project funds were used for procurement and distribution of additional PPE (safety goggles, working gloves, working overall, safety boots, safety mask, working gloves etc.), waste logistic equipment (waste bins, wheelie bins, trolleys, chemical transport bins etc.) and locally produced hand rub disinfectants.

As there was a lack of knowledge and awareness how to segregate, collect, store, treat and dispose the waste generated in health facilities during the COVID-19 crisis, the project provided additional IPC training for staff in the pilot HCFs. With support from global partners and based on a WHO technical guidance on water, sanitation, hygiene and waste management for Covid-19, the regional expert team of the project prepared a summary of Frequently Asked Questions on water, sanitation, hygiene and waste management for COVID-19 HCWM.

Under a series of UNDP COVID-19 webinars, the project organized a joint webinar on HCWM for all UNDP on 6th May 2020. In another webinar organized by UNDP Seoul Policy Centre on the World Environment Day (5 June 2020), senior HCWM expert from WHO shared lessons learnt from the GEF Med Waste Africa project and provided details of UNDP's HCWM Programme Offer.

Moreover, the project provided technical support to the virtual rapid health care waste management assessment in the context of COVID-19 that was conducted in 10 countries. The assessment produced a snapshot report of the situation in the field and provided concrete recommendations in the context of increased procurement of PPE and other health care items to ensure whole product life cycle including sustainable waste disposal.

As a response to the request from the GEF Secretariat, the regional team supported development of a medium size GEF project titled "Promoting a Coordinated Approach to the Sustainable Management of Healthcare Waste During and Beyond the COVID-19 Pandemic". The draft Project Document was being finalized for submission to GEF in early 2021.

Last but not least, the regional component provided a sizeable budget of about 120,000 US\$ to the four national components to facilitate national activities/closure plans supporting COVID-19 responses. Consequently, each of the four project countries prepared a leaflet on contributions of UNDP and their respective national project components to the COVID-19 response. Collaboration between four UNDP Country Offices supported publication of an article on HCWM in relation to COVID-19 and the specific role women can play in it.

Moreover, the project supported local production of hand sanitizers in Ghana and distribution to 21 HCFs across the country in order to reduce the risk of COVID-19 infection. The two project HCFs in Madagascar used autoclaves for disposal of COVID-testing material and PPE waste. Also, the support of the project for management of waste from the vaccination campaign against measles in Madagascar has built local capacities that will be available in future vaccination campaigns against COVID-19.

Achievement of the Project Objective

The overall objective of the project was to implement best environmental practices and introduce non-incineration healthcare waste treatment technologies and mercury-free medical devices in the four countries (Ghana, Madagascar, Tanzania and Zambia) to reduce harmful releases from the health sector. Status of achievement of the objective is summarized in Table 24 below.

Table 24: Status of achievement of the project objective

PROJECT OBJECTIVE			
Indicator	End of Project Targets	Delivery Status at TE	Rating
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	Non-incineration technologies and mercury-free medical devices installed and commissioned at 17 HCFs	MS
UPOPs releases from the health sector reduced or avoided	Amount of UPOPs releases from HCW incinerators reduced by 31.8 (g-TEQ/yr)	Direct reduction of UPOPs releases 4.19 g-TEQ/y Indirect reduction of UPOPs releases 24.42 g-TEQ/y	MS
Mercury releases from the health sector reduced	Amount of mercury releases from the health sector reduced by 25.3 (kg/yr)	Amount of mercury releases 57.3 kg over the project period	S
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	National HCWM Policies, Plans and Guidelines prepared or revised and adopted by the relevant national authorities	S

The original plan involved provision of HCWM systems to 4 central treatment facilities, 22 hospitals and 24 health posts in two phases. This plan was fully implemented in the 1st phase of the project that assisted 14 HCFs to acquire the autoclave technology and few health posts to build a HCWM system. MTR of the project questioned efficiency of provision of the HCWM systems to small health posts as the latter were found too small to have their own autoclave and generated only small quantities of HCW that would command a disproportionately high costs of transport to the cluster or central treatment facility.

Based on the MTR recommendations, the 2nd phase of the project focused on further assistance to the HCFs from the 1st phase with only a limited addition of new HCFs. Consequently, the total number of assisted HCFs was lower in comparison with the plan in the Project Document. However, the 1st phase revealed several challenges to the practical application of the non-incineration technology, in particular maintenance of the autoclaves and landfilling of the autoclaved waste. In this regard, the changed focus on a deeper qualitative confirmation instead of thin quantitative expansion is considered reasonable and justified.

The project objective was to reduce the amount of UPOPs releases from HCW incinerators by 31.8 g-TEQ/year. The calculations conducted upon installation of the 18 autoclaves in the 1st phase indicated that 1,048.3 tonnes per year of HCW can be treated in the autoclaves. This calculation was based on the assumption that all autoclaves would be operated with 6 treatment cycles per day for 260 days per year.

However, the above is just a calculated theoretical treatment capacity of the installed 18 autoclaves. The real data collected from the operation of all autoclaves in the period January – November 2019 suggest that the actually treated quantities of HCW in the above period were only fraction of the theoretical capacity, ranging from 17.5% in Ghana to 4.4% in Zambia. Moreover, in few cases the sterilized waste was incinerated as the HCFs could not dispose of it by landfilling.

Additional data on operation of the autoclaves were obtained during the extension period. Table 25 below contains a summary overview on operation of the autoclaves commissioned under the 1st phase of the project.

Table 25: Overview of autoclave operation (as of September 2020)

	Ghana	Madagascar	Tanzania	Zambia	Total
Number of autoclaves commissioned	5	3	5	5	18
Number of autoclaves operational	5	2	5	5	17
Maximum capacity used in a month (%)	23 - 62	0 - 16	0 - 26	0 - 24	0 - 62
Cumulative amount of HCW treated during project (kg)	47,416	35,695	7,650	11,068	101,829
Cumulative amount of UPOPs reduction during project (gTEQ/y)	1.98	1.42	0.32	0.47	4.19

With the exception of one small (80-litre) unit in Madagascar, all autoclaves commissioned under the 1st phase were reportedly operational. However, due to various reasons they were operated well below their theoretical operational capacity. Two 260-litre units in Ghana were utilized on average at 62% capacity. The remaining 15 units were operated at about one quarter of the operational capacity or below. The cumulative amount of HCW treated during the project implementation in the four countries was 101.83 tonnes out of which almost 50% was treated in the 5 autoclaves in Ghana. The cumulative UPOPs reduction from the HCW treatment autoclaves commissioned by the project reaches 4.19 g-TEQ/year.

In Ghana, the project designated the private company Zoompak to be the central HCW treatment facility for Accra. Zoompak received technical assistance and capacity building support and also benefited from the advocacy activities in the HCW policy area. The same type of support was provided from the project to two HCFs with their own autoclaves. Zoompak have substantially increased the amount of treated HCW over the years of the project implementation to 509,563 kg. Together with the two hospitals, the total amount of HCW treated reached 586,382 kg that is equivalent to UPOPs reduction 24.42 g-TEQ/year. This amount could be claimed by the project as indirect UPOPs reduction. The total UPOPs reduction (direct + indirect) from the project thus reaches 28.6 g-TEQ/year.

Following the 1st round of procurement, total 7,300 mercury-free devices (sphygmomanometers and digital thermometers) were distributed in the project model HCFs. The project plan was to reduce releases of mercury through 1:1 replacement of old mercury-containing devices with the new devices. However, the actual number of collected mercury-containing devices in the 1st phase was lower due to the fact that some of the model HCFs in Ghana, Tanzania and Zambia had already started the exchange before the project intervention as a result of the respective national policies to purchase only mercury-free equipment. Therefore, there were smaller quantities of mercury-containing equipment found at the model HCFs and the total number of collected old devices was lower than the number of new devices distributed. In the 1st phase in Madagascar, the project team could collect only few mercury-containing thermometers as it was found that the 6 model HCFs did not own any mercury-containing devices and had been using devices privately owned by the doctors, nurses or patients.

The comparison of the distributed and collected amounts from the 1st phase is in Table 27 below.

Table 26: Summary of exchange of mercury-containing devices (1st and 2nd phase)

	Ghana		Madagascar		Tanzania		Zambia		Total	
	Distr.	Coll.	Distr.	Coll.	Distr.	Coll.	Distr.	Coll.	Distr.	Coll.
Digital Thermometers	225	225	3963	2341	160	33	1093	352	5,441	2,951
Sphygmomanometers	384	219	498	0	306	52	773	587	1,961	858
Total kg mercury reduced	0	17.7	0	2.3	0	4.2	0	47.3	0	71.5
Total kg mercury avoided	30.9	0	43.8	0	24.6	0	62.9	0	162.3	0

It follows from Table 26 that total 5,441 digital thermometers and 1,859 sphygmomanometers have been distributed but only 2,951 digital thermometers and 858 sphygmomanometers have been collected.

According to UN Environment Toolkit for Identification and Quantification of Mercury Releases (2017), clinical thermometers typically contain 0.5-1.5 g mercury, sphygmomanometers in average contain about 80 g mercury. The actually achieved reduction of mercury releases from the collected old devices is in Table 28 below.

Table 27: Overview of results of reduction of mercury releases¹³

	Ghana	Madagascar	Tanzania	Zambia	Total
Mercury releases reduced (based on mercury-containing device collected) -kg	17.7	2.3	4.2	47.3	71.5
Number of mercury-free healthcare facilities	2	more than 50	5	5	33

It follows from Table 27 that the actual direct reduction of mercury releases attributed to the project was 71.5 kg. On top of this, the project also had indirect impact through promotion and advocacy for mercury-free devices. Madagascar reported that a national campaign resulted in declaration of more than 50 small HCFs as mercury-free.

Summary assessment: The Project deserves credit for its support to the countries in revision and further development of the national Healthcare Waste Management Plans that proposed solutions for improving HCWM situation in the countries. Apart from review and critical assessment of the existing HCWM situation, the plans identified targets and pathways for improvement through outlining options for improving all specific components of the national HCWM systems and describing the best approaches as well as presenting a capacity building concept for facilitating implementation of proper HCWM practices.

As already discussed under Components 3 and 5, the project has provided non-incineration HCW treatment technology to 17 HCFs in the four countries. However, the goal of the project to promote a shift from HCW incineration to autoclaving followed by waste recycling and landfilling was achieved only partially. Despite the successful introduction and commissioning of the autoclaves, the autoclaves have been used only to a fraction of their theoretical capacities. Some HCFs had to revert to the HCW incineration as this technique was the only available option for disposal due to lack of options for landfilling of the autoclaved HCW.

¹³ As of 30 November 2020.

This experience from the project implementation shows that introduction of the non-incineration HCW treatment technology does not lead to the desired result if not accompanied by necessary complementary measures. Although the project model HCFs and medical staff in the four countries fully appreciated and understood health and environmental benefits of the non-incineration technology, the project has not fully convinced other stakeholders outside the health sector in the four countries about the benefits of the technology. This was due to the fact that the project mainly focussed on the upstream part of the HCW lifecycle, i.e., waste segregation at source and waste treatment, while less attention was paid to the downstream part, namely recycling of certain parts of the waste stream and landfilling of the sterilized HCW.

Nevertheless, the project achieved some success in the effort to assist with establishment of recycling programmes for the plastic fraction of HCW. According to the baseline information in the Project Document, the market for recycling businesses, in particular for recycling of plastics, had been established in all four countries. However, the overall situation was found different to the expectations. This was due to the external conditions beyond control of the project teams, in particular to the current status of markets for recyclables in the four countries. Companies able to recycle the plastic fraction of HCW were found only in the capital cities so the model HCFs located in the capital cities could sell the sterilized plastic waste to the recycling companies for a nominal fee. The situation was completely different in remote regions where the model HCFs could not find any active recycling companies and therefore could not follow the same pattern.

The project has effectively used the extension period not only to complete activities and consolidate the planned results according to the Project Document but also to provide useful guidance and technical support to emerging issues related to the global pandemic.

Based on the above findings, the overall achievement of the project objective is rated **Moderately Satisfactory (MS)**.

Efficiency

The main issues examined in relation to efficiency were the length of the project implementation period and to what extent the results have been achieved with the least costly GEF and other resources possible.

The Project was designed for a period of 4 years (from April 2016 to April 2020). The outbreak of COVID-19 precluded timely completion of overdue activities. The project was extended by 8 months in order to complete key activities and address the implementation challenges posed by the COVID-19 pandemic and provide critical support to the project countries on health care waste management dimensions of the COVID-19 pandemic.

One issue related to the efficient use of the project resources was change of the originally planned technology procurement arrangements. In the Project Document, the central procurement role was assigned to the UNDP Global Procurement Unit. The use of central procurement was based on experience from the Global Project that had been implemented with national procurement arrangements and experienced delays due to different procurement policies and procedures of the participating countries. The assumption made for this project was that GPU would use its long-standing expertise in international procurement and bidding procedures, as well as its access to long-term agreements with medical equipment suppliers to streamline the procurement procedures, reduce the length of procurement time and achieve economies of scale.

The original arrangement was changed after the regional project team had received the proposed fee for procurement services by GPU. Although consultations with the latter resulted in a

discount from the originally proposed fee, the final proposal 98,975 US\$ was considered too high and consequently the central procurement role was assumed by UNDP IRH.

Avoiding payment of the procurement service fee probably did not result in full saving of the above amount as GPU Health would supposedly pull off lower financial offers on HCWM equipment through established long-term agreements with equipment vendors. It is also possible that the total time for the two rounds of central procurement would be shorter with GPU Health due to their experience with procurement of medical equipment.

On the other hand, reassignment of the procurement role to IRH facilitated better and more interactive communication related to the procurement events (such as technical specifications, communication with equipment vendors, etc.) as both the regional project team and the IRH procurement officers were based at UNDP IRH.

Participation of the project international partners (WHO and HCWH) in the project followed experience from the GHCW project that had been implemented in 2008-2012 with assistance of the above two agencies. In the current project, the WHO and HCWH participation was institutionalized through standard financial agreements concluded between UNDP IRH and the two partner agencies. The total financial amount for securing participation of the two international partner agencies was 586,000 US\$.

