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MANAGEMENT AND DISPOSAL OF PCBs IN RWANDA

TERMINAL EVALUATION REPORT

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Acronyms and Abbreviations

APR	Annual Progress Report
BAT/BEP	Best Available Techniques/ Best Environmental Practices
CEO	Chief Executive Officer
CDR	Combined Delivery Report
CSS	College of Social Sciences
CST	College of Science and Technology
ECD	Electron Capture Detector
EDPRS	Economic Development and Poverty Reduction Strategy
ESM	Environmentally Sound Management
EUCL	Energy Utility Corporation Limited
EWSA	Energy, Water and Sanitation Authority
GEF	Global Environmental Facility
GC-MS	Gas Chromatography-Mass Spectrometry
HWM	Hazardous Waste Management
MDGs	Millenium Development Goals
MEAs	Multilateral Environmental Agreements
MINIRENA	Ministry of Environment and Natural Resources
MTR	Mid-Term Review
NGOs	Non-governmental Organizations
NIP	National Implementation Plan
OVI	Objectively Verifiable Indicator
PIF	Project Identification Form
POPs	Persistent Organic Pollutants
PCBs	Polychlorinated Biphenyls
PIR	Project Implementation Review
PMU	Project Management Unit
PPG	Project Preparation Grant
RECO	Rwanda Electricity Company
REG	Rwanda Energy Group
REMA	Rwanda Environment Management Authority
RPPA	Rwanda Procurement Plan Authority
RSB	Rwanda Standards Board
RTA	Regional Technical Advisor
SAICM	Strategic Approach to International Chemicals Management
SC	Stockholm Convention
SDGs	Sustainable Development Goals
TE	Terminal Evaluation
TOR	Terms of Reference
UNCT	United Nations Country Team
UNDAP	United Nations Development Assistance Plan
UNDP	United Nations Development Programme
UR	University of Rwanda

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 Evaluation Consultant sincerely thanks all individuals for their valuable time they devoted to participation in interviews and discussions and for their candid views and opinions on the activities and achievements of this project during the course of the evaluation mission in Rwanda on 15 – 21 July 2018. Their valuable information and insights on the project enabled the Evaluation Consultant to better understand, assess and verify the project activities, project results and their sustainability.

In particular, the Evaluator thanks the Rwanda Environment Management Authority (REMA) for making available their resource persons during and after the evaluation field mission. The cooperation and assistance of REMA, in particular a well-organized itinerary and meeting schedules of the evaluation mission enabled the Evaluation Consultant to meet with a representative sample of project partners, participants and beneficiaries which contributed to the effectiveness of the evaluation mission and of related data collection.

The Evaluator would also like to extend his thanks to the UNDP Country Office in Kigali and the UNDP Istanbul Regional Hub for supplying the necessary documentation requested for this evaluation and for providing additional details and clarification on factual findings through skype conversations.

EXECUTIVE SUMMARY

Project Information Table

Project Title			
UNDP Project ID (PIMS #):	4274	PIF Approval Date:	29 September 2009
GEF Project ID (PMIS #):	4014	CEO Endorsement Date:	18 May 2011
ATLAS Business Unit, Award # Proj. ID:	RWA10 – 61958 (Project) – 79116 (Output)	Project Document (ProDoc) Signature Date (date project began):	18 January 2012
Country(ies):	Rwanda	Date project manager hired:	
Region:	Africa	Inception Workshop date:	23 April 2013
Focal Area:	Persistent Organic Pollutants	Midterm Review completion date:	N.A.
GEF Focal Area Strategic Objective:	GEF-4 POPs-SP1 (Capacity Building), POPs-SP2 (Investment)	Planned planned closing date:	31 December 2014
Trust Fund [indicate GEF TF, LDCF, SCCF, NPIF]:	GEF TF	If revised, proposed op. closing date:	31 December 2017
Executing Agency/Implementing Partner:	UNDP Rwanda Rwanda Environment Management Authority (REMA)		
Other execution partners:	-		
Project Financing	<i>at CEO endorsement (US\$)</i>	<i>At Terminal Evaluation (US\$)</i>	
GEF financing:	886,700	886,203.09	
Total co-financing	1,081,870	1,030,685.65	
PROJECT TOTAL COSTS	1,968,570	1,916,888.74	

Project description

The project supported Rwandan efforts in the management and disposal of PCBs in Rwanda with tools to achieve effective compliance with respect to its obligations against the Stockholm Convention and to substantively minimize the environmental and health risks of PCBs, both locally and globally.

The project has both national and global benefits in the mitigation or even elimination of risks associated with the release of PCBs into the environment and their subsequent global distribution with resultant ecological and human health impacts from exposure to this chemical.

The objective of the project is to reduce environmental and human health risks from PCB releases through the introduction of cost-effective environmentally sound management (ESM) to PCB oils, equipment and wastes held by electrical utilities in the country.

The project results framework is composed of four outcomes and nine outputs organized under the following project components:

- Complete PCB inventory through enhanced cooperation with the Government bodies and equipment holders and selection of options for PCB disposal;
- Legislative support to aid the operation of PCB management system;
- Awareness raising of stakeholders, public and PCB equipment holders;
- Safe temporary storage of PCB wastes and environmentally sound disposal of PCB oils;
- Project management

Summary of project results

The project has helped establish solid foundations for sound management of PCBs in Rwanda by contributing to removal of several barriers to effective implementation of the country's obligations under the Stockholm Convention that had been identified at the PIF/PPG stage.

The main achievement of the project is elimination of PCB waste oil by incineration in a local cement kiln, contrary to the originally planned export of waste oils for incineration abroad. This was enabled by a completed feasibility study of the PCB disposal by co-incineration in the locally available cement kiln at CIMERWA in line with the Best Available Techniques and Best Environmental Practices under the Stockholm and Basel Conventions. The contract for incineration concluded with the Rwanda's integrated cement manufacturer envisages incineration of up to 50 tonnes of PCB liquid waste with a provision to increase the amount if necessary at the cost of 150 US\$/ton. By the time of the terminal evaluation, 5.2 extra tons were incinerated hence incineration of 55.2 tonnes of PCB-oil was completed under the project.

Another important deliverable of the project at the time of TE has been the updated inventory of transformers that helped to substantially reduce the information gap on the physical extent of PCB contamination in the country as it provided new information in terms of quantities and location of PCB-contaminated transformers. The updated inventory not only contributed to better identification of the national stock of PCB-containing transformers in terms of levels of PCB concentration but also enabled to establish a plan for a gradual phase-out of in-service transformers and decommissioning of out-of-service transformers. The national technical capacity for elaboration of PCB management strategies and action plans has been enhanced as well.

The information on the level of PCB-contamination of transformers in the updated inventory was obtained through field testing by rapid analytical methods and could therefore be considered as more information than the 2005 survey. However, as the national capacity for

PCB laboratory analysis by more accurate analytical techniques (such as GC/ECD and GC/MS) has not been established. The absence of accredited national laboratory capacity for analysis of PCBs in PCB oils and environmental matrices at the project closure is a serious impediment to the management of PCBs in the country. The implementing partners have recently started discussion about a follow-up project on management of POPs. Accredited and operational national laboratory will be absolutely critical for any future PCB- and POPs-related activities such as inventory of small PCB holdings and assessment and remediation of PCB/POP contaminated sites.

The project provided the technical support and assistance in the development of a draft *Law on PCBs Disposal and Management in Rwanda* to cover all aspects of the PCB cycle, assign roles and responsibilities for PCB management, oversight, reporting and enforcement to public administration agencies, PCB users and other stakeholders. The proposed regulation was developed through a participatory process with the participation of all relevant stakeholders.

However, the project did not succeed in getting the PCB Law approved and enacted due to the length and complexity of the legislative process in Rwanda, particularly to the fact that the country was at the same time preparing a revision of the Organic Law on Environment. Consequently, the legislative process for the new law on PCB was put on hold and a change in the format of the new PCB law was considered to ensure consistency with the revised Organic Law on Environment and simplify the adoption process. The evaluation noted that the draft law had passed almost through all mandatory review stages and that the final approval of the draft Law has been beyond the control of the project implementing partners. At the time of the TE Report preparation, the framework Organic Law has been enacted while the specific PCB Law was in the Ministry of Environment out of control of the project implementing partners. The Organic Law has therefore been serving as a temporary legislative base for PCB management. Nevertheless, despite the contribution to the capacity building for understanding and formulation of PCB-related legislation, the full strengthening of the national regulatory capacity for sound management of PCBs was not achieved.

The project has also developed and cultivated keen awareness of the risks posed by PCBs, and of options to manage these risks among the relevant enforcement agencies, electricity utilities, educational institutions and public at large. Although it is difficult to measure the level of success in awareness-raising, there are indicators that better understanding of the risks of PCBs to human and environmental health increase political willingness and action of relevant authorities (including senior politicians) and PCB holders to safeguard and gradually phase-out PCBs.

It has to be noted that the project has also contributed to improvements in communication about the PCB issue in the country. Prior to the project, REMA voluntarily disclosed insufficiencies in PCB management to the stakeholder community including journalists. All stakeholders and environmental journalists in particular had been updated through targeted project activities about improvement in PCB management during the project. This has contributed to changed perception and reputation of REG/EUCL as the principal PCB holder. The collected data and established procedures under the project not only provided more information but also contributed to better understanding of duties and obligations of the key stakeholders, i.e. the electric utility company, national enforcement agency and general public and enabled all stakeholders to be much more forthcoming on the topic in comparison with the situation before the project. Moreover, the implementation of the PCB waste oil incineration has also enhanced the capacity of CIMERWA for safe handling PCBs and has enabled creation of an important partnership for management of PCBs in the future.

The national technical capacity for environmentally sound management of PCBs was strengthened and enhanced through elaboration and adoption of four technical guidelines on various aspects of the PCB waste management cycle. The guide on servicing, repairing and maintaining PCB-containing equipment provided instructions to REG/EUCL and other PCB holders for prevention of cross-contamination, spills and illegal discharges or disposals. It also contributed to building capacities of the PCB holders in decontaminating and cleaning up equipment and materials contaminated with PCBs. Through development of two other technical guidelines, the project provided required technical tools in support of the regulatory control and facilitated creation and establishment of infrastructure and operational capacity for environmentally safe safeguarding and management of PCB-contaminated oil and materials.

At the same time, however, the evaluation noted the reported slow uptake of the standardized procedures for safeguarding, handling, transport and storage of PCB-contaminated materials as well as lack of commitment to the procedures on proper packaging and transport of PCB-containing or -contaminated oil, equipment and materials to ensure public health and safety, and preservation of the environment. One of the reasons for the slow uptake of the standardized procedures could be inability of the national stakeholders to promptly allocate equipment for loading, unloading, handling and pre-treatment of PCB oil and PCB-contaminated equipment. This issue was finally addressed and resolved by the implementing partners when EUCL provided a forklift for loading of drums from the temporary storage to the trucks and CIMERWA provided another forklift for offloading drums from the trucks to the pre-incineration storage.

Achievement of the project objective

In summary, the evaluator concludes that the project achieved some degree of reduction of environmental and health effects of PCBs. This has been achieved through the inventory of PCB waste, awareness of the PCB holders, of relevant government entities and public at large on the risks posed by PCBs. The immediate effect of the project is elimination of practices where PCBs and PCB contaminated material had been randomly disposed of or exported for direct recycling and re-use and resulted in uncontrolled PCB releases into the environment from unprotected metal reclamation or from selling of PCB oils for local open uses.

The long-term effect of the project is anchored in enhancement of the national technical capacity for identification and testing of existing equipment contaminated with PCBs in accordance with the Stockholm Convention and laid foundations for environmentally sound management of yet to be identified PCB sources and for temporary storage of PCB-contaminated waste materials. Last but not least, the project was successful in testing and pioneering environmentally safe final disposal of PCB-contaminated oil through co-incineration PCB waste oil in local cement kilns in line with the recommendation of the Stockholm Convention.

However, the evaluation concludes that the project did not realize its full potential. Although the project implementation period was twice longer than originally approved, at the end of the project there is some unfinished matters related to PCB management. Sizeable amount of PCB wastes has not been fully separated from non-PCB waste materials and the national regulatory capacity for PCB management remains relatively weak due to the absence of the specific PCB legislation and will have to be further strengthened in line with provisions of the new environmental legislation related to management of hazardous waste and more targeted regulations expected in the new PCBs legislation.

Also, although the most critical part of the in-service transformers has been addressed and all identified highly contaminated transformers in possession of REG/EUCL have been drained

and replaced, there has not been such progress in PCB phase-out from the four in-service highly contaminated transformers owned by private owners and leakage of PCB-containing liquids from these in-service transformers constitutes a potential release route of PCBs into the environment. Moreover, assessment of the PCB-contaminated site was not conducted as planned. Last but not least, practical implementation of the standard procedures on PCB-contaminated waste materials custody and traceability during transport and temporary storage of PCB-contaminated waste materials has shown only a moderate progress.

Sustainability and progress to impact

The evaluation established moderate risks to sustainability of the project results. The financial risk is related to the high costs of PCB phase-out and disposal. Once the project is closed, the responsibility to assume the costs of PCB inventories, including costs of sampling, rapid analysis by screening tests and eventually GC analysis once a suitable national laboratory capacity is available. The phase-out of PCB equipment and replacement by non-PCB equipment, as well as transportation and costs of the final disposal will put a considerable pressure on the budget of PCB holders in the country. All transformers with high PCB contamination was stored in the interim storage of PCBs waste. Other equipment in service with low concentration of PCBs was cleaned and wait to be tested before their decommissioning. However, REG/EUCL as the principal PCB holder indicated that they did not have the financial resources to immediately phase-out all in-service contaminated equipment in the near future.

The institutional framework and governance risk is related to potential longer absence of the specific law on PCB disposal and management. Although Rwanda has achieved a lot in adoption of POPs legislation in general including PCBs and the four technical guidelines on various aspects of PCB management were developed and disseminated under the project, the specific legal framework is necessary to establish compulsory standards and norms for the management of PCBs as well as inspection, monitoring and assessment of the effect of PCBs on environmental media. It is obvious that the guidelines serve only as support to the PCB legal framework and in the continued absence of the latter the PCB holders and enforcement agencies would adopt the procedures and practices described in the guidelines only on a voluntary basis if at all.

The project did reach out to the principal PCB stakeholders and resulted in the training of staff and operational personnel to increase awareness and build-up capacity in the handling, maintenance and management of PCBs. International expertise was extended to Rwandan PCB holders through advice and elaboration of procedures on proper safeguarding measures and approaches for prevention and mitigation of spills. All these efforts contributed to the reduced likelihood of cross-contamination, spills and improper management of PCB-contaminated oil and equipment.

Furthermore, because of import/export/use/re-use/trade of PCBs and PCB containing wastes and equipment is now prohibited and PCBs have been classified as hazardous wastes, in particular the work undertaken by the project to support the inventory has been successful in reducing the uncontrolled disappearance and sale of PCB containing equipment.

The final disposal of PCB-contaminated oil through co-incineration at CIMERWA will have a chain of direct environmental impacts from local to global levels. Locally, the PCB disposal will reduce the risks of direct exposure to PCBs of local communities living around the old storage site and reduce the risk of further transport of PCBs in stormwater runoff and bioaccumulation of PCBs in a wider area with resultant ecological and human health impacts.

The co-incineration of PCB oil in the manufacturing of cement will also have a global environmental impact in reduction of CO₂ emissions and conservation of non-renewable fossil fuels. The use of PCB-contaminated oil as replacement of the traditional raw materials reduces the exploitation of natural resources and the environmental footprint of the cement manufacturing process.

The co-incineration of PCB waste that cannot be minimized or otherwise recycled will also have a two-tier economic impact both at local as well as national levels. Cost savings at the processing enterprise (CIMERWA) are related to recovery of the material and energy content of the PCB oil, conservation of non-renewable fossil fuels and natural resources, reduction of CO₂ emissions. Cost savings at the level of national economy relates to avoidance of the need to invest in purpose-built incinerators or in transport of the PCB oil for final disposal abroad.

There is a potential catalytic effect of the project on integration of cement kiln co-processing within an overall waste management strategy of Rwanda. Discussions with the CIMERWA management revealed a potential for the company to use a wider range of hazardous wastes suitable for the co-processing. As the company already has a feeder for accommodating plastic waste, it could possibly consider using also municipal waste in the process.

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

Evaluation Criteria	Evaluator's Rating
Monitoring and evaluation: design at entry	Satisfactory (S)
Monitoring and evaluation: plan implementation	Satisfactory (S)
Overall quality of monitoring and evaluation	Satisfactory (S)
Quality of UNDP Implementation	Moderately Satisfactory (MS)
Quality of Execution - Executing Agency	Moderately Satisfactory (MS)
Overall quality implementation / execution	Moderately Satisfactory (MS)
Relevance	Relevant (R)
Effectiveness	Satisfactory (S)
Outcome 1	Moderately Satisfactory (MS)
Outcome 2	Moderately Satisfactory (MS)
Outcome 3	Satisfactory (S)
Outcome 4	Satisfactory (S)
Efficiency	Moderately Unsatisfactory (MU)
Overall Project Objective Rating	Satisfactory (S)
Institutional framework and governance	Moderately Likely (ML)
Financial	Moderately Likely (ML)
Sociopolitical	Moderately Likely (ML)
Environmental	Moderately Likely (ML)
Overall likelihood of sustainability	Moderately Likely (ML)

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

Summary of conclusions and recommendations

This Terminal Evaluation makes two types of recommendations. Immediate recommendations are provided that the designated project partners should consider for urgent action to ensure the project results are fully consolidated with the key project stakeholders and responsibilities of the national project partners are defined and shared for continued management and disposal of PCB waste stockpiles. The immediate recommendations are suggested for implementation **by the end of 2018** using the existing institutional capacities and frameworks that had been created by the current project.

As the project partners recently commenced discussion about a next phase project on management of POPs that would contain one or more modules on PCBs, set of consecutive recommendations is provided for follow-up and uptake by the project partners **before and during preparation of the next project under the Stockholm Convention thematic area** in order to address capacity gaps and institutional insufficiencies remaining after the closure of the current project.

Immediate recommendations

Conclusion	Recommendation
1.Setting up of the national PCB inventory is a dynamic process as it needs to be regularly updated to reflect changes in stocks. It is imperative to continue the update of the PCB inventory and disposal activities at regular intervals in order to facilitate regular national reporting on PCBs according to the Stockholm Convention.	<i>1.REMA in cooperation with REG/EUCL should make update of the national PCB database to reflect the transformer drainage and decontamination operations conducted in 2017-2018.</i>
2.The updated information on PCB-contaminated transformers is not only a tool for exchange of information between the PCB holders but it is also an important indication of commitment of the Government to operative tracking, effective management and timely phase-out/replacement of PCB-contaminated transformers. The database of PCB-contaminated should be made accessible to a wider audience a part of the effort to ensure support for implementation of the country's obligations as party to the Stockholm Convention.	<i>2.REMA should make the database of PCB-contaminated transformers as well as other related information (such as territorial maps of locations PCB-contaminated transformers) available to a wider audience through publication on its web site.</i>
3.In the future, various national stakeholders (PCB holders, service providers, educational institutions, NGOs) can benefit from the project related technical documents as well as awareness raising materials if the project-related technical and informational	<i>3.REMA in cooperation with UNDP CO should ensure that all materials prepared by the project, in particular technical guidelines, awareness raising materials, videos, publications and booklets, are posted on the website of REMA and eventually</i>

Conclusion	Recommendation
documentation is accessible to them, even beyond the project implementation period.	<i>create a dedicated part of the website for information on PCB management.</i>
4. The new storage site at Jabana will benefit from an operational upgrade that will ensure storage and full trackability of PCB-contaminated materials according to the Stockholm Convention. The upgrade is required in terms of equipment for handling of PCB-contaminated materials, IT equipment for tracking and update of the storage register and enhancement of safety of the operations.	<i>4. REMA should transfer the Jabana site ownership to REG/EUCL as the main PCB holder in the country in order to ensure the necessary operational upgrade of the new temporary storage of PCB-waste at Jabana. In the future, all PCB-contaminated materials should be stored exclusively at Jabana and ensure their storage inside the building in order to avoid risk of environmental pollution by PCBs.</i>
5. Although the supporting technical guidelines were adopted by the Government and distributed to the main national stakeholders, the procedures and practices on handling and treatment of PCB wastes contained therein are not binding to the PCB holders. The continued absence of coercive provisions on PCB management and disposal is not conducive to effective enforcement of environmentally sound management of PCB wastes. Further protraction of the specific legal framework insufficiency could undermine the sustainability of the results achieved by this project.	<i>5. REMA in cooperation with other law enforcement agencies and support of UNDP CO should submit the developed specific PCB-related legislative framework for approval through an abridged procedure. The legal framework on the PCB management cycle should be enacted through a relevant legal instrument and/or short-term measures, that can be established directly by the Government without requirement of parliamentary approval.</i>
6. It is desirable to require commitment of all PCB holders for early phase-out or decontamination of PCB-equipment. While REG/EUCL as the principal PCB holder has started implementation of the plan for disposal of highly contaminated transformers and decontamination of in-service transformers, it would be desirable to bring the other owners of PCB-contaminated equipment on the same track for early phase-out of PCBs.	<i>6. REMA should follow-up with minority PCB holders for implementation of the submitted plans for phase-out of PCBs in transformers and closely monitor implementation of the phase-out plans until disposal or decontamination of the transformers.</i>
7. Currently the capacity of handling and storage of equipment with very high contamination of PCB is still very limited, notwithstanding the capacity building carried out under the project. Transformer oil with very high content of PCBs is not suitable for disposal by incineration and therefore careful and cautious management of the Askarel	<i>7. REMA and EUCL should develop a formal management plan for the Askarel transformers. The plan should include regular inspections to check the condition of the transformer in operation in order to prevent overloading, overheating and leakage as well as transport of the transformers removed from service to the new temporary storage at Jabana once the</i>

Conclusion	Recommendation
transformers is required until the disposal of both the equipment and oil.	<i>storage site is upgraded to guarantee safety of the operation and storage.</i>
8.The speed of the planned decontamination of in-service transformers owned by REG/EUCL by retro-filling has been negatively impacted by insufficient equipage for drainage of PCB-contaminated oil and lack of PCB-free oil for re-filling.	<i>8a: REG/EUCL should identify funding for additional equipment for retro-filling of PCB-contaminated transformers. Two different explosion-proof pumping lines will have to be provided: one for draining out (PCB-contaminated oil) and the other for refilling (PCB-free oil) to prevent any cross contamination.</i> <i>8b: REG/EUCL should develop a strategy for securing the long-term investment needed to ensure steady progress in the retro-filling of the in-service PCB-contaminated transformers.</i>
9.The implementation of the contract signed between REMA and CIMERWA for incineration of PCB-contaminated oil could have negative public and environmental health impact if the procedures of PCB-waste custody and traceability are not strictly followed.	<i>9.REMA should develop and implement a procedure of meticulous supervision of all operations for storage, transport and acceptance of the PCB-contaminated oil for incineration.</i>

Consecutive recommendations

Conclusion	Recommendation
10. Insufficient national capacity for implementation of the project on PCB management and complicated national procurement procedures hampered progress in the first years of the project and were the main reason for extension of the project by three additional years.	<i>10a. Prior to start of the future project(s) related to management of chemical wastes including PCBs, UNDP should conduct an in-depth assessment of capacity of the project partners and determine their commitment (staff allocation and time, co-financing) to active participation in the project implementation and as well as their capacity to achieve the results that they will become responsible for.</i> <i>10b. Procurement planning for goods and services should require particular attention as national procurement procedures continue to be lengthy and complicated and will have to be streamlined. It is therefore proposed that future procurement of goods and services from international suppliers is conducted by UNDP.</i>

Conclusion	Recommendation
<u>Conclusion 11:</u> The absence of accredited national laboratory for analysis of POPs/PCBs in waste materials and abiotic matrices is a setback to any future activities related to the Stockholm Convention. The implementing partners have recently started discussion about a follow-up project on management of POPs that would include assessment of sites contaminated with POPs/PCBs. There is an urgent need to designate one national laboratory for accreditation in POPs analysis by more advanced analytical techniques (such as GC-MS/ECD) capable to identify and quantify POPs with accuracy and precision as required by Article 16 of the Stockholm Convention. The country requires to establish at least one national laboratory for routine analysis of PCBs in environmental matrices. Since accreditation of the national laboratory is a lengthy process, the capacity for exact PCB analysis should be established in two stages.	<i>11. In order to establish capacity for PCB analysis, REMA should consider concluding cooperation with a laboratory abroad that has accreditation for PCB analysis. In parallel, UNDP in cooperation with the key national stakeholders (REMA and REG) should identify sources of support for establishment of a national laboratory for POPs analysis and ensure international technical assistance is provided to the designated national laboratory for improving skills in sampling and analysis of POPs/PCBs.</i>
12.The existing national database of PCB waste should be used for national statistical reporting and for reports according to the Stockholm Convention when necessary.	<i>12.REMA should consider upgrade of the PCB database from the simple Excel sheet to a more robust information system that would better support reporting according to the Stockholm Convention. REMA and REG/EUCL should also make a commitment to manage the system in the future (e.g. by signing an MoU).</i>
13. An important part of POPs reduction projects is an effective import/export control system for products containing or depending on POPs/PCBs performed by the customs authorities.	<i>13.UNDP CO in cooperation with relevant national partners should consider inclusion of capacity building components for national customs authorities in future project(s) on POPs/PCBs management.</i>
14. The project has upgraded national capacities for making comprehensive inventory and safeguarding PCB waste materials. This capacity is available for use in inventory of other PCB applications that is required in the Action Plan No. 2 contained in the updated NIP.	<i>14. REMA should establish and eventually implement a plan for a national inventory of other PCB applications such as dielectric fluids for capacitors, voltage regulators, and hydraulic and heat transfer fluids.</i>

Conclusion	Recommendation
<u>Conclusion 15:</u> The national capacity for PCB analysis, once established, should be made available for monitoring of PCB-contaminated sites in order to enable their sound ecological management.	<i>15. REMA in cooperation with UNDP should identify financial resources for monitoring of PCB-contaminated sites and their clean-up and remediation consistent with international practice.</i>

INTRODUCTION

In line with the GEF Evaluation Policy, all full and medium-sized GEF-financed projects are required to undergo a terminal evaluation upon completion of project implementation. Terminal evaluations assess the performance of the projects in terms of relevance, effectiveness and efficiency, sustainability of the projects' outcomes and progress to impact.