WHO involvement was founded on the UN Agency to UN Agency Contribution Agreement concluded for the total financial contribution of 296,000 US\$ that was payable in three instalments upon submission of progress reports for the completed activities. The Agreement contained rather broad description of agreed deliverables, namely technical assistance for development of national plans for safe HCWM, preparation of training packages both for country and HCF levels, as well as advocacy and support to the project at international conferences and learning events. No description of activities for the above areas was included in the document. The participation of WHO was realized through involvement three WHO experts during the entire project implementation period and in addition to the activities directly related to the current project it provided also links to broader WHO work on WASH in HCFs, on Infection Prevention Control (IPC), quality of health care and mercury phase-out.

Participation of HCWH was secured through a series of three Micro-Capital Grant Agreements (MCGAs) concluded for the total amount of 290,000 US\$. Each MCGA contained a detailed list of activities related to individual Outcomes of the project. Subsequent MCGAs were concluded upon submission of a detailed activity report for the preceding Agreement. The participation of HCWH was realized through contributions of two senior HCWH experts, namely the Director of HCWH Global Projects and the International Science and Policy Coordinator. In addition to the activities directly aligned with the current project, participation of HCWH also associated the project with the GGHH network and the global SHiPP project.

The total amount earmarked to the involvement of the two international partner agencies appears to be relatively high, namely 9.1% of the total GEF grant allocated to the project. However, it is clear that UNDP does not have the required specific expertise for this type of project and would anyway have to call upon external technical expertise to address specific health care-related issues in the project.

For the above earmarked amount, UNDP obtained systematic involvement of the same senior WHO and HCWH technical experts throughout the entire project implementation period, access to broader work and knowledge products of the partner agencies, as well as advocacy and awareness raising for the projects conducted by representatives of the two partners at international and regional conferences and workshops. From this point of view, the approach chosen by the project streamlined solicitation of the required external expertise and brought

more value for money in comparison with an alternative of *ad-hoc* short-term appointments of external technical experts.

Hence, the efficiency in terms of the project timeline and use of resources is rated **Satisfactory (S)**.

Country ownership

As discussed above, the UPOPs project is fully aligned with the beneficiary countries' national priorities and plans in the field of HCWM. It is also fully consistent with the countries' obligations under the Stockholm and Minamata Conventions as all four countries have ratified the Conventions.

The project was instrumental for improving the legislative and regulatory frameworks in the health sector according to the methodologies and criteria stipulated by the Conventions. Non-combustion technologies were included into new or revised national HCWM Policies and related guidelines were prepared the official guidance tools for the healthcare sector.

Excellent working relationships had been established between the regional project team located in IRH, the national project teams led by senior officials from the ministries responsible for the health care sector and UNDP COs in the four countries. Designated governmental stakeholders from the four countries actively participated through membership in RPB and contributed thus to the oversight and overall coordination for the project. Through participation in NPBs, the governmental officials provided necessary guidance on management decisions for the project national components, in cooperation with the National Technical Coordinators.

The active participation of the line ministries in the project management and coordination indicate strong national commitment the project objectives and ownership of the achieved results that is a critical condition for sustainability of the project interventions beyond the project completion date.

Mainstreaming

The focus of this section is to discuss to what extent was the project mainstreaming UNDP priorities such as poverty alleviation, improved governance, and women's empowerment, i.e., whether it is possible to identify and define positive or negative effects of the project on local populations, whether gender issues had been taken into account in project design and implementation and in what way has the project contributed to greater consideration of gender aspects.

The initial two-week training of national experts in Nakuru, Kenya included a session on gender inequality. The first part of the training session introduced the participant to the key conventions that ensure women's rights in Africa. This was followed by a discussion session on gender inequality issues in the HCW sector and an interactive session with the participation of the national experts. The latter emphasised the need for the project to undertake a special analysis of gender inequality gaps in HCWM and to develop recommendations for action.

The project also underwent a social and environmental screening in 2016 by the UNDP-GEF Monitoring and Evaluation Unit that had expressed an interest in whether the relevant gender issues were raised in the project design, in particular as the socio-economic assessment carried out at the design phase identified some human rights issues related to the waste collectors and handlers.

Based on the above motions, the project engaged an international consultant to conduct an analysis of gender and group-disaggregated information through a desk study of relevant documents and key stakeholders' consultations on gender equality and human rights issues in

HCWM in Ghana. The consultant conducted a participatory social and environmental injustice analysis over HCWM issues in the project in Ghana and analysed the findings from the point of view of social and environmental injustices as well as gender inequalities faced by disadvantaged groups in relation to HCWM. Furthermore, this study identified achievements, strengths as well as specific gaps on gender equality and human rights mainstreaming.

The study concluded that gender equality and human rights issues concerns had not been fully mainstreamed in the design phase of the project due to the fact that the project did not expect serious adverse effects on any groups in the society because of safety guards that had been put in place for introduction and implementation of the HCW management and treatment systems.

The study also concluded that although the project aimed to benefit communities in the neighbourhood of the project waste treatment and disposal sites (hospital incinerators, municipal waste landfills), the communities had not been consulted and integrated in the project. In this regard, the study highlighted lack of attention to the groups most affected by the HCW, namely waste pickers and handlers, and claimed that the latter could be influential agents provided they receive comprehensive guidance on HCWM.

In addition to the above, the study also found that traditional norms related to work (e.g., gender division of labour based on masculine and feminine work) were practiced in the workplace of HCFs in Ghana and that this could prevent both women and men from effectively grasping available opportunities in the job market.

The study produced a set of recommendations for the Ghana project component and suggested an action plan to be developed in alignment with project' outputs in order to facilitate activities that promote gender equality and human rights. Based on the study conclusions, the consultant developed a gender equality and human rights training module that was proposed for adjustment to the national contexts and included in the short HCWM training courses as well as integrated into the national HCWM curriculums in the project countries.

The evaluator found the conclusions of the study valid but some of them beyond the scope of the current project. In particular, the recommendation to invest more project resources in educational activities in the HCFs and in the communities, if implemented, would drag the resources from the improvement of HCW management and treatment systems that is the main focus of the project. The strengthening of HCWM systems is a benefit for the vulnerable groups in its own as it improves the conditions for health workers and patients at model HCFs where few of them are specialized mother and child HCFs.

Nevertheless, the study's conclusion about lack of consultation with the communities in the neighbourhood of the model HCFs has a wider validity for the project as integration of the neighbouring communities into the project would not only address the poverty-related issues but would also help to disperse the concerns and worries related to the dumping of the treated waste on the community landfill sites.

In order to highlight the gender issues in HCWM, a factsheet "*Women in Health Care Waste Management*" was developed as a small collection of short real-life examples of women health workers from Ghana, Madagascar and Tanzania that have successfully assisted in improvements of HCWM in their daily work.

The evaluation found that some gender-related information (e.g., numbers of men and women trained) was collected throughout the project, however, more on an ad-hoc than systematic basis.

Implementation of the project had a significant impact on improvement of working conditions for women health workers in the four countries. Recent WHO analysis shows that female

workers comprise about 65% nurses and about 28% of physicians in the Africa region¹⁴. There is no doubt that particularly the nursing and midwifery workforce face a range of occupational risks associated with exposure to biological and chemical hazards. The project helped to reduce the propensity for spreading communicable diseases like HIV/AIDS and Hepatitis B amongst nurses. Since several project model HCFs were maternity hospitals, the improvements of the HCWM practices also contributed to reduction of the exposure of the pregnant women and children that are particularly vulnerable to healthcare waste related diseases.

The project contributed to poverty alleviation through improvement of eco-health through addressing health and protection of health workers and patients in the designated model HCFs and reducing local air and environmental pollution. It concentrated the support on public HCFs in the four countries that serve the middle-to lower income population groups.

The contribution of the project to improved governance is discussed under the section Sustainability below. There was no contribution of the project to prevention and recovery from natural disasters.

Sustainability

Sustainability of the project is judged by the commitment of the beneficiary countries to continue and replicate the project activities beyond the project completion date. The evaluation identifies key risks to sustainability and explains how these risks may affect continuation of the project benefits after the project closes. The assessment covers institutional/governance risks, financial, socio-political, and environmental risks.

Institutional framework and governance: The project assisted in establishment or revision of the respective national policies on HCWM in Ghana, Madagascar and Tanzania, as well as elaboration of updated technical guidelines and standards. Apart from describing approached for waste minimisation, separation at source, storage, transportation, treatment (including non-incineration technologies) and disposal, these documents defined the necessary institutional arrangements for implementation of the national policies and outlined roles and responsibilities of the main stakeholders to ensure a concerted effort towards improving the HCWM situation in the three countries.

Due to the specific legislative provisions in Zambia, a different approach was taken through revision of the two principal laws that cover HCW, namely the Public Health Act and the Environmental Management Act. Moreover, Zambia reviewed the 2015-2019 National HCWM Plan and national technical guidelines on sound management of healthcare waste, as an overview of the situation analysis regarding the waste generating processes at HCFs and presentation of options for minimizing HCW generation through reduction at source.

The review process both at the country level as well as at the level of HCFs was necessitated by the several assessments undertaken on the status of HCWM in the countries that revealed gaps and insufficiencies in HCWM that posed risk to health workers, the general public and the environment.

These documents have been endorsed by the respective line ministries and printed for dissemination throughout the countries. Moreover, the documents served as a foundation for establishment or revision of HCWM policies at the level of the model HCFs that can serve as

¹⁴ Gender equity in the health workforce: Analysis of 104 countries, Health Workforce Working paper 1, WHO, 2019

a template for other HCFs to follow. Therefore, the established institutional and governance frameworks will be used in the four project countries in the foreseeable future.

Based on the above, the institutional framework and governance sustainability is rated: **Likely (L)**.

Financial sustainability: The financial sustainability is judged by the commitment of the designated model facilities to continued use of the non-incineration HCW treatment and the mercury-free medical devices.

Replacement of mercury-containing devices in the project countries actually started shortly before the current project intervention in the wake of adoption of the Minamata Convention that, under its Article 4, calls for the phase-out of import, export and manufacture of mercury-containing thermometers and sphygmomanometers used in health care. However, the project intervention has provided the 27 designated HCFs in the four countries with up-to-date medical devices and guidelines for their use. Despite several HCFs reported initial challenges, the widespread use of the mercury-free devices is unlikely to face any major issues in the future given the Minamata Convention mercury phase-out targets and the fact that the Convention addresses not only use but also manufacturing and export of mercury-containing medical devices.

The main challenge to financial sustainability is related to the capacities of the designated model HCFs to continue the established HCWM systems and sustain operation of the non-incineration HCW treatment technologies. The importance of ensuring availability of financial resources to keep the HCW management and treatment systems functional cannot be overemphasized. It is hoped that the relevant government agencies in the four countries will include management, treatment and disposal of HCW amongst their top priorities and consequently make budgetary allocations necessary for continued operation of the HCW management and treatment on an on-going basis.

There are only relatively minor issues related to the sustainability of separation, transport and storage of HCW, namely availability of bins and liners for collection of separated HCW, carts and trolleys for the on-site transport as well as vehicles for HCW off-site transport within cluster or central HCW treatment arrangements. These issues are likely to be effectively addressed at the level of the tertiary HCFs but their importance should not be underestimated for primary HCFs, in particular for those in remote rural areas, that have far fewer financial resources at their disposal.

There are two main challenges related to sustainability of operation of the non-incineration technologies, namely maintenance and repair of the installed equipment as well as accessibility and affordability of spare parts.

Regarding the sustainability of the non-incineration HCF treatment technologies, inadequate operation, bad maintenance and absence of repair capacity were identified as the main reasons for breakdown and sub-optimal functioning of the equipment. Corrective actions were hardly possible due to low capacity of national and HCF maintenance teams in terms of insufficient manpower and skills/know-how, lack of spare parts and scarce funding for regular maintenance trips to HCFs in remote locations.

While the equipment supplier was requested to provide operating & maintenance manuals, training of staff in the operation and maintenance at all 17 pilot facilities equipped with autoclaves and supporting establishment and training of local maintenance teams/technicians were considered as key measures by the project to ensure continuity of the equipment operation. Following MTR recommendations, the project invested a lot of effort into building and strengthening maintenance capacity at the national and HCFs levels for the autoclaves.

In order to minimize impact of instability of local utilities, the project invested in ensuring proper media supply by procuring a water treatment system and a voltage stabilizer for each autoclave supplied. Furthermore, the following provisions were included in the contract with the autoclave supplier:

- Provision of a spare parts package for 2,500 hours (to reduce waiting times for ordering and supply of spare parts);
- 10-year spare part guarantee (to ensure availability of original spare parts from the manufacturer); and
- After-sale service team in the country (to guarantee presence of a local agent of the equipment supplier in each beneficiary country)

Despite these efforts, breakdown of few autoclaves occurred during the 1st year of operation or shortly after that required assistance of the supplier's local agents. Few HCFs reported problems in getting a timely response for the repairs from the local service agent and that the repairs had consumed the original spare parts package provided with the equipment.

Insufficient funding for operation and maintenance and lack of quick access to the spare parts represent a considerable risk to smooth and uninterrupted operation of the autoclaves at the designated model HCFs. While provision of operation and maintenance budgets is fully in hands of the relevant authorities in the four countries and therefore out of control of the project, quick access to spare parts should be facilitated by the project in order to streamline the ordering and delivery of the spare parts to the countries.

Rating of financial sustainability: **Moderately Likely (ML)**

Socio-political sustainability: Waste generated in hospitals and clinics, if not properly managed, constitutes a major threat to the health of patients, health care professionals and communities in the neighbourhood of HCFs. The socio-political sustainability depends on the capability to continue and upscale the existing HCW management and treatment systems and continue phase-out of mercury-containing medical devices.

The systems for separation of HCW at source and management of waste streams have been well established in the four countries based on the approved national and HCF policies on HCWM that were established with the assistance of the project. Moreover, the health workers became much more aware of potential health hazards from improper management of HCW. The project helped to change behaviour of health care workers at the model HCFs and improve their awareness of the risks associated with improper management and disposal of HCW. Therefore, there is no risk of return to previous practices of irregular and careless HCWM. Although practical implementation of the HCWM systems was found way off perfection at some HCFs, the existence of the HCWM policies and the awareness of the health workers suggest improvements are only a matter of time.

Similarly, there are no major issues related to the phase-out of mercury-containing medical instruments. All four countries have recently ratified the Minamata Convention and are the strong commitment to replacement of old devices was clearly indicated by continued use of new digital mercury-free gadgets at the project model HCFs and storage of old devices in temporary storage facilities. The only remaining concern is the current absence of decision about the ultimate disposal of the collected mercury waste. However, the evaluator considers that it is only a matter of time before a suitable final disposal option is identified and pursued.

The evaluation noted some challenges related to recycling of parts of the HCW streams. Various socio-economic factors influence willingness to introduction of recycling actions into HCWM practices in LDCs, including slow progress towards establishment of markets for recyclables,

absence of recycling companies in remote regions as well as logistical challenges for transport of recyclables between the originator HCFs and recyclables' processing facilities.

Based on the above, the socio-political sustainability is rated **Likely (ML)**.

Environmental sustainability: The main concern on the environmental sustainability is related to the continued lack of options for ultimate disposal of the autoclaved waste. Following the successful commissioning of the autoclaves, several model HCFs have discontinued operation of the previously used HCW incinerators that had deteriorated the local air quality and negatively affected living conditions of the communities around the model HCFs. However, a more intensive utilization of the installed autoclave HCW treatment capacities was hampered by lack of approval for disposal of the sterilised waste on public landfill sites.

At present, sterilised waste can be disposed of only at uncontrolled dumpsites as engineered landfill sites with a special designated area protected by fence and monitored by a guard are not available in the project countries. The reason for reluctance to dispose of HCW at uncontrolled landfills is the fear that this practice would pose a serious risk to the communities in the neighbourhood as parts of HCW (e.g., plastics and needles) have a value for recycling and/or reuse and would therefore attract local scavengers. There is a common belief in the four countries that all sterilised waste should be either shredded or compacted in order to alter and trim its physical appearance and enable clear distinguishing from untreated infectious HCW. This was reported as a major concern in all four project countries since commissioning of the autoclaves.

Supply and installation of waste compactors to three model HCFs in Tanzania that enabled placement of the sterilized and compacted HCW at uncontrolled landfills demonstrated that the use of compactors can be one of possible solutions to this challenge. As the supplied compactors were of local provenience, maintenance and provision of spare parts should not be creating major challenges to trimming and landfilling of the autoclaved HCW in the near future.

The other three countries opted for use of waste shredders that were procured only in the second round of procurement. Delivery of the shredders to the HCFs was delayed until the last two months of the project implementation period. It is imperative for waste shredders to be maintained regularly, especially when a variety of materials is introduced into the shredder. Given the fact that the shredder systems had been procured from abroad, maintenance and availability of spare parts for smooth operation of the shredders could append the already existing challenges of maintenance and spare parts for the autoclaves. It is obvious that before its closure the project will not have enough time to obtain sufficient feedback and share relevant information from practical application of the shredder trimming of autoclaved waste.

The refusal of local authorities to give permission for landfilling of sterilized waste forced some of the model HCFs to revert to obsolete practices of HCW incineration. This is obviously in contrast to the main objective of this project. In one visited HCF, the lack of disposal options for sterilized waste turned the initial high expectations of the HCF management into disillusion. Even though the health authorities understand the negative health and environmental implications of return to HCW incineration, the protracted absence of options for ultimate disposal of the sterilized waste poses a big challenge for the demonstration of the autoclave sterilization as the BAT/BEP option.

Based on the above, the environmental sustainability is rated **Moderately Likely (ML)**.

Based on aggregation of the above partial ratings, there are some risks to sustainability of the project interventions, hence the overall rating for sustainability is **Likely (L)**.

Key factors that affected implementation and outcomes

Project design

The project design followed a holistic approach for establishing a chain of HCWM and support for demonstration of the non-combustion HCW treatment technology and mercury phase-out. However, as discussed above, the focus was mostly on the first stages of the HCW management and treatment system and it was assumed that the final disposal of autoclaved waste through landfilling was implicitly granted. The implementation experience from all four countries proved that assumption wrong and the regional project team was forced to add procurement of shredder and compactor post-treatment systems to the equipment procurement plan. Although this is considered to be a correct decision to address the problem, the fact that the procurement of the shredders and compactors was done relatively late in the project implementation period limited the ability of the project to fully achieve its objective of full elimination of HCW incineration practices at the model HCFs.

No activities were planned with regard to gender issues, although the development challenge of HCWM encompasses dimensions related to gender and other vulnerable groups of society. This was later partially rectified through conduct of the study on social and environmental injustice analysis over HCWM issues in the project in Ghana, however there was no follow-up to the study.

Project implementation

The project was designed for a period of 4 years, divided into 2 phases. The relatively complex 1st phase required preparation of national HCWM plans and technical guidelines and training of key project personnel as well as technical assistance and careful assessment of site preparation for installation of the autoclave technology. Start of implementation of the 2nd phase was pending on detailed evaluation of the countries' performance in the 1st phase through the obligatory MTR.

The kick-start of the project was delayed due to waiting for official approval of the project by all four countries. The need to obtain approval of the UNDP Regional Procurement Committee and differences in the procedures for custom clearance of procured goods in the four countries added further delays to the project. It is not certain to what extent or if at all the originally planned centralized procurement under the custody of GPU of the UNDP Nordic Office would have solved the delays and difficulties in the procurement, as there could have been additional difficulties in communication between the procurement custodian and the four project teams. Certainly, following the original procurement arrangements would bring the additional service fee charged by GPU and would therefore be at the expense of implementation efficiency.

It follows from the above that the planned 4-year period for implementation of such multi-country project with two sequential implementation phases including two rounds of miscellaneous equipment procurement proved to be too short. Although the project was actually completed within the planned 4-year period, but this was achieved at the cost of insufficient consolidation of the project results and incomplete fulfillment of the project objective to completely phase out of HCW incineration at the model HCFs.

Achievement of outcomes

In addition to the concerns related to landfilling of autoclaved HCW already discussed above, slow progress towards establishment of the central/cluster HCW treatment schemes was a key factor limiting full achievement of the project objective. All autoclaves installed under the project operate well below their respective treatment capacities. This limited the ability of the project to achieve the presupposed levels of reduction of UOPs emissions.

The summary of ratings of the selected evaluation criteria is in the Table 28 below.

Table 28: Overall Project Ratings

Evaluation Criteria	Evaluator's Rating
Monitoring and evaluation: design at entry	Satisfactory (S)
Monitoring and evaluation: implementation	Moderately Satisfactory (MS)
Overall quality of monitoring and evaluation	Satisfactory (S)
Implementation (regional components)	Satisfactory (S)
Execution (national components)	Satisfactory (S)
Overall quality implementation / execution	Satisfactory (S)
Relevance	Relevant (R)
Effectiveness	Satisfactory (S)
Component 1	Satisfactory (S)
Component 2	Satisfactory (S)
Component 3	Moderately Satisfactory (MS)
Component 4	Satisfactory (S)
Component 5	Highly Satisfactory (HS)
Efficiency	Satisfactory (S)
Overall Project Objective	Moderately Satisfactory (MS)
Introduction of HCW management and treatment	Moderately Satisfactory (MS)
Reduction of UPOPs releases	Moderately Satisfactory (MS)
Reduction of mercury releases	Satisfactory (S)
Country capacity to phase-out POPs releases	Satisfactory (S)
Overall likelihood of sustainability	Moderately Likely (ML)
Institutional framework and governance	Likely (L)
Financial	Moderately Likely (ML)
Socio-political	Likely (L)
Environmental	Likely (L)

CONCLUSIONS AND RECOMMENDATIONS

Based on the facts collected and analysed in the previous section, this section elaborates conclusions that make judgments supported by the findings. Each conclusion is linked with a recommendation as a corrective action proposed to be taken by relevant project stakeholders to address the deficiencies identified in the findings and conclusions.

This Terminal Evaluation makes two types of recommendations. Recommendations on substantive matters are provided for consideration of the project partners in order to ensure the project results are fully consolidated with the key project stakeholders. These recommendations are suggested for implementation as soon as possible using the existing institutional capacities and frameworks that had been created by the current project.

The implementation experience from the UPOPs project allows that some conclusions could be generalized for all UNDP programming areas. Recommendations of the second type are provided for consideration of UNDP in order to improve programming and project preparation in general.

Recommendations to follow-up and/or reinforce initial benefits from the project

Finding 1: The model HCFs in all four countries that had been supplied with the autoclave technology experienced concerns related to placement of sterilised waste on a dumpsite without any change of physical appearance of the autoclaved waste. This issue had been highlighted during MTR shortly after installation and commissioning of the autoclaves in late 2018. However, most of the model HCFs from the project 1st phase were not able to discontinue use of incinerators for HCW final disposal after 12 or more months of the autoclaves' operation. In two cases, the challenge on disposal of autoclaved waste was resolved through intensive discussions with local stakeholders.

Conclusion 1: The project focused mainly on the upstream part of the HCWM systems, namely waste classification, segregation at source, on-site storage and transportation as well as demonstration of the non-incineration technology. Noticeably less attention was paid to off-site transportation of infectious waste to central/cluster treatment facilities and final disposal of autoclaved waste and local stakeholders relevant for this part of HCWM had not been sufficiently involved and consulted in the design phase of the project.

***Recommendation 1:** Before the completion of the project, the four project teams should engage in intensive consultations with relevant local authorities (such as district/regional environmental authorities, public health offices and district/local councils). In particular, they should arrange visits of the autoclave treatment facilities by the local authorities and share with them reports and other information on testing of performance of the HCW sterilization.*

Finding 2: The project introduced standardized forms for reporting of quantities of HCW treated by the autoclave technology by each designated model HCFs and started the practice of regular (monthly) reporting to the respective PIUs.

Conclusion 2: Continuity of the reporting on the amounts of HCW treated by the autoclaves installed by the demonstration project is essential for convincing international donors and local private companies about effectiveness and feasibility of the autoclave technology in the four countries and in the region as well as for reporting on measures taken to implement the provisions of the Stockholm Convention related to UPOPs.

***Recommendation 2:** Before the completion of the project, the UNDP COs in the four countries in cooperation with the national PIUs should establish institutional mechanisms for a post-project monitoring of performance of the autoclaves and periodic collection of information about amounts of HCW treated. The monitoring, led by the national health authorities, should start immediately upon closure of the project with monthly periodicity.*

Finding 3: In order to resolve the issue of disposal of the autoclaved waste through open dumping on municipal landfills, the project procured additional equipment for altering physical appearance of autoclaved waste. On-site small or medium shredder systems for HCFs in Ghana, Madagascar and waste compactors for HCFs in Tanzania were installed only at the end of the project.

Conclusion 3: In addition to the planned demonstration of the non-incineration (autoclave) technology, the project will introduce and demonstrate use of two different options for after treatment of HCW, namely waste shredding and waste compacting. As there is only limited experience with application of the two alternatives in the project countries and in the region, it would be valuable to collect experience from use of the two alternatives. However, due to the delayed procurement of the two post-treatment systems, there will not be enough time for collection of substantial information within the project implementation period.

***Recommendation 3:** As part of the post-project monitoring, the four countries should evaluate merits of the post-treatment on final disposal of autoclaved HCW and gather experience from operation and maintenance of the shredding and compacting devices. The lessons learned should be disseminated through relevant UNDP outreach channels.*

Finding 4: Almost all project model HCFs equipped with autoclaves currently process only their own infectious waste. Consequently, the autoclaves are operated well beyond their planned treatment capacity. Insufficient funding of fuel hinders higher HCW transport vehicle/tricycle occupation. Progress towards establishment of functional centralized and cluster HCW treatment facilities has been only marginal.

Conclusion 4: One of the main obstacles to better exploitation of the autoclave capacity installed by the project was lack of progress in organization of centralized and cluster HCW treatment schemes, in particular lack of experience at the autoclave holder HCFs in elaboration of viable financing by members of the central/cluster HCW treatment configurations. Establishment of effective centralized and cluster HCW treatment will increase efficiency and enhance sustainability of the installed autoclave technology at the autoclave holder HCFs.

***Recommendation 4:** Relevant health authorities in the project countries should collect and disseminate experience from working cluster HCW treatment systems including formulas for calculation of tariffs for transportation of HCW and treatment at the autoclave cluster treatment centres.*

Finding 5: During the first year of operation of the installed autoclaves, several recipient HCFs reported complaints about availability of local service technicians from the autoclave supplier for repair services within the warranty period. Some pilot HCFs do not have sufficient internal maintenance and repair capacity to keep the autoclaves in operation.

Conclusion 5: Establishment of effective local capacity for regular maintenance and repair, as well as availability and affordability of spare parts are the most critical requisites for smooth and sustained operation of the autoclaves.

Recommendation 5: In order to ensure continued after-warranty repair service of the installed autoclaves, the national health authorities and the project model HCFs in the four countries should establish national autoclave maintenance teams and/or contracting local external repair service companies. UNDP COs should be of assistance for identification of reliable local suppliers of necessary spare parts for the autoclaves.

Finding 6: Through provision of sizeable quantities of digital thermometers and sphygmomanometers, the project aimed to assist the four countries to collect, replace and centrally store old mercury-containing devices. All four countries successfully completed collection and replacement and subsequently the model HCFs were declared mercury-free. Only Zambia completed construction of the central storage facility for mercury HCW while in the other three countries progress towards the same was slow. All four countries now have banned procurement of mercury-containing devices for health care sector.

Conclusion 6: It will be important to continue collection of old mercury-containing devices from other HCFs in the four countries and ensure the centrally stored mercury HCW is properly managed after the project completion date.

Recommendation 6: Relevant health authorities in the four countries should establish procedures for sound post-project management of the central storage of mercury HCW and cooperate with holders of mercury waste in other sectors in order to identify final disposal option in line with provisions of the Minamata Convention.

Finding 7: The project assisted the four countries to prepare national HCWM policy documents and transpose them into HCWM policies at the level of the model HCFs. Training of health care professionals was included in the HCWM policies and the countries updated the national training curricula for health workers with special modules on HCWM.

Conclusion 7: Training and re-training of health as well as sanitary workers is a pivot to improved knowledge, attitude and practices in HCWM. There is a need to secure continued financing to the national training institutions for roll out of training and re-training courses for health professionals throughout the four countries.

Recommendation 7: Relevant health authorities in the four countries should assist national health training institutions to secure financing for continuation of training and re-training courses with HCWM modules for health workers.

Finding 8: The project has supported elaboration of numerous written materials and information on HCW management and treatment, such as training materials, standard operation procedures, technical guidelines, HCWM equipment catalogue, sample drawings for autoclave housing, and others. In addition, some technical reports directly related to this project were prepared by the project partners (WHO, HCWH).

Conclusion 8: Dissemination of the knowledge products from the project and its partners will be important for preparation of follow-up interventions in the project countries and could also support replication and upscaling of the non-incineration technologies in the entire African region and beyond.

Recommendation 8: UNDP IRH should ensure maintenance of the web repository containing the project knowledge products after closure of the project.