This document presents results of the terminal evaluation of the UNDP/GEF project "Management of PCBs stockpiles and equipment containing PCBs" (hereafter called "PCB project"). The terminal evaluation was conducted in accordance with the GEF Monitoring and Evaluation Policy², the Guidelines for GEF Agencies in Conducting Terminal Evaluations³, and the GEF Minimum Fiduciary Standards for GEF Implementing and Executing Agencies.

Objective of the evaluation

The objective of the evaluation is to provide the project partners i.e. GEF, UNDP and the Government of Rwanda with an independent assessment of the key achievements of the project through measurements of changes in the set outcome indicators and to draw lessons that can both improve the sustainability of benefits from this project, and aid in the overall enhancement of UNDP programming in the thematic area. The report and their sustainability and identify and discuss the lessons learned.

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 PCB project from January 2012 up to July 2018. The geographic scope of the evaluation is the whole country (Rwanda).

It has to be noted that the project had been designed before the international donor community issued guidance and policy documents that expressed the development assistance agencies' commitment to promotion of gender equality and empowerment of women through implementation of their projects. Therefore, the results framework for this project did not include gender-responsive indicators. Moreover, given the nature of the project, majority of project interventions were considered outside the activities where gender equality would be one of the key aspects requiring a systematic examination.

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 was a desk review of a variety of documents covering project design, implementation progress, monitoring and review, policies/ legislation/ regulations – among others. The review was followed by preparation of evaluation questionnaires with a set of discussion points aiming at gathering information from chosen respondents about attitudes,

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

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 reviewing the project implementation reports.

Evaluation Field Mission: The evaluation field mission was undertaken in order to perform face-to-face consultations with the key stakeholders. The preparation of the field mission was done in close coordination with the UNDP Country Office in Rwanda. From the COs, advice was sought to agree the timing of the mission and schedule of visits of the key informants. To the extent possible, visit of relevant project sites to make direct observations of selected project outputs were also conducted during the evaluation mission.

The interviews were planned in advance of the mission with the objective to obtain a critical sample of stakeholders' views during the time allocated to the evaluation mission. 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. Triangulation of results, i.e. comparing information from different sources, such as documentation and interviews, or interviews on the same subject with different stakeholders, were used to corroborate or check the reliability of evidence.

The itinerary of the evaluation mission and list of people interviewed during and after the evaluation mission are provided as respective Annexes 2 and 3 to this report.

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 responds to the evaluation questions and fulfils the purposes of the evaluation.

The list of documents reviewed is provided as Annex 4 to this report.

Structure of the evaluation report

The structure of the evaluation report follows the "Evaluation Report Outline" presented in Annex F of the ToR of the assignment (contained in Annex 1 to this report).

PROJECT DESCRIPTION AND DEVELOPMENT CONTEXT

Polychlorinated biphenyls (PCBs) are organic compounds which are fire-resistant, stable, non-conductive to electricity and with low volatility making them ideal for many industrial applications and consumer products. They were once widely used in industry as heat exchange fluids, in electric transformers and capacitors, and as additives in paint, carbonless copy paper, and plastics. However, PCBs were found to cause chronic health effects including cancer, reproductive and development, toxicity, impaired immune function, effects on the central nervous system, and liver changes. Due to the toxicity characteristics of PCBs and their classification as persistent organic pollutants (POPs), their production was banned globally in the early 1980s.

Given the toxicity of POPs, their persistence and trans-boundary properties, the global community adopted the Stockholm Convention (SC) as a multilateral environmental agreement to address the challenge of POPs control by requiring Parties to take measures to eliminate or reduce the release of POPs into the environment. SC was ratified by an initial 128 parties and 151 signatories. Initially, the Convention addressed twelve distinct POPs divided across three broad categories: pesticides, unintended by-products and industrial chemicals. The fourth Conference of the Parties (COP-4) in 2009 reached a consensus to add nine new POPs. For PCBs, the Convention requires all Parties to eliminate the use of PCB-containing equipment by 2025 and to make determined efforts to have liquid PCBs and equipment contaminated with PCBs subject to environmentally sound waste management as soon as possible, but no later than 2028.

Rwanda has acceded to the Stockholm Convention on 5 June 2002 and the Convention entered into force in Rwanda on 17 May 2004. According to the Article 7 of the Convention, Parties are required to develop a National Implementation Plan (NIP) to demonstrate how they will implement the obligations under the Convention. In 2007, Rwanda submitted its first NIP to the SC Conference of Parties and in 2016 submitted updated NIP.

Brief description of the project

The project supported Rwandan efforts in the management and disposal of PCBs Rwanda with tools to achieve effective compliance with respect to its obligations against the Stockholm Convention and to substantively minimize the environmental and health risks of PCBs, both locally and globally.

The project has both national and global benefits in the mitigation or even elimination of risks associated with the release of PCBs into the environment and their subsequent global distribution with resultant ecological and human health impacts from exposure to this chemical.

The objective of the project is to reduce environmental and human health risks from PCB releases through the introduction of cost-effective environmentally sound management (ESM) to PCB oils, equipment and wastes held by electrical utilities in the country.

The project results framework is composed of four outcomes and nine outputs organized under the following project components:

- Complete PCB inventory through enhanced cooperation with the Government bodies and equipment holders and selection of options for PCB disposal;
- Legislative support to aid the operation of PCB management system;
- Awareness raising of stakeholders, public and PCB equipment holders;
- Safe temporary storage of PCB wastes and environmentally sound disposal of PCB oils;
- Project management

Project start and duration

The project implementation milestones are summarized below.

Table 1: Key project implementation milestones

Milestone	Date
Approval of PIF	29 Sep 2009
Endorsement by GEF CEO	18 May 2011
Signature by Government of Rwanda	18 Jan 2012
Project Inception Workshop	23 April 2013
Planned Mid-term Review	January 2013
Actual Mid-term Review	N.A.
Planned Terminal Evaluation	December 2015
Actual Terminal Evaluation	July 2018

The project implementation officially commenced in January 2012 (the date of signature by the recipient government) and the original completion date was December 2014. The project implementation period was initially extended until the end of 2015. Due to initial delays and slow progress in implementation, UNDP/GEF and the Government approved another extension of additional 24 months and set a new project completion date at 31 December 2017.

The GEF project grant approved for the project amounts to US\$ 886,700 with total co-financing of US\$ 1,081,870. The co-financing is composed of contributions from UNDP as the Implementing Agency and various national stakeholders and make the total resources committed for the project US\$ 1,968,570.

Problems that the project sought to address

During the preparatory activities for the project, several barriers were identified that prevented effective implementation of Rwanda's Stockholm Convention obligations.

The overarching barrier to reversing this situation is the absence of national capacity and resources, that are directly linked to the country's modest means, and underscore importance of the international assistance. At a more specific level, the following five major barriers were identified and explicitly addressed in the project design:

- *Incomplete knowledge on the extent and impact of the PCB issue:* A significant information gap limited the ability to define the physical extent of the issue in terms of quantity of PCB-contaminated equipment, amounts of PCB stockpiles/wastes, location and impact of the contaminated sites.
- *Limited awareness about the issue and lack of knowledge on how to address it.* The level of awareness generally was low, particularly at a practical level among key stakeholders including technical and environmental regulators, customs officials, recycling activities and equipment holders. The means to collect and disseminate information and skills necessary to increase this awareness were also lacking.
- *Insufficient effective regulatory instruments:* The necessary detailed regulations and standards to ensure effective capture and management of PCBs were missing and this created opportunities for avoidance and ultimately continued release of PCBs into the general environment.
- *Limited availability of technical tools:* There were key gaps in technical capacity in the form of required analytical capability, and supporting procedures, techniques and practices to

address knowledge barriers, support regulatory control, and plan for sustainable management of PCBs.

- *Absence of infrastructure and operational capacity:* Even in case of identification and capture of PCBs, there was no dedicated capacity to provide for environmentally sound management and disposal.

Immediate and development objectives of the project

The immediate objective of the project is to encourage introduction of Environmentally Sound Management (ESM) of PCBs at national level within a regionally harmonized framework. This approach provides an opportunity to deliver cost-effective ESM for PCB oils, equipment and wastes whilst building relevant national capacities.

The longer-term objective of this project is to reduce environmental and human health risks from PCBs releases through the introduction of cost-effective environmentally sound management (ESM) of PCB oils, equipment and wastes held by electrical utilities in the country.

Baseline Indicators established

Project baseline data is the initial information on program activities collected prior to the program intervention that are used later down the project implementation trajectory to provide a comparison for assessing project outcomes or impacts.

Before the elaboration of the project, the Project Preparation Grant (PPG) was funded by the GEF that resulted in — amongst others — the following findings:

- The country does not have specific regulations or administrative mechanisms governing PCB oils, equipment and wastes;
- Owners of PCB equipment currently lack the means to apply environmentally sound management practices to PCB equipment in service, in storage or out of service;
- Despite awareness-raising efforts during preparation of the National Implementation Plan for the Stockholm Convention, owners and holders of PCB oils, equipment and wastes are frequently unaware of the threats that PCBs pose to human health and the environment;
- That environmentally-sound infrastructure for storage and destruction is not available in the country
- That there are no systematic investment mechanisms to support enterprises with the environmentally sound management of their PCB wastes.

As a result of the above deficiencies, PCBs were released to the environment at unprotected equipment maintenance and storage sites and during waste management operations as these primarily focused on recovery of metals. Furthermore, PCB fluids were frequently mixed with mineral dielectric oils during maintenance and subsequently reused in previously uncontaminated transformers, thereby cross-contaminating a sizeable portion of the whole transformer population.

Owners and holders of PCB equipment were hampered in their efforts to improve management standards because the relatively small market for such work in the country inhibited local investment by service providers. Since access to international service provision was both difficult and expensive, local waste management of PCB equipment resulted in uncontrolled PCB releases from unprotected metal reclamation or, worse, the selling of PCB oils for local open uses. Such uses posed significant health and environmental threats and were not permitted under the Stockholm Convention.

The initial inventory of PCBs was conducted in October 2005 and covered each of the four provinces of Rwanda and Kigali City and focused mainly on the electric transformers which constitute the principal source of PCBs in the developing countries. During the initial inventory, about 986 transformer devices apparatuses were inspected which was about 97.5 % of the total number in Rwanda. The year of manufacture of the inspected devices was from 1961 to 2005 with 58 had no date of manufacture. On the basis of the data collected, the inventory made an estimate of 343 transformers containing PCBs dielectric fluids which equals to 153.58 tonnes of fluids with PCBs and 352.58 tonnes of solid wastes contaminated with PCBs.

Main stakeholders

The Project Document provides a list of other governmental institutions with stakes in the project but does not however stakeholders from other sectors private sector and other stakeholders in PCB management (Kigali City, Districts, University of Rwanda and other Academic/Research institutions

The Project Document provide analysis of the main project stakeholders, and their functions and responsibilities related to the subject topic of the project as follows in Table 2 below:

Table 2: List of project stakeholders and their responsibilities

Ministry/Department	Function
Ministry of Environment and Lands	Overall policy oversight, monitoring & institutional support. The Ministry of Environment and Lands coordinates resource mobilization, allocation & accountability
REMA	Develops and implements policies for environmental protection, conservation of biological diversity and forest ecological systems, rational use of natural resources, sustainable development of mountain areas and assure the state's ecological security. It organizes and implements government control over environmental protection and natural resources use; implements multilateral environmental agreements (MEAs); and licenses uses, releases, transport, storage and disposal of toxic materials and waste, including radioactive. Oversight responsibility within REMA assigned to the State Environmental Inspection that acts as Stockholm Convention Contact point and the GEF Focal Point
Rwanda Revenue Authority	The Rwanda Revenue Authority is a quasi-autonomous body charged with the task of assessing, collecting, and accounting for tax, customs and other specified revenues. This is achieved through effective administration and enforcement of the laws including those related to prevention of harmful chemical substances or potentially toxic chemical substances.
Ministry of Health	Develops and implements policies to prevent harmful influence of chemical substances on human health and people livelihoods, administers national registers of potentially toxic chemical substances in the country. It monitors pesticides including POPs.
Ministry of Agriculture and Animal Resources	Develops and administers policies on the use of fertilizers and pesticides in agriculture. It also takes part in controlling water resources from chemical pollution.
National University of Rwanda (Kigali Institute of Sciences and Technology)	They aim to generate and disseminate high quality multi-disciplinary knowledge and promote effective research, skills training and community service for national competitiveness and sustainable socio-economic development. Their vision is to become innovative, world class and self-sustainable Universities that are responsive to national, regional and global challenges.
Ministry of Health	Develops and implements policies related to occupational health associated with chemical production and use.
Ministry of Infrastructure	Implements necessary measures and develops rules on any type of transport of chemical substances.
Ministry of Trade and Industry	The Ministry is responsible for development and industrial development policy and issues related to standardization and metrology.
Ministry of Interior	Implements government control over illegal application of chemical substances.
Ministry of Justice	Carries out governmental registration of all normative-legal statements related to chemical management.

Pursuant to Article 9 of the Stockholm Convention, each Party shall designate a national focal point for the exchange of the information referred to in paragraph 1 of article 9. Rwanda Environment Management Authority (REMA) has been the designated National Focal Point for SC and therefore the principal stakeholder of the project.

By this token the project is in alignment with the country's priorities associated with sound chemicals management as reflected in the other priority environmental management initiatives

related to addressing national priorities associated with other POPs issues, hazardous waste management and Strategic Approach to International Chemicals Management (SAICM).

Expected results

The project was designed to specifically address the principle barriers listed above within the overall project component framework set out in the original PIF but with appropriate expansion and modification of outcomes and outputs based on the PPG work.

The immediate expected results from the four areas of intervention were as follows:

- (1) Completed PCB inventory through enhanced cooperation with the Government bodies and equipment holders and selection of options for PCB disposal;
- (2) Enhanced legislation and supporting guidance for operation of a PCB management system;
- 3) Increased national awareness of the PCB through sensitization of the project stakeholders and general public;
- (4) Environmentally sound management of PCBs and disposal of PCB equipment, oils and waste.

Apart from the immediate results that address reduction of impacts close to the source of release of PCBs into the environment, there are also more distant results as secondary impacts of PCBs are widely distributed and effectively global in nature, given the PCBs tendency for bio-accumulation higher in the food chain and subject to long range and multi-media transport vectors.

The major expected global environmental benefit of the project was the mitigation or elimination of risks associated with the release of PCBs into the environment and their subsequent global distribution with resultant negative ecological and human health impacts from exposure to PCBs. The immediate results were expected to contribute to the achievement of the global benefit both directly (results 1 and 4) and indirectly (results 2 and 3).

The NIP at the time of its development recognized the need to urgently organize a national dialogue between the principal stakeholder parties in PCB management issues. The PCB section of the NIP was drawn up to target progressive withdrawal of PCB equipment and safe handling and disposal of PCB materials and wastes. However, the plan was based on expectations of international cooperation since no sufficient resources were available in the country and therefore assistance in the form of the GEF-funded project was requested.

Apart from the above four expected outcomes, the following outputs were expected:

- A tracking system for in-service equipment, waste stockpiles and contaminated sites;
- Publicly accessible PCB information system;
- One accredited national laboratory capable of doing routine PCB analysis in soil, water and air samples inclusive of trained personnel;
- Technical instructions for management of current and future PCB inventories and tracking system;
- A comprehensive national regulatory registry of all PCB equipment in service;
- A detailed plan endorsed by responsible authorities and PCB holders for replacement of in-service PCB equipment;
- One national designated secure storage facility established and equipped with necessary infrastructure for handling and transport of PCB waste;
- Equipment replacement scheme to replace up to 42 transformers in service;
- Max 150 tons of PCB oil disposed of through export;
- Max 350 tons of PCB contaminated solid waste material packed and safely stored;

FINDINGS

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

There is an obvious terminology mismatch in the project results framework as the nine sub-outcomes listed in the far-left column (numbered 1.1 through 4.3) are in fact project outputs. The outputs are once again correctly summarized under the title *Expected Outputs* at the bottom of the framework.

With the above terminology clarification, the project results framework outlines the project's overall objective and defines the project's five outcomes and nine outputs. Furthermore, the results framework contains more than thirty Objectively Verifiable Indicators (OVIs) and their pre-project (baseline) as well as post-project (target) values that were selected for measuring the change in the indicators' values over time (from baseline to target values) and therefore for measuring the effectiveness of the intervention. Additionally, the results framework suggests verification sources for the OVI target values and assumptions for their achievement. The complete project results framework as was incorporated in the approved Project Document is provided as Annex 4 to this report.

The proposed project objective, outcomes and outputs are in line with the priorities of the 2006 National Implementation Plan, national sectoral and development priorities and address all main barriers had been identified at the PIF/PPG stage that prevented the country from effective implementation of its obligations under the Stockholm Convention. Furthermore, the proposed results framework is in line with UNDP and GEF objectives.

From the point of view of the design of the project results framework, there is a good consistency between the project overall objective and the four substantive outcomes. The Outcomes 1 and 4 (PCB inventory, management planning, storage and final disposal) had direct relation to the overall project objective to minimize the environmental and health risks of PCBs impacts of PCBs while the Outcomes 2 and 3 (legislation and awareness raising) had more supporting function for achievement of the project objective. Also, the outputs were well linked with the outcomes and overall constitute a coherent project results framework.

A more detailed analysis of the results framework revealed few internal inconsistencies within the logframe. Firstly, there is an overlap between the indicators and their target values under the Outputs 1.1, 1.2, 2.1 and 3.2 as the same or similar indicator target values are used under different outputs. Secondly, there is a mismatch between the description of the indicators and their target values.

The same indicator target value namely the existence of the tracking system or registry of in-service equipment, was used under the outputs 1.1 and 2.1. It is obvious that the indicator target value is suitable only for the Output 1.2 but not for the Output 2.1.

The focus of the Output 1.2 is on the development of technical guidelines and training for all parts of the PCB management cycle (handling, transport and safeguarding) while the Output 3.2 focuses on use of the guidelines for awareness raising and capacity building of PCB holders. However, this distinction is not reflected in the clear separation of indicators and their target values under the outputs 1.2 and 3.2. One of the indicators for the Output 1.2. is the same as the indicator for the Outputs 3.2. in Table 3 below.

The overlaps and inconsistencies between the indicators and their target values are listed in Table 3 below.

Table 3: Overlaps between indicators and their target values in the project results framework

Output	OVI	Target
1.1 Updated the PCB inventory per category of holders (database) and reinforced local capacity to maintain and update PCB inventory on annual basis	Data management and tracking system operational and used for reporting end of 2011	Tracking system for in-service equipment, waste stockpiles and contaminated sites that will be maintained on an ongoing basis Publicly accessible PCB information system operational, maintained, and used for reporting and information exchange under the Convention
2.1: PCB legislation and technical guidance developed and implemented	Regulations requiring registration, labeling and status reporting of potential all PCB and PCB containing materials in use end of 2010	A comprehensive national regulatory registry of all PCB containing equipment in service that is maintained and updated such that its status and fate can be tracked
1.2. RECO (principal PCB holder) and other possible holders are accessed to establish partnership scheme(s) for early/mature equipment replacement	Phase out program and disposal plan established by the end of 2011	Availability and application of technical instructions for management of current and future PCB inventories and tracking system Reco staff technically able to manage disposal plan
3.2: Promoted safe and proper equipment handling at holders; holders trained on leak handling, safeguarding and repairing of old/damaged equipment	Strategy and plan for pre-treatment and disposal of PCB stockpiles and wastes in place end of 2011 Long term plan for the monitoring in place and phase out of PCB containing equipment in service consistent with Convention requirements (2025) formally adopted. Technical guidance and training available for handling, transport and safeguarding	Comprehensive strategy and plan adopted, defining selection and the process of implementation of pre-treatment and disposal options both to be applied in the country (i.e. equipment decontamination, soil management, potential cement kiln utilization) and through export, including potential regional initiatives Secure PCB handling, transport, storage operations

Furthermore, the target indicators suggested in the results framework are not always SMART⁴ as in some cases they lack one or more SMART dimensions, i.e. they are not measurable, assignable and/or not time-bound. The time dimension is more frequently specified in the description of indicators instead of within the indicator target values. As can be seen from Tables 3 and 4, the time specified in several indicators are the years 2010 and 2011, i.e. before the inception of the project. The most affected by the imperfect target indicators is the capacity building Outcome 3 that contains only vaguely formulated target indicators.

Examples of the insufficiently defined target indicators are in Table 4 below.

⁴ SMART = Specific, Measurable, Assignable, Realistic and Time-bound

Table 4: Insufficient target indicators in the project results framework

Objectively verifiable indicators	Target
Supply of lab equipment and consumables for the screening of 1200 units with staff trained in their use by 2011	Screening capacity to effectively support tracking database as PCB management is undertaken into the future
Educational curricula related to chemicals (including PCBs) impacts on environment and human health, and management actions for addressing the issue during the project.	Inclusion of chemicals management and particularly PCBs in relevant educational programs, and active R&D interest in addressing it
Training and information seminars on chemicals management including PCBs for relevant government agencies, the academic community, affected communities, NGOs, and holders of PCB	Well informed stakeholder community engaged in addressing the issue with a high level of understanding and technical capacity.
Technical guidance and training available for handling, transport and safeguarding	Secure PCB handling, transport, storage operations

Risks and assumptions

Apart from the indicators, the project results framework contains in the last column assumptions as events or circumstances expected to occur during the project life-cycle and therefore important necessary conditions for achievement of the project results. However, the results framework does not contain risks as the risk assessment table is contained only in the corresponding GEF CEO Endorsement Document (Section G). The separation of the risks and assumptions is a deviation from the good practices in project formulation that require both risks and assumptions to be listed together in the last column of the project/programme results frameworks.

The overall risk matrix enclosed in the GEF CEO Endorsement Document identified and rated seven specific risks. The same risk matrix proposed sound corresponding mitigation strategies. The evaluator found the risk and mitigation identification reasonable with one exception, namely the risk of “*delay in implementing key PCB regulations that delay or reduce the effectiveness of other activities which more directly minimize and/or prevent PCB releases*”. The word “preparation” should have been more appropriate instead of “implementing” in the description of the risk. Passing of legislative acts is normally a lengthy and complicated process frequently influenced by political and other issues that are almost completely out of control of the project implementation teams and therefore can’t be accelerated and/or mitigated by prioritization of disbursements as was proposed in the mitigation strategy. Although the delay in adoption of the new PCB regulations actually occurred in the project implementation period and the new PCB law that had been elaborated early in the initial period of the project was still in the unfinished legislative process at the project completion, this had minimal or no effect on the project implementation.

Lessons from other relevant projects incorporated into project design

The project “Management and Disposal of PCBs in Rwanda” was amongst the first batch of PCB-related projects formulated under GEF-4 not only in Africa but also in other regions of the world. Around the same time, similar projects were formulated in Ghana, Morocco (both with UNDP) and Nigeria (World Bank). Therefore, there was no experience from implementation of similar projects with GEF funding and no lessons were available for incorporation into the current project.

However, lessons from implementation of the project on development of the NIP in Rwanda⁵ were incorporated into the current project design in terms of follow-up on the initial national PCB inventory and incorporated elements of the national action plan for elimination of PCBs (Action Plan No. 4), in particular the progressive withdrawal of the electric equipment with PCBs and environmentally sound management of the PCB wastes.

Planned stakeholder participation

During the PIF/PPG phase, consultations were held with relevant government entities, national technical experts previously engaged in chemicals and/or waste related project and activities, private sector and NGOs with experience in the area of environment protection and chemicals management.

The project document contained a section on *Stakeholder Analysis* that contains a table in which responsibilities are listed of various stakeholders with a role in the management of PCBs. However, the stakeholders listed in this table are all ministries and national agencies related to the Government and no stakeholders from the private and general public sectors are listed. Moreover, there is no explicit plan for stakeholder involvement other than the general statement that ... *"the project will be implemented in close coordination and collaboration with relevant government institutions, regional authorities, industries, public and local authorities and NGOs, as well as with other related relevant projects in the region"*.

Nevertheless, the entire project component on capacity building (Outcome 3) is devoted to sensitization of a range of stakeholders including PCB holders and general public to PCB-related issues and therefore elaborates in more details about stakeholder participation in learning activities.