Finding 9: In addition to the activities specified in the Project Document, the project supported pilot country-specific activities (entitled Lighthouse Projects) on selected specific HCW issues, namely on cooperation with private sector on HCW treatment, management of sharps waste,

use of solar panels as energy source for autoclaves, market study on recycling of plastic HCW as well as construction and operation of a biodigester.

Conclusion 9: The experience collected through the country-specific Lighthouse Projects is unique and the detailed results and specific lessons learned are worth of sharing with a wider audience in order to help them to replicate the pilot projects.

Recommendation 9: UNDP IRH should collect all technical reports, market studies and other results of the Lighthouse Projects and make them available through the web repository of the knowledge products.

Recommendations to improve programming and preparation of projects

Finding 10: For preparation of the first round of procurement, two missions of RTA were required to discuss the national implementation work plans and to ensure readiness of the model HCFs for installation of the autoclave technology. The necessary prerequisites for the second round of procurement were elaboration of funds allocation criteria through MTR and approval of the criteria by RPB. The procurement process itself was impeded by the need to obtain approval of the UNDP regional procurement committee, complex custom clearance procedures in some countries, as well as delays in equipment commissioning.

Conclusion 10: The project implementation experience proved that it is unrealistic to expect a multi-country project with staged two rounds of equipment procurement to be completed within 4 years. Delayed official project approval by all four countries, intricate procurement processes, as well as various challenges with equipment commissioning and operation ramp up precluded consolidation of the project results and full achievement of the project objective before the end of the 4-year project implementation period.

Recommendation 10: For preparation of multi country projects with sizeable and staged equipment procurement components UNDP should plan minimum 5-years implementation period.

Finding 11: The project results matrix aimed at segregation of the results in two dimensions - thematically into Components and separately clustered regional and national Outcomes under each Component. The structure of the project results framework matrix is overly complicated and partially inconsistent.

Conclusion 11: The overly complicated structure of the project results matrix impedes smooth monitoring of implementation progress and pertinent reporting thereof. Thematic clustering of Outcomes into Components is a standard practice but further clustering of Outcomes according to implementation responsibility is not necessary.

Recommendation 11: For preparation of future multi-country projects with regional and national components, UNDP should follow the standard Objective-Outcome-Output-Activity pattern and construct project logframe matrix according to substantive topics and assign national or regional responsibility for implementation of individual Outcomes in the results matrix without clustering them according to the implementation responsibility.

Finding 12: The GEF Co-financing Policy requires GEF Partner Agencies to report on materialized co-financing according to source and type during project implementation and at project closure. In the GEF standard format of the Project Implementation Reports (PIRs), there is currently no requirement for information on actual co-financing.

Conclusion 12: Information on co-financing contributions is not collected in a systematic manner. Consequently, only rough estimates of materialized co-financing are provided at project completion.

Insufficient accounting for co-financing contributions precludes accurate reporting of actual materialized co-financing to the donor agency.

Recommendation 12: UNDP should ensure that updated information on actually materialized co-financing for GEF projects is reported in the last two PIRs.

Finding 13: The Project Document stipulated TE to be conducted three months prior to the project completion date. In reality, the TE data collection phase was conducted 5-6 months prior to the project completion date - started on 30 October – 2 November with the mission to IRH and continued with the evaluation missions to the four countries between 16 November and 14 December 2019. The TE field missions were conducted concurrently with the on-going 2nd round of procurement and few months before delivery and installation of the procured items to the beneficiaries. The early conduct of the TE missions did not allow to capture and evaluate any real achievements of the 2nd phase of the project, in particular to assess impact of the 2nd round of procurement on routes for ultimate disposal of autoclaved HCW and on achievement of planned UOPs reduction targets.

Conclusion 13: Realization of a TE field mission before completion of procurement for major technology transfer precludes thorough assessment of impact of the technology transfer at the level of beneficiaries, in particular for projects designed for a staged implementation.

Recommendation 13: UNDP should carefully plan the conduct of Terminal Evaluations. In case TE mission is included in the TE plan, the TE mission should not be conducted earlier than three months before the project planned completion date.

Lessons learned and best practices related to relevance, performance and success

There are several university/teaching hospitals amongst the designated HCFs. This is considered a good practice as teaching hospitals are prime HCFs in any country hence they usually have less budgetary constraints and better trained personnel compared to ordinary hospitals. Moreover, serving as training institutions they give opportunity to future health professionals to practice HCW separation and collection procedures as well as get hands-on experience from use of mercury-free medical devices.

A major part of the project focused on provision of the non-incineration (autoclave) technology for which shelter housing had to be constructed by the recipient HCFs to ensure safety of the autoclaves' operation and prevent adverse weather impacts. The project was instrumental in providing design drawings and technical specifications for setup of the shelter housing. Between September 2017 and January 2018, RTE conducted missions to certify the site readiness for the installation of the autoclaves, he found that all HCFs in Zambia and four out of five HCFs in Tanzania had not started the construction works on the shelter housing.

Although the construction of the buildings itself should be relatively fast (about 2 months), the actual completion of the construction took 6-12 months due to complicated administrative and financial procedures at the level of the beneficiary HCFs. Moreover, some HCFs had challenges to comply with the strict infrastructure requirements for operation of the autoclave steam generation systems. In particular demands on the electricity connection (cables with a capacity 25 - 75 kVA) proved to be a challenge and forced some HCFs to setup new power transformers.

The late start of the shelter construction and site adjustments caused delays in implementation. For future projects requiring construction works and infrastructure adjustments at the project

sites, it would be desirable to develop a checklist of all requirements with a time plan for completion and involve local PIUs in intensive monitoring of the progress.

A technical assessment carried out in the four project countries on medical equipment, such as autoclaves, identified inadequate operation, insufficient maintenance and absence of repair capacity as the main reasons for breakdown and sub-optimal performance of such medical equipment resulting in frequent breakdowns.

As a preventive measure, the following key points were included in the procurement of the autoclave equipment:

- Full service during one-year warranty period
- 10-year spare part guarantee (availability of spare parts from the manufacturer)
- After-sale service team in the country (local agent of the supplier)
- Initial full spare parts package for 2,500 hours (to reduce waiting times for spare parts)
- On the job basic maintenance and operation training

In order to ensure adequate media supply (electricity and water), auxiliary equipment such as water treatment systems (filter and water softener), water booster pump and voltage stabilizers were procured to complement the main autoclave equipment. This is considered as a good practice to avoid negative impact of power and water pressure fluctuations on performance of the main equipment.

The maintenance and repair capacity of technicians in the model HCFs was found limited and in few cases qualified technicians were not available. Although initial on-site training was included in the contract with the equipment supplier, additional training of HCF technicians in operation and preventive maintenance of autoclaves was provided by the project. This is a good practice that should be complemented by support for set-up and training of dedicated country maintenance teams and establishment of service contracts with external qualified service companies as additional measures for ensuring smooth operation of the new devices.

During the first three months after commissioning of the autoclaves, some HCFs experienced technical problems which either partially or fully hindered the usage of the autoclaves. The causes identified included challenges on the side of the HCFs (e.g., absence of basic preventive maintenance and/or replacement of previously trained autoclave operators by untrained operators) and challenges related to poor/lack of communication between the HCFs and local agent of the supplier and the supplier. To resolve these problems, a Standard Operation Procedure (SOP) was developed on proper communication of technical problems to the local representative and/or the supplier. Moreover, retraining of operators was conducted at some HCFs either by the local agent of the supplier or by technicians of the equipment manufacturer.

One of the conditions in the technical specification documents for procurement of the autoclaves required the equipment suppliers to have local representatives for provision of equipment installation and maintenance services. While the rationale for this condition has been well known to the development assistance community, the value of qualified technicians locally available was reconfirmed during the extension phase of the project when installation the autoclave in Madagascar had to be conducted via a 4-day video conference with assistance of a qualified local technicians.

Some HCFs have budget constraints that limit provision of funds to cover operation costs and spare parts for the new HCW treatment systems. The project encouraged the model HCFs to develop strategies to cover or compensate the necessary operation and spare parts cost. This is a good practice as it provides a enhance sustainability of the autoclave operations.

The project target is to reduce the amount of UPOPs releases from the originally used HCW incinerators. Estimations of UPOPs reduction targets were based on assumption that all installed

autoclaves will operate 6 treatment cycles per day for 260 days per year. However, the data provided by the recipient HCFs for the period January – November 2019 indicate that a majority of autoclaves performed only a couple of treatment cycles per week and few autoclaves were even below as either they faced maintenance and repair issues or could not autoclave HCW because of concerns about disposal of the autoclaved waste at public landfills.

Introduction of a new technology inevitably brings along several challenges that restrict smooth and unlimited operation of the technology, in particular in developing countries where it is often difficult to find and realize appropriate remedial measures. Therefore, performance and impact target indicators for new technologies should not be calculated on grounds of maximum performance capacity that is highly unlikely to be attained.

The 1:1 replacement scheme of the mercury-containing devices planned in the Project Document was found not realistic due to the fact that the countries (with exception of Madagascar) started the replacement of mercury-containing devices on their own before the start for the project intervention and the project teams therefore found only small quantities of the old devices in use. In Madagascar, thermometers and sphygmomanometers were not owned by the public HCFs but by the physicians and the patients hence the exchange was not possible until the recipients of the new equipment were identified.

Insufficient capacity was observed in the project model HCFs for calibration and use of the mercury-free medical equipment. This will have to be considered for future procurement as it has impact on durability of the digital medical devices. Also, any future procurement must ensure that chargers and replacement rechargeable batteries are provided in sufficient quantities to the recipient HCFs.

For introduction mercury-free sphygmomanometers, sufficient attention should be paid to selection of proper cuff size as there is no cuff size that fits all patients. The general preference of health professionals is digital equipment. However, the latter should be accompanied with rechargeable batteries and battery chargers and assistance in identification of local supply channels for the chargers and batteries in order to sustain the use of new equipment. In any case, aneroid sphygmomanometers with stethoscopes should also be supplied as a back-up for periods of temporary lack of batteries for digital devices.

The project advocated for the training on HCWM to be institutionalized in the health service curriculums of the countries (schools of hygiene and other teaching institutions), to ensure that capacity on HCWM improves continuously after completion of the project support the future operation and expansion of the HCWM systems. Despite the obvious benefits, not all the countries followed this approach.

Although the project was subject to social and environmental screening at inception, no specific activities related to women or other vulnerable groups were considered for the project. An analytical study on social and environmental injustice over HCWM issues was commissioned in one country (Ghana) in the second year of the project but no specific activities based on the analysis were incorporated into the project.

If analysis of gender mainstreaming in relation to elements of the project results framework is conducted during the project implementation, it has little practical meaning. Even though such analysis could establish relevant findings and make valuable recommendations, there is scant possibility of practical follow-up on the analysis due to missing budget allocation. In order to address specific gender issues through project activities, gender-related analysis has to be conducted at the project preparation phase and corresponding funds allocation to be made in the project work plan and budget.

Annex 1: Evaluation Terms of Reference

Terminal Evaluation of UNDP-GEF Project

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 undergo a terminal evaluation upon completion of implementation. These terms of reference (TOR) sets out the expectations for a TERMINAL Evaluation (TE) of the *“Reducing UPOPs and Mercury Releases from the Health Sector in Africa.”*

The project was designed 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, implemented by UNDP Istanbul Regional Hub (IRH) in partnership with WHO and the NGO Health Care Without Harm (HCWH), 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).

The TE will be conducted according to the guidance, rules and procedures established by UNDP and GEF as reflected in the UNDP Evaluation Guidance for GEF Financed Projects.

2. Description of Responsibilities

The objectives of the evaluation are to assess the achievement of project results, and to draw lessons that can both improve the sustainability of benefits from this project, and aid in the overall enhancement of UNDP programming. The evaluator is expected to frame the evaluation effort using the criteria of **relevance, effectiveness, efficiency, sustainability, and impact**, as defined and explained in the UNDP Guidance for Conducting Terminal Evaluations of UNDP-supported, GEF-financed Projects.

The evaluator will first review all relevant sources of information, such as the project document, project reports – including Annual PIR, project budget revisions, midterm review, progress reports, GEF focal area tracking tools, project files, national strategic and legal documents, and any other materials that the evaluator considers useful for this evidence-based assessment. A list of documents that the project team will be provided to the evaluator for review. The TE mission will then consist of field mission to Turkey, Ghana, Tanzania, Madagascar, Zambia, including project sites and interviews will be held with the following organizations and individuals at a minimum: respective ministries and UNDP Country Offices in Ghana, Madagascar, Tanzania and Zambia as well as UNDP Istanbul Regional Hub and project partners WHO and NGO Health Care Without Harm (HCWH); executing agencies, senior officials and task team/ component leaders, key experts and consultants in the subject area, Project Board, project stakeholders, academia, local government and CSOs, etc.

The evaluator will assess the extent to which the project is achieving impacts or progressing towards the achievement of impacts. Key findings that should be brought out in the evaluations include whether the project has demonstrated: a) verifiable improvements in ecological status, b) verifiable reductions in stress on ecological systems, and/or c) demonstrated progress towards these impact achievements.

The TE consultant will include a section in the TE report setting out the TE's evidence-based conclusions, in light of the findings. The TE 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 TE 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 TE consultant should make no more than 15 recommendations total.

Duration

The Contract will enter into effect upon signature by both parties, expected for six (6) months of duration. The international consultant is expected to start in early October 2019.

Travel requirements

The evaluator is expected to conduct field missions as follows:

- One mission of 3 days to Istanbul/Turkey.
- One mission of 5 days each to the capitals of each project country – Accra/Ghana, Antananarivo/Madagascar, Dar es Salaam/Tanzania, Lusaka/Zambia with additional visits to projects sites as deemed necessary in each country (5 working days for each country in total).
- Additional travels may be requested by the IRH over the duration of the assignment within the estimated workload.

Schedule of payments and expected outputs

The total number of days of work is estimated approximately 60 working days. The breakdown corresponds to the expected outputs and schedule of payments as follows:

- 10% of payment upon submission of the inception report and mission travel plan.
 - Inception report: Evaluator provides clarifications on timing, method and mission plan of the evaluation (approx. 5 working days; due date – 21 October 2019)
- 50% 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. 27 working days; due date – 20 December 2019)
- 40% of payment upon approval of the final TE report and presentation of the TE report.
 - Draft final report: Full report with annexes (approx. 22 working days; due date – 31 December 2019).
 - Final report: Revised report after comments/feedbacks (approx. 4 working days; due date – 31 January 2020).
 - Presentation of the final TE report during the regional project closure meeting, remote participation (date TBC) (approx. 2 working days; due date – 31 March 2020)

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, preferably with non-incineration treatment technologies and mercury elimination in health sector
- Previous experience with results-based management evaluations is required and gender sensitive evaluation and analysis is an asset
- Experience with 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/CV 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 and evaluation of samples – 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 English and French – max points: 3. |

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

6. Application procedures

The application submission is a two-step process. Failing to comply with the submission process may result in disqualifying the applications.

Step 1: Interested candidates must include the following documents when submitting the applications (Please group all your documents into one (1) single PDF attachment as the system only allows upload of one document):

- **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.
- **Three (3) samples of previous evaluation work** similar to the assignment (links can be shared as well)
- **Filled P11** form or CV 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);

- Offeror's Letter (blank template can be downloaded from <https://bit.ly/2KO1okS>).

Step 2: Submission of Financial Proposal – Only shortlisted candidates will be contacted and requested to provide a financial offer.

***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*

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 2: Evaluation Matrix

Evaluation Questions	Indicators	Data Sources	Data Collection Methods
Relevance and Project Formulation			
<p>Is the initiative aligned to the national development strategy?</p> <p>How does the project align with national strategies in the affected sectors and specific development challenges in the country?</p> <p>Where is this project implemented?</p> <p>Who are the main beneficiaries of the project and how does the project address their human development needs?</p> <p>To what extent are the objectives of the project still valid?</p> <p>Are the activities and outputs of the project consistent with attainment of its objectives?</p>	<p>Number of development and sectoral plans/strategies relevant for the project</p> <p>Level of alignment between the project objectives/outcomes and national development and sectoral strategies</p>	<p>UNDP programme/pro- ject documents</p> <p>UNDP programme/pro- ject Annual Work Plans</p> <p>Programmes/projects/ thematic areas evaluation reports</p> <p>Government's national planning documents</p> <p>Human Development Reports</p> <p>MDG progress reports</p> <p>Government partners progress reports</p> <p>Interviews with beneficiaries</p>	<p>Desk reviews of secondary data</p> <p>Interviews with government partners</p> <p>Interviews with NGOs partners/service providers</p> <p>Interviews with funding agencies and other UNCT</p> <p>Interview with civil societies in the concerned sector</p> <p>Interviews with related parliamentary committees</p> <p>Related Constitutional bodies such as Human Rights, Women Rights, etc.</p> <p>Field visits to selected projects</p>
<p>Were the project's objectives and components clear, practicable and feasible within its time frame?</p> <p>Were the capacities of the executing institution(s) and its counterparts properly considered in the project design?</p> <p>Were lessons from other relevant projects properly incorporated in the project design?</p> <p>Were the partnership arrangements properly identified and roles and responsibilities negotiated prior to project approval?</p> <p>Were counterpart resources (funding, staff, and facilities), enabling legislation, and adequate project management arrangements in place at project entry?</p> <p>Were the project assumptions and risks well identified in the PIF and the Project Document?</p> <p>To what extent has UNDP adopted participatory approaches in planning and delivery of the initiative and what has been feasible in the country context?</p> <p>What analysis was done in designing the project?</p> <p>Are the resources allocated sufficient to achieve the objectives of the project?</p>	<p>Level of participation of key and tangential stakeholders in the project design and implementation</p> <p>Level of stakeholder analysis at the project design stage</p> <p>Level of allocation of resources to individual outcomes</p> <p>Level of alignment with the priorities mentioned in the UNDAF and UNDP Country Programme Document</p> <p>Appreciation from national stakeholders with respect to adequacy of project design and implementation to national realities and existing capacities</p>	<p>UNDP staff</p> <p>Development partners (UN agencies, bilateral development agencies)</p> <p>Government partners involved in specific results/thematic areas</p> <p>Concerned civil society partners</p> <p>Concerned associations and federations</p> <p>National policies and strategies</p> <p>UNDAF and CPD documents</p>	<p>Interviews with UNDP staff, development partners and government partners, civil society partners, associations, and federations</p>

Evaluation Questions	Indicators	Data Sources	Data Collection Methods
Project Implementation and Adaptive Management			
<p>Did the project undergo significant changes as a result of MTR recommendations and/or of other review procedures?</p> <p>Did the changes materially change the expected project outcomes?</p> <p>Were there adequate provisions in the project design for consultation with stakeholder?</p> <p>To what extent were effective partnerships arrangements established for implementation of the project with relevant partners?</p> <p>To what extent were lessons from other relevant projects incorporated into project implementation?</p> <p>Whether feedback from M&E activities was used for adaptive management?</p>	<p>Response to the MTR</p> <p>Level of solution of implementation issues solved by PMU/UNDP</p> <p>Quality and level of use of implementation monitoring tools</p>	<p>Minutes of the Project Steering Committee meetings</p> <p>MTR Report</p> <p>Annual Work Plans</p> <p>Annual Progress Reports</p> <p>Government partners</p> <p>Development partners</p> <p>UNDP staff (Programme Implementation Support Unit)</p>	<p>Interviews with UNDP staff</p> <p>Interviews with government partners</p> <p>Interviews with development partners</p> <p>Desk review of secondary data</p>
<p>–</p> <p>Was the M&E plan well conceived at the design phase and sufficient to track progress toward achieving objectives?</p> <p>Was the M&E plan sufficiently budgeted and funded during project preparation and implementation?</p> <p>Were the monitoring indicators from the project document effective for measuring progress and performance?</p> <p>Was the logical framework used during implementation as a management and M&E tool?</p> <p>What has been the level of compliance with the progress and financial reporting requirements/ schedule, including quality and timeliness of reports?</p> <p>What was the extent to which follow-up actions, and/ or adaptive management, were taken in response to monitoring reports (APR/PIRs)?</p> <p>.</p>	<p>M&E Plan design and implementation</p> <p>Quality and level of use of implementation monitoring tools</p> <p>Quality of existing information systems in place to identify emerging risks and other issues</p> <p>Quality of risk mitigations strategies developed and implemented</p> <p>Level of financial controls established and used to provide feedback on implementation</p> <p>Level of prioritization of activities for achievement of significant results</p> <p>Consistency of the APR/PIR self-evaluation ratings with the MTR findings</p>	<p>Minutes of the Inception Workshop</p> <p>Programme documents</p> <p>Annual Work Plans</p> <p>Annual Progress Reports</p> <p>Evaluation reports</p> <p>Government partners</p> <p>Development partners</p> <p>UNDP staff (Programme Implementation Support Unit)</p>	<p>Interviews with UNDP staff</p> <p>Interviews with government partners</p> <p>Interviews with development partners</p> <p>Desk review of secondary data</p>

Evaluation Questions	Indicators	Data Sources	Data Collection Methods
Effectiveness			
<p>Did the project or programme implementation contribute towards the stated outcomes? Did it at least set dynamic changes and processes that move towards the long-term outcomes?</p> <p>What outputs has the project achieved and what outcomes does the project intend to achieve?</p> <p>What changes and progress towards the outcomes can be observed as a result of the outputs?</p> <p>To what extent were the project objectives achieved?</p> <p>How does UNDP measure its progress towards expected results/outcomes?</p> <p>In addition to the project, what other factors may have affected the results?</p> <p>What were the unintended results (+ or -) of the project?</p>	<p>Target indicators in the project results framework</p> <p>Level of coherence between the project design and implementation approaches</p> <p>Level of coherence between activities and outputs/outcomes</p> <p>Level of management of assumptions and risks</p>	<p>Project/programme/thematic areas evaluation reports</p> <p>Data reported in project annual and quarterly reports by PMU and UNDP staff</p> <p>Development partners</p> <p>Government partners</p> <p>Beneficiaries</p>	<p>Interviews with UNDP staff</p> <p>Interviews with government partners</p> <p>Interviews with development partners</p> <p>Desk review of project annual and quarterly reports</p> <p>Field visits to selected sites</p>
<p>How broad are the outcomes (e.g., local community, district, regional, national)?</p> <p>What has been the results of the capacity building/training components of the project? Were qualified trainers available to conduct trainings?</p> <p>Are the results of the project intended to reach local community, district, regional or national level?</p>	<p>Level of outreach of the project to the ultimate beneficiaries</p> <p>Level of increase in capacity building resulting from the training components</p>	<p>Training evaluation reports</p> <p>Progress reports on projects</p>	<p>Desk review of secondary data</p>
<p>Who are the direct beneficiaries and how many of them were affected by the project?</p> <p>Who are the ultimate beneficiaries and to what extent have they been reached by the project?</p> <p>To what extent do the poor, indigenous groups, women, and other disadvantaged and marginalized groups benefit?</p> <p>How have the particular needs of disadvantaged groups been taken into account in the design and implementation, benefit sharing, monitoring and evaluation of the project/ programme?</p> <p>How far has the regional context been taken into consideration while selecting the project/ programme?</p> <p>Was there any partnership strategy in place for implementation of the project and if so how effective was it?</p>	<p>Level of outreach of the project to the ultimate beneficiaries</p> <p>Level of inclusion of marginal groups of beneficiaries</p> <p>Cooperation with partners on project implementation</p>	<p>Programme documents</p> <p>Annual Work Plans</p> <p>Annual Progress Reports</p> <p>Evaluation reports</p> <p>MDG progress reports</p> <p>Human Development Reports</p>	<p>Desk review of secondary data</p>

Evaluation Questions	Indicators	Data Sources	Data Collection Methods
Efficiency			
<p>Has the project or programme been implemented within the original timeframe and budget?</p> <p>Have UNDP and its partners taken prompt actions to solve implementation issues, if any?</p> <p>Have there been time extensions on the project? What were the circumstances giving rise to the need for time extension?</p> <p>Has there been over-expenditure or under-expenditure on the project?</p> <p>What mechanisms does UNDP have in place to monitor implementation? Are these effective?</p> <p>Have there been any outside factors (e.g. political instability) affecting on implementation effectiveness?</p>	<p>Level of adherence to the original timeframe and budget</p> <p>Quality of annual workplans <i>vis-à-vis</i> the project logframe</p> <p>Level of solution of implementation issues solved by PMU/UNDP</p> <p>Quality and level of use of implementation monitoring tools</p> <p>Timeliness and adequacy of reporting provided</p> <p>Level of discrepancy between planned and utilized financial expenditures</p> <p>Comparison of planned vs. actual funds leveraged</p>	<p>Programme documents</p> <p>Annual Work Plans</p> <p>Annual Progress Reports</p> <p>Evaluation reports</p> <p>Government partners</p> <p>Development partners</p> <p>UNDP staff (Programme Implementation Support Unit)</p>	<p>Interviews with government partners and development partners</p> <p>Desk review of secondary data</p>
<p>Were UNDP resources focused on the set of activities that were expected to produce significant results?</p> <p>Was there any identified synergy between UNDP initiatives that contributed to reducing costs while supporting results?</p> <p>Was there a Project Implementation Support Unit and how it assisted the efficiency of implementation?</p> <p>Were the project resources concentrated on the most important initiatives or were they scattered/spread thinly across initiatives?</p> <p>Did the leveraging of funds (co financing) happen as planned?</p> <p>Were financial resources utilized efficiently? Could financial resources have been used more efficiently?</p> <p>Was procurement carried out in a manner making efficient use of project resources?</p> <p>Was an appropriate balance struck between utilization of international expertise as well as local capacity?</p> <p>Did the project take into account local capacity in design and implementation of the project?</p> <p>Was there an effective collaboration between institutions responsible for implementing the project?</p> <p>How efficient are partnership arrangements for the project?</p>	<p>Synergies with similar activities funded from other sources</p> <p>Level of financial controls established and used to provide feedback on implementation</p> <p>Level of prioritization of activities for achievement of significant results</p> <p>Proportion of expertise utilized from international experts compared to national experts</p> <p>Number/quality of analyses done to assess local capacity potential and absorptive capacity</p> <p>Specific activities conducted to support the development of cooperative arrangements between partners,</p> <p>Examples of supported partnerships</p> <p>Evidence that particular partnerships/linkages will be sustained</p> <p>Types/quality of partnership cooperation methods utilized</p>	<p>Programme documents</p> <p>Annual Work Plans</p> <p>Annual Progress Reports</p> <p>Evaluation reports</p> <p>Government partners</p> <p>Development partners</p> <p>UNDP staff (Programme Implementation Support Unit)</p>	<p>Interviews with government partners and development partners</p> <p>Desk review of secondary data</p>

Evaluation Questions	Indicators	Data Sources	Data Collection Methods
Sustainability			
<p>Does/did the project have an exit strategy?</p> <p>How does UNDP propose to exit from projects that have run for several years?</p> <p>To what extent does the exit strategy take into account the following:</p> <ul style="list-style-type: none"> – Political factors (support from national authorities) – Financial factors (available budgets) – Technical factors (skills and expertise needed) – Environmental factors (environmental sustainability) <p>Were initiatives designed to have sustainable results given the identifiable risks?</p>	<p>Quality and level of self-sufficiency of institutional frameworks for continuation of activities after project completion</p> <p>Availability of counterpart/stakeholder funding for the project outcomes</p>	<p>Programme documents</p> <p>Annual Work Plans</p> <p>Annual Progress Reports</p> <p>Evaluation reports</p>	<p>Desk review of secondary data</p>
<p>What issues emerged during implementation as a threat to sustainability?</p> <p>What corrective measures were adopted?</p> <p>How has UNDP addressed the challenge of building national capacity in the face of high turnover of government officials?</p> <p>What unanticipated sustainability threats emerged during implementation?</p> <p>What corrective measures did UNDP take?</p>	<p>Level and quality of identification of sustainability issues</p> <p>Nature and quality of corrective measures by the project management to address sustainability issues</p>	<p>Evaluation reports</p> <p>Progress reports</p> <p>UNDP programme staff</p>	<p>Interview with UNDP and PMU staff</p> <p>Desk review of secondary data</p>
<p>Do the various key stakeholders see that it is in their interest that project benefits continue to flow?</p> <p>Is there sufficient public/stakeholder awareness in support of the project's long-term objectives?</p>	<p>Level of stakeholder awareness and ownership of the project results</p>		<p>Interview with government representatives</p> <p>Interview with other stakeholders' representatives</p> <p>Desk review of secondary data</p>
<p>How has UNDP approached the scaling up of successful pilot initiatives and catalytic projects?</p> <p>Has the government taken on these initiatives?</p> <p>Have external donors stepped in to scale up and/or replicate the project activities?</p> <p>What actions have been taken to scale up the project if it is a pilot initiative?</p>	<p>Level of UNDP and government interest for scale-up and/or replication</p> <p>Level of external donor interest for scale-up and/or replication</p>	<p>Evaluation reports</p> <p>Progress reports</p> <p>UNDP and PMU staff</p>	<p>Interview with UNDP and PMU staff</p> <p>Review of external donor interventions</p> <p>Desk review of secondary data</p>