Replication approach

The approach used in this project to consolidate institutional stakeholders and focus on the identified barriers and priorities to initiate targeted actions is applicable in other countries, particularly in the equatorial Africa region and beyond. In addition, the adoption of a regional perspective of the issue, particularly in relation to facilities/technology development and addressing import/export questions as well as focusing responsibilities where practical expertise and working level involvement exists in undertaking PCB management activities (such as tracking system with databases) contain also potentially specific aspects of the project that could be replicable elsewhere.

However, it should be noted that successes and lessons learned in general should only be applied between projects that have been undertaken in a similar country set-up (regulatory, financial, capacity, etc.). The project was amongst the first batch of GEF-funded interventions on PCB management and was undertaken in the same period as similar initiatives in Ghana, Nigeria and Morocco. Therefore, it is advisable to study collective experience from several countries in order to identify specific elements worth of replication.

UNDP comparative advantage

At the time of the formulation of the project, there were several projects on PCB management activities developed by UNDP under GEF funding (in the four countries of Africa mentioned

⁵ Enabling activities to facilitate early action on the implementation of the Stockholm Convention on Persistent Organic Pollutants (POPs) in Rwanda, GEF/UNIDO project

in the previous paragraph plus several countries of Latin America and Central Asia). The projects were all similar in design and aimed at provision of support and technical assistance in the following areas:

- Addressing gaps in national PCB management regulations and creating an enabling environment for the environmentally sound management and destruction of PCBs;
- Updating previously undertaken PCB inventories to identify remaining geographically dispersed PCBs and sensitive sites;
- Improving PCB management practices (in particular handling, storage, transport) by providing technical guidance and technical training for PCB holders and other immediate stakeholders;
- Implementing public awareness campaigns and communication strategies to sensitize a wide range of stakeholders including general public to the PCB issues in order to solicit support for the targeted interventions;
- Testing several ways of safe disposal of PCBs including developing domestic disposal/destruction facilities, facilitating export of PCB waste to safe disposal facilities abroad, and improving coordination among PCB holders.

Results from these projects have been assessed and made available through mandatory terminal evaluations. UNDP's comparative advantage is embedded in the fact that UNDP has accumulated first-hand experience from implementation of the sizeable batch of projects and should use this experience in formulation of follow-up projects in its partner countries.

Linkages between project and other interventions within the sector

The project has had strong linkages with the UNIDO/GEF project “Enabling Activities to Review and Update the National Implementation Plan for the Stockholm Convention on POPs” that was implemented in the period 2013-2015. The report on PCB inventory served as input into the relevant section of the updated NIP.

The project was also linked with a study initiated by REMA for development of a pollution management and monitoring framework and tools for hazardous, toxic and radioactive wastes in Rwanda. The study was conducted by a national consultant in 2017/2018 and the final report provided in March 2018.

Management arrangements

The project was executed in line with the established UNDP procedures for National Implementing Modality (NIM) with Rwanda Environment Management Authority (REMA) as the Executing Agency/Implementing Partner. REMA appointed a National Project Director - a high-level government official primarily responsible for overall implementation of the Project – and hired (with GEF funding) a Project Manager and an administrative/financial assistant. A summary of the roles and responsibilities of the National Project Director, the Project Manager, and the Administrative and Financial Assistant are provided in the Project Document.

In order to ensure advisory and supervisory functions, REMA established a Project Steering Committee to guide the project implementation. PSC was chaired by the National Project Director and since the project inception consisted of representatives of all key stakeholders. Mid-way through the project implementation, a decision was taken to reduce the size of PSC as REMA had created a Single Project Implementation Unit for coordination of all projects implemented by REMA and UNDP.

UNDP CO assumed the role of Supplier—being a GEF Implementing Agency represented in the country.

The first meeting of PSC was in October 2012 and subsequent meetings were arranged 2-3 times per year. Progress reports from the previous quarter as well as a quarterly work plan for the forthcoming quarter were presented for PSC consideration and approval. Moreover, PSC reviewed status of implementation of resolutions from the previous PSC meeting and discussed key implementation challenges.

The established managerial arrangements are adequate for the size and level of complexity of the project and functioned well throughout the entire extended implementation period. The frequency of PSC meetings shows strong commitment and ownership of the project by the implementing partners.

Adaptive management

The project implementation did not start early in 2012 as had been anticipated because of protracted discussion between the implementing partners (REMA and UNDP CO) about the work plan for the year. Consequently, REMA received the first instalment of GEF funds in fall 2012. Furthermore, there was a delay in holding the inception workshop caused by some planning hitches on the side of the implementing partners.

There is no doubt that the above delays were the main reason for the slow implementation of the project in the first two years. The purpose of the inception workshop is to bring the project stakeholders together, inform them about the project and discuss their respective roles in the project. Reportedly it was difficult to proceed with project activities before the inception workshop was held as not all stakeholders were fully aware of the project inception and purpose.

In order to improve the project implementation, the implementing partners decided in early 2014 to hold bimonthly meetings of the project team and UNDP CO. Furthermore, REMA decided to strengthen the project team by addition of two people. These decisions helped to fast-track implementation of project activities and bring the project back on track through a more pro-active addressing challenges and bottlenecks to the planned activities.

Compliance with national regulations regarding the procurement process and integration of the project procurement needs resulted in delays in hiring of international and national consultants under the project. The delays were due to the complicated procurement process that required to include procurement of goods and services well in advance not only in the procurement plan of REMA but also to get approval by the Rwanda Procurement Plan Authority (RPPA). Early in 2015, in order to mitigate the procurement delays, the implementing partners decided to allow UNDP CO to lead the procurement process, in particular recruitment of international consultants and take advantage of UNDP's access to international expertise and its more streamlined procurement procedures. Although UNDP CO, upon request by REMA, assumed responsibility for recruitment of the second international consultant for the project, the involvement of UNDP CO did not accelerate the process and the consultant was actually recruited only early in 2016.

There were no changes to the project design and results framework during implementation.

Partnership arrangements

During the implementation, the project had established three important partnerships as follows:

Rwanda Energy Group/Energy Utility Corporation Limited (REG/EUCL): EUCL is responsible for energy distribution in the country. As it has responsibility for management of transformers, it is in fact a principal PCB holder in the country. Therefore, this partnership proved to be critical for progress in implementation of the components 1 and 4 of the project.

University of Rwanda: The University of Rwanda (UR) is the principal national establishment of higher education. This partnership was important in particular for implementation of the educational and awareness-raising component but at the same time UR also provided inputs to the other three components through participation of UR lecturers for as reviewers of various reports and documents produced by international and national consultants. UR students also participated as assistants to the team of experts that conducted the PCB survey.

CIMERWA: CIMERWA is Rwanda's only integrated cement producer with the production plant located in Bugarama, Rusizi district near South Western border of Rwanda. The company was an important partner to the project in implementation of the component 4, namely after the refocusing of the Output 4.3 for the development of the PCB final disposal solution. After extensive preparatory work and technical tests, REMA formalized the partnership through contracting CIMERWA for incineration of 50 tons of PCB-contaminated oil in the CIMERWA facility, signed in March 2018.

Rwanda Standards Board (RSB): A Memorandum of Understanding on laboratory testing of PCB samples of oil, soil and water as well as on development of PCB-related standards was concluded between REMA and RSB in May 2014 for a period of two years. However, this partnership did not produce any tangible deliverables and in 2016, after almost two years, the task of qualitative and quantitative analysis of PCB samples was transferred to the contract with the international consultant on PCB destruction.

Association Rwandaise des Ecologistes "ARECO" participated as a member of PSC representing the CSOs/NGOs. are also members of the Platform of Integrated Chemical Management in East Africa. The Civil Society Organizations/NGOs are widely involved in raising awareness about the health hazards of PCBs at the local level. The institutions are able to deliver information about PCBs in a customized manner using local context so that communities can be able to understand the issues.

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

Project finance

The project was designed to support actions required to develop a sustainable capability to meet the obligations of the Convention in terms of strengthening the regulatory infrastructure and management of PCBs and PCB contaminated equipment, temporary storage and disposal of PCB waste and building stakeholders' awareness. The costs of doing so thus represent incremental costs that would not be incurred if the Convention had not prompted them.

In the absence of international assistance and specifically GEF funding, Rwanda would not be able to implement those activities that are beyond the country's financial capacities. Therefore, it is reasonable to assume that progress on the implementation of the NIP and efforts toward compliance with the Stockholm Convention would have been minimal.

According to the Project Document, the GEF grant was approved at 886,700 US\$ and together with co-financing from UNDP and governmental agencies the total funding required for the project was 1,968,570 US\$.

The amount required for the project of this size and complexity appears to be underestimated. In three similar projects implemented in Africa, one in Ghana⁶ and two in Morocco⁷, the GEF grant allocations were between 2 – 3 million US\$. The project in Ghana received GEF grant of almost 3 million US\$ and the component on PCB disposal was more about 1.3 million US\$ for disposal of 450 tonnes of PCB-contaminated equipment. The Pillar I project in Morocco had total budget allocation 2,1 million US\$.

For this project, the way the budget was constructed shows insufficient budget planning, particularly under Outputs 1 and 4. It could have been anticipated that these project components (PCB inventory and PCB waste storage/disposal, respectively) would require sizeable procurement of international expertise, the budget allocations for international consultant were 3,200 US\$ for Outcome 1 and 6,000 US\$ for Outcome 4. The entire GEF budget allocation for Outcome 1, that covered conduct of the national PCB inventory and establishment of an accredited analytical laboratory for routine PCB analysis was only 95,000 US\$. In the Pillar I project in Morocco, the GEF grant allocation just for the single component on establishment and upgrade of analytical laboratories for assessing PCB level in transformers was as high as 217,800 US\$.

These are only few examples suggesting that the budget of this project was underestimated. It is natural that disposal of PCBs should be budgeted according to the estimated quantities of PCB waste hence countries with higher estimated PCB waste quantities should receive higher funding. However, other components, namely capacity building for laboratory analyses, as well as international assistance for PCB legislation and elaboration of supporting technical guidelines require comparably same level of funding irrespective of the recipient country size and PCB waste quantities.

The summary of project expenditures displayed in Table 5 below is based on the Combined Delivery Reports (CDRs) provided by the REMA PMU and UNDP CO for the period January 2012 through October 2018.

Table 5: Project expenditures in the period 2012-2018 by GEF grant and UNDP co-financing (US\$)

	2012	2013	2014	2015	2016	2017	2018	2012-2018
Govt	8,779.24	157,996.20	243,892.14	185,527.45	14,894.51	40,042.53	0	651,132.07
UNDP	206.31	256,660.75	114,602.42	-1,749.80	15,393.01	62,877.00	21,939.15	240,724.00
Total GEF	8,985.55	414,656.95	129,289.72	183,777.65	30,287.52	102,919.53	21,939.15	886,203.09
UNDP-Govt	0	0	0	75,109.79	67,284.33	66,376.75	10,468.68	219,239.55
UNDP	0	750.75	7,619.07	11,071.03	19,561.32	11,216.62	54,364.60	104,583.39
Total UNDP	0	750.75	7,619.07	86,180.82	86,821.88	77,593.37	63,418.88	325,433.79
Grand Total	8,985.55	415,407.70	136,908.79	269,958.47	117,133.17	171,969.41	36,845.16	1,151,531.50
% GEF	1.01%	46.76%	14.58%	20.73%	3.42%	11.61%	1.83%	99.94%

⁶ Capacity Building for PCB Elimination in Ghana, GEF Request for CEO Endorsement/Approval

⁷ Safe PCB Management Programme in Morocco, Pillar I and Pillar 2, GEF Request for CEO Endorsement/Approval

The table clearly shows lack of implementation in the first year of the project (2012) that was affected by the late disbursement of GEF funds by UNDP CO and the protracted process to procure services of technical experts for the PCB inventory.

According to the data, the total implementation of the GEF grant by REMA was 651,132 US\$ which is 73.47% of the total. In addition, REMA implemented 67.4% (219,239.55 US\$) of the UNDP in-cash co-financing contribution that amounted to 325,433.79 US\$. Remarkably, the UNDP co-financing contribution was substantially higher and reached 217.06% of the amount pledged at the project inception.

Table 6 below displays breakdown of the planned and actual co-financing by the participating organizations of the Government of Rwanda.

Table 6: Planned and actual expenditures by the Government of Rwanda in the period 2012-2018 by the project components (US\$)

	EUCL (EWASA)		REMA		Total Government of Rwanda	
	Planned	Actual	Planned	Actual	Planned	Actual
Component 1	28,000	23,000	-	11,500	28,000	34,500
Component 2	1,250	5,000	23,750	25,000	25,000	30,000
Component 3	8,000	5,000	7,500	16,000	15,500	21,000
Component 4	821,170	504,072	-	40,000	821,170	544,072
Component 5	-	-	42,270	75,680	42,270	75,680
Total Project	858,420	537,072	73,520	168,180	931,940	705,252

The information in Table 6 shows that the project has leveraged co-financing by the Government of Rwanda in the amount of 705,252 US\$. However, this was by 226,688 US\$ less than had been anticipated in the Project Document.

Table 7 below summarizes the information on the total cost of the project and total co-financing by the project implementation partners.

Table 7: Comparison of planned and actual project costs by the source of financing

Source of funds	Planned	Actual	Percentage
GEF	886,700	886,203.09	99.94%
UNDP	149,930	325,433.79	217.06%
Government	931940	705,251.86	75.68%
Total	1,968,570	1,916,888.74	97.37%
Total Co-financing	1,081,870	1,030,685.75	95.27%

It follows from Table 7 that the total co-financing for the project reached the amount of 1,030,685.75,123.76 US\$ that is 95.27% of the expected co-financing at the project inception.

Monitoring and evaluation: design at entry and implementation

The Monitoring & Evaluation Framework is in details described in the Project Document. The Framework consists of the Project Inception Workshop, meetings of the quarterly/annual project reports as well as mi-term review and terminal evaluation. The design of the monitoring and evaluation framework is following the standard M&E frameworks for projects of this size and complexity and is therefore **rated Highly Satisfactory (HS)**.

Project Inception Workshop: Organization of the Project Inception Workshop is critical for bringing the project stakeholders together in order to inform them about the project objectives, agree on their respective roles during the implementation and build their ownership of the project results. The workshop also has an important function in planning of the annual work plan for the first year of the project.

The Inception Workshop was supposed to be held within the first 2 months of project start. However, it was delayed as a result of deficiencies in planning on the side of the implementing partners. The workshop had to be postponed several times since it was colliding with other planned activities. The workshop finally took place in April 2013.

Project Steering Committee: The first meeting of the Project Steering Committee composed of representatives of several governmental and public agencies took place in October 2012. PSC

met about thirteen times during the period October 2012 - July 2017. After the Inception Workshop, all stakeholders involved in the project were regularly informed about the progress of the project and any difficulties encountered through meetings of the Project Steering Committee.

Mid-Term Review: The objective of MTR is to provide project implementing partners with an independent assessment of early signs of project success or failure and identify the necessary adjustments to be made in order to set the project on-track to achieve its intended results. Due to the project implementation delays, PSC approved decision not to conduct MTR as the latter is not mandatory for medium-size GEF projects. The decision was approved by PSC in 2014 and communicated to UNDP GEF.

In the approved M&E framework, it was envisaged to hold MTR at the mid-point of project implementation, i.e. at the end of the second year of implementation. The progress reports from the first two years of implementation mention lack of national capacity in the technical field of PCBs and insufficient project management framework as reasons for the slow progress in implementation. By virtue of the decision to abandon MTR the project was deprived of an independent and detailed assessment of reasons for the slow progress in implementation and advice to address the main challenges and bottlenecks.

Terminal Evaluation: The Terminal Evaluation was planned at the end of 2017 that was the new completion date of the project. Due to the delays in the implementation of the 4th component, TE was postponed until July 2018. As some important activities were still protracted into 2018 (e.g. the last mission of the international consultant and finalization of the contract for co-incineration of PCB oil at CIMERWA described under Outcome 4), the delayed TE enabled the evaluator to provide a more comprehensive assessment of project results.

The financial planning of the M&E framework was insufficient since the allocation of funds for MTR and TR, budgeted at 6,000 US\$ each, was underestimated. Following the PSC decision not to conduct the MTR, the combined budget was used for TE and proved to be closer to but not fully covering the real TE costs. On the other hand, the same amount (2x6,000 US\$) was planned for financial audit of the project. Reportedly, UNDP conducted annual auditing of the project.

The implementation of the monitoring and evaluation plan is **rated Satisfactory (S)**.

Feedback from M&E activities used for adaptive management

The quarterly and annual reports prepared by the project team to the Project Steering Committee, as well as the PIRs were used as the main instruments to evaluate the project progress, identify issues encountered during project implementation to determine necessary adaptive management measures required.

Project Implementation Reviews (PIRs): The evaluator reviewed PIRs for the years 2013 through 2017 as well as Annual Progress Reports (APRs) for the years 2014 through 2016 and two Quarterly Progress Reports (QPRs) from 2016 (from 1st and 2nd quarters).

Annual Progress Reports: The Annual Progress Reports were produced by the REMA and UNDP CO only and contain more or less the same information as the PIRs. However, there is only partial overlap of the APRs and PIRs since the former cover the fiscal year of the implementing partners (January to December) while the latter reflect the fiscal year of the donor agency (July to June). From the point of view of the contents, the APRs do not bring substantively new information and do not provide much of added value.

The GEF Tracking Tools: The evaluator reviewed two GEF Tracking Tools that had been prepared around the midterm of the project and in December 2017. The evaluator found the TTs repetitive of the PIRs and APRs with much reduced level of factual details.

Having reviewed the available PIRs and APRs the evaluator concludes that the project progress was regularly and thoroughly monitored by the national project manager, UNDP CO and UNDP Regional Technical Advisor (RTA). The evaluator found the quality of reporting in the PIRs good, particularly for the reason that they combine reporting by the two implementing partners (REMA and UNDP) and the UNDP RTA. Although the contributions from the three individuals appear sometimes repetitive, they provide cross-verification and triangulation of salient challenges faced by the project and views of the same issues from different perspectives.

Based on the above, **the overall quality of the M&E is rated Satisfactory (S).**

UNDP and implementing partner implementation / execution

The project was implemented under the National Implementing Modality (NIM). The latter is defined as a cooperative operational arrangement whereby the recipient Government through a designated national institution(s) assume responsibility for the management of UN-financed technical cooperation programmes and projects. The objective of NIM is to ensure that UN-financed projects are managed and implemented by the national institutions as an integral part of their development programmes, whilst ensuring that UN policies and procedures underlying development cooperation and programme management are adhered to. By this token, NIM is expected to promote national ownership, accountability, national capacity development, and sustainability of UN-supported interventions.

For this project, REMA assumed responsibility for implementation of the project activities and UNDP CO was responsible for oversight and reporting on the project. From the very outset, the implementation of the project was affected by insufficient national capacities for implementation of development assistance projects in the technical area of PCB management. As already mentioned above, although the two implementing partners (REMA and UNDP CO) had reached agreement on a realistic work plan for the first year of implementation, they could not implement it in a timely manner due to staff recruitment and length of the recruitment process. Consequently, the initial transfer of GEF funds from UNDP to REMA was delayed by about 9 months.

Once the initial funds transfer was executed, the need for additional human resources to support management of the project was identified at REMA. The latter expressed commitment for improvement of the project delivery and strengthened its project management team by adding two new staff to this project, namely M&E Officer and Project Officer and made operational adjustments (e.g. established division of labour among the project management team, performance contracts of the team members based on the project annual work plan) that helped to accelerate implementation of the project activities.

The principal reason for the relative slow implementation was lack of national technical expertise in the area of PCB management. Almost all planned activities depended on recruitment of international and national consultants but as the technical area of PCB management was relatively new in Rwanda, the project team faced difficulties in getting national experts for various tasks and on several occasions had to re-advertise announcements for recruitment of national consultants.

The project team held bimonthly meetings with UNDP CO to accelerate implementation of project activities and address bottlenecks affecting the project. The repetitive problems in procurement finally led to agreement between the implementing partners concluded in early

2015. According to the agreement, UNDP CO was requested to lead the procurement of an international consultant for activities under Outcome 4.

Although the insufficient national technical capacities in the field of PCB management was revealed in the first year of the project implementation, it took a relatively long time until this deficiency was fully recognized and addressed by the implementing partners. In order to address this deficiency, a study tour to the PCB management project in Morocco was arranged in March 2015. The study tour facilitated exchange experience of the REMA team with their counterparts in Morocco on strategies for raising public awareness on PCBs, experience on conducting PCB inventory, development of PCB legislative frameworks, sampling and testing of PCBs as well as the private sector engagement. It also provided the REMA team with the direct exposure to Moroccan experience on legal and technical procedures and challenges of procuring a company for disposal of PCB wastes in approved facilities abroad and enabled discussions with technical experts involved in PCB exports for disposal.

The Morocco study tour proved to be the turning point in the implementation of the project. Apart from the fact that the participation in the study tour appeared to have convinced the national implementing partner about the disproportions between the complexity of the PCB management challenge and the existing national capacities in Rwanda, it also gave the project team the possibility to learn about the possibility that final disposal of PCB waste oil can be done domestically by incineration instead of the initially planned disposal by export of the contaminated waste oil. This raised the need for new arrangements and capacity within country, which delayed the project, however contributed to a more concrete outcome. and prompted to request UNDP to organize the procurement of international consultant's services under Outcome 4.

The immediate effect of the study tour on the Rwanda project implementation is a clear demonstration of the positive effect of south-south cooperation. It should be noted that the study tour was an ad-hoc decision as it was not planned under the GEF funding. Learning from the Moroccan experience convinced the project implementing partners to change the overall approach for recruitment of the next international consultant. While the recruitment of the first international consultant was narrow oriented on specific tasks, the ToR for recruitment of the second consultant was developed in a more holistic way in order to solicit international expertise not only for specific tasks but also for overall operational support to the project.

Analysis of the project timelines and progress reports leads to a conclusion that the initial project implementation delays could have been avoided if sufficient attention had been paid to the assessment of existing national capacities for management of international development projects in the technical area of PCB management. The fact that the lack of national capacities in the technical area of PCB management was not incorporated into the risk matrix in the Project Document suggests that the risk management planning at the project inception was insufficient.

It has to be noted that the delay in project implementation had a positive effect on the component dealing with disposal of PCB waste (Output 4.3). The local cement producing factory was not existing in the original project implementation period as it was commissioned only in 2015. Implementation of Output 4.3 started only in 2016 when the factory was already operational hence the local adoption of co-incineration of PCB waste oil in the local cement kiln was found realistic and feasible. This is one of practical demonstrations of a strong orientation on results by all implementing partners, particularly the national PCB holders

A more thorough assessment of the existing national capacities should have been conducted by UNDP during the PIF/PPG stage and a study tour to a similar project implemented in the region could have been added to the risk matrix as one of the potential risk mitigation measures. This would have helped to address and mitigate this type of risk earlier in the project.

UNDP CO has effectively fulfilled its broker role in securing international expertise to the project. However, the above findings indicate that it could have been accomplished in a more pro-active way and increase thus efficiency of the project implementation.

The UNDP implementation, execution by the national partner as well as the overall quality of implementation/execution is rated Moderately Satisfactory (MS).

Overall results (attainment of objectives)

The information presented in this section has been sourced from numerous project implementation reports and verified with information collected through interviews of key informants during the evaluation field missions to Rwanda and reports of international and national consultants recruited by the project. The list of documents consulted is provided as Annex 9 to this report.

Relevance

The project is linked to the SDG Goal 12 that calls for sustainable consumption and production patterns and in particular to the target 12.4 that reads as follows:

By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment.

The above linkage has been further reinforced through the 2006 Dubai Declaration that established the Strategic Approach to International Chemicals Management and recognizes the sound management of chemicals to be crucial to achieving sustainable development.

A clear link has also been established to the SDG Goal 1 that calls for eradication of poverty since it is predominantly the poor that routinely face unacceptably high risks because of their occupations, living conditions and lack of knowledge about the detrimental impacts of exposures to hazardous chemicals and wastes such as PCBs.

Furthermore, the project is also linked to several other SDG goals and targets, although in a less prominent mode, including the SDGs No. 3,6 and 11 that address human health, water and sustainable cities/human settlements.

The 2013 Geneva Statement on the sound management of chemicals and waste specifically underlines that the full and effective implementation of the Basel, Rotterdam and Stockholm conventions contributes to sustainable development and the protection of human health and the environment.

The project is in line with the overall objective of the Stockholm Convention that is:

“to protect human health and the environment from persistent organic pollutants”.

More specifically, it is aligned with the obligations of Rwanda as Party to the Stockholm Convention and addresses the four objectives of the Action Plan No. 4: “Management of the PCBs and Equipment Containing PCBs” incorporated into the 2007 submission of the NIP:

- 1. Accomplishment of the inventory of the PCBs and their wastes in the electric energy sector;*
- 2. Insurance of an ecologically rational management of the PCBs and electric equipment with PCBs as well as other contaminated wastes by the PCBs;*
- 3. Security of electric equipment with PCBs at the end of their lifetime*

starting from 2008; and

4. Immediate security of the electric equipment with PCBs still functioning

Furthermore, the project contributed to Outcome 1.3 of the UNDP 2013-2018 for Rwanda that reads:

Rwanda has in place improved systems for: sustainable management of the environment, natural resources and renewable energy resources, energy access and energy security, to achieve greater environmental and climate change resilience in line with Rio+20 recommendations on Sustainable Development

Last but not least, the project addresses the GEF-4 Strategic Objectives No.1: *Strengthening Capacity for NIP Development and Implementation*; and No.2: *Partnering in Investments for NIP Implementation of POPs Focal Area*.