Evaluation Questions	Indicators	Data Sources	Data Collection Methods
Progress towards impacts			
<p>What difference has the project made to the direct and ultimate beneficiaries?</p> <p>Which are the intermediate states that lead to impacts, have they been achieved and how?</p> <p>Which (if any) are still missing gaps between the project outcomes and realization of the expected impacts?</p> <p>Are the necessary conditions in place for enabling scaling up of outcomes into impacts?</p>	<p>Level of coherence between the project outcomes and intended impacts</p> <p>Nature of conditions for conversion of outcomes into impacts</p>	<p>Programme documents</p> <p>Annual Work Plans</p> <p>Annual Progress Reports</p> <p>Evaluation reports</p> <p>Government partners</p> <p>Development partners</p> <p>UNDP staff (Programme Implementation Support Unit)</p>	<p>Interviews with government partners and development partners</p> <p>Desk review of secondary data</p>
<p>Have there been verifiable improvement in energy intensity</p> <p>Have there been changes in specified indicators that progress is being made towards achievement of project objectives</p> <p>Have there been regulatory and policy changes at regional, national and/or local levels</p>	<p>Actual positive and negative, foreseen and unforeseen changes to and effects produced/induced by the development intervention</p>	<p>Programme documents</p> <p>Annual Work Plans</p> <p>Annual Progress Reports</p> <p>Evaluation reports</p> <p>Government partners</p> <p>Development partners</p> <p>UNDP staff (Programme Implementation Support Unit)</p>	<p>Interviews with government partners and development partners</p> <p>Desk review of secondary data</p>
<p>Have indigenous institutions been established and or strengthened to provide leadership and technical support to the transfer of project outcomes into impacts?</p> <p>Have collaboration mechanisms between government agencies and their boundary partners established to implement the project-initiated measures?</p> <p>Have the relevant government agencies undertaken measures to support the adoption of the project's results and their inclusion as national priorities?</p>	<p>Level of key stakeholder awareness and ownership of the project results</p> <p>Quality and level of collaboration between the stakeholder institutions</p>	<p>Programme documents</p> <p>Annual Work Plans</p> <p>Annual Progress Reports</p> <p>Evaluation reports</p> <p>Government partners</p> <p>Development partners</p> <p>UNDP staff (Programme Implementation Support Unit)</p>	<p>Interviews with government partners and development partners</p> <p>Desk review of secondary data</p>
<p>Are there sufficient fundraising, investment and revenue-generating mechanisms and strategies to enable and support the outcome-impact pathways?</p> <p>Are government agencies encouraged/enabled to facilitate wider adoption of the project results?</p> <p>Have senior and influential government officials endorsed the project's innovative approaches and champion the development of a more enabling policies, mechanisms and strategies for wider adoption?</p>	<p>Level of key stakeholders' awareness and ownership of the project results</p> <p>Level of stakeholders' financial commitments</p>	<p>Programme documents</p> <p>Annual Work Plans</p> <p>Annual Progress Reports</p> <p>Evaluation reports</p> <p>Government partners</p> <p>Development partners</p> <p>UNDP staff (Programme Implementation Support Unit)</p>	<p>Interviews with government partners and development partners</p> <p>Desk review of secondary data</p>

SAMPLE QUESTIONS RELATING TO THE PROMOTION OF UN VALUES FROM A HUMAN DEVELOPMENT PERSPECTIVE

Evaluation Questions	Indicators	Data Sources	Data Collection Methods
Supporting policy dialogue on human development issues			
<p>To what extent did the initiative support the government in monitoring achievement of MDGs?</p> <p>What assistance has the initiative provided supported the government in promoting human development approach and monitoring MDGs?</p> <p>To what extent do the project objectives conform to agreed priorities in the UNDP country programme document (CPD) and UNDAF?</p>	<p>Level of contribution of the project to the achievement of MDGs</p> <p>Level of alignment of the project objectives with the CPD and UNDAF</p>	<p>Project documents</p> <p>Evaluation reports</p> <p>HDR reports</p> <p>MDG reports</p> <p>National Planning Commission</p> <p>Ministry of Finance</p>	<p>Interviews with government partners</p> <p>Desk review of secondary data</p>
Contribution to gender equality			
<p>To what extent was the UNDP initiative designed to appropriately incorporate in each outcome area contributions to attainment of gender equality?</p> <p>To what extent did UNDP support positive changes in terms of gender equality and were there any unintended effects?</p> <p>Provide example(s) of how the initiative contributes to gender equality.</p> <p>Can results of the programme be disaggregated by sex?</p>	<p>Level and quality of monitoring of gender related issues</p>	<p>Project documents</p> <p>Evaluation reports</p> <p>UNDP staff</p> <p>Government partners</p> <p>Beneficiaries</p>	<p>Interviews with UNDP staff and government partners</p> <p>Observations from field visits</p> <p>Desk review of secondary data</p>
Addressing equity issues (social inclusion)			
<p>How did the UNDP initiative take into account the plight and needs of vulnerable and disadvantaged to promote social equity, for example, women, youth, disabled persons?</p> <p>To what extent have indigenous peoples, women, conflict- displaced peoples, and other stakeholders been involved in project design?</p> <p>Provide example(s) of how the initiative takes into account the needs of vulnerable and dis- advantaged groups, for example, women, youth, disabled persons</p> <p>How has UNDP programmed social inclusion into the initiative?</p>	<p>Level and quality of monitoring of social inclusion related issues</p>	<p>Project documents</p> <p>Evaluation reports</p> <p>UNDP staff</p> <p>Government partners</p> <p>Beneficiaries</p>	<p>Interviews with UNDP staff and government partners</p> <p>Observations from field visits</p> <p>Desk review of secondary data</p>

Annex 3: Itinerary of the Evaluation Missions

AGENDA OF THE EVALUATION MISSION TO MADAGASCAR 10 - 16 NOVEMBER 2019

Date	Activity	Venue
<i>Sunday 10 November</i>		
14:55	Arrival from Vienna	Antananarivo Airport
<i>Monday 11 November</i>		
8:45 – 12:00	Meeting with the UPOPs project team	UPOPs Office Mahamasina
14:00-15:00	Courtesy visit at MOH	MOH Ambohidahy
15:00-16:30	Meeting with the UPOPs project team	UPOPs Office Mahamasina
<i>Tuesday 12 November</i>		
9:30 – 11.30	Meeting with Facility Management, Project Focal Person, Visit treatment site	CHU-MET Tsaralalàna
14:00 -15:00	Meeting with SENV MOH	SENV Office Tsaralalàna
<i>Wednesday 13 November</i>		
9:30- 12:00	Meeting with Facility Management, Project Focal Person, Visit treatment site	CHU-JRA Ampefiloha
14:00- 16:00	Meeting with Facility Management, Project Focal Person, Visit treatment site	CHU-JRB Befelatanana
<i>Thursday 14 November</i>		
9:00-9:30	Courtesy visit UNDP Office	UNDP CO Andraharo
9:30-11:00	Travel Antananarivo-Manjakandriana	
11:00-11:30	Visit to Head of Manjakandriana Health District	SDSP Manjakandriana office
12:00-14:00	Meeting with Facility Management, Project Focal Person, Visit treatment site	CHRD Manjakandriana
14:00 – 16:00	Return to Antananarivo	
<i>Friday 15 November</i>		
8.30-13.30	Meeting with national TWG and M&E committee of the project, Debriefing about findings of the evaluation mission	Motel Anosy, Antananarivo
<i>Saturday 16 November</i>		
16:25	Departure for Zambia	Antananarivo Airport

AGENDA OF THE EVALUATION MISSION TO ZAMBIA
18th – 22nd November 2019

Date	Activity	Venue
<i>Sunday 17 November</i>		
01:20	Arrival in Lusaka	Kenneth Kaunda International Airport
<i>Monday 18 November</i>		
9:00 – 10:30	Meeting with PMU	UNDP CO, Alick Nkhata Road,
10:30 – 11:30	Meeting with ARR Energy and Environment UNDP	UNDP CO, Alick Nkhata Road
12:00 – 13:00	Meeting with Waste Master	UNDP CO, Alick Nkhata Road,
13:30 – 15:00	Meeting with Director Health Promotion, Environmental and social determinants (HPESD)	Ndeke House Lusaka
15:30 – 16:30	Meeting with Zambia Environmental Management Agency	Longacres Lusaka
<i>Tuesday 19 November</i>		
09:00 – 12:00	Inspection of treatment facility, meeting with Focal Point	University Teaching Hospital
12:00 – 14:00	Meeting with EHTs	Chilenje Level 1 Hospital
14:00 – 16:30	Travel to Kabwe	
<i>Wednesday 20 November</i>		
09:00 – 10:30	Inspection of treatment facility, meeting with Focal Point	Kabwe General Hospital
10:30 – 11:30	Meeting with Provincial EHO and PHD Central Province	Provincial Environmental Health Office
11:30 – 14:00	Travel to Ndola	
14:30 – 16:00	Inspection of treatment facility, meeting with Focal Point	Ndola Teaching Hospital
16:00 – 16:30	Meeting with PHD Copperbelt Province	On-site of the Ndola Teaching Hospital
<i>Thursday 21 November</i>		
7.00 – 9:00	Travel to Kapiri	
9:00 – 10:30	Meeting with EHTs	Kapiri Mposhi district hospital
10:30 – 13:30	Travel to Lusaka	
14:00 – 15:30	Meeting with EHTs	Matero Level 1 Hospital
15:30 – 17:00	Consultant consolidation of information	Hotel
<i>Friday 22 November</i>		
9.00 – 11.00	Exit Meeting	UNDP CO, Alick Nkhata Road
15:45	Departure from Lusaka	Kenneth Kaunda Airport

**AGENDA OF THE EVALUATION MISSION TO GHANA
2 - 7 DECEMBER 2019**

Date/Time	Activity	Venue
<i>Monday 2 December</i>		
11.20	Arrival from Vienna	Accra airport
13:30 – 14:30	Meeting with Ghana Health Service and PMU	Dodoo Lane, Accra PMU office, Liberia Road
14:30 – 15:30	Meeting UNDP Staff	UNDP CO
15:30 – 16:15	Meeting with Accra School of Hygiene	Korle Bu, Accra
18:00 – 18:30	Skype call meeting with Ministry of Health's Quality Manager	Consultant's hotel
<i>Tuesday 3 December</i>		
7:00 – 10:00	Travel to Cape Coast	
10:00 – 12:30	Meeting with Facility Management, Project Focal Person, Visit treatment site, Debriefing meeting	Cape Coast Teaching Hospital, Cape Coast
13:00 – 14:00	Meeting with Environmental Protection Agency Inspection of the storage of collected mercury waste	Environmental Protection Office, Cape Coast
14:00 – 18:00	Travel to Koforidua	Overnight stay in Koforidua
<i>Wednesday 4 December</i>		
08:30 – 10:30	Meeting with Facility Management, Project Focal Person, Visit treatment site, Debriefing meeting	Eastern Regional Hospital, Koforidua
10:35 – 11:00	Meeting with Environmental Protection Agency Inspection of the storage of collected mercury waste	Koforidua
11:00 – 13:30	Travel to Accra	Accra
13:30 – 14:15	Meeting with Ministry of Health	Starlets 91 Road
14:15 – 15:15	Meeting with Environmental Protection Agency, Accra	Victoriaborg, Starlets 91 Rd
15:15 – 16:00	Meeting with Zoompak Ghana Limited, tour their facility	Teshie SSNIT Greda Estates
16:00 – 17:00	Korle-Bu Teaching Hospital	Korle-Bu
<i>Thursday 5 December</i>		
8:30-10:00	Meeting with World Health Organisation	7 Ameda St, Accra
10:00 – 11:00	Meeting with Ministry of Environment, Science Technology and Innovation,	
11:00 – 12:00	Meeting with Ministry of Finance, Desk Office for UN projects	
12:45 – 16:00	Travel to Keta	Travel to Keta
16:00 – 17:00	Meeting with Project Focal Person, Visit treatment site	Tigbe Health Centre,

Date/Time	Activity	Venue
17:00 – 18:00	Meeting with Meeting with Facility Management, Project Focal Person, Keta Municipal Health Director	Keta Municipal Hospital
<i>Friday 6 December</i>		
07:00 – 10:30	Travel to Accra	
11:00 – 12:00	Debriefing Meeting with UNDP and PMU	UNDP CO
14:30 – 15:00	Meeting with Formal Keta Municipal Health Director (skype)	Skype call
<i>Saturday 7 December</i>		
12:20	Departure for Tanzania	Accra Airport

AGENDA OF THE EVALUATION MISSION TO TANZANIA
8 - 13 DECEMBER 2019

Date/Time	Activity	Venue
<i>Sunday 8 December</i>		
03:40	Arrival from Ghana	Dar es Salaam airport
<i>Monday 9 December</i>		
	Meeting with the PMU	
<i>Tuesday 10 December</i>		
9:00 – 10:30	Meeting with Facility Management, Project Focal Person, Visit the treatment site and sample of wards	Sinza Hospital for Women and Children
11:00 – 12:00	Meeting with Facility Management, Project Focal Person, Visit the treatment site and sample of wards	Buguruni Anglican Health Centre (BAHC)
13:00 – 14:00	Meeting with Facility Management, Project Focal Person, Visit the treatment site and sample of wards, inspection of storage of the mercury- containing equipment	Mwananyamala Hospital (MH)
<i>Wednesday 11 December</i>		
	Courtesy visit of UNDP	Rescheduled to Friday
9:30 – 10:30	Meeting with Facility Management, Project Focal Person, Visit the treatment site and sample of wards	Mbagala Ranji Tatu Hospital (MRTH)
11:30 – 13:00	Meeting with Facility Management, Project Focal Person, Visit the treatment site and sample of wards	<u>Muhimbili National Hospital (MNH)</u>
<i>Thursday 12 December</i>		
9:00-10:15	Travel to Dodoma	
12:00 – 14:00	Meeting with Ministry of Health, Direction of Capacity	Ministry of Health
14:00 – 16:00	Meeting with Ministry of Environment	
18:00 – 19:15		Return to Dar es Salaam
<i>Friday 13 December</i>		
10:00 – 12:00	Debriefing Meeting with UNDP and PMU	
17:55	Departure for Vienna	Dar es Salaam airport

Annex 4: List of People Interviewed

To be inserted

Annex 5: List of Documents Consulted

1. Reducing UPOPs and Mercury Releases from the Health Sector in Africa, Request for Concept Entry and PDF Block B Approval, UNDP/GEF 2013
2. Reducing UPOPs and Mercury Releases from the Health Sector in Africa, Project Document, UNDP/GEF 2014
3. Mid-Term Review Report, Reducing UPOPs and Mercury Releases from the Health Sector in Africa UNDP/GEF 2019
4. Minutes of the Project Inception Workshop, UNDP, 2016
5. Minutes of the Regional Project Board Meetings, UNDP, 2016-2019
6. Project Implementation Reviews, UNDP Regional PIU, 2017-2019
7. Project Progress Reports, UNDP Regional PIU, 2016-2019
8. Project Combined Delivery Reports, UNDP IRH, 2016-2019
9. WHO Progress Reports, WHO, 2017 and 2018
10. Micro-Grant Agreement Reports, HCWH, 2017 and 2018
11. Regional Procurement Bills of Quantities, UNDP Regional PIU, 2018 and 2019
12. Chief Technical Expert's Training Report, 2016
13. Chief Technical Expert's Interim Final & Progress Report, 2018
14. Social and Environmental Injustice Analysis in Healthcare Waste Management in Ghana, including Gender Dimensions by Ms. Sabrina Regmi, Independent Consultant, 2018
15. Health Care Waste Management Policy for Ghana, Ghana Health Service, 2018
16. National Guidelines for Health Care Waste Management in Ghana, Ministry of Health, 2018
17. Project Exit Strategy, Draft Version, Ghana PIU, 2019
18. Minutes of the Steering Committee, Ghana National PIU, 2016-2019
19. Politique Nationale de Gestion des Déchets des Etablissements de Soins et de Sécurité des Injections, Ministry of Public Health, Madagascar, 2017
20. Guide Technique de Gestion des Déchets Médicaux, Service de Santé et Environnement, Madagascar (2017)
21. Livret de Gestion des déchets médicaux, Environment and Health Service, Madagascar (2017)
22. Minutes of the National Technical Working Group Meetings, Madagascar National PIU, 2016-2019
23. Study on Mapping of Recycling Industries, Solofonirina Raberahona, Madagascar National Technical Consultant, 2017
24. Market Study of the Recycling of Valuable Products from the Treatment of Health Care Waste in Model Establishments, Solofonirina Raberahona, Madagascar National Technical Consultant, 2017

25. Introduction and Training of Trainers in Global Green Healthy Hospitals in Madagascar, National PIU, 2017
26. National Policy Guidelines for Health Care Waste Management in Tanzania, Ministry of Health, Community Development, Gender, Elderly and Children, 2017
27. National Standards and Procedures for Health Care Waste Management, Ministry of Health, Community Development, Gender, Elderly and Children, 2017
28. National Strategic Plan for Healthcare Waste Management (2018 – 2022), Ministry of Health, Community Development, Gender, Elderly and Children, Tanzania, 2018
29. Monitoring the Placenta Digester at Mwananyamala Referral Hospital; Dar Es Salaam, Christopher Kellner, National Consultant, Tanzania, 2019
30. Minutes of the National Local Project Advisory Committee Meeting, Tanzania, 2019
31. Model HCFs in Ghana, Madagascar, Tanzania and Zambia, National PIUs, 2018
32. National Health--Care Waste Management Plan 2015 – 2019, Ministry of Health, Zambia, 2015
33. Technical Guidelines on the Sound Management of Health Care Waste, Environmental Council of Zambia, 2019
34. Curriculum for Certificate In Health-Care Waste Management, Ministry of Health, Zambia, 2019
35. Scaling up the Reduction of Emissions (GHGs & UPOPs) from the Health Sector in Lusaka Province, Draft Project Proposal, Ministry of Health Zambia, 2019
36. I-Rat Forms for Model HCFs in Ghana, Madagascar, Tanzania and Zambia, National PIUs, 2018
37. Waste Tracker Forms for Model HCFs in Ghana, Madagascar, Tanzania and Zambia, National PIUs, 2019
38. Fact Sheets and Case Studies from Ghana, Madagascar, Tanzania and Zambia, National PIUs, 2019,
39. Report on the Tasks Implemented by Resource Person on GEF/UNDP Project, Akbar Sultanov, 2019
40. 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 Report, UNDP, 2015
41. COVID-19 Rapid Assessment on Healthcare Waste Management: Final Report, Engineers Without Borders, 2020
42. Project Exit Strategies: Ghana, Madagascar, Tanzania, Zambia, 2020
43. Technical Lessons Learned Report from UNDP GEF Project “Reducing UPOPs and Mercury Releases from the Health Sector in Africa”, UNDP, 2020
44. Project Replication and Scale-up: Guidance and Examples, UNDP, 2020
45. Sustainability Check on Facility Level: Ghana, Madagascar, Tanzania, Zambia, UNDP, 2020

46. Promoting a Coordinated Approach to the Sustainable Management of Healthcare Waste during and beyond the COVID-19 Pandemic, GEF-7 request for MSP, UNDP, 2020
47. UNDP Evaluation Guidelines, Independent Evaluation Office of UNDP, 2019
48. Guidelines for GEF Agencies in Conducting Terminal Evaluation for Full-sized Projects, GEF, 2017
49. Project-level Evaluation: UNDP Evaluation Guidance for GEF Financed Projects, UNDP, 2012
50. The GEF Monitoring and Evaluation Policy, GEF Evaluation Office, 2010
51. Outcome-Level Evaluations, A Companion Guide, UNDP, 2011
52. Glossary of Key Terms in Evaluation and Results Based Management, OECD, 2010
53. Ethical Guidelines for Evaluations, UNEG, 2008
54. Integrating Human Rights and Gender Equality in Evaluations, UNEG, 2014

Annex 6: Project Stakeholder Map from the Project Document

Stakeholder Name	Stakeholder Roles and Responsibilities
Ministry of Health (MoH) Health and Environment Unit	Organize a safe and environmentally sound management system for the management of healthcare waste generated by all government, mission, private and health facilities in the country and facilitate and support various measures directed towards managing environmental impacts, from the health sector
Ministry of Environment (MoE)	Provide policies pertaining to environmental protection e.g. such as National Environmental Policies, Environmental Management Acts and their Regulations, programmes and projects
Environmental Protection Agency (EPA)	Draft environmental regulations/guidelines and support enforcement and compliance pertaining to environmental protection and pollution control Review and monitor environmental impact assessments (EIAs), facilitate public participation in environmental decision-making and co-ordinate environmental management issues
Ministry of Local Government (MoLG) and Municipalities/City Councils	Regulate and supervise waste management in municipalities/districts/councils In towns, provide containers for waste collection, the transportation of the waste from the point of collection to the disposal site, proper disposal of the waste as well as management of the landfill/disposal
Pharmacy Board (Chief Pharmacist & National Centralized Procurement Division)	Propose changes to the health specific procurement catalogue and advise the pharmacy board on changes and additions to the current offer of devices/products and supplies for public healthcare facilities (e.g. relevant for the introduction of Hg and PVC-free alternatives)
Healthcare Facilities (HCFs)	Implement measures for health protection and safety of the staff, patients and visitors as well as procedures for the safe disposal of health-care waste Development of the HCWM plan in the hospital and for the day-to-day operation and monitoring of the waste management system at the
National Dental Association (NDA)	Support the development of guidelines for best practices pertaining to Hg/dental amalgam management, disposal practices and dissemination of information among NDA members Encourage a ban on the mixing of dental amalgam at dental offices and promote a shift towards pre-mixed capsules or preferably alternative restorative materials.
Medical Universities, Colleges and Medical/Nursing Schools	Offer education and training in HCWM at national and facility levels
Private Sector	Participate through Public Private Partnerships in the collection and centralized treatment of HCW
Development partners in the health sector	Support country initiatives through technical expertise and financing of development assistance and in the area of HCWM
Non-governmental Organizations (NGOs)	Supplement government efforts in curbing environmental impacts from hazardous waste practices through targeted interventions at national level Create awareness on health impact arising from HCW and hazardous substances

Annex 7: Project Results Framework (at the Project Inception)

This project will contribute to achieving the following Country Programme Outcome as defined in CPAP or CPD:

- **Ghana (same as 2012 – 2016 UNDAF outcomes):** Outcome 5: An additional 2.5% of the population have sustainable use of improved drinking water and sanitation services and practice the three key hygiene behaviours by 2016. Outcome 11: Ministries, Department Agencies, (MDAs), Local Governments and CSOs have effectively developed, funded, coordinated and implemented national and sectoral policies, plans and programmes aimed at reducing poverty and inequalities, and promote inclusive socio-economic growth by 2016.
- **Madagascar Country Programme (2008 – 2011):** The environment will be protected within and around priority conservation zones
- **Tanzania - Common Country Programme Document (2011 – 2015):** National and local levels have enhanced capacity to coordinate, enforce and monitor environment and natural resources
- **Zambia UNDP Country Programme Outcome (2011 – 2015):** 1.1.1 Government and partner institutions have technical skills upgraded to revise and implement policies according to the latest guidelines

Applicable GEF Strategic Objective and Program: GEF-5 Chemicals Focal Area:

Objective 1: Phase-out POPs and Reduce POPs Releases

Objective 3: Pilot Sound Chemicals Management and Mercury Reduction

Outcome 3.1: Country Capacity Built to Effectively Manage Mercury in Priority Sectors

Applicable GEF Outcome Indicators:

Indicator 1.3: Amount of un-intentionally produced POPs releases avoided or reduced from industrial and non-industrial sectors; measured in grams TEQ against baseline as recorded through the POPs tracking tool

Indicator 1.5.2: Progress in developing and implementing a legislative and regulatory framework for environmentally sound management of POPs, and for the sound management of chemicals in general, as recorded through the POPs tracking tool

Indicator 3.1: Countries implement pilot Mercury management and reduction activities

	Indicator	Baseline	Targets End of Project	Source of verification	Risks and Assumptions
Project Objective	Non-incineration and Mercury-free technologies introduced in African countries Affordable non-incineration technologies available in the African region	In 2012, there were approximately 115 non-incineration HCW technologies installed throughout Africa In the project countries, 1 nonworking technology was present in Tanzania, 1 working hydroclave in Ghana and none in Madagascar, the status could not be assessed in Zambia (April 2014) Affordable non-incineration technologies are not available to African HCFs	Non-incineration technologies and Mercury-free medical devices introduced at 4 central treatment facilities, 22 hospitals and 24 health posts	Photos of HCWM supplies and installed treatment technologies available from all project HCFs	Lack of effective maintenance mechanism could decrease the achievement of the project objective and the demonstration purpose. Existing manufacturers with limited distribution networks and experience in the Africa market may not be willing to reduce prices sufficiently New manufacturers may not be able to scale up quickly to meet the demand
	UPOPs releases from the health sector reduced or avoided	UPOPs baseline: <u>Ghana</u> : 19.8 g-TEQ/yr (preselected hospitals) <u>Madagascar</u> : 4.0 g-TEQ/yr (preselected hospitals) <u>Tanzania</u> : 1.7 g-TEQ/yr (preselected hospitals) <u>Zambia</u> : 6.3 g-TEQ/yr (preselected hospitals)	Amount of UPOPs releases from HCW incinerators reduced by 31.8 (g-TEQ/yr)	The I-RATs that will be conducted for each of the project's HCFs before project interventions will take place will provide insight in the amount of UPOPs produced and Mercury released on a yearly basis	Assumption: Ministries of Health and model healthcare facilities would be willing to start phasing out low technology incinerators and replacing them with non-incineration alternatives. Risk: Low
	Mercury releases from the health sector reduced	Mercury baseline: <u>Ghana</u> : 8.2 kg/yr (pre-selected hospitals) <u>Madagascar</u> : 2.8 kg/yr (preselected hospitals) <u>Tanzania</u> : 6.3 kg/yr (pre-selected hospitals) <u>Zambia</u> : 8.0 kg/yr (pre-selected hospitals)	Amount of mercury releases from the health sector reduced by 25.3 (Kg/yr)	Guidance on “ <i>Estimating Baseline Dioxin Releases for the UNDP Global Healthcare Waste Project</i> ” will be used Guidance on “ <i>Measurements and Documentation</i> ” as developed under the Global Medical Waste Project will be used to provide for a before and after snapshot	Assumption: Ministries of Trade would be willing to introduce import restriction on mercury containing medical devices. Risk: Low Assumption: Ministries of Health and model healthcare facilities would be willing to start phasing out Hg-containing thermometers and replacing them with Mercury-free alternatives. Risk: Low
	Country capacity built to effectively phase out and reduce releases of POPs	The regulatory and policy framework in the four project countries do not cover all medical waste management challenges, which the project countries are facing	Completed draft, revision or adoption of a national policy, plan, strategy, standard and/or guidelines in each country	Draft, revision or adoption of a national policy, plan, strategy, standard and/or guidelines available	

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					
	Indicator	Baseline	Targets End of Project	Source of verification	Risks and Assumptions
Outcome 1.1: Technical guidelines, evaluation criteria and allocation formula adopted	Mid-term evaluation criteria and formula for the allocation of technologies among countries available	Evaluation criteria and allocation of technologies among project countries not agreed upon	First Regional Conference organized Evaluation criteria and allocation of technologies among project countries agreed upon.	Signed meeting notes from the first regional conference	Assumption: Government representatives of the project countries reach an agreement on the evaluation criteria and allocation of technologies. Risk: Low
Outcome 1.2: 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	Some knowledge on mercury and UPOPs releases from the health sector built during the PPG phase	16 national experts trained in non-incineration HCWM systems, policies, waste assessments, UNDP GEF and WHO tools, national planning, BAT/BEP guidelines, mercury phaseout, international standards, and other technical guidelines. Master trainers trained in content, effective teaching methods, evaluation tools, and training of trainers programs	Certificates of training completion and attendance sheets of training sessions	Assumption: National experts trained by the project will remain supporting the project throughout its entire duration. Risk: Low Assumption: Sufficient national experts interested and available at national level to be trained in HCWM Risk: Low