Based on the alignment with the above priorities of both implementation partners and the donor agency, **the project is rated Relevant (R)**.

Effectiveness & Efficiency

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 evaluation mission to Rwanda. Additional information was supplemented from the project-related documentation provided by the project team.

Each table below contains an overview of the actually achieved project results⁸ in bullet points followed by a short narrative with additional insight and details on how and how the results have 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 argumentation of the rating of the outcomes.

⁸ Consistently with the conclusions in the previous section on Analysis of the project results framework, the original sub-outcomes are presented as outputs.

Table 8: Deliverables for Outcome 1

Output	OVI Targets	Delivery Status at Terminal Evaluation
1.1: Updated PCB inventory per category of holders (database) and reinforced local capacity to maintain and update PCB inventory on annual basis	Tracking system for in-service equipment, waste stockpiles and contaminated sites that will be maintained on an ongoing basis	Inventory of total 2,344 transformers conducted in September 2014 Total 293 transformers suspected to contain PCB-contaminated oil A tracking system in the Excel database format developed in 2014 Districts maps indicating the actual locations of contaminated transformers across the entire country Total 376 transformers tested with qualitative test kits (chlor-n-oil) Total 169 transformers tested with semi-quantitative test kits (Dexil L-2000 PCB analyser) Total 100 transformers found contaminated with PCBs
	Publicly accessible PCB information system operational, maintained, and used for reporting and information exchange under the Convention	Excel sheet with essential data on the population of transformers suspected to be contaminated with PCBs produced and updated on annual basis
	One accredited national laboratory capable of doing routine PCB analysis in soil, water and air samples inclusive of trained personnel and accessible to responsible regulatory authorities, PCB holders and service providers Screening capacity to effectively support tracking database as PCB management is undertaken into the future. Availability and application of technical instructions for management of current and future PCB inventories and tracking system	Total 61 staff and technicians from REG (former EWSA), REMA and RSB trained how to sample and test for PCBs using the Chlor-N-Oil test kits (October 2014) Total 16 participants from REMA and RSB trained in two training sessions (May and August 2016) on quantitative analysis with LX 2000 analytical equipment Assessment of capacity of national laboratories to analyse POPs chemicals including PCBs A manual for inventory of PCB developed to complement the tracking system
1.2: RECO (principal PCB holder) and other possible holders are accessed to establish partnership scheme(s) for early/mature equipment replacement	Availability and application of technical instructions for management of current and future PCB inventories and tracking system RECO staff technically able to manage disposal plan	Guidelines for PCBs Inventory developed (2014)

Output 1.1: Updated the PCB inventory per category of holders (database) and reinforced local capacity to maintain and update PCB inventory on annual basis

In order to carry out the inventory, teams involving experts from the technical staff of Energy, Water and Sanitation Authority (EWSA)⁹ assisted by students of College of Social Sciences (CSS) and College of Science and Technology (CST) from Rwanda University were trained. The students and the technical staff were prepared through a well consolidated training on PCBs inventory tools, Sampling and chemical analysis of contaminated oil, soil and water.

Two teams of six people were formed to collect information on transformers through visits of stations and substations and inspection of high voltage / medium voltage transformers in 23 branches of RECO and included electrical stores as well as transformers maintenance shops.

The inventory was an update on the original inventory that was conducted in 2005. It covered a total of 20 districts as follows: 3 districts in Kigali city, 4 districts in the Eastern Province, 5 districts each in the Southern and Western Provinces and 3 districts in the Northern Province. The inventory was conducted by physical inspection in accordance with the inventory sheet method established by the national and international consultants. Before the inventory, the expected number of transformers known by EWSA was 2,109 but the inventory teams found a total of 2,344 transformers.

As no sampling and analysis of transformer oil were done at this stage, a theoretical approach about PCB contamination was used following the methodology described in the Guidelines for the identification of PCBs and equipment containing PCBs recommended by UNEP. Since manufacturing of PCB equipment was banned in 1982 and assuming that elimination of stored manufactured transformers continued until 1985, the survey worked with the assumption that all transformers manufactured before 1986 were suspected to contain PCBs.

The survey concluded that in total 283 transformers in the distribution network, power plants, substations, private sector and storage sites were supposed to be contaminated with PCBs.

The survey also identified high-content PCB equipment including the intentionally PCB-filled transformers, designated as “Askarel” transformers¹⁰ and a large group of PCB-contaminated oil-filled transformers, which had been contaminated with PCBs by different mechanisms of cross-contamination, and typically have a PCB concentration in the range of 50 – 2,000 mg/kg.

Apart from the inventory of transformers, the 2014 survey also attempted to locate capacitors with PCB content. Since capacitors had not been included in the original 2005 inventory, all substations with capacitors were visited on the basis of a list of substations with capacitor banks obtained from EWSA in order to determine the type of capacitors. The 2014 inventory reports that all capacitors found were of dry type, free of PCBs, however, the report does not specify the number of capacitors found and also does not provide information on their location.

Since the 2014 inventory provided only an estimate of number of PCB-contaminated transformers and did not conduct testing of PCB oil, an updated survey was conducted in 2016. By using the chlor-N-oil 50 testing method, total 169 transformers were sampled for quantitative testing of PCB oil using a Dextil L-2000 PCB analyzer.

⁹ On 31 January 2014, the Rwandan Parliament enacted a law splitting the Energy Water and Sanitation Authority (EWSA) into two separate entities: (a) the Water and Sanitation Corporation (WASAC) and (b) the Rwanda Energy Group Limited (REG).

¹⁰ Askarel transformers, also known as PCB transformers, were manufactured prior to 1977 and were deliberately insulated with PCBs diluted in a mix a tri- and tetra-chlorobenzene solvent into PCB concentrations of 300,000 to 700,000 ppm (30 to 70 %). Askarel transformers are usually easily identifiable since their nameplates indicate that they are insulated with PCB dielectric.

The testing by the quantitative method confirmed contamination by PCBs in 100 transformers. That included 23 phased-out transformers stored at the Gikondo storage facility and 77 transformers in operation mostly owned by REG. According to the level of PCB contamination, the transformers were grouped into three clusters as follows:

- i) low contamination (up to 250 ppm of PCBs);
- ii) medium contamination (250-2,000 ppm of PCBs); and
- iii) high contamination (over 2,000 ppm of PCBs);

Based on the test results, a list of contaminated transformers with the recommended action for decontamination or disposal and a management plan for the PCB contaminated transformers was prepared. Details of the management plan are discussed under Output 1.2.

The proposed treatment method for a majority of the contaminated in-service transformers was drainage of the PCB-contaminated oil and retro-filling with PCB-free dielectric fluid. Only for few transformers, due to their high level of contamination (from 5,000 to 13,000 ppm), the retrofilling method was not recommended and it was suggested that the transformer owners should replace them.

The information on each piece of sampled equipment was entered into an Excel database for record keeping and compilation of the data. The database records location of all transformers in services and suspected contamination sites and contaminated equipment in 23 REG branches. The collected data also included information on total equipment weight and the weight of the liquids in order to estimate the total quantity of PCBs and PCB-contaminated equipment. Furthermore, district maps indicating the actual locations of transformers across the entire country were developed to provide an additional tool for tracking the transformer contamination.

The database enables tracking of PCB-contaminated in-service transformers, transformers in the REG/EUCL repair shop and at the storage site facilities until they are decontaminated or safely disposed.

The TE found that the PCB database was used only by the core project stakeholders, namely REMA and REG/EUCL. In order to turn the PCB into a PCB information system, a database management system (DBMS) would be necessary for a more effective maintenance and use of the database. A DBMS would provide for controlling data access, enforcing data integrity, managing concurrency control as well as maintaining database security. Therefore, the target of a publicly accessible PCB information system operational, maintained, and used for reporting and information exchange was not fully achieved.

National capacity for PCB screening and analysis

The first meeting of the Project Steering Committee that took place in October 2013 recommended that instead of upgrading the laboratory capacity to analyse PCBs, the respective project output should be reformulated “To assess the capacity of national laboratories to analyse PCB oils and suggest their upgrading strategies”.

Following the PSC recommendation, a study was commissioned to assess several aspects of laboratory performance, such as existing laboratory equipment and consumables, human resources available and their capacity, level of collaboration of the laboratories and their capacity for analysis and interpretation of results, in particular for PCBs.

The study was conducted by a national consultant and assessed five laboratories, namely at Rwanda Standard Board (RSB), laboratories at two colleges of University of Rwanda (UR), laboratories of Rwanda Agriculture Board and laboratories of Energy, Water and Sanitation Authority (EWSA). It concluded that four out of the five laboratories were not able to analyse

POPs/PCB due to lack/inadequacy of equipment, lack of trained staff for POPs/PCB analysis, shortage of consumables and inadequacy of laboratory housing infrastructures. The laboratories at RSB were found to be the most advanced from the examined cohort as they possessed three gas chromatography systems with various detectors including Electron Capture Detector (ECD) and Mass Spectrometer (MS) detectors that are required for qualitative and quantitative PCB analysis. Although the RSB laboratory was found familiar with analysis of some POPs (organochlorine and organophosphorus pesticides) in mineral and drinking water, it had never performed any analysis of PCB samples.

In order to perform quantitative analysis for PCBs by LX-2000 analytical equipment, REMA concluded a Memorandum of Understanding (MoU) with RSB for a 2-year duration. According to the MOU that was signed by the two parties in May 2014, RSB was expected to i) provide capacity building (short training) to REMA staff and assign a PCB sampling team; ii) develop technical specifications and conduct tender process for consumables, reagents and spare parts; iii) develop and publish PCB standards in water and oil; and iv) conduct laboratory analysis of PCB samples (oil, soil, water). Moreover, one unit of the LX-2000 analyser that had been procured by REMA from the project, was leased to RSB.

It appears that there was no follow-up to the laboratory assessment study in 2014 that would examine further the readiness of RSB to fulfil the duties envisaged in the MoU between REMA and RSB. The MoU was not implemented for almost 2 years. In early 2016, REMA recruited an international consultant for verification of equipment and capability of RSB staff for PCB analysis at RSB, and assessment of proposed methods for PCB analysis.

The consultant found that although the RSB laboratory was equipped with GC system with ECD detector, the available chromatographic columns were not suitable for the proposed standard methods of PCB analysis. Moreover, reagents and auxiliary equipment for preparation of samples (extraction) were also not available.

The consultant suggested to conduct the quantitative analysis of PCB in two steps, namely i) to charge the holders of suspected PCB-contaminated equipment with the task of quick quantitative determination of PCB contents with the LX-2000 analyser, and ii) later to verify the results by exact analytical methods of gas chromatography with ECD detector at RSB. In order to implement the first step, the consultant developed a sampling plan for quick quantitative analysis of the contaminated transformers and held two training sessions for staff of REG/EUCL and REMA in quantitative analysis of PCBs with the LX-2000 analyser. Although he also held discussion with RSB on development of Standard Operation Procedure (SOP) for exact analysis of PCB in dielectric oil and water, there was no follow up on this after completion of the consultant's assignment due to lack of budget for completion of the laboratory accreditation task.

For assessment of the PCB contamination of the transformers, the project used rapid PCB screening test kits to indicate whether transformers contained more or less than 50 ppm of PCBs. Based on the results of the rapid tests, transformers were subsequently analyzed by the L-2000 DX analyser for a more accurate determination of PCB contamination level. Due to the lack of national laboratory capacity for PCB analysis, no cross-reference analysis was conducted.

The evaluator visited the RSB laboratories in July 2018 during the evaluation mission and found unchanged situation regarding the capacity and readiness for PCB analysis. The Director of Chemical Laboratories Unit at RSB confirmed that analysis of PCBs in industrial product/waste matrices was beyond the RSB laboratories' mandate and although their equipment base has been further upgraded since the 2016 consultant's visit, they still lack SOPs for PCB analyses as well as necessary auxiliary equipment and consumables for preparation of samples.

The 2014 laboratory assessment found that laboratories of the University of Rwanda, College of Science and Technology (URCST) were equipped with a GC analytical equipment, namely URCST laboratories at Huye and Nyarugenge campuses. Although the 2014 study found the equipment not operational due to incomplete installation or insufficient regular maintenance, interviews that the evaluator held with informants involved in the project as national consultants and members of the Project Steering Committee revealed potential capacity for PCB analysis at URCST.

At the time of the TE, the all URCST laboratory equipment has reportedly been moved from the Huye campus and the GC/ECD analytical system will be reinstalled at the Nyarugenge Campus. Secondly, the University of Rwanda has recently signed a Memorandum of Understanding with the U.S. based pharmaceutical L.E.A.F. Pharmaceuticals to promote and strengthen academic and research collaboration. Thirdly, URCST lecturers as well as students were involved in the project during the PCB inventory phase and therefore have sufficient knowledge about the PCB issues in the country.

Although the MoU with L.E.A.F. is primarily focused on biotechnologies, it is a long-term agreement that will ensure upgrade, management and maintenance of UR laboratories and knowledge transfer not only in the main line of research but also in boundary research areas such as environmental monitoring.

The evaluation confirmed that the project was successful in establishing a sustainable national capacity for screening of PCB transformers by commonly used rapid analytical methods, namely the Chlor-N-Oil test kits and the L-2000DX Analyser. As these methods can be used in the field and 'on-site' to detect PCB in transformer oil samples, it appears logical that the capacity for use of the methods has been anchored in the principal PCB holder (REG/EUCL) and the regulatory agency (REMA).

However, since both methods rely on the same basic chemistry with either colorimetric detection (the Chlor-N-Oil test kits) or quantitative determination with an ion-specific electrode (L-2000DX), it is important to remember that both methods detect chlorine/chloride content in the sample that must not necessarily reflect the presence of PCBs. Moreover, false positive results could reportedly also be caused by presence of water in the oil samples. Therefore, a more sophisticated laboratory analysis is always required for confirmation of the presence of PCB and a more accurate determination of PCB concentration in the samples.

It follows from the above that at the end of the implementation period the project has been a way off the expected target to establish an accredited national laboratory capable of routine analysis of PCBs. It is the opinion of the evaluator that the laboratory assessment study that was done in 2014 with the project support should have been conducted before the project approval, namely at the PPG stage of the project, and should have outlined in more details further course of actions towards the achievement of the target, in particular shortlisting of candidate laboratories and strategies for their upgrading in order to qualify for the accreditation. In the absence of such information, time was lost in negotiations with the laboratory of RSB that despite having necessary equipment does not have mandate for analysis of PCBs in oil, water and soil matrices.

In any case, the prolonged lack of national laboratory capacity for PCB analysis is a serious deficiency and should be addressed as a matter of urgency. In the absence of dedicated project funding for strengthening of analytical and laboratory capacities, parallel financing under bilateral cooperation can be used for equipment upgrading necessary for PCB analysis while assistance from UN-funded regional projects can be of assistance for staff training and laboratory intercalibration studies.

The evaluator would like to emphasize that there is a realistic potential to establish a laboratory capacity for analysis of PCBs in transformer oil and environmental matrices (water, soil) at URCST. Due to the experience and track record of participation of UR lecturers and students in the PCB inventory, it would be more natural to consider linkages with academia and research laboratories in this regard as they have broader mandate and scope and thus might be more accessible to responsible regulatory authorities, PCB holders and service providers than the quality control laboratories such as the laboratory at RSB. Moreover, as future PCB-related activities could focus on assessment of contaminated sites, URCST laboratory could be of assistance not only with analysis of PCBs in transformer oils but also in non-biotic environmental matrices such as soils, water and surface wipes.

Rating Output 1.1: Moderately Satisfactory (MS)

Output 1.2: The principal PCB holder and other possible holders are accessed to establish partnership scheme(s) for early/mature equipment replacement

The Guidelines for PCBs Inventory was developed by the first international consultant appointed under the project. It contains two chapters. Chapter I explains briefly the chemistry of PCBs, their potential environmental and health hazards as well as uses of PCBs. Chapter II is more detailed and specifically discusses how to identify equipment (e.g. transformers and capacitors) or materials suspected of PCB contamination. It provides general guidance how to conduct the inventory studies including necessary safety features and provides an overview of requirements for sampling and testing of samples for PCBs and gives instructions how to register the sampled equipment and materials. Finally, the guidelines also provide overview of the management and disposal options for PCB waste.

As discussed above in the section on Analysis of the project results framework, there is a clear inconsistency in this part of the results framework. The title of Output 1.2 and one of the target indicators focus on plan for early replacement of PCB-contaminated equipment while the other indicator target corresponds to capacity building for management of current and future PCB inventories.

Because of the inconsistency in the results framework, the Output 1.2 is not rated.

Based on the above, the overall achievement of Outcome 1 is rated Moderately Satisfactory (MS).

Table 9: Deliverables for Outcome 2

2.1: PCB legislation and technical guidance developed and implemented	A comprehensive national regulatory registry of all PCB containing equipment in service that is maintained and updated such that its status and fate can be tracked	A registry of in-service transformers containing PCB developed and maintained by REG/EUCL Guidelines for PCBs inventory developed and REG/REMA staff trained
	Explicit inclusion of high concentration PCB wastes as priority hazardous wastes in national waste management legislation/regulations. Consistency of these with applicable international standards and the Basel Convention on trans-boundary movement of hazardous waste.	Draft law “On determining the modalities of management, disposal and phasing-out the use of PCBs in Rwanda” developed Consultation/verification workshop with key stakeholders (2015) Review of the draft law on PCB by the Rwanda Law Reform Commission and submission to the Parliament for Approval
	Effective implementation and enforcement of use, re-use, trade, import and export bans including ensuring trade in scrapped contaminated PCB equipment and import of used PCB equipment is eliminated.	N.A.
	Allowance in practice of access by mandated regulatory authorities to sites potentially containing or contaminated by PCBs, including rights to initiate assessment.	N.A.
	Mitigation of cross contamination Mitigation of risks of leakage and PCB pollution during transport and handling	Guidelines for inspection, monitoring and assessment of PCBs in Rwanda; Guidelines for mitigation of cross contamination of PCBs oil during the power transformer reparation; Guidelines for recycling, decontamination and rehabilitation of PCB contaminating equipment, oil and sites; The guidelines posted at REMA website and disseminated among PCBs holders, and institutions with responsibilities for their management Training of REG/EUCL staff on the use the guidelines and their implementation
2.2: Developed and established rules to avoid cross-contamination of the oils and equipment; rules/procedures on handling contaminated oils/equipment and labelling		

Output 2.1: PCB legislation and technical guidance

The primary focus of this outcome was development of a new national law as a legal framework for management, disposal and phasing-out the use of PCBs in Rwanda. The national legislation in place at the project inception, namely *Organic Law on determining the modalities of protection, conservation and promotion of environment in Rwanda (4/2005)* provided only a general framework for regulation of chemicals in Rwanda and thus did not address specificities of the management, disposal and elimination of PCBs.

The new *Law on PCB disposal and management in Rwanda* was drafted by a team of national experts in 2nd half of 2014. The draft law encompasses provisions on phase-out plan and inventories of PCBs; obligations for testing, classification and labelling of PCBs; requirements on decontamination and prevention of cross-contamination of PCB materials and PCB contaminated materials; as well as specifications on PCBs handling, removal from service, recycling, transportation, storage, disposal. Furthermore, it also stipulates requirements for reporting and emergency preparedness, as well as institutional mandates and responsibilities in relation to the management, disposal and elimination of PCBs.

A validation workshop to discuss the draft law with key stakeholders was organized in early 2015. After the workshop, the text of the law was reviewed from the legal point of view by the Rwanda Law Reform Commission and from the technical point of view by the international consultant recruited by REMA under the project. Towards the end of 2016, the revised law was presented to the Ministry of Justice for submission into the Parliament.

As the country at the same time conducted revision of the Organic Law on Environment, the legislative process for the new law on PCB was put on hold for more than one year. Reportedly, a change in the format of the new PCB law has been considered to ensure consistency with the revised Organic Law on Environment and simplify the adoption process so that approval by the Parliament is not required. Format of the Order of the Prime Minister has been considered as one option. The framework Organic Law was enacted in August 2018¹¹ while the specific PCB Law was in the Ministry of Environment out of control of the project implementing partners.

To date the project has been unsuccessful at getting the national PCB legislation approved and enacted. Although the evaluator understands that the legislative process is a complicated process that is mostly out of control of the project implementing partner agencies, absence of the PCB legislation does not enable classification of PCB and PCB-contaminated materials as hazardous waste nor adoption and enforcement of specific obligations on PCB registration and phase-out and restrictions on trade and import/export of PCBs/PCB-contaminated equipment. Due to the lack of PCB legislation, government entities, in particular officers of the enforcement agencies, do not have unrestricted access to relevant information and entry of locations that may have PCBs wastes, stockpiles, PCB containing equipment and to PCB-contaminated sites. This is a particular challenge in case of PCB information from private and semi-private entities.

Continuation of this situation has not only been a substantial risk to sustainability of the achieved project results but also to preparation of follow-up activities. Recently, the national stakeholders commenced discussion about preparation of a new project with a wider focus on POPs (including PCBs) and mercury. However, it will be of critical importance for success of such efforts as potential donors might be reluctant to consider financial support if the legislative

¹¹ Law N°48/2018 of 13/08/2018 on environment replaces the Organic Law N° 04/2005 of 08/04/2005 determining the modalities of protection, conservation and promotion of environment in Rwanda.

basis for management of PCBs and PCB-contaminated materials is not enacted and effectively implemented.

Rating Output 2.1: The PCB Law as the main deliverable under this output has not been provided, however for the reason out of control of the project team, hence the rating of this output is **Moderately Satisfactory (MS)**.

Output 2.2: Rules on handling PCB-contaminated oil and equipment

In order to support and strengthen the implementation of the proposed legal framework for the management and disposal of PCBs, three technical guidelines on various aspects of the PCB management and one guideline on PCB inventory were developed and made available to main PCB holders as well as to the public. The guidelines provide information on best available techniques (BAT) and best environmental practices (BEP) as they apply to the prevention and minimization of PCB release to the environment.

The Guideline for mitigation of cross-contamination of PCB oil during the power transformer reparation was primarily prepared for utility companies, owners and users of PCB equipment, servicing facilities and operators of Treatment, Storage and Disposal (TSD) facilities to advise them on the safe handling of PCB contaminated equipment and materials. The guideline contains detailed instructions to carry particular processes regarding maintenance and repairing of transformers.

The other two guidelines are somewhat less specific and therefore devoted to a wider target audience. The Guideline for recycling of PCBs oils and decontamination / rehabilitation of PCBs equipment and contaminated sites has a relatively general part on decontamination of oil, soil and water and a more detailed part on recycling methods for PCB oil where in fact the guideline discusses methods of destruction of PCB-contaminated oil. At the end of the guideline, there is a short chapter on rehabilitation of contaminated sites that contains a general review of rehabilitation/remediation methods for PCB-contaminated soils and sediments.

The guideline for inspection, monitoring and assessment in for controlling PCBs effect in environment and public health contains an overview of procedures for regular inspection, sampling and testing of PCB-contaminated materials and sites. Although it is written in the preamble of the document that it is primarily devoted to PCB holders, a major part of the information contained therein is relevant to the work of central normative and enforcement agencies such as RSB and REMA as well as for environmental officers and facilitators working at district level.

Based on the review of activities implemented under the project, it can be concluded that the guideline for mitigation of cross contamination has been used by the PCB holders to improve their day-to-day handling of PCB-contaminated oil and equipment. The other two documents appear to be informative materials rather than practical guidelines for day-to-day operations. No activities on testing, assessment nor on rehabilitation of PCB-contaminated sites were implemented under the project.

Nevertheless, the package of the three guidelines provides comprehensive information background on multiple aspects of PCB contamination and are therefore valuable and useful for a variety of target audiences.

Rating Output 2.2: Satisfactory (S)

Based on the above, the overall achievement of the Outcome 2 is rated Moderately Satisfactory (MS).

Table 10: Deliverables for Outcome 3

3.1: Public awareness campaigns conducted	Widely accessible current information on PCBs and ongoing management activities. Integration into a national information program on sound chemicals management	Training Manual for PCB awareness raising (October 2014) Information and communication materials (video, banners, brochures) translated into local language (2016)
	Inclusion of chemicals management and particularly PCBs in relevant educational programs, and active R&D interest in addressing it.	Capacity Building Plan for PCBs and other chemical management in Rwanda (September 2014)
	Well informed stakeholder community engaged in addressing the issue with a high level of understanding and technical capacity.	32 journalists from 32 different media houses trained (November 2014) 1662 people trained on harmful effects of PCBs to human health and environment (2014-2016) Weekly radio and TV infomercials for the period of 12 months (2016-2017) Total 1,113 people from the government, media and public trained on PCB health and environmental risks
3.2: Promoted safe and proper equipment handling at holders; holders trained on leak handling, safeguarding and repairing of old/damaged equipment	Comprehensive strategy and plan adopted, defining selection and the process of implementation of pre-treatment and disposal options both to be applied in the country (i.e. equipment decontamination, soil management, potential cement kiln utilization) and through export,	Action Plan for Management and Disposal of PCBs developed by REMA (2014) Review of the national plan conducted including targets related to decontamination and disposal of PCB oil, material and equipment (included in the 2016 NIP update) Plan for management of in-service transformers and disposal of retired transformers developed by REG/EUCL (2016)
	Operational capability within responsible government agencies and/or commercial service providers to undertake assessment and clean-up of PCB contaminated sites consistent with international practice.	The Huye site identified as the most seriously contaminated site
	A fully elaborated detailed plan endorsed by responsible authorities and PCB holders for replacement of in service PCB equipment identified in the detailed national inventory (Outcome 1), consistent with Convention obligations.	A plan for management of in-service transformers completed by REG/EUCL (2016) 7 transformers with higher PCB concentration replaced (2016) 4 transformers with high level of PCB contamination identified with private holders and replacement requested PCB oil removed from 28 transformers with lower PCB concentration in service and transported to CIMERWA for testing of the incineration 96 transformers contaminated with PCB drained and 118 drums of PCB waste oil stored at Gikondo
	Secure PCB handling, transport, storage operations	Procedures established for management of in-service Askarel and PCB-contaminated transformers Procedures for handling and transport of PCB-contaminated transformers (including maintenance) in the REG/EUCL repair shop established

Output 3.1: Public awareness campaigns

Implementation of the capacity building activities commenced with elaboration of a Capacity Building Plan on for PCBs and other chemicals' management in Rwanda. The Plan, produced in September 2014, with the intention to be a road map for all capacity building activities in the project, systematically categorized the target audience into two groups according to their potential exposure and health risks as well as the impact the two groups could play for achievement of the desired state of a safe chemicals management. The primary target group included technical and managerial staff in institutions directly dealing with management of chemicals, field/store operators of electrical companies as well as communities residing in the vicinity of PCB-contaminated sites. The secondary group comprised of universities and research institutions, secondary schools, policymakers and local government authorities, as well as environmental, women and youth NGOs.

Elaboration of the Capacity Building Plan was followed by one-day train-the-trainer workshop in October 2014. Fifty-four (54) participants from the two principal stakeholders of the project, namely REMA and REG, were trained on the use of various awareness-raising tools. This was followed in November 2014 by another workshop attended by 32 journalists from various trained media houses. The aim of the media workshop was to train the journalists how to raise awareness of the general public of the PCB inventories that were conducted around the same time. Further training events were organized in 2015, a training workshop for 30 district environmental facilitators and another workshop for 55 representatives of environmental NGOs.

The seminars and training workshops were conducted for various target groups including environmental clubs in secondary schools, students and lecturers from 2 leading national universities, as well as women and environmental NGOs. About 225 students and staff from 2 higher education institutions (University of Rwanda, University of Kigali) were trained on harmful effects of PCBs and 1,113 secondary school students participated in training workshops on the same subject. A total of 1,664 people from the capital as well as four regions participated in the trainings that ensured increased level of awareness of PCBs and risks associated with them across the country.

The University of Rwanda incorporated two modules regarding PCBs into its regular course on Environmental Chemistry, namely the Organic Chemistry module taught in the 2nd year and the Fundamental Waste Management module taught in the 3rd year of the course. Both modules were developed by UR lecturers that have participated in the project as members of the PSC or national consultants and therefore benefited from direct access to information about all aspects of PCBs and their management generated by the project. About 90 students enroll annually to the two modules.

While the evaluation documented the systematic approach of the awareness-raising component for reaching to a wide range of stakeholders and making information on PCBs and their management widely accessible, it also made observation that it is difficult to prove the link between awareness and practice, i.e. to make assessment whether the level of awareness of the wider stakeholder community (in particular the public at large) has been sufficient to prompt to take active part in addressing the PCB issue.

Rating Output 3.1: Highly Satisfactory (HS)

Output 3.2: Safe and proper PCB and PCB-equipment handling

A majority of PCB-contaminated transformers are owned by the Rwanda Energy Group (REG) which is a public company producing and distributing electric power. Few transformers were found with private owners.

Under output 3.2, specific trainings were organized for staff of REG/EUCL on identification, sampling, qualitative and quantitative analysis and drainage and storing of contaminated dielectric oils. Under the same output, procedures were developed for management of in-service Askarel and PCB-contaminated transformers as well as procedures for handling and transport of PCB-contaminated transformers (including maintenance) in the REG/EUCL repair shop.

An action plan for management and disposal of PCBs was developed by REMA in March 2014 in parallel with the inventory of PCB-contaminated transformers.

The action plan recommended as priority actions the following:

- Safeguarding of in-service transformers containing PCBs
- Safeguarding of stored equipment containing PCBs
- Disposal of equipment containing PCBs
- Remediation of selected contaminated sites

With regards to safeguarding of in-service and stored PCB-contaminated transformers, procedures were established with the principal PCB holder (REG/EUCL) for handling and transport of PCB-contaminated transformers (including maintenance). In fall 2017, REG/EUCL teams replaced 7 transformers with higher PCB concentration (2,000 ppm and higher) and removed PCB oil from additional 28 in-service transformers with lower PCB concentration (51 – 1,256 ppm) and cleaned the transformers.

There is a list of additional 38 transformers owned by REG/EUCL to be cleaned but the clean-up operations had to be put on hold due to lack of PCB-free transformer oil. Additional 4 transformers are privately owned. Expedition of the drainage/clean-up campaign was also negatively hampered by equipage insufficiencies, as only one pump was available for drainage of the transformers. Although REG/EUCL had requested procurement of two additional pumps from the project, the procurement did not materialize as the request came too late to be included in the 2017 procurement plan.

A majority of the PCB-contaminated transformers are being reused based on the retrofilling technique. As the latter method is not economically viable for Askarel and highly PCB-contaminated transformers, they must be decommissioned and dismantled, their contents and their carcasses incinerated in facilities outside the country.

During the evaluation mission, the evaluator made a quick inventory of the existing waste stockpiles consisting of materials consisting of or containing PCBs as follows:

There are 101 records of PCB-contaminated in-service transformers in the database. However, for the last record (item No. 101), there is no data and the operational unit of the REG/EUCL claimed that it was not a transformer.

Majority of the 100 contaminated transformers were under ownership of REG/EUCL. With the exception of 4 transformers, the rest (96 transformers) had been drained and the PCB-contaminated oil collected and stored at the Gikondo storage. The remaining 4 transformers had high level of PCB contamination, namely 2 units at Mironko Plastic Industries in Kigali, and 1 unit each at Ruhengeri Hospital (Musanze, Muhura, Northern Rwanda), and La Palisse. REMA notified the owners of the requirement to drain and replace the PCB-contaminated oil but the speed of the replacement was slow as the owners were supposed to cover the cost of the drainage and replacement dielectric oil. At least the transformer at Ruhengeri Hospital is expected to have the oil replaced.

Moreover, other 7 transformers with high level of PCB contamination had been replaced and stored at the Gikondo storage facility. Another transformer with unknown level of contamination has been waiting for test of the PCB content.

REG/EUCL replaced 2 Askarel transformers found by the survey at the National Bank. The transformers carcasses are stored at Gikondo. The third Askarel transformer is in possession of the Hotel des Mille Collines in Kigali. The owner developed a plan for replacement of the transformer but is not ready to implement it.

There are four indicator targets for assessment of achievement of this output. The evaluator is of the opinion that in the formulation of these targets the project was too ambitious. According to one of the indicators, the project was expected to build capacities for assessment and clean-up of PCB contaminated sites.

With regards to the remediation of contaminated sites, the 2014 inventory judged 6 sites of old transformers manufactured before 1986 with high leaks as hot spots and contaminated sites. Consequently, the action plan considered the site at Huye as the most contaminated and earmarked for priority action. The REG/EUCL storage site and repair shop at Gikondo was earmarked for the second priority action. The targets for remediation of contaminated sites in the action plan included the following:

- Evacuation of the Huye site and disposal of contaminated oil and sludge in an environmentally safe manner, however, according to the quantitative testing the site is not contaminated;
- Investigation of remaining PCB contamination, assessment of the risk of groundwater contamination and establishment of a system for monitoring of PCB contamination of the ground water;
- Remediation of the REG/EUCL storage site and repair shop to a level of contamination, based on an environmental risk assessment, that is not considered to constitute a significant risk of PCB exposure of the environment and people;

Apart from the identification and designation of the contaminated sites, there is no information available about any activities related to this target.

Rating Output 3.2: Moderately Satisfactory (MS)

The overall achievement of the Outcome 3 is rated Satisfactory (S).

Table 11: Deliverables for Outcome 4

Output	OVI Targets	Delivery Status at Terminal Evaluation
4.1: Assessed existing locations for safe PCB equipment storage 4.2: Collected PCB equipment / packaged oils and waste sent for storage location(s)	1 national designated secure storage facility established in RECO premises and equipped with necessary infrastructure for PCB waste stockpiles under continuing care and custody of a responsible government authority. Major holders have secure storage facilities to accommodate PCB contaminated equipment when retired as an option. Mitigation of risks associated with handling and transport of PCBs	Guidance for safeguarding of the contaminated transformers in the old storage in Gikondo New storage warehouse in Jabana constructed (2015) and commissioned (2016) Procedures for PCB waste acceptance and transport established and tested in practical operations (2016 – 2017) Hazardous Waste Manifest System developed (2016) Procedures established for the implementation of a pilot HW manifest system in Rwanda (2017) PCB holders trained on the implementation of the HW manifest and PCB-contaminated oil and waste storage register (2016-2017)
4.3: Agreed disposal plan put in place: shipment overseas and final disposal	Fully operational service provider capacity to support the securing of PCB waste stockpiles and transport to the designated national facility or export for disposal Establish the feasibility of environmentally sound transformer decontamination locally as an option to replacement and export of large volumes of materials for ESM disposal Equipment replacement scheme promoted at RECO to replace up to 42 transformers in use Environmentally sound disposal of max. 150 tonnes of PCB oil and PCB contaminated mineral oil and local experience for future disposal requirements Max 350 tonnes of PCB-contaminated solid waste material packed and safely stored	31 drums with PCB liquid waste transported to CIMERWA for testing of the co-incineration in June 2017 Altogether 118 drums with PCB liquid waste transported to CIMERWA in two transports (February and August 2018) A study for cost comparison of available PCB waste disposal options (2016) A feasibility study on co-incineration of PCB-contaminated oil in cement kiln (2017) Guidance for management of highly contaminated or pure PCB transformers (2017) Contract signed between REMA and CIMERWA for incineration of up to 50 tonnes of PCB-contaminated oil 4.36 tonnes of PCB oil transported to CIMERWA and incinerated during testing of the incineration procedure 28.46 tonnes of PCB oil transported to CIMERWA in February 2018 22.4 tonnes of PCB-contaminated oil transported to CIMERWA in August 2018 Inauguration ceremony for incineration of PCB liquid waste held on 17 August 2018 and total 50.86 tonnes of PCB-contaminated oil incinerated in August

Implementation of Outcome 4 commenced in 2Q 2016 with appointment of the 2nd International Consultant. The above tasks were implemented in the period of May 2016- August 2018.

Output 4.1: Assessment and upgrade of PCB storage locations

During the development of the project, REMA had committed in-kind co-financing in the form of a location (land) for an earmarked temporary storage of PCB-waste and PCB-contaminated equipment at Jabana, Umuiy Wa Kigali.

The construction of the new central warehouse at Jabana was completed in 2015. After two inspections by the international consultant the facility was commissioned for PCB temporary storage in the 2nd Quarter of 2016. The storage building covers a surface of around 419m² with a maximum height of around 7 m. However, according to the technical report provided by the

designer, the storage was designed only for the storage of barrels containing PCB oil. Therefore, equipment for loading, unloading, handling and pre-treatment of PCB-contaminated equipment (out-service transformer carcasses) was not part of the construction project.

The purpose of the Jabana storage construction was to achieve a complete segregation of PCB oil and PCB-contaminated waste from other types of equipment and material waste and to ensure that the stockpiles consisting of or containing PCBs are handled, collected, transported and stored in an environmentally sound manner in line with international standards of the Stockholm Convention.

The evaluator would like to highlight that the construction of the Jabana storage was commissioned by REMA (as the project national implementing partner) and the latter was the owner of the facility at the time of TE. At the time of the evaluation mission the site was not accessible by trucks and construction of a bridge to facilitate truck access for trucks was suggested by the international consultant. The bridge was constructed in fall 2018. Also, a final operational and safety upgrade of the facility was planned before transfer of the ownership to REG/EUCL.

Rating of Output 4.1: Moderately Satisfactory (MS)

Output 4.2: Storage of PCB contaminated oil and equipment

In July 2016, dielectric oil from 180 transformers stored in the old storage at Gikondo was tested with the chlor-n-oil quick test and 52 transformers were found with PCB contamination at a level exceeding 50 ppm. A guidance for the safeguarding of PCB contaminated transformers at the Gikondo storage was prepared by the International Technical Adviser and through REMA officially submitted it to REG, and, consequently, a plan was developed to arrange the removal of the PCB-contaminated transformers to a new storage in order to segregate the PCB-contaminated and PCB-free transformers.

Moreover, the following technologies were considered for decontamination and disposal of PCB-contaminated equipment:

- Retrofilling of low-contaminated transformers with new dielectric oil PCB free;
- Cleaning of low-contaminated transformer carcasses through single or multiple rinsing with PCB-free fuel oil;
- Incineration of PCB-contaminated oil in cement kiln (Output 4.3);

For in-service transformers, it was suggested to perform retrofilling by draining PCB-contaminated oil from a transformer and refilling it with a PCB-free insulating fluid. This technology prevents the phasing out of the transformers and reduces the offline time.

For carcasses of end of life transformers, the choice was drainage (basic solvent washing) by flushing the non-porous part of a PCB-contaminated transformer with PCB-free fuel oil, and subsequent disposal of the oil.

For management of transformers with low level of PCB-contamination two options were proposed. Cleaning of transformer carcasses through single or multiple rinsing with PCB-free fuel oil was proposed for end-of-life transformers while retro-filling with new dielectric PCB-free oil was the choice for transformers still in the service. Following instructions from the international consultant, 24 out-of-service PCB-contaminated transformers were identified at the old Gikondo storage, set aside in a specific area of the facility, the PCB-oil was drained and stored in 31 drums that were transported to CIMERWA for testing of the co-incineration of PCB waste (described under Outcome 4.3). Later, the transformer carcasses were transported to the new storage at Jabana.

According to the interviews conducted during the evaluation field mission, there were 118 drums with PCB-contaminated oil stored at the Gikondo site and prepared for transport to the place of final disposal at CIMERWA. This was confirmed by the visit of both storage sites by the evaluator. At Gikondo, the evaluator found the drums with PCB liquid waste stored in the open-air area and 8 transformers with high level contamination stored in the repair workshop under the roof. The transport of the 118 drums for incineration at CIMERWA was scheduled in the week of the evaluation mission but it was postponed as CIMERWA had to conduct some additional preparatory work. The drums were transported to CIMERWA on 15 August and an official inauguration ceremony to commence the incineration was held 2 days later. The total amount incinerated was 51.2 tonnes of PCB-contaminated oil so together with the amount incinerated during the testing of the incineration procedure the total amount of PCB oil incinerated reached 55.2 tonnes.

In the storage building at Jabana, the evaluator found three drums with PCB-waste oil (probably the combined collected waste from samples for testing of PCB oil) and a number of empty drums marked as PCB-waste. Moreover, 24 transformer carcasses were found outdoor in the area adjacent to the ramp of the storage building.

Apart from the bulk of the PCB-waste generated during the treatment of transformers that has been on track for environmentally safe disposal through the co-incineration, there is also limited amount of waste that cannot be treated locally, namely:

- Solid waste (transformer carcasses) contaminated by PCB with a concentration exceeding 50 ppm
- Transformer oil with concentration of PCB above 2,000 ppm
- Transformers with level of PCB above 2000 ppm

This waste will be temporarily stored at the Jabana storage until a feasible disposal option is found.

According to the supervision reports by the international consultant, transport of PCB oil drums to CIMERWA in February 2018 did not fully follow the procedures for hazardous waste transport developed and established under the project. Insufficiencies were observed on the side of REMA, REG/EUCL and CIMERWA in implementation of the hazardous waste acceptance procedures, in the conduct and supervision of the drums' loading and offloading operation as well as in emergency planning for events of waste spillage. Moreover, there have been differences in opinions of the consultant and the PCB waste holders regarding the format of labelling of the drums with PCB-contaminated oil (plastic label stickers vs. scratched labels on drums).

Based on the above findings and observations, it appeared that the procedures for handling, transport, and storage of PCB waste as well as the intended separation of the stockpiles consisting of or containing PCBs from PCB-free materials was not fully achieved. However, the incomplete segregation of the PCB waste oil was only temporary due to the postponement of the PCB incineration at CIMERWA (described below under Outcome 4.3) and the delays in commissioning of the Jabana temporary storage facility. Since all previously collected PCB waste oil was incinerated at CIMERWA in August 2018, there was no PCB waste oil at Gikondo storage at the end of 2018. PCB-contaminated oil collected in the future will be stored at the Jabana storage.

Moreover, there were also reported deficiencies in the compliance with the procedures for hazardous waste chain of custody and traceability (labelling of drums, use of new drums for storage) that require attention and corrective actions by all involved stakeholders.

Rating of Output 4.2: Moderately Satisfactory (MS)

Output 4.3: Plan for disposal of PCB-contaminated materials

The disposal of PCB wastes turned out the most challenging part of the project. The main challenge faced by Rwanda in the export of PCB waste for final disposal abroad was the high cost of the packing and transport as well as restrictions in trans-boundary movement of PCB-containing oils and PCB-contaminated solid waste.

In 2016, cost analysis was conducted in order to estimate the cost of shipment of PCB-contaminated waste abroad (the disposal option envisaged in the Project Document) and the cost of incineration of PCB-contaminated oil in cement kilns. The analysis concluded that it was not considered feasible to use export routes for disposal of the PCB-containing waste with the budget allocated under the relevant component of the project (Output 4.3). An alternative option based on import of equipment for the treatment of PCB-contaminated oil (such as a PCB dehalogenation system) was also found beyond the project budget allocation.

A new state-of-the-art cement production facility was commissioned in Rwanda in 2015, (Bugarama plant, Rusizi region, CIMERWA PPC). Since co-incineration of PCB waste in cement kilns is one of the Best Available Technologies (BAT) under the Stockholm Convention and has been proven for PCB waste disposal in several countries in Asia, the project team decided to explore this option with the aim to use it for PCB disposal instead of the originally envisaged option of the shipment abroad.

After initial negotiations with CIMERWA management confirmed readiness of the company to participate in the project, a composite sample of oil from the transformers located in the storage at Gikondo was shipped to an international laboratory for confirmation of the PCB concentration (previously determined by the LX-2000 rapid analytical method) and determination of other parameters relevant to the co-incineration of PCB in a cement kiln.

In April to May 2017, all PCB contaminated transformers located in Gikondo were drained and the oil was placed in separate labelled drums. Drums with 4.36 tonnes of PCB-oil from the transformers were transported to CIMERWA to enable testing of the procedure in line with the Stockholm Convention BAT/BEP.

In June 2017, a burning test of all PCB-contaminated dielectric oil previously transported to CIMERWA was conducted in accordance with the requirements of the Stockholm convention BAT. The procedure of quality control and acceptance of the waste oil by CIMERWA was ensured through the technical assistance of UNDP international technical consultant.

PCB oil was fed to the cement kiln through the main burner and the flue gas sampling and analysis was carried out by an internationally accredited laboratory (Eccochimica Romana, Italy) following internationally recognized standard methods.

The main parameters of the test are summarized in Table 12.

Table 12: Main parameters of the PCB co-incineration test at CIMERWA

PCB concentration in the oil	122 mg/kg
PCB oil flow rate	313 kg/h
Test duration	369 minutes
Total amount of PCB incinerated	234,844 mg
Stack gas flow rate	170,000 Nm ³ /h
PCB concentration at the stack	0.771 pgTeq/Nm ³
Destruction and Removal Efficiency	99,9999994 %

The co-incineration test confirmed that the concentration of dioxin-like PCBs (DL PCBs) and polychlorinated dibenzodioxine and dibenzofurane (PCDD/F) at the stack of the kiln were from

100 to 6 times lower than the limit established under the Stockholm convention (0.1 ngTeq/Nm³), the concentration of DL PCBs and PCDD/F in the ashes sampled from the bag filter was below the low analytical limit of detection and the estimated Destruction and Removal Efficiency was higher than the 99,9999%. The PCDD/F concentrations were found of the same order of magnitude as in other similar plants during normal operation (i.e. burning coal only). The test confirmed that the plant is suitable for burning oil with PCB concentration up to 1,000 ppm, at an average flow rate of about 300 L/h fed through the main burner.

Following the success of the incineration test, REMA and CIMERWA concluded a contract for disposal of up to 50 tonnes of PCB-contaminated oil by co-incineration at the CIMERWA Bugarama plant in Rusizi. The value of the contract, signed in March 2018, was 49,000 US\$. The contract contains an option to increase the total incinerated PCB oil quantity if needed, in such case the disposal will be paid on a weight basis (150 US\$/ton of PCB oil). Furthermore, total 50.86 tonnes of PCB oil were transported to CIMERWA in two batches (February and July 2018) and were disposed of by incineration in August 2018.

It has to be noted that the total amount of PCB waste oil incinerated (55.2 tons) is only about one third of the amount that was envisaged for disposal in the Project Document (150 tonnes). The latter amount was based on the results of the initial 2005 survey that had not provided fully reliable values and therefore the planned amount was probably overestimated. Nevertheless, the evaluator is of the opinion that the actually completed incineration of 55.12 tonnes PCB oil at the local facility, could be rated as highly satisfactory achievement of the Output 4.3 as the actually pursued final disposal option by incineration is a far more long-term solution than the original plan for transport of PCB waste abroad. Moreover, it is possibly for the first time when the PCB final disposal option by incineration in cement kilns is practically implemented in Africa so it could also serve as reference for other countries in the region that would opt for the local final disposal option.

Rating of Output 4.3: Highly Satisfactory (HS)

Overall rating of Outcome 4: Satisfactory (S)

Achievement of the Project Objective:

This section of the TE Report discusses overall achievement of the project objective of minimizing environmental and health risks associated with PCBs through strengthening technical and regulatory capacity for the environmentally sound management and disposal of PCBs in Rwanda.

The project has helped establish solid foundations for sound management of PCBs in Rwanda by contributing to removal of several barriers to effective implementation of the country's obligations under the Stockholm Convention that had been identified at the PIF/PPG stage.

The flagship deliverable of the project at the time of TE has been the updated inventory of transformers that helped to substantially reduce the information gap on the physical extent of PCB contamination in the country as it provided new information in terms of quantities and location of PCB-contaminated transformers. The updated inventory not only contributed to better identification of the national stock of PCB-containing transformers in terms of levels of PCB concentration but also enabled to establish a plan for a gradual phase-out of in-service transformers and decommissioning of out-of-service transformers. The national technical capacity for elaboration of PCB management strategies and action plans has been enhanced as well.

The information on the level of PCB-contamination of transformers in the updated inventory was obtained through field testing by rapid analytical methods and could therefore be

considered as more information than the 2005 survey. However, as the national capacity for PCB laboratory analysis by more accurate analytical techniques (such as GC/ECD and GC/MS) has not been established, the results were verified only in one case of the composite sample of PCB-oil that was tested by a laboratory in Italy in relation to the feasibility of incineration of PCBs in the local cement kiln.

It has to be emphasized that the survey covered only large PCB holdings, i.e. transformers. Although the inventory reportedly attempted to include also capacitors, it produced only a statement that all capacitors found were PCB-free. The report did not present any quantitative results in terms of number of capacitors found and their location (i.e. whether the capacitors were found with in-service or out-of-service transformers). As a matter of fact, capacitors are estimated to constitute the second largest source of PCBs therefore more focus on inventory of capacitors would be desirable during future updates of the survey as it is also suggested in the relevant section of the 2016 NIP update.

The project provided the technical support and assistance in the development of a draft *Law on PCBs Disposal and Management in Rwanda* to cover all aspects of the PCB cycle, assign roles and responsibilities for PCB management, oversight, reporting and enforcement to public administration agencies, PCB users and other stakeholders. The proposed regulation was developed through a participatory process with the participation of all relevant stakeholders.

However, the project did not succeed in getting the PCB Law approved and enacted due to the length and complexity of the legislative process. However, the evaluation noted that the draft law had passed almost through all mandatory review stages and that the final approval of the draft Law has been beyond the control of the project implementing partners. Nevertheless, despite the contribution to the capacity building for understanding and formulation of PCB-related legislation, the full strengthening of the national regulatory capacity for sound management of PCBs was not achieved.

The continued absence of the specific legal provisions is likely to prevent key stakeholders from fully assuming their respective role in the PCBs management system designed under the project and could result in considerable slow down or even halt of implementation of the PCBs management strategy and the action plan. This constitutes a serious risk as it could undermine the commitment of the stakeholders to management of already identified PCB-contaminated materials and weaken the momentum for future expansion of activities into management of small PCB holdings such as capacitors and hydraulic compressors.

The absence of accredited national laboratory capacity for analysis of PCBs in PCB oils and environmental matrices at the project closure is a serious impediment to the management of PCBs in the country. The implementing partners have recently started discussion about a follow-up project on management of POPs. Accredited and operational national laboratory will be absolutely critical for any future PCB- and POPs-related activities such as inventory of small PCB holdings and assessment and remediation of PCB/POP contaminated sites. The evaluator is of the opinion that the laboratory capacity for PCB/POP analysis should be established before start of future SC-related project(s). It will require certain level of international technical assistance in terms of capacity building as well as limited financial support as it could be based on the existing in-country laboratory equipment and infrastructure base. Considerable scientific and technical skills to conduct laboratory functions at the University of Rwanda have been created and upgraded in parallel with the project by other sources of support. Without any doubt, such laboratory capacity should be established prior to implementation of any future POPs/PCBs-related project.