COMPONENT 2: HEALTHCARE WASTE NATIONAL PLANS, IMPLEMENTATION STRATEGIES, AND NATIONAL POLICIES IN EACH RECIPIENT COUNTRY					
	Indicator	Baseline	Targets End of Project	Source of verification	Risks and Assumptions
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	Ghana: ANNEX I Madagascar: ANNEX II Tanzania: ANNEX III Zambia: ANNEX IV	In each of the project countries the baseline pertaining to the HCWM policy and regulatory framework is different and is summarized in detail in respective Annexes I, II, III, and IV to the ProDoc	Ghana: ANNEX I Madagascar: ANNEX II Tanzania: ANNEX III Zambia: ANNEX IV	Draft of national HCWM strategies, policies, plans as well as drafts for HCWM related standards and guidelines available	Assumption: The project has adequately trained experts that are able to develop national HCWM strategies, policies, plans as well as drafts for HCWM related standards and guidelines Risk: Low
Outcome 2.2: National plan with implementation arrangements adopted	Number of National Action Plans for project implementation available	No National Action Plans for project implementation available Pre-selection of HCFs has already taken place (see Annex I, II, III, and IV respectively)	1 National Action Plans 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)	Action Plans available MOUs with selected HCFs and central/ cluster facilities Results of I-RAT assessments, staff preferences on non- Hg devices; facility level HCWM policies and plans	Assumption: National Government counterparts and health care facilities reach an agreement on which ones will be supported in the project's 1 st half and which ones in the 2nd half. Risk: Low Assumption: HCFs are willing to sign MOUs and the MOU signature process doesn't slow down the launch of HCF HCWM activities Risk: Low Assumption: All project HCFs are willing to participate in baseline assessments and are open to sharing information related to their current HCWM practices Risk: Low

COMPONENT 3A: MAKE AVAILABLE IN THE REGION AFFORDABLE NON-INCINERATION HCWM SYSTEMS AND MERCURY-FREE DEVICES THAT CONFORM TO BAT AND INTERNATIONAL STANDARDS					
	Indicator	Baseline	Targets End of Project	Source of verification	Risks and Assumptions
Outcome 3.a.1: Favourable market conditions created for the growth in the African region of affordable technologies that meet BAT guidelines and international standards	Number of HCWM systems and Hg free devices procured Number of HCWM systems installed and Hg-free devices distributed	In the project countries, 1 nonworking technology was present in Tanzania, 1 hydroclave was operational in Ghana and none in Madagascar - the status could not be assessed in Zambia (April 2014)	HCWM systems and mercury-free devices for at least 12 health posts, 8 hospitals and 4 central or cluster facilities procured 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	Photos of procured mercury-free devices and non-incineration technologies Photos of mercury-free devices in use and non-incineration technologies installed	Assumption: Procurement of non-incineration technologies through UNDP-PSO Health doesn't run into major challenges. Risk: medium Assumption: A sufficiently large offer of mercury-free devices is available at national level to allow procurement processes to run smoothly. Risk: Low
COMPONENT 3B: DEMONSTRATE HCWM SYSTEMS, RECYCLING, MERCURY WASTE MANAGEMENT AND MERCURY REDUCTION AT THE MODEL FACILITIES, AND ESTABLISH NATIONAL TRAINING INFRASTRUCTURES					
Outcome 3.b.1: HCWM systems, recycling, mercury waste management and mercury reduction at the model facilities demonstrated and national training infrastructures established (<i>National Component</i>)	Number of project HCFs that have introduced BEP Number of HCF staff trained in BEP & BAT Number of project HCFs that have operational BAT Number of project HCFs that have recycling programmes in place No. of project countries that have storage sites for phase-out Hg-containing devices Number of mercury-free project HCFs Number of institutions that offer HCWM training/certificate courses	No BAT/BEP in place at most of the model HCFs No recycling programmes in place at any of the HCFs No storage sites for mercury or medical devices containing mercury available in any of the project countries Some project HCFs already use some mercury-free medical devices, but none of the HCFs is mercury-free In most project countries, training programme for waste management exist, but training programmes for HCWM need to be established/improved (see Annex I, II, III, and IV respectively)	HCF staff trained in BEP & BAT BAT/BEP implemented at all (24) the model facilities Recycling programs started in each of the model facilities Safe storage sites for mercury- containing medical devices established for each of the project countries Mercury-free devices used in each of the model facilities At least one national HCWM training programme established in each of the project countries	Certificates of training completion and attendance sheets of training sessions Monitoring and Progress reports HCF visit reports Photos of recycling practices Photos of installed and operational technologies Photos of mercury-free devices in use	Assumption: Treatment hubs and satellites located in the zone supported by the project are willing to sign cost-sharing agreements for the treatment of their infectious waste Risk: Medium Assumption: As co-financing, Facilities allocate adequate storage space for interim Hg waste storage, appoint waste management committee members, and allocate staff time to participate in training on BEP/BAT, recycling and the use of Hg-free alternatives and non-incineration technologies. Risk: Low Assumption: The Ministry of Health and national medical training institutions are open and willing to revise the national training modules. Risk: Medium

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					
	Indicator	Baseline	Targets End of Project	Source of verification	Risks and Assumptions
Outcome 4.a.1: Capacities of project countries to absorb additional technologies evaluated Outcome 4.a.2: Additional technologies distributed depending on evaluated capacities for absorption	Evaluation report (including recommendations for each project country and HCF) available Number of HCWM systems and Hg free devices procured	Not applicable	Evaluation conducted of all the 4 project countries and all the HCFs, which have received project support Additional HCWM systems and mercury-free devices procured and distributed, based on the evaluation results and allocation formula	Evaluation report	Assumption: One or more of the project countries are sufficiently advanced by project midterm, that they are ready to receive additional support, technologies and devices Risk: Low
COMPONENT 4B: EXPAND HCWM SYSTEMS AND THE PHASE-OUT OF MERCURY IN THE RECIPIENT COUNTRIES AND DISSIMINATE RESULTS IN THE AFRICAN REGION					
Outcome 4.b.1: HCWM systems expanded to other facilities in the country	Number of HCFs supported in addition to the initial set of HCFs	Not applicable	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	Monitoring and Progress reports HCF visit reports	Assumption: Sufficient HCFs are eager to participate in the project’s second phase Risk: Low
Outcome 4.b.2: Country capacity to manage mercury and to phase-in mercury-free devices improved	Number of mercury-free project HCFs in addition to the initial set				
Outcome 4.b.3: National training expanded	Number of people trained in addition to the initial set of trained HCF personnel		HCF staff of the additional HCFs trained in BEP/BAT	Certificates of training completion and attendance sheets of training sessions	
Outcome 4.b.4: Information disseminated at environment and health conferences in the region	List of environment and health conferences in the region				Assumption: Sufficient travel budget is available to allow for participation in such meetings by the project international or National consultants/experts. Risk: Medium

COMPONENT 5: MONITORING, ADAPTIVE FEEDBACK, OUTREACH AND EVALUATION					
	Indicator	Baseline	Targets End of Project	Source of verification	Risks and Assumptions
Outcome 5.1 Project's results sustained and replicated	Number of high-quality monitoring and evaluation documents prepared during project implementation	Not applicable	<p>1 annual APR/PIR submitted to UNDP each year</p> <p>1 Mid-term project review</p> <p>M&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>4 QORs available for each project year</p> <p>APR/PIR available for each project year</p> <p>Mid-Term Evaluation Report available</p> <p>Lessons-learned from the project easily accessible and searchable on-line</p> <p>Project related documentation, photos and videos posted on the project's website and Facebook page</p> <p>Reports submitted to UNDP</p>	<p>Assumptions: It is assumed that the regional and national project technical coordinators will prepare all the reports that are required by the GEF and UNDP.</p> <p>Risk: Low</p>

Annex 8: Performance Rating of GEF Projects

The main dimensions of project performance on which ratings are provided in terminal evaluation are outcomes, sustainability, quality of monitoring and evaluation, quality of implementation, and quality of execution.

Outcome ratings

The overall ratings on the outcomes of the project will be based on performance of the criteria of relevance, effectiveness and efficiency. A six-point rating scale is used to assess overall outcomes.

Highly Satisfactory (HS)	Level of outcomes achieved clearly exceeds expectations and/or there were no short comings
Satisfactory (S)	Level of outcomes achieved was as expected and/or there were no or minor short comings
Moderately Satisfactory (MS)	Level of outcomes achieved more or less as expected and/or there were moderate short comings
Moderately Unsatisfactory (MU)	Level of outcomes achieved somewhat lower than expected and/or there were significant shortcomings
Unsatisfactory (U)	Level of outcomes achieved substantially lower than expected and/or there were major short comings
Highly Unsatisfactory (U)	Only a negligible level of outcomes achieved and/or there were severe short comings
Unable to Assess (UA)	The available information does not allow an assessment of the level of outcome achievements

Sustainability Ratings

The sustainability will be assessed taking into account the risks related to financial, sociopolitical, institutional, and environmental sustainability of project outcomes. The evaluator may also take other risks into account that may affect sustainability. The overall sustainability will be assessed using a four-point scale.

Likely (L)	There is little or no risks to sustainability
Moderately Likely (ML)	There are moderate risks to sustainability
Moderately Unlikely (MU)	There are significant risks to sustainability
Unlikely (U)	There are severe risks to sustainability
Unable to Assess (UA)	Unable to assess the expected incidence and magnitude of risks to sustainability

Monitoring and Evaluation Ratings

Quality of project M&E are assessed in terms of design and implementation on a six point scale:

Highly Satisfactory (HS)	There were no short comings and quality of M&E design / implementation exceeded expectations
Satisfactory (S)	There were no or minor short comings and quality of M&E design / implementation meets expectations
Moderately Satisfactory (MS)	There were some short comings and quality of M&E design/implementation more or less meets expectations
Moderately Unsatisfactory (MU)	There were significant shortcomings and quality of M&E design / implementation somewhat lower than expected
Unsatisfactory (U)	There were major short comings and quality of M&E design/implementation substantially lower than expected
Highly Unsatisfactory (U)	There were severe short comings in M&E design/ implementation
Unable to Assess (UA)	The available information does not allow an assessment of the quality of M&E design / implementation

Implementation and Execution Rating

Quality of implementation and of execution will be rated separately. Quality of implementation pertains to the role and responsibilities discharged by the GEF Agencies that have direct access to GEF resources. Quality of Execution pertains to the roles and responsibilities discharged by the country or regional counterparts that received GEF funds from the GEF Agencies and executed the funded activities on ground. The performance will be rated on a six-point scale.

Highly Satisfactory (HS)	There were no short comings and quality of implementation / execution exceeded expectations
Satisfactory (S)	There were no or minor short comings and quality of implementation / execution meets expectations
Moderately Satisfactory (MS)	There were some short comings and quality of implementation / execution more or less meets expectations
Moderately Unsatisfactory (MU)	There were significant shortcomings and quality of implementation / execution somewhat lower than expected
Unsatisfactory (U)	There were major short comings and quality of implementation / execution substantially lower than expected
Highly Unsatisfactory (U)	There were severe short comings in quality of implementation / execution
Unable to Assess (UA)	The available information does not allow an assessment of the quality of implementation / execution

Annex 9: Evaluation Report Outline

i. Opening page:

- Title of UNDP supported GEF financed project
- UNDP and GEF project ID#s.
- Evaluation time frame and date of evaluation report
- Region and countries included in the project
- GEF Operational Program/Strategic Program
- Implementing Partner and other project partners
- Evaluation team members
- Acknowledgements

ii. Executive Summary

- Project Summary Table
- Project Description (brief)
- Evaluation Rating Table
- Summary of conclusions, recommendations and lessons

iii. Acronyms and Abbreviations

1. Introduction

- Purpose of the evaluation
- Scope & Methodology
- Structure of the evaluation report

2. Project description and development context

- Project start and duration
- Problems that the project sought to address
- Immediate and development objectives of the project
- Baseline Indicators established
- Main stakeholders
- Expected Results

3. Findings

(In addition to a descriptive assessment, all criteria marked with (*) must be rated)

3.1 Project Design / Formulation

- Analysis of LFA/Results Framework (Project logic /strategy; Indicators)
- Assumptions and Risks
- Lessons from other relevant projects (e.g., same focal area) incorporated into project design
- Planned stakeholder participation
- Replication approach
- UNDP comparative advantage

- Linkages between project and other interventions within the sector
- Management arrangements

3.2 Project Implementation

- Adaptive management (changes to the project design and project outputs during implementation)
- Partnership arrangements (with relevant stakeholders involved in the country/region)
- Feedback from M&E activities used for adaptive management
- Project Finance:
- Monitoring and evaluation: design at entry and implementation (*)
- UNDP and Implementing Partner implementation / execution (*) coordination, and operational issues

3.3 Project Results

- Overall results (attainment of objectives) (*)
- Relevance (*)
- Effectiveness & Efficiency (*)
- Country ownership
- Mainstreaming
- Sustainability (*)
- Impact

4. Conclusions, Recommendations & Lessons

- Corrective actions for the design, implementation, monitoring and evaluation of the project
- Actions to follow up or reinforce initial benefits from the project
- Proposals for future directions underlining main objectives
- Best and worst practices in addressing issues relating to relevance, performance and success

5. Annexes

- ToR
- Itinerary
- List of persons interviewed
- Summary of field visits
- List of documents reviewed
- Evaluation Question Matrix
- Questionnaire used and summary of results
- Evaluation Consultant Agreement Form

Annex 10: Evaluation Consultant Agreement Forms

Evaluators:

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 imitations, findings and recommendations.
7. Should reflect sound accounting procedures and be prudent in using the resources of the evaluation.

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

Name of Consultant: DALIBOR KYSELA

Name of Consultancy Organization (where relevant): _____ N.A. _____

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

Signed at Vienna on 15.10.2019



Signature: _____

Annex 12: Evaluation Report Clearance Form

Evaluation Report Reviewed and Cleared by

UNDP Nature, Climate, Energy (NCE) Regional Technical Advisor
Name: Etienne Gonin, Programme Analyst, Montreal Protocol Unit / Chemicals & Waste - NCE, UNDP IRH

Signature: Etienne Gonin Date: 04-Dec-2020

Commissioning Unit
Name: Abusabeeb Elsadig, Regional Programme Coordination, RBM and QA Specialist, UNDP IRH

Signature: Abusabeeb Elsadig Date: 04-Dec-2020

Annex 13: Audit Trail – annexed as a separate file