The project has also developed and cultivated keen awareness of the risks posed by PCBs, and of options to manage these risks among the relevant enforcement agencies, electricity utilities,

educational institutions and public at large. Although it is difficult to measure the level of success in awareness-raising, there are indicators that better understanding of the risks of PCBs to human and environmental health increase political willingness and action of relevant authorities (including senior politicians) and PCB holders to safeguard and gradually phase-out PCBs.

Through involvement of lecturers from the University of Rwanda as national consultants and members of PSC and active participation of UR students in the physical conduct of the PCB survey the project facilitated integration of the PCB-related information into UR educational curricula for under-graduate students. The first-hand access of UR lecturers to detailed relevant information on various aspects of the PCB issue was also instrumental for improvement of quality of the UR courses and modules on organic chemistry and fundamental management of waste.

It has to be noted that the project has also contributed to improvements in communication about the PCB issue in the country. Prior to the project, the REG/EUCL as the principal PCB holder was on several occasions blamed for improper management of PCBs by environmental journalists. The collected data and established procedures under the project not only provided more information but also contributed to better understanding of duties and obligations of the key stakeholders, i.e. the electric utility company, national enforcement agency and general public and enabled all stakeholders to be much more forthcoming on the topic in comparison with the situation before the project.

The national technical capacity for environmentally sound management of PCBs was strengthened and enhanced through elaboration and adoption of four technical guidelines on various aspects of the PCB waste management cycle. The guide on servicing, repairing and maintaining PCB-containing equipment provided instructions to REG/EUCL and other PCB holders for prevention of cross-contamination, spills and illegal discharges or disposals. It also contributed to building capacities of the PCB holders in decontaminating and cleaning up equipment and materials contaminated with PCBs. Through development of two other technical guidelines, the project provided required technical tools in support of the regulatory control and facilitated creation and establishment of infrastructure and operational capacity for environmentally safe safeguarding and management of PCB-contaminated oil and materials.

At the same time, however, the evaluation noted the reported slow uptake of the standardized procedures for safeguarding, handling, transport and storage of PCB-contaminated materials as well as lack of commitment to the procedures on proper packaging and transport of PCB-containing or -contaminated oil, equipment and materials to ensure public health and safety, and preservation of the environment. One of the reasons for the slow uptake and low commitment could be inability of the national stakeholders to allocate equipment for loading, unloading, handling and pre-treatment of PCB oil and PCB-contaminated equipment.

The evaluation also noted that two areas necessary for effective management of PCBs were insufficiently or not at all addressed by the project as follows:

Although one of the target indicators under the Output 3.2 aims at achievement of operational capacity to undertake assessment and clean-up of PCB contaminated sites, no activities were planned to develop or strengthen skills and tools to conduct site assessment and inspections. The draft Law on PCB Disposal and Management stipulates several provisions related to site assessment and inspections. Once the Law is enacted, lack of capacities of the responsible government agencies to assess compliance with the Law could weaken effectiveness of the enforcement.

The Action Plan No. 4 in the 2006 NIP contains Action 4.2: “*Prohibit the importation of electric equipment with PCBs*”. In this regard, the evaluation noted that no activities were envisaged in the project on awareness-raising and development of sufficient skills of the national customs authorities to inspect, process and clear PCB-containing oil, equipment and materials either for export or import into the country.

The list of the project’s achievement would be incomplete without mentioning the completed feasibility study of the PCB disposal by incineration in the locally available cement kiln in line with the Best Available Techniques and Best Environmental Practices under the Stockholm and Basel Conventions. The contract concluded with the Rwanda’s integrated cement manufacturer envisages incineration of up to 50 tonnes of PCB liquid waste with an option to increase the amount if necessary. By the time of the terminal evaluation, incineration of 55.2 tonnes of PCB-oil was completed.

In summary, the evaluator concludes that the project achieved some degree of reduction of environmental and health effects of PCBs. This has been achieved through the inventory of PCB waste, awareness of the PCB holders, of relevant government entities and public at large on the risks posed by PCBs. The immediate effect of the project is elimination of practices where PCBs and PCB contaminated material had been randomly disposed of or exported for direct recycling and re-use and resulted in uncontrolled PCB releases into the environment from unprotected metal reclamation or from selling of PCB oils for local open uses.

The long-term effect of the project is anchored in enhancement of the national technical capacity for identification and testing of existing equipment contaminated with PCBs in accordance with the Stockholm Convention and laid foundations for environmentally sound management of yet to be identified PCB sources and for temporary storage of PCB-contaminated waste materials. Last but not least, the project was successful in testing and pioneering environmentally safe final disposal of PCB-contaminated oil through incineration of 55.2 tonnes of PCB waste oil in local cement kilns in line with the recommendation of the Stockholm Convention.

However, the evaluation concludes that the project did not realize its full potential. Although the project implementation period was twice longer than originally approved, at the end of the project there is some unfinished matters related to PCB management. Sizeable amount of PCB wastes has not been fully separated from non-PCB waste materials and the national regulatory capacity for PCB management remains relatively weak due to the absence of the specific PCB legislation and will have to be further strengthened in line with provisions of the new environmental legislation related to management of hazardous waste and more targeted regulations expected in the new PCBs legislation.

Also, although the most critical part of the in-service transformers has been addressed and all identified highly contaminated transformers in possession of REG/EUCL have been drained and replaced, there has not been such progress in PCB phase-out from the four in-service highly contaminated transformers owned by private owners and leakage of PCB-containing liquids from these in-service transformers constitutes a potential release route of PCBs into the environment. Moreover, assessment of the PCB-contaminated site was not conducted as planned and the old REG/EUCL storage site and repair shop at Gikondo has not been remediated and constitutes a significant risk of PCB exposure. Last but not least, practical implementation of the standard procedures on PCB-contaminated waste materials custody and traceability during transport and temporary storage of PCB-contaminated waste materials has shown only a moderate progress.

The project objective aimed at strengthening both technical and regulatory capacity for environmentally sound management of PCBs. It clearly follows from the above text that the

project has effectively enhanced the national technical capacity for environmentally sound management of PCB oil and PCB-containing equipment at all stages of the PCB management cycle. The national regulatory capacity has been enhanced only to the point of creation of the specific PCB legislative measures as the approval of the specific PCB legislation developed under the project is still awaiting approval and this process has been out of control of the project implementing partners. Therefore, the national capacity for implementation and in particular for enforcement of the specific PCB legislation will have to be further enhanced once the specific PCB legislation is enacted.

Based on the above, the overall **rating of the achievement of the Project Objective is Satisfactory (S).**

Efficiency

Three main issues were examined in relation to efficiency, namely the length of the project implementation period, the allocation of GEF financial resources to the project and cost-efficiency of the final disposal by incineration in the local cement kiln.

The project was originally approved for duration of 36 months but actually lasted for six years (72 months) from January 2012 to December 2018. The first transfer of GEF funds from UNDP to the National Implementing Partner (REMA) took place nine months after the official project start. The project implementation from the start was negatively affected by insufficiencies in the project planning and management as well as lack of national technical expertise in the PCB-related areas.

The late transfer of funds from UNDP to REMA was reportedly caused by inability to agree on realistic substantive and financial workplans during the first year of the project. In order to improve and accelerate the project delivery, REMA as the National Implementing Partner strengthened the project management team by appointing two additional staff to the project as of 2013, namely the M&E Officer and the Project Officer in addition to the National Project Manager.

While the above delays were caused by the general project planning and management issues, the project was also negatively impacted by the administratively complicated procurement processes. According to relevant national legislation, REMA had to include each planned procurement of goods and services under the project in its annual procurement plan and the latter had to be integrated with the annual procurement plan of the Rwanda Public Procurement Authority (RPPA). Too much time was required for each procurement event which had negative effect on implementation of project activities for which the procurement was requested.

The REMA project team also found difficulties in recruitment of national consultants and reportedly had to re-advertise the recruitment announcements. This was probably due to the novelty of the PCB issue in Rwanda as the pool of national consultants with such expertise had not been established. Recruitment of international consultants was also protracted as announcements published at the REMA website and in the national printed media could not attract attention of qualified international consultants. The delays in procurement resulted in submission of request from REMA to UNDP asking the latter to take over international procurement for Outcome 4.

The length of procurement was mentioned as the reason for delays in several project monitoring and implementation reports. However, the same reports also noted no substantial acceleration of procurement after UNDP took over. Some comments hinted that completion of almost every activity took longer than expected and that corrective measures were not taken quickly enough to mitigate implementation challenges as they occurred.

National procurement had to permanently conform to the national procurement rules described above that had negatively affected the implementation of the plan for phase-out of PCBs from the in-service transformers. REG/EUCL submitted request for purchase of two additional pumping units in 2017 but the procurement request was reportedly presented too late with regard to the procurement planning process and hence could not be implemented in 2017. Consequently, there was only one pumping unit available for retro-filling of in-service transformers and REG/EUCL technicians had to use the same pump for draining of PCB-contaminated oil from the transformers as well as for refilling PCB-free oil into the transformers. As the use of the single pump involved high risk of cross-contamination, the technicians had to drain and flush the pump completely before each refilling. This considerably slowed down the transformer draining operations and increased the material cost due to excessive use of the flushing agent.

The extension of the project by additional three years was a no-cost extension to GEF but had obvious impact on the increased overall project management costs. According to the CDRs, expenditures for service contracts and office supplies in the period 2016-2018 can be roughly estimated up to additional 90,000 US\$ in the costs of the project management and related administrative expenses. Although these costs did not draw from the GEF grant, they negatively affected overall efficiency of the project implementation. In relation to the overall financing of the project it has to be emphasized that the UNDP co-financing was almost double of the originally pledged amount (271,000 US\$ instead of 149,930 US) and part of this increase was used to cover the overhead cost of the protracted project implementation.

Comparison with other similar projects and with the average price of PCB-waste disposal suggests that the allocation of GEF funding for the project in Rwanda was too low, in particular the part for disposal of PCB-waste (Outcome 4). Average international price for shipping POPs waste for disposal is in the order of 5 US\$ per kg of waste, hence the allocation of the single component for disposal of 150 tonnes of PCB liquid and 350 tonnes of PCB solid wastes as originally planned in the Project Document was underestimated.

On the other hand, the project successfully demonstrated the feasibility of local environmentally safe final disposal option and led to conclusion of a contract for incineration of minimum 50 tonnes of PCB-contaminated oil out of which 28.8 tonnes were successfully incinerated on 17 August 2018. The successful incineration of 4 tonnes of PCB-oil for testing and further almost 30 tonnes in the first batch was achieved due to sizeable co-financing from the private sector (CIMERWA).

The cost of incineration of 50 tonnes of PCB liquid waste according to the contract between REMA and CIMERWA is about 700 US\$/tonne. The above figure represents net cost excluding cost of transportation and pre-treatment of the oil and is considered as cost-efficient way of final disposal of PCB liquid waste.

The planned safe storage of up to 350 tonnes of PCB-contaminated solid waste materials was achieved only partially. Although 24 carcasses of out-of-service transformers were transported to the new storage site at Jabana, two Askarel transformers and 8 replaced transformers with high content of PCBs in dielectric oil remain at the old storage at Gikondo. Moreover, the transformer carcasses at Jabana are stored outdoor and therefore remain a threat to releases of PCBs to the soil and water.

Also, the progress on the decontamination of in-service transformers by retro-filling was slower than expected due to inefficiencies in procurement of goods and materials and insufficient co-financing commitment of the PCB holders.

Based on the findings that not all planned results were achieved even after the extension of the project duration by another 36 months, **the rating of Efficiency is Moderately Unsatisfactory (MU).**

Country ownership

As already discussed above under Relevance, the project design and objectives were aligned with the national priorities of Rwanda related to the Stockholm Convention. The country has ratified the Stockholm Convention and has included the PCB issue amongst the main priorities in its National Implementation Plan that was approved in 2006. Specifically, the commitment to PCB management has been expressed by the Action Plan n° 4: “*Management of the PCBs and equipments containing them*” that is contained in the NIP.

At the time of this project conceptualization (PIF, PPG), a range of stakeholders that had been involved in the elaboration of the NIP were engaged in the project’s design. Furthermore, the Project Steering Committee composed of representatives of several governmental and public agencies met about thirteen times during the period October 2012 - July 2017. The regularity and relatively high frequency of PSC meetings shows high level of interest in the project implementation by the project stakeholders and is therefore another indicator of the strong project ownership by the country.

The financial commitment which the Government and other stakeholders initially made during the project design phase (indicated by means of co-financing letters provided by national counterparts) and the actual financial as well as in-kind commitment that the national project provided throughout the project implementation period is also considered an important indicator of the country’s ownership of the project. In particular, the co-financing secured from REMA (the project’s lead national implementing partner) in the form of land allocation for the construction of an interim PCB waste storage facility, and from CIMERWA, in terms of allocation of the company’s staff, facilities and equipment for preparation of conduct of the test of PCB co-incineration, also document strong ownership of the project by the two key project stakeholders from the public as well as private sectors.

Last but not least, the intention of the Government to undertake the three years extension of the project is also seen as strong commitment to achievement of the planned results and addressing the PCB issues.

Mainstreaming

The project was designed before the issuance of the GEF Policy on Gender Mainstreaming¹² that expresses GEF’s commitment to enhancing the degree to which the GEF and its implementing agencies promote the goal of gender equality through GEF-funded projects. Therefore, the project results framework did not include gender-responsive indicators.

Nevertheless, attempts of gender-focussed reporting can be found in several PIRs and APRs, particularly in the parts reporting on activities related to the capacity building Output 3. For example, in training sessions conducted in secondary schools in 2014, out of the 710 students and teachers trained there were 320 female participants (45 %). Furthermore, REMA as the national implementation partner has established a female expert coordinator of the Single Project Implementation Unit (SPIU). The reporting of gender-related data appears to be a

¹² Policy on Gender Mainstreaming, Global Environmental Facility, May 2012

reaction to the launching of the UNDP institutional mechanism to ensure accountability for delivering gender equality results¹³.

This project does not belong to the class of projects where gender equality would be one of the main concerns. In general, there were no gender inequalities as both male and female were involved to the extent possible in the project activities, particularly in the training and information workshops and seminars organized under the awareness-raising component.

The evaluator is of the opinion that gender issues in Rwanda do not require a focused attention of international development assistance. The female representation in the Rwandan Parliament is currently 64% and has been ranked the highest in the world - with the most women in parliament as of January 2017. It was the first country in the world to have more than half of its government run by women, and, according to the latest reports, Rwanda is Africa's gender-equality success story for high female representation in politics, education, the workplace and across industries¹⁴.

Sustainability

Financial risks: Following the provisions of the Stockholm Convention, all equipment found to contain more than 50 ppm PCB must be identified, labelled and removed from use. The identification as well as labelling has been conducted under the project, however, there is a concern regarding costs of the replacement of in-service PCB-contaminated transformers.

The risk is related to the high costs of PCB phase-out and disposal. Once the project is closed, the responsibility to assume the costs of PCB inventories, including costs of sampling, rapid analysis by screening tests and eventually GC analysis once a suitable national laboratory capacity is available. The phase-out of PCB equipment and replacement by non-PCB equipment, as well as transportation and costs of the final disposal will put a considerable pressure on the budget of PCB holders in the country. REG/EUCL as the principal PCB holder already indicated that they did not have the financial resources to phase out in-service equipment in the near future. Private owners of PCB-contaminated transformers could be in a similar or even worse situation since even hand-over of out-of-service equipment and PCB-containing waste oils might be problematic due to a perceived high value of the equipment by the private owners.

There are currently no financial incentives for early replacement of PCB-containing equipment and it is highly likely that PCB-holders would defer the phase-out and disposal for as long as possible, particularly if the legal provisions for PCB management and phase-out are not enacted soon.

As discussed under the Output 3.2 above, the main PCB holder (REG/EUCL) has an absolute priority in ensuring universal access to electricity for the entire population of the country. In this regard, the company does not have incentives nor necessary resources for early replacement of PCB-contaminated transformers before the end of their operational life.

The evaluation did not find evidence that the Government has committed additional funds to PCB-related activities. Although discussion about a follow-up PCB project has commenced, it could take couple of years to get it approved. In the absence of earmarked funding there is a risk that some project results would not be sustained in the near future.

¹³ Gender Equality Strategy 2014 – 2017, UNDP, January 2014

¹⁴ Global Competitiveness Report 2017–2018, Global Economic Forum, 2017

Lack of resources was evident during the drainage of out-of-service transformers in November 2017 when EUCL staff reported they were using the same pump (as it was the only pump available) for draining PCB-contaminated oil from the transformers as well as for refilling of the transformers with PCB-free dielectric fluid despite the risk of cross-contamination. EUCL submitted a request for procurement of two additional pumps required for collection of PCB oil before final disposal. In the 2017 GEF Project Implementation Report, this procurement was ranked as a critical risk requiring specific management measures, however, the procurement did not materialize as the request was reportedly submitted too late to be included in REMA procurement plan for 2017.

Interviews with the EUCL staff confirmed that the lack of pumping equipment has hampered the progress of the decontamination of in-service transformers during the project. Due to the fact that EUCL has no funding available for early phase-out of in-service transformers, the retro-filling will be the principal technology for decontamination of in-service transformers as it prevents early phase-out of transformers and reduces the power equipment offline time. Since a number of transformers were found contaminated with concentrations of PCBs in the order of 250 ppm and above at least two retro-filling cycles will be required to regard the transformers as non “Non-PCB Equipment” means any equipment containing dielectric oil with PCB concentration from 2 to less than 50 ppm-PCB equipment¹⁵.

Another example of the financial risk is the slow progress with allocation of funds for upgrade of the Jabana storage that is still owned by REMA. The upgrade should include equipment (a forklift and/or crane) for loading/offloading operations, a computer and a printer, plus basic office furniture needed for updating of the PCB storage register and the generation of the HWM documents, basic tools for operating on waste packages (such as wrenches to tighten the drum caps, equipment for producing durable labels, workshop tools like screwdrivers, pliers, etc.) as well as installation of a ventilation system. The reports from visits of the international technical advisor from November 2017 and May 2018 indicated that the loading/offloading of PCB drums was negatively affected by the lack of the above auxiliary equipment and incomplete physical condition of the storage facility.

As for the disposal of PCBs by co-incineration, it was already mentioned above that the testing and preparatory work was possible thanks to successful mobilization of sizeable co-financing from CIMERWA for the preparatory work and tests aimed to establish feasibility of the co-incineration of PCB oil in the process of cement manufacturing.

Rating of financial sustainability: Moderately Likely (ML)

Institutional framework and governance risks: The main risk here is related to potential longer absence of the specific law on PCB disposal and management. Although four technical guidelines on various aspects of PCB management were developed and disseminated, the legal framework is necessary to establish compulsory standards and norms for the management of PCBs as well as inspection, monitoring and assessment of the effect of PCBs on environmental media. It is obvious that the guidelines serve only as support to the PCB legal framework and in the continued absence of the latter the PCB holders and enforcement agencies would adopt the procedures and practices described in the guidelines only on a voluntary basis if at all.

There is no indication of expected timeline for approval of the new framework Organic Law on Environment and even if it is approved soon, it could happen that the need for management of

¹⁵ Non-PCB Equipment is any equipment containing dielectric oil with PCB concentration from 2 to less than 50 ppm of PCBs.

PCBs will be partially overshadowed by attempts to regulate more prominent and/or pressing environmental issues causing further delays in the approval of the PCB law.

This implies that until approval of the PCB Law as phase-out dates have not yet been mandated, the PCB holders are able to continue using equipment containing PCBs, as they are currently not obliged to identify, report on or phase-out/dispose of PCB-containing equipment.

On the other hand, the TE documented existing considerable in-country capacity for assessment and management of PCB and other types of hazardous waste. The national expert that participated in the development of the PCB law was recruited by UNDP CO to conduct a survey of hazardous waste. Throughout the TE it became evident that other national experts that had been involved in the project would continue to be engaged by the project partners on PCB issues even when the project comes to an end.

Rating of institutional framework and governance sustainability: Moderately Likely (ML)

Socio-economic risks: For more than 20 years, Rwanda has guarded its political stability¹⁶. In addition, the institutional stakeholders (mainly the main PCB holders and enforcement officers) are well aware of the PCB issue and committed to address it. Due to the successful implementation of the awareness raising component of the project, there is general awareness of the PCBs and their health and environmental impacts in all sectors of the society, including academia and the informal sector.

The 2025 and 2028 deadlines as demanded by the Stockholm Convention is considered adequate for PCB holders to investigate their requirements in terms of equipment replacement and PCB disposal. However, earlier recycling or replacement of the contaminated transformers would be desirable.

Nevertheless, according to the Director of Distribution Operations of REG/EUCL, replacement and cleaning of in-service transformers has not been a high priority for REG as the company has been tasked to ensure universal access to on-grid electricity in Rwanda by 2024. Early replacement or immediate cleaning of PCB-contaminated transformers before reaching end of their operational life would require considerable funding that appears to be beyond the company's immediate priorities.

Rating of socio-economic sustainability: Moderately Likely (ML)

Environmental risks: Recent reports of the international consultant indicated only a slow progress in uptake and practical implementation of the technical guidelines for PCB transport, handling and storage by the PCB holders and enforcement authorities. Cases of PCB leakage during transport and limited spills during on- and offloading of drums with PCB oil were documented by the international consultant. There is risk of leakage of PCBs that could result if transport, handling and storage of PCB-contaminated oil and equipment is not conducted strictly in line with the recommended internationally recognized procedures and if leakage and spills are not contained according to the developed safeguards measures. This risk is associated with the lack of financial resources for auxiliary equipment at the storage facility that was discussed above in the paragraph on financial sustainability.

Rating of environmental sustainability: Moderately Likely (ML)

¹⁶ Rwanda Overview: The World Bank Group (<https://www.worldbank.org/en/country/rwanda/overview>)

Lack of the financial resources and institutional support could jeopardize the durability of the project results after the completion of the project.

Consistent with the ratings given in the four sub-categories above, **the overall sustainability is rated Moderately Likely (ML).**

Progress to impact

The project was designed to minimize environmental and health risks associated with PCBs. The assessment of impact refers to the extent to which the project brought about changes in the human and environmental exposure to PCBs.

The evaluation found sufficient evidence that the information and management practices were adopted and integrated into regular operations of the principal PCB holder (REG/EUCL) as well as of the governmental regulatory agency (REMA). However, as already discussed above, the adoption and uptake of the new practices of handling, transport and storage of PCB was found much slower than expected. The evaluator is of the opinion that one reason could be that the adoption of the new information and management practices occurred on a voluntary basis as the new *Law on PCB Disposal and Management*, although drafted and advanced through several stages of the legislative process, was not yet adopted. In the process of preparation and review of the new law, the project helped to strengthen national capacities for formulation of PCB-related legislation. However, due to the absence of the enacted PCB legislation, it did not address issues of practical enforcement of the legislation.

The project did reach out to the principal PCB stakeholders and resulted in the training of staff and operational personnel to increase awareness and build-up capacity in the handling, maintenance and management of PCBs. International expertise was extended to Rwandan PCB holders through advice and elaboration of procedures on proper safeguarding measures and approaches for prevention and mitigation of spills. All these efforts contributed to the reduced likelihood of cross-contamination, spills and improper management of PCB-contaminated oil and equipment. However, it has to be noted that with the exception of the PCB-oils drained from 25 out-of-service transformers that was used in the testing of the co-incineration, the remaining PCB-contaminated wastes (oils and out-of-service contaminated equipment including three Askarel transformers) were at the time of the evaluation mission still stored at the Gikondo storage and not separated from the non-PCB waste.

Furthermore, because of import/export/use/re-use/trade of PCBs and PCB containing wastes and equipment is now prohibited and PCBs have been classified as hazardous wastes, in particular the work undertaken by the project to support the inventory has been successful in reducing the uncontrolled disappearance and sale of PCB containing equipment.

At the time of the evaluation, the final disposal of PCB liquid waste only started through incineration of 55.12 tonnes of PCB-contaminated oil in local cement kilns. Although the contract with CIMERWA provides option for incineration of additional quantities to be paid by PCB holders, it is unlikely that the planned disposal of 150 tonnes of PCB liquid waste will be achieved by the financial closure of the project at the end of 2018.

The final disposal of PCB-contaminated oil through co-incineration at CIMERWA will have a chain of direct environmental impacts from local to global levels. Locally, the PCB disposal will reduce the risks of direct exposure to PCBs of local communities living around the old storage site at Gikondo. At the same time, it will also reduce the risk of further transport of PCBs in stormwater runoff and bioaccumulation of PCBs in a wider area with resultant ecological and human health impacts.

The co-incineration of PCB oil in the manufacturing of cement will also have a global environmental impact in reduction of CO₂ emissions and conservation of non-renewable fossil fuels. The use of PCB-contaminated oil as replacement of the traditional raw materials reduces the exploitation of natural resources and the environmental footprint of the cement manufacturing process. However, as the amount of PCB incinerated is relatively small, the amount of reduction of the CO₂ emissions is only marginal.

The co-incineration of PCB waste that cannot be minimized or otherwise recycled will also have a two-tier economic impact both at local as well as national level. Cost savings at the processing enterprise (CIMERWA) are related to recovery of the material and energy content of the PCB oil, conservation of non-renewable fossil fuels and natural resources, reduction of

Evaluation Criteria	Evaluator's Rating
Monitoring and evaluation: design at entry	Satisfactory (S)
Monitoring and evaluation: plan implementation	Satisfactory (S)
Overall quality of monitoring and evaluation	Satisfactory (S)
Quality of UNDP Implementation	Moderately Satisfactory (MS)
Quality of Execution - Executing Agency	Moderately Satisfactory (MS)
Overall quality implementation / execution	Moderately Satisfactory (MS)
Relevance	Relevant (R)
Effectiveness	Satisfactory (S)
Outcome 1	Moderately Satisfactory (MS)
Outcome 2	Moderately Satisfactory (MS)
Outcome 3	Satisfactory (S)
Outcome 4	Satisfactory (S)
Efficiency	Moderately Unsatisfactory (MU)
Overall Project Objective Rating	Satisfactory (S)
Institutional framework and governance	Moderately Likely (ML)
Financial	Moderately Likely (ML)
Sociopolitical	Moderately Likely (ML)
Environmental	Moderately Likely (ML)
Overall likelihood of sustainability	Moderately Likely (ML)

CO₂ emissions. Cost savings at the level of national economy relates to avoidance of the need to invest in purpose-built incinerators or in transport of the PCB oil for final disposal abroad. It also has to be noted that unlike dedicated waste incinerators, ash residues from hazardous waste materials co-processed in cement kilns are incorporated into the clinker so there are no end products that require further management.

There is a potential catalytic effect of the project on integration of cement kiln co-processing within an overall waste management strategy of Rwanda. Discussions with the CIMERWA management revealed a potential for the company to use a wider range of hazardous wastes suitable for the co-processing. As the company already has a feeder for accommodating plastic waste, it could possibly consider using also municipal waste in the process.

Last but not least, the impact of the successful implementation of the public information component (Output 3.1) has materialized in establishment of two new modules in curricula of high education courses taught at the University of Rwanda. Annual enrollment of about 90 students for the two courses constitutes a sizeable impact in education of a new generation of industrial and environmental experts for the country.

The summary of ratings of the selected evaluation criteria is in the Table 13 below.

Table 13: Overall Project Ratings

CONCLUSIONS AND RECOMMENDATIONS

Based on the facts finding collection in the previous section, this section synthesizes and transposes the empirical findings into conclusions that make judgments supported by the findings. Recommendations are then corrective actions proposed to be taken by various project stakeholders to address the insufficiencies and imperfections identified in the findings and conclusions.

This Terminal Evaluation makes two types of recommendations. Immediate recommendations are provided that the designated project partners should consider for urgent action to ensure the project results are fully consolidated with the key project stakeholders and responsibilities of the national project partners are defined and shared for continued management and disposal of PCB waste stockpiles. The immediate recommendations are suggested for implementation **by the end of 2018** using the existing institutional capacities and frameworks that had been created by the current project.

As the project partners recently commenced discussion about a next phase project on management of POPs that would contain one or more modules on PCBs, set of consecutive recommendations is provided for follow-up and uptake by the project partners **before and during preparation of the next project under the Stockholm Convention thematic area** in order to address capacity gaps and institutional insufficiencies remaining after the closure of the current project.

Immediate recommendations

Finding: The national database of PCBs facilitated the main achievement of the project in terms of achievement of PCB elimination. While the database records comprehensive information on the type, location and ownership of PCB-contaminated transformers, database updates do not reflect disposal and decontamination operations conducted in 2017 and 2018.

Conclusion 1: Setting up of the national PCB inventory is a dynamic process as it needs to be regularly updated to reflect changes in stocks. It is imperative to continue the update of the PCB inventory and disposal activities at regular intervals in order to facilitate regular national reporting on PCBs according to the Stockholm Convention.

Recommendation 1: REMA in cooperation with REG/EUCL should make a comprehensive update of the national PCB database to reflect the transformer drainage and decontamination operations conducted in 2017-2018.

Finding: The project was designed to assist in delivery of a publicly accessible PCB information system and in making it operational, maintained and used for reporting and information exchange under the Stockholm Convention. The database of PCB-containing transformers that resulted from the project has been maintained by REMA and REG/EUCL and used for exchange of information only between the two key stakeholders.

Conclusion 2: The updated information on PCB-contaminated transformers is not only a tool for exchange of information between the PCB holders but it is also an important indication of commitment of the Government to operative tracking, effective management and timely phase-out/replacement of PCB-contaminated transformers. The database of PCB-contaminated should be made accessible to a wider audience a part of the effort to ensure support for implementation of the country's obligations as party to the Stockholm Convention.

Recommendation 2: REMA should make the database of PCB-contaminated transformers as well as other related information (such as territorial maps of locations PCB-contaminated transformers) available to a wider audience through publication on its web site.

Finding: During the project implementation, four technical guidelines on various aspects of PCB management and disposal were prepared as well as number of awareness raising materials on health and environmental effects of PCBs.

Conclusion: In the future, various national stakeholders (PCB holders, service providers, educational institutions, NGOs) can benefit from the project related technical documents as well as awareness raising materials if the project-related technical and informational documentation is accessible to them, even beyond the project implementation period.

Recommendation 3: REMA in cooperation with UNDP CO should ensure that all materials prepared by the project, in particular technical guidelines, awareness raising materials, videos, publications and booklets, are posted on the website of REMA and eventually create a dedicated part of the website for information on PCB management.

Finding: At the time of TE, PCB-contaminated transformers and PCB waste oil were still found stored at the old site at Gikondo. All PCB waste oil was later transported to CIMERWA for incineration and the retired contaminated transformers to Jabana temporary storage. Although the Jabana storage has been commissioned for operations and was recently upgraded in terms of truck access to the site, further operational upgrade is necessary.

Conclusion 4: The new storage site at Jabana will benefit from an operational upgrade that will ensure storage and full trackability of PCB-contaminated materials according to the Stockholm Convention. The upgrade is required in terms of equipment for handling of PCB-contaminated materials, IT equipment for tracking and update of the storage register and enhancement of safety of the operations.

Recommendation 4: REMA should transfer the Jabana site ownership to REG/EUCL as the main PCB holder in the country in order to ensure the necessary operational upgrade of the new temporary storage of PCB-waste at Jabana. In the future, all PCB-contaminated materials should be stored exclusively at Jabana and ensure their storage inside the building in order to avoid risk of environmental pollution by PCBs.

Finding: The project was designed to assist in strengthening of the national legislative framework for PCB management and disposal through drafting of a new Law on PCB Management and Disposal and supporting technical guidelines. The preparation of the new Law started early on in the project and has taken several years but at the time of TE the Law has not yet been approved as the approval was delayed due to the revision of the Organic Law on Environment.

Conclusion 5: Although the supporting technical guidelines were adopted by the Government and distributed to the main national stakeholders, the procedures and practices on handling and treatment of PCB wastes contained therein are not binding to the PCB holders. The continued absence of coercive provisions on PCB management and disposal is not conducive to effective enforcement of environmentally sound management of PCB wastes. Further protraction of the specific legal framework insufficiency could undermine the sustainability of the results achieved by this project.

Recommendation 5: REMA in cooperation with other law enforcement agencies and support of UNDP CO should submit the developed specific PCB-related legislative framework for approval through an abridged procedure. The legal framework on the PCB management cycle should be enacted through a relevant legal instrument and/or short-term measures, that can be established directly by the Government without requirement of parliamentary approval.¹⁷

Finding: While majority of PCB-contaminated transformers are owned by REG/EUCL, there is a small number of transformers in possession of private owners (Mironko Plastic Industries in Kigali, Ruhengeri Hospital in Musanze, Northern Rwanda).

Conclusion 6: It is desirable to require commitment of all PCB holders for early phase-out or decontamination of PCB-equipment. While REG/EUCL as the principal PCB holder has started implementation of the plan for disposal of highly contaminated transformers and decontamination of in-service transformers, it would be desirable to bring the other owners of PCB-contaminated equipment on the same track for early phase-out of PCBs.

Recommendation 6: REMA should follow-up with minority PCB holders for implementation of the submitted plans for phase-out of PCBs in transformers and closely monitor implementation of the phase-out plans until disposal or decontamination of the transformers.

Finding: Three “pure PCB” (Askarel) transformers were identified by the national survey. One is still in operation and two were recently replaced by the holder (EUCL).

Conclusion 7: Currently the capacity of handling and storage of equipment with very high contamination of PCB is still very limited, notwithstanding the capacity building carried out under the project. Transformer oil with very high content of PCBs is not suitable for disposal by incineration and therefore careful and cautious management of the Askarel transformers is required until the disposal of both the equipment and oil.

Recommendation 7: REMA and EUCL should develop a management plan for the Askarel transformers. The plan should include regular inspections to check the condition of the transformer in operation in order to prevent overloading, overheating and leakage as well as transport of the transformers removed from service to the new temporary storage at Jabana once the storage site is upgraded to guarantee safety of the operation and storage.

Finding: The plan for the first drainage and clean-up of in-service transformers included 67 transformers in possession of REG/EUCL. The REG/EUCL staff reportedly had to use the same pump for draining and refilling in-service transformers as it was the only pump available for the operation. The drainage/clean-up had to be put on hold as the amount of dielectric oil available for refilling was sufficient only for the first batch of 64 transformers.

Conclusion 8: The speed of the planned decontamination of in-service transformers owned by REG/EUCL by retro-filling has been negatively impacted by insufficient equipment for drainage of PCB-contaminated oil and lack of PCB-free oil for re-filling.

¹⁷ Implementation of this recommendation is also desirable for preparation of future projects/project components related to PCBs as donors might not provide funding for a follow-up PCB project component in the absence of the specific PCB law and effective enforcement of the latter.

Recommendation 8a: REG/EUCL should identify funding for additional equipment for retro-filling of PCB-contaminated transformers. Two different explosion-proof pumping lines will have to be provided: one for draining out (PCB-contaminated oil) and the other for refilling (PCB-free oil) to prevent any cross contamination.

Recommendation 8b: REG/EUCL should develop a strategy for securing the long-term investment needed to ensure steady progress in the retro-filling of the in-service PCB-contaminated transformers.

Finding: The first transport of drums with PCB-contaminated oil from the temporary storage at Jabana to CIMERWA was not conducted in line with the requirements of the hazardous waste management under the Stockholm Convention.

Conclusion 9: The implementation of the contract signed between REMA and CIMERWA for incineration of PCB-contaminated oil could have negative public and environmental health impact if the procedures of PCB-waste custody and traceability are not strictly followed.

Recommendation 9: REMA should develop and implement a formal procedure of meticulous supervision of all operations for storage, transport and acceptance of the PCB-contaminated oil for incineration.

Consecutive recommendations

Conclusion 10: Lack of national capacity for implementation of the project on PCB management and complicated national procurement procedures hampered progress in the first years of the project and were the main reason for extension of the project by three additional years.

Recommendation 10a: Prior to start of the future project(s) related to management of chemical wastes including PCBs, UNDP should conduct an in-depth assessment of capacity of the project partners and determine their commitment (staff allocation and time, co-financing) to active participation in the project implementation and as well as their capacity to achieve the results that they will become responsible for.

Recommendation 10b: Procurement planning for goods and services should require particular attention as national procurement procedures continue to be lengthy and complicated and will have to be streamlined. It is therefore proposed that future procurement of goods and services from international suppliers is conducted by UNDP.

Finding: Although assessment of national laboratory capacities for analyses of POPs including PCBs was commissioned under the project, the target of establishment of one accredited national laboratory capable of routine analyses of PCBs in transformer oil and environmental matrices has not been achieved. The laboratories of the Rwanda Bureau of Standards (RBS), despite possessing advanced analytical instrumentation, is not mandated for analysis of transformer oil and abiotic environmental matrices (water and soil). Considerable scientific and technical skills to conduct laboratory functions at the University of Rwanda have been created and upgraded in parallel with the project by other sources of support.

Conclusion 11: The absence of accredited national laboratory for analysis of POPs/PCBs in waste materials and abiotic matrices is a setback to any future activities related to the Stockholm Convention. The implementing partners have recently started discussion about a follow-up project on management of POPs that would include assessment of sites contaminated with POPs/PCBs. There is an urgent need to designate one national laboratory for accreditation in POPs analysis by more advanced analytical techniques (such as GC-MS/ECD) capable to

identify and quantify POPs with accuracy and precision as required by Article 16 of the Stockholm Convention. The country requires to establish at least one national laboratory for routine analysis of PCBs in environmental matrices. Since accreditation of the national laboratory is a lengthy process, the capacity for exact PCB analysis should be established in two stages.

Recommendation 11: In order to establish capacity for PCB analysis, REMA should consider concluding cooperation with a laboratory abroad that has accreditation for PCB analysis. In parallel, UNDP in cooperation with the key national stakeholders (REMA and REG) should identify sources of support for establishment of a national laboratory for POPs analysis and ensure international technical assistance is provided to the designated national laboratory for improving skills in sampling and analysis of POPs/PCBs.

Finding: The project was designed to assist in delivery of a publicly accessible PCB information system and in making it operational, maintained and used for reporting and information exchange under the Stockholm Convention. The database of PCB-containing transformers that resulted from the project is only a simple tool and does not allow for effective management of the database.

Conclusion 12: The existing national database of PCB waste should be used for national statistical reporting and for reports according to the Stockholm Convention when necessary.

Recommendation 12: REMA should consider upgrade of the PCB database from the simple Excel sheet to a more robust information system that would better support reporting according to the Stockholm Convention. REMA and REG/EUCL should also make a commitment to manage the system in the future (e.g. by signing an MoU).

Finding: In the effort to strengthen the national regulatory capacity for environmentally sound PCB management, the capacity building component of the current project centred at improvement of the specific legal instruments and on training and awareness raising of PCB holders, the law enforcement agency and public at large. Customs authorities were not included in the project.

Conclusion 13: An important part of POPs reduction projects is an effective import/export control system for products containing or depending on POPs/PCBs performed by the customs authorities.

Recommendation 13: UNDP CO in cooperation with relevant national partners should consider inclusion of capacity building components for national customs authorities in future project(s) on POPs/PCBs management.

Finding: The current project focussed on inventory and safe management of PCBs in the dielectric fluids for transformers in a major part of the country. Inventory of PCB contamination of dielectric fluids in other electric utilities (such as capacitors, voltage regulators, liquid filled switches) and of hydraulic and heat transfer fluids was not conducted.

Conclusion 14: The project has upgraded national capacities for making comprehensive inventory and safeguarding PCB waste materials. This capacity is available for use in future inventory of other PCB applications that is required in the Action Plan No. 2 contained in the updated NIP.

Recommendation 14: REMA should establish and eventually implement a plan for a national inventory of other PCB applications such as dielectric fluids for capacitors, voltage regulators, and hydraulic and heat transfer fluids.

Finding: Assessment and remediation of PCB-contaminated sites, although originally planned, was not conducted under the current project because of insufficient national capacities for PCB analysis in abiotic matrices (water, soil). The 2016 NIP update calls for sampling and analysis of water and soil from six PCB-contaminated sites.

Conclusion 15: The national capacity for PCB analysis, once established, should be made available for monitoring of PCB-contaminated sites in order to enable their sound ecological management.

Recommendation 15: REMA in cooperation with UNDP should identify financial resources for monitoring of PCB-contaminated sites and their clean-up and remediation consistent with international practice.

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

The project from the very outset faced the challenge of lack of national capacities in the technical area of PCBs and PCB waste management. REMA as the leading national implementation partner initially did not assign sufficient workforce to the project management team. Analysis of the project timelines and progress reports leads to a conclusion that the initial project implementation delays could have been avoided if sufficient attention was paid to the assessment of existing national capacities for management of international development projects in the technical area of PCB management. The fact that the insufficient national capacities in the technical area of PCB management was not incorporated into the risk matrix in the Project Document suggests that the risk management planning at the project inception stage was not satisfactory.

Before the first meeting of the Project Steering Committee, the project implementation was slow since not all project stakeholders were aware of the project purpose and its objective. As soon as regular meetings of PSC were scheduled and organized, the implementation of the project remarkably accelerated. A dedicated Project Steering Committee with representation of the key stakeholders was therefore an effective instrument for awareness raising of the project stakeholders and information sharing.

Development assistance projects addressing highly technical areas usually struggle in attempts to inform and raise awareness general public due to the diversity of the target audiences. The awareness raising workshop for 32 journalists from 32 different media organized in the first year of the project implementation period is considered a very cost-effective tool for reaching out to the general public. Printed and electronic media had the power to attract relatively large audiences and had therefore far better outreach power than any other public awareness modality. Moreover, the journalists helped to translate the technical language of the project into a colloquial language easily understandable by a wide section of the public at large and performed thus a bridging function between the project direct and ultimate beneficiaries.

The REMA project team established a technical peer review group comprising of experts from prime national academic institutions in order to assess deliverables produced by international as well as national consultants that were directly working on assignments under this project. This practice considerably enhanced quality of the studies, technical guidelines and the legal framework and also enhanced the capacity of peer reviewers in the technical area of PCBs.

Specifically, appointment of lecturers from the University of Rwanda as national consultants and involvement of UR students in the inventory of transformers has contributed to integration of the PCB topic into educational programmes of national higher education institutions and

enhanced sustainability of the project capacity building component beyond the project time boundary.

Results of the PCB inventory were transformed into maps showing location of PCB-contaminated electrical equipment, PCB-waste sites and potentially contaminated sites. The maps became an important supplementary tool to support arguments necessary to push on for developing legal and regulatory frameworks for management of PCB as hazardous waste.

Another good practice was clustering of activities for international consultancy instead of dividing up into several short consultancy assignments. The clustered contract also included task of procurement of sampling equipment. This practice started in 2015. Given the fact that the project faced problems with protracted procurement of both goods and services since the very beginning, this approach has significantly reduced the time required for recruitment and procurement of goods and services in comparison with the first years of the implementation period. Moreover, it also enhanced the continuity of implementation since longer engagement in the project enabled the qualified international consultant to take a more holistic view of the project. This approach resulted in accelerated delivery of the planned outputs as well as in finding a solution to the final disposal of PCB liquid waste stockpiles that is so far unprecedented in the region.

Another example of a good practice was the review and comparison of the PCB waste disposal options under the project component 4. The review was in fact a return to the “drawing board” that was conducted without limiting itself to the disposal option that was presupposed in the Project Document (i.e. export of PCB waste abroad). Such review finally paved way towards finding a cost-effective and efficient final PCB waste disposal solution in compliance with the Stockholm Convention. Moreover, it also established a precedential problem-solving option for the Africa region.

One of the elements of success of the project was sensitization of senior politicians of the country including the Office of the President to the issue of health and environmental risks of PCBs and management of PCB waste. This practice ensured high-level political support to the project and was also instrumental in the efforts to establish an important partnership with the private sector. This cooperation leveraged co-financing contribution for testing and piloting of the national option for environmentally safe disposal of PCB liquid waste.

The sustainability of project accomplishments is greatly enhanced by the commitment to the sound PCBs management developed during the project by the participating national institutions and utility firms. Through sizeable in-kind and in-cash contributions to the project the key project stakeholders have indicated strong ownership of the project and contributed to the effective implementation of the project.

Annex 1: Evaluation Terms of Reference

Terms of Reference (ToR)

Individual consultant for project final evaluation of “Management and Disposal of PCBs in Rwanda”

1. BACKGROUND AND CONTEXT

Exposure to Polychlorinated Biphenyl's (PCBs) has been demonstrated to cause environmental and health effects including cancer, as well as a variety of other adverse effects on the immune, reproductive, nervous, and endocrine systems. Due to PCBs' environmental toxicity and negative effects on human health, PCBs production was banned by the United States Congress in 1979 and by the Stockholm Convention on Persistent Organic Pollutants (POPs) which was adopted in 2001 and entered into force in 2004. The convention requires its parties to take measures to eliminate or reduce the release of POPs into the environment.

In its efforts to manage POPs including PCBs, Rwanda ratified the Stockholm Convention in July 2002. The country also deposited a National Implementation Plan (NIP) with the Stockholm Convention in 2007 that outlined the National Action Plan for the management of POPs in the country.

In order to support the implementation NIP, the Global Environment Facility (GEF) and United Nations Development Programme (UNDP) provided funds with co-financing from Energy, Water and Sanitation Authority (currently Rwanda Energy Group Limited) and Rwanda Environment Management Authority (REMA) to support the Management and Disposal of PCBs project in Rwanda. This project is implemented by REMA in collaboration with relevant government institutions. The project fits within the country's evolving priorities associated with sound management of chemicals and environmental management initiatives. The project is consistent with the following UNDAF (2013 -2018) outcome: *Rwanda has an in place improved systems for: sustainable management of the environment, natural resources and renewable energy resources, energy access and security, for environmental and climate change resilience, in line with Rio+20 recommendations for sustainable development.*

The project has an overall objective of providing Rwanda with the tools to achieve effective compliance with respect to its convention obligations and to substantively minimize the environmental and health risks of PCBs, both locally and globally. The project has the following components:

1. Complete PCB inventory through enhanced cooperation with the Government bodies and equipment holders and selection of options for PCB disposal;
2. Legislative support to aid the operation of PCB management system;
3. Stakeholders and public sensitized, PCB equipment holders handle equipment in well informed and responsible manner;
4. Safe disposal of PCB equipment, oils and waste material.

Implementation of this project has a major global environmental benefit in the mitigation or elimination of risks associated with the release of PCBs into the environment and their subsequent global distribution with resultant ecological and human health impacts from the exposure to this chemical. In Rwanda, the project will greatly improve the management and disposal of PCBs stockpiles and waste while at the same time strengthening technical, regulatory and institutional capacity to handle PCBs.

2. EVALUATION PURPOSE

The final evaluation of the project 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.

The evaluation report produced is aimed at critically assessing the stages of the project through participatory approaches, measuring to what extent the objective/outputs/activities have been achieved against the results and resources framework, and identifying factors that have hindered or facilitated the success of the project. The lessons learned section is aimed at capturing key lessons to assess the success of the project based on several criteria, so that the legacies of the project will be replicated and sustained beyond the project lifetime. Furthermore, the final evaluation is intended to identify weaknesses and strengths of the project design and implementation, and to come up with recommendations for any necessary changes in the overall design and orientation of similar projects as well as assessing the achievements the project outputs and outcomes. The results and recommendations of the evaluation would therefore help UNDP and implementing partners to document lessons learnt and best practices and prepare for the next project cycle.

3. EVALUATION SCOPE AND OBJECTIVES

Objectives

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 final evaluation main objectives are the following:

- ☐ Assess the Project's implementation strategy.
- ☐ Assess the relevance, efficiency, effectiveness, sustainability, and impact of the interventions.
- ☐ Assess the mainstreaming of UNDP programming principles (gender, human rights, RBM, environment, capacity building)
- ☐ Assess the Project's processes, including budgetary efficiency
- ☐ Assess the extent to which planned activities and outputs have been achieved.
- ☐ Identify the main achievements and impacts of the project's activities
- ☐ Identify the underlying causes and issues of non-achievement of some targets
- ☐ Assess the project exit strategy
- ☐ Document lessons learnt
- ☐ Formulate key recommendations for the way forward for the programme

Scope

The evaluation covers the implementation period of the project, from January 2012 up to December 2017. The geographic coverage of the evaluation is the whole country (Rwanda). The scope of the final evaluation covers all activities undertaken in the framework of the project. This refers to:

- ☐ Planned outputs of the project compared to actual outputs and the actual results as a contribution to attaining the project objectives.

- ☐ Problems and necessary corrections and adjustments to document lessons learnt.
- ☐ Efficiency of project management, including the delivery of outputs and activities in terms of quality, quantity, timeliness and cost efficiency.
- ☐ Likely outcomes and impact of the project in relation to the specified goals and objectives of the project.

The evaluation comprises the following elements related to project design and implementation:

- (i) Assess whether the project design was clear, logical and commensurate with the time and resources available;
- (ii) An evaluation of the project's delivery of achievement of its overall objectives;
- (iii) An evaluation of project performance in relation to the indicators, assumptions and risks specified in the logical framework matrix and the Project Document; An assessment of the scope, quality and significance of the project outputs produced to date in relation to expected results; Identification of any programmatic and financial variance and/or adjustments made during the duration of the project and an assessment of their conformity with decisions of the PSC and their appropriateness in terms of the overall objectives of the project;
- (iv) An evaluation of the project's contribution to the achievements of UNDP's outcome and outputs as well as the project's contribution to national government strategies such as the EDPRS II and Vision 2020;
- (v) Identification and, to the extent possible, quantification of any additional outputs and outcomes beyond those specified in the Project Document;
- (vi) An evaluation of project coordination, management and administration. This includes specific reference to:
 - a. Organizational/institutional arrangements for collaboration among the different stakeholders involved in project arrangements and execution;
 - b. The effectiveness of the monitoring and evaluation framework/mechanisms used by REMA in monitoring on a day to day basis, progress in project implementation;
 - c. Administrative, operational and/or technical challenges and constraints that influenced the effective implementation of the project;
 - d. An assessment of the functionality of the institutional structure established and the role of the Project Steering Committee (PSC);
 - e. Financial management of the project, including the balance between expenditures on administrative and overhead charges in relation to those on the achievement of substantive outputs.

- (vii) A prognosis of the degree to which the overall objectives and expected outcomes of the project were met;
- (viii) Progress towards sustainability and replication of project activities;
- (ix) Assess the extent to which the design, implementation and results of the project have incorporated a gender equality perspective and human rights-based approach¹
- (x) Assess of the extent to which the design, implementation and results of the project have incorporated the environmental sustainability concerns and make recommendations accordingly
- (xi) Lessons learned during project implementation;
- (xii) Evaluate the project's exit strategy in terms of quality and clarity

4. EVALUATION

Evaluation criteria & ratings

The project will be evaluated on the basis of the DAC evaluation criteria:

- ☐ **Relevance:** measures whether the project addresses an important development goal and whether its objectives are still valid.
- ☐ **Effectiveness:** measures whether the project activities achieve their goals.
- ☐ **Efficiency:** measures the cost effectiveness, i.e. the economic use of resources to achieve desired results.
- ☐ **Sustainability:** measures whether the benefits of the project are likely to continue after donor funding has been withdrawn. The project needs to be environmentally as well as financially sustainable.
- ☐ **Impacts of intervention:** measure the positive and negative changes produced by the project, directly or indirectly, intended or unintended.

An assessment of project performance will be carried out, based against expectations set out in the Project Logical Framework/Results Framework, which provides performance and impact indicators for project implementation along with their corresponding means of verification. The evaluation will at a minimum cover the criteria of: **relevance, effectiveness, efficiency, sustainability and impact**. Ratings must be provided on the following performance criteria. The completed table must be included in the evaluation executive summary.

Evaluation Ratings:

1. Monitoring and Evaluation	rating	2. IA& EA Execution	rating
M&E design at entry		Quality of UNDP Implementation	
M&E Plan Implementation		Quality of Execution - Executing Agency	
Overall quality of M&E		Overall quality of Implementation / Execution	
3. Assessment of Outcomes	rating	4. Sustainability	rating
Relevance		Financial resources:	
Effectiveness		Socio-political:	
Efficiency		Institutional framework and governance:	
Overall Project Outcome Rating		Environmental :	
		Overall likelihood of sustainability:	

Evaluation questions

More specifically, the final evaluation aims at addressing the following questions for each evaluation criteria:

Relevance

- ☐ Where is this Project being implemented? How was the Project site selected? What has been the main focus of the project implementation so far? Who are the main beneficiaries? How were they selected? How was the project aligned to the national development strategy (EDPRS 2, Vision 2020)?
- ☐ The extent to which the project activities are suited to the priorities and policies of the target group, recipient and donor.
- ☐ To what extent are the objectives of the project still valid?

- ☐ Are the activities and outputs of the project consistent with the overall goal and the attainment of its objectives?
- ☐ Are the activities and outputs of the project consistent with the intended impacts and effects?

Effectiveness

- ☐ To what extent were the objectives achieved?
- ☐ What were the major factors influencing the achievement or non-achievement of the objectives?
- ☐ Did the activities contribute to the achievement of the planned outputs?
- ☐ Have the different outputs been achieved?
- ☐ What progress toward the outcomes has been made?
- ☐ To what extent the design, implementation and results of the project have incorporated a gender equality perspective and human rights based approach? What should be done to improve gender and human rights mainstreaming?
- ☐ What has been the result of the capacity building/trainings interventions? Were qualified trainers available to conduct training?
- ☐ How did UNDP support the achievement of project outcome and outputs?
- ☐ How was the partnership strategy conducted by UNDP? Has UNDP partnership strategy been appropriate and effective? What factors contributed to effectiveness or ineffectiveness? What were the synergies with other projects?

Efficiency

- ☐ Were activities cost-efficient?
- ☐ Were objectives achieved on time?
- ☐ Was the project implemented in the most efficient way compared to alternatives?
- ☐ What was the original budget for the Project? How have the Project funds been spent? Were the funds spent as originally budgeted?
- ☐ Are there any management challenges, which affected efficient implementation of the Project? What are they and how were they addressed?

Sustainability

- ☐ To what extent the design, implementation and results of the project have incorporated environment sustainability? What should be done to improve environmental sustainability mainstreaming?
- ☐ To what extent will the benefits of the programme or project continue after donor funding stops?

- ☐ What were the major factors that influenced the achievement or non-achievement of sustainability of the programme or project?
- ☐ Does the project have a clear exit strategy?

Impact of interventions

- ☐ What are the stated goals of the Project? To what extent are these goals shared by stakeholders? What are the primary activities of the programme and expected outputs? To what extent have the activities progressed? How did the project contribute to the achievement of UNDAP and EDPRS II outcomes and outputs?
- ☐ What has happened as a result of the project?
- ☐ How many people have been affected?
- ☐ Has the project contributed or is likely to contribute to long-term social, economic, technical, environmental changes for individuals, communities, and institutions related to the project?
- ☐ What difference has the project made to beneficiaries?
- ☐ How did the role of UNDP in the project contribute to the UNDAP and EDPRS II outcomes and outputs?

5. METHODOLOGY

General guidance on evaluation methodology can be found in the UNDP Handbook on Monitoring and Evaluating for Development Results, the UNDP Guidelines for Outcome Evaluators, and UNDP Outcome-Level Evaluation: A Companion Guide to the Handbook on Monitoring and Evaluating for Development Results). UNDP's Evaluation Policy provides information about the role and use of evaluation within the M&E architecture of the organization.

An overall approach and method for conducting project terminal evaluations of UNDP supported GEF financed projects has developed over time. 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. A set of questions covering each of these criteria have been drafted and are included with this TOR, under the section "Evaluation questions". The evaluator is expected to amend, complete and submit this matrix as part of an evaluation inception report, and shall include it as an annex to the final report.

The evaluation must provide evidence-based information that is credible, reliable and useful. The evaluator is expected to follow a participatory and consultative approach ensuring close engagement with government counterparts, in particular the GEF operational focal point, UNDP Country Office, project team, UNDP GEF Technical Adviser based in the region and key stakeholders. Interviews will be held with the following organizations and individuals at a minimum.

6. DELIVERABLES (EVALUATION PRODUCTS)

This section presents the key evaluation products the evaluation team will be accountable for producing. The deliverables are the following:

Deliverable	Content	Timing	Responsibilities
Inception Report	Evaluator provides clarifications on timing and method	1 week after mission start	Evaluator submits to UNDP CO
Draft Final Report	Full report, (per annexed template) with annexes	Within 3 weeks of submitting inception report	Sent to CO, reviewed by RTA, PCU, GEF OFPs
Final Report* and policy brief	Revised report and a policy brief	Within 1 week of receiving UNDP comments on draft	Sent to CO for uploading to UNDP ERC.
Presentation of final report	Presentation (Power Point) of findings of report and policy brief	Within 1 week after final report	Evaluator makes a presentation

*When submitting the final evaluation report, the evaluator is required also to provide an 'audit trail', detailing how all received comments have (and have not) been addressed in the final evaluation report.

7. EVALUATION TEAM COMPOSITION AND REQUIRED COMPETENCIES

The evaluation team will be completed by 1 international or national evaluator. The consultant shall have prior experience in evaluating similar projects. Experience with GEF financed projects is an advantage. The evaluator selected should not have participated in the project preparation and/or implementation and should not have conflict of interest with project related activities.

Evaluation methods and selection criteria

The offer will be evaluated by using the *best value for money* approach. Technical proposal will be evaluated on 70% whereas the financial proposal will be evaluated on 30%. Below is the breakdown for the technical proposal on which will be brought to 70%.

Criteria	Weight	Max. Point
Technical		
At least master's degree in Public Policy and Management, Public Administration, Development studies, International Development, Environmental Sciences (preferred degree in scientific field related to chemicals and waste management)	10%	10
Minimum 10 years of relevant professional experience	20%	20
Proven expertise, knowledge and experience in the field of environmental management (in particular waste management and chemicals) as well as knowledge of UNDP and GEF and a good understanding of gender equality, human-rights based approach and environmental sustainability concepts;	15%	15
Overall Methodology (clear demonstration of evaluation methodology and understanding of the ToR);	30%	30
At least 10 years' experience in programme management support including formulation, monitoring and evaluation and RBM implementation	15%	15
Fluent in English (written and verbal skills) and basic knowledge of French would be a value adding	10%	10

8. HOW TO APPLY

Qualified and interested candidates are hereby requested to apply. The application should contain the following:

- Personal CV or P11, indicating education background/professional qualifications, all past experiences, as well as the contact details (email and telephone number) of the candidate and at least three (3) professional references;

- Brief description of why the individual considers him/herself as the most suitable for the assignment, and a methodology, on how they will approach and complete the assignment;
- Financial Proposal that indicates the all-inclusive fixed total contract price, supported by a breakdown of costs of the assignment (including daily fee, per diem and travel costs).

UNDP applies a fair and transparent selection process that will take into account the competencies/skills of the applicants as well as their financial proposals. Qualified women and members of social minorities are encouraged to apply.

*Submissions are to be made by email to: **offers.rw@undp.org** by no later than 12h00 on 25th October, 2017. Note that no hard copy submissions will be accepted unless deemed necessary by Agency.*

9. EVALUATION ETHICS

The evaluation will be undertaken in-line with the following principles:

- ☐ Independence
- ☐ Impartiality
- ☐ Transparency
- ☐ Disclosure
- ☐ Ethical
- ☐ Partnership
- ☐ Competencies and Capacities
- ☐ Credibility
- ☐ Utility

Evaluation consultants will be held to the highest ethical standards and are required to sign a Code of Conduct (Annex) upon acceptance of the assignment. UNDP evaluations are conducted in accordance with the principles outlined in the [UNEG 'Ethical Guidelines for Evaluations'](#)

10. IMPLEMENTATION ARRANGEMENTS

The evaluation will be conducted for a period of 30 working days of which the consultant will conduct the detailed final evaluation with methodology which will be agreed, as part of the contract finalisation process.

The consultant will start the evaluation process with an inception meeting with relevant the UNDP representative(s) and REMA's Project Focal Point. The consultant should submit an inception plan based on the meeting within the issuance of contract. S/he will then undertake the review of documentation (home-based), interviews with key stakeholders/field visits (mission), preparation of an evaluation report and lessons learned documents (home-based). S/he will submit the draft products to UNDP CO for comments and finalise the products after receiving the feedback.

Every deliverable will be assessed by a technical team made up by representatives from REMA (Project Focal Point), the UNDP Project Manager and a Technical Advisor from GEF.

The consultant will report directly to DG of REMA, and the UNDP Country Director.

11. TIME FRAME FOR THE EVALUATION PROCESS

The suggested timeline/tasks are as follows:

Activity	Time proposed for each deliverable
Preparation and submission of inception report	5 working days
Draft Evaluation Report	15 working days
Review of Draft by stakeholders (no action required from consultant)	<i>5 working days*</i>
Final Report and policy brief	5 working days
Presentation (Power Point)	5 working days

*The duration of assignment will be 30 working days for the consultant over a period of 7 weeks. A review of the draft will be undertaken for 1 week, during which no action is required from the consultant.

12. PRICE PROPOSAL AND SCHEDULE OF PAYMENTS

The consultancy fee will be paid as a lump sum (inclusive of all expenses related to the consultancy), and will be fixed regardless of changes in the cost components of the consultancy. The consultancy fee will be paid upon completion of the following milestones:

UNDP is committed to achieving workforce diversity in terms of gender, nationality and culture. Individuals from minority groups, indigenous groups and person with disabilities are equality encouraged to apply. All applicants will be treated with the strictest confidence.

Annex 2: Itinerary of the Evaluation Mission

Date	Activity/Topic	Stakeholder institutions/Responsible
Sunday 15 July	Arrival to Kigali	Evaluation Consultant
Monday 16 July	Consultation meeting on the plan of mission	Consultant & PCBs Project Team
	Consultation meeting	REMA (Project Management), UNDP CO Project Officer, REMA Director
Tuesday 17 July	Update of PCBs inventory	REMA, REG/EUCL, University of Rwanda, National Consultant, Evaluation Consultant
	Public awareness and training	REMA, REG/EUCL, University of Rwanda, National Consultant, Evaluation Consultant
	Safe disposal and storage of PCBs	REMA, REG/EUCL, University of Rwanda, National Consultant, Evaluation Consultant
Wednesday 18 July	PCB legislation and technical guidance	REMA, REG/EUCL, University of Rwanda, National Consultant, Evaluation Consultant
	Visit of Transformer's storage of Gikondo	Consultant & PCBs Project Manager
	REG/EUCL transformers	REG/EUCL Focal Point, Consultant & PCBs Project Manager
	Visit of interim storage warehouse at Jabana	Consultant & PCBs Project Manager
Thursday 19 July	Public awareness and training	REMA, REG/EUCL, University of Rwanda, National Consultant, Evaluation Consultant
	REG/EUCL operations	REG/EUCL Director of Operations, Consultant & PCBs Project Manager
	Consultation meeting with a project steering committee member	Consultant & PSC member
Friday 20 July	Laboratory analysis of PCBs	RSB Chief of Laboratory, Consultant & PCBs Project Manager
	Consultation meeting at UNDP CO	UNDP CO Focal Point, Evaluation Consultant
	Debriefing on the findings of the evaluation mission	REMA Director General, Consultant & PCBs Project Team
	Debriefing with UNDP senior management	Consultant & UNDP senior management
Saturday 21 July	Departure from Kigali	Evaluation Consultant

Annex 3: List of People Interviewed

Name of Person	Organisation	Designation
Bernardin Uzayisaba	UNDP CO Rwanda	Program Analyst- Poverty and Environment unit
Etienne Gonin	UNDP Istanbul Regional Hub	Regional Technical Advisor
Carlo Lupi	Freelance Consultant	International Consultant
Colette Ruhamy	REMA	Director General
Remy Norbert Duhuze	REMA	Director of Environmental Regulation and Pollution Control
Eliezer Rusakana	REMA	PCB Project Coordinator
Israel Dufatanye	REMA	Environmental Inspection Officer
Christian Sekomo Birame	University of Rwanda	National Consultant – PCB Legislation
Richard Ngendahayo	Eco Design & Protection Ltd	National Consultant - PCB Inventory
Elisée Gashugi	University of Rwanda	National Consultant – Capacity Building
Adrien Rutikanga	University of Rwanda	Member of PSC
	REG/EUCL	Director of Operations
Théophile Numviyingoma	REG/EUCL	Focal Point

Annex 4: Project Stakeholder Map

Ministry/Department	Function/Responsibility
Ministry of Environment and Natural Resources (MINIRENA)	Overall policy oversight, monitoring & institutional support. Develops and implements policies for environmental protection, conservation of biological diversity and forest ecological systems, rational use of natural resources, sustainable development of mountain areas and assure the state's ecological security. It organizes and implements government control over environmental protection and natural resources use; implements multilateral environmental agreements (MEAs); and licenses uses, releases, transport, storage and disposal of toxic materials and waste, including radioactive. Responsible for resource mobilization, allocation and accountability.
Rwanda Environment Management Authority (REMA)	Under supervision of the Ministry of Natural Resources, from the Law n°63/2013 of 27/08/2013 determining the mission, organization and functioning of Rwanda Environment Management Authority (REMA), REMA reserves the legal mandate for national environmental protection, conservation, promotion and overall management, including advisory to the government on all matters pertinent to the environment and climate change. Serves as the designated National Focal Point for SC
Rwanda Revenue Authority	A quasi-autonomous body charged with the task of assessing, collecting, and accounting for tax, customs and other specified revenues. This is achieved through effective administration and enforcement of the laws including those related to prevention of harmful chemical substances or potentially toxic chemical substances.
Ministry of Health	Develops and implements policies to prevent harmful influence of chemical substances on human health and people livelihoods, administers national registers of potentially toxic chemical substances in the country. It monitors pesticides including POPs and develops and implements policies related to occupational health associated with chemical production and use.
Ministry of Agriculture and Animal Resources	Develops and administers policies on the use of fertilizers and pesticides in agriculture. Responsible for obsolete pesticide management, particularly for common regulatory measures, infrastructure, technical expertise and training.
Ministry of Trade and Industry	Responsible for development of industrial development policy and issues related to standardization and metrology.
Ministry of Interior	Implements government control over illegal application of chemical substances.
Ministry of Justice	Carries out governmental registration of all normative-legal statements related to chemical management.
RECO (The National Electricity Company)	Identified as the main holder of PCB transformers representing actually more than 95% of the whole transformer population at the inception of the project.
National University of Rwanda and Kigali Institute of Sciences and Technology	Both aim to generate and disseminate high quality multi-disciplinary knowledge and promote effective research, skills training and community service for national competitiveness and sustainable socio-economic development. Their vision is to become innovative, world class and self-sustainable Universities that are responsive to national, regional and global challenges.

Annex 5: Evaluation Matrix

Evaluation Criteria	Evaluation Questions	Data Sources	Data Collection Methods
Relevance	Is the initiative aligned to the national development strategy (EDPRS 2, Vision 2020)? How does the project align with national strategies in the affected sectors and specific development challenges in the country? Where is this project implemented? Who are the main beneficiaries of the project and how does the project address their human development needs? To what extent are the objectives of the project still valid? Are the activities and outputs of the project consistent with attainment of its objectives?	UNDP programme/project documents UNDP programme/project Annual Work Plans Programmes/projects/thematic areas evaluation reports Government's national planning documents Human Development Reports MDG/SDG progress reports Government partners progress reports Interviews with beneficiaries	Desk reviews of secondary data Interviews with government partners Interviews with NGOs partners/service providers Interviews with funding agencies and other UNCT Interview with civil societies in the concerned sector Interviews with political parties leader Interviews with related parliamentary committees Related Constitutional bodies such as Human Rights, Women Rights, etc. Field visits to selected projects

	Are UNDP approaches, resources, models, conceptual framework relevant to achieve the planned outcome? Are they sufficiently sensitive to the conflict- post-conflict environment in the country? To what extent has UNDP adopted participatory approaches in planning and delivery of the initiative and what has been feasible in the country context? What analysis was done in designing the project? To what extent have indigenous peoples, women, conflict- displaced peoples, and other stakeholders been involved in pro- ject design? Are the resources allocated sufficient to achieve the objectives of the project?	UNDP staff Development partners (UN agencies, bilateral development agencies) Government partners involved in specific results/thematic areas Concerned civil society partners Concerned associations and federations	Interviews with UNDP staff, development partners and government partners, civil society partners, associations, and federations
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Evaluation Criteria	Evaluation Questions	Data Sources	Data Collection Methods
Effectiveness	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? What outputs has the project achieved and what outcomes does the project intend to achieve? What changes and progress towards the outcomes can be observed as a result of the outputs? To what extent were the project objectives achieved? How does UNDP measure its progress towards expected results/outcomes? In addition to the project, what other factors may have affected the results? What were the unintended results (+ or -) of the project?	Project/programme/thematic areas evaluation reports Progress reports on projects UNDP staff Development partners Government partners Beneficiaries	Desk reviews of secondary data Interviews with government partners, development partners, UNDP staff, civil society partners, associations, and federations Field visits to selected sites
	How broad are the outcomes (e.g., local community, district, regional, national)?	Evaluation reports Progress reports on projects	Desk reviews of secondary data

	What has been the results of the capacity building/training components of the project? Were qualified trainers available to conduct trainings? Are the results of the project intended to reach local community, district, regional or national level?		
	Who are the direct beneficiaries and how many of them were affected by the project? Who are the ultimate beneficiaries and to what extent have they been reached by the project? To what extent do the poor, indigenous groups, women, and other disadvantaged and marginalized groups benefit? 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? How far has the regional context been taken into consideration while selecting the project/ programme? Was there any partnership strategy in place for implementation of the project and if so how effective was it?	Programme documents Annual Work Plans Annual Progress Reports Evaluation reports MDG/SDG progress reports Human Development Reports	Desk reviews of secondary data

Evaluation Criteria	Evaluation Questions	Data Sources	Data Collection Methods
Efficiency	Has the project or programme been implemented within the original timeframe and budget? Have UNDP and its partners taken prompt actions to solve implementation issues, if any? Have there been time extensions on the project? What were the circumstances giving rise to the need for time extension? Has there been over-expenditure or under-expenditure on the project? What mechanisms does UNDP have in place to monitor implementation? Are these effective? Have there been any outside factors (e.g. political instability) affecting on implementation effectiveness?	Programme documents Annual Work Plans Annual Progress Reports Evaluation reports Government partners Development partners UNDP staff (Programme Implementation Support Unit)	Desk reviews of secondary data Interviews with government partners and development partners
	Were UNDP resources focused on the set of activities that were expected to produce significant results? Was there any identified synergy between UNDP initiatives that contributed to reducing costs while supporting results? Was there a Project Implementation Support Unit and how it assisted the efficiency of implementation? Were the project resources concentrated on the most important initiatives or were they scattered/spread thinly across initiatives?	Programme documents Annual Work Plans Annual Progress Reports Evaluation reports Government partners Development partners UNDP staff (Programme Implementation Support Unit)	Desk reviews of secondary data Interviews with government partners and development partners

Evaluation Criteria	Evaluation Questions	Data Sources	Data Collection Methods
Sustainability	Does/did the project have an exit strategy? How does UNDP propose to exit from projects that have run for several years? To what extent does the exit strategy take into account the following: – Political factors (support from national authorities) – Financial factors (available budgets) – Technical factors (skills and expertise needed) – Environmental factors (environmental sustainability) Were initiatives designed to have sustainable results given the identifiable risks?	Programme documents Annual Work Plans Annual Progress Reports Evaluation reports	Desk reviews of secondary data
	What issues emerged during implementation as a threat to sustainability? What corrective measures were adopted? How has UNDP addressed the challenge of building national capacity in the face of high turnover of government officials? What unanticipated sustainability threats emerged during implementation? What corrective measures did UNDP take?	Evaluation reports Progress reports UNDP programme staff	Desk reviews of secondary data Interview UNDP programme staff
	How has UNDP approached the scaling up of successful pilot initiatives and catalytic projects? Has the government taken on these initiatives? Have donors stepped in to scale up initiatives? What actions have been taken to scale up the project if it is a pilot initiative?	Evaluation reports Progress reports UNDP programme staff	Desk reviews of secondary data Interview UNDP programme staff

Evaluation Criteria	Evaluation Questions	Data Sources	Data Collection Methods
Progress towards impacts	What difference has the project made to the direct and ultimate beneficiaries? Which are the intermediate states that lead to impacts, have they been achieved and how? Which (if any) are still missing gaps between the project outcomes and realization of the expected impacts? Are the necessary conditions in place for enabling scaling up of outcomes into impacts?	Programme documents Annual Work Plans Annual Progress Reports Evaluation reports Government partners Development partners UNDP staff (Programme Implementation Support Unit)	Desk reviews of secondary data Interviews with government partners and development partners
	Have indigenous institutions been established and or strengthened to provide leadership and technical support to the transfer of project outcomes into impacts? Have collaboration mechanisms between government agencies and their boundary partners established to implement the project-initiated measures? Have the relevant government agencies undertaken measures to support the adoption of the project's results and their inclusion as national priorities?	Programme documents Annual Work Plans Annual Progress Reports Evaluation reports Government partners Development partners UNDP staff (Programme Implementation Support Unit)	Desk reviews of secondary data Interviews with government partners and development partners
	How did the project contribute to the achievement of UNDAF and EDPRS II? Are there sufficient fundraising, investment and revenue-generating mechanisms and strategies to enable and support the outcome-impact pathways? Are government agencies encouraged/enabled to facilitate wider adoption of the project results? 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?	Programme documents Annual Work Plans Annual Progress Reports Evaluation reports Government partners Development partners UNDP staff (Programme Implementation Support Unit)	Desk reviews of secondary data Interviews with government partners and development partners

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

Evaluation Criteria	Evaluation Questions	Data Sources	Data Collection Methods
Supporting policy dialogue on human development issues	To what extent did the initiative support the government in monitoring achievement of MDGs/SDGs? What assistance has the initiative provided supported the government in promoting human development approach and monitoring MDGs/SDGs? Comment on how effective this support has been.	Project documents Evaluation reports HDR reports MDG/SDG reports National Planning Commission Ministry of Finance	Desk review of secondary data Interviews with government partners
Contribution to gender equality	To what extent was the UNDP initiative designed to appropriately incorporate in each outcome area contributions to attainment of gender equality? To what extent did UNDP support positive changes in terms of gender equality and were there any unintended effects? Provide example(s) of how the initiative contributes to gender equality. Can results of the programme be disaggregated by sex?	Project documents Evaluation reports UNDP staff Government partners Beneficiaries	Desk review of secondary data Interviews with UNDP staff and government partners Observations from field visits
Addressing equity issues (social inclusion)	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? Provide example(s) of how the initiative takes into account the needs of vulnerable and disadvantaged groups, for example, women, youth, disabled persons. How has UNDP programmed social inclusion into the initiative?	Project documents Evaluation reports UNDP staff Government partners Beneficiaries	Desk review of secondary data Interviews with UNDP staff and government partners Observations from field visits

Annex 6: Project Results Framework

This project will contribute to achieving the following Country Programme Outcome as defined in CPAP or CPD: Sustainable development principles integrated into poverty reduction policies and programmes.
Country Programme Outcome Indicators:
Primary applicable Key Environment and Sustainable Development Key Result Area (same as that on the cover page, circle one): Expanding access to environmental and energy services for the poor.
Applicable GEF Strategic Objective and Program: Objectives: To reduce and eliminate production, use and releases of POPs Program: (1) POPs SP1 Strengthening Capacities for NIP Development and Implementation, (2) POPs SP2 Partnering in Investments for NIP Implementation
Applicable GEF Expected Outcomes: (1) GEF eligible countries have the capacity to implement the measures required to meet their obligations under the Convention, including POPs reduction measures. As such measures will address the full range of chemicals (e.g., pesticides, industrial chemicals, and unintentionally produced by-products). Countries will also be implementing measures that will improve their general capacity to achieve the sound management of chemicals. (2) Sustainably-reduced POPs production, use, and releases, through phase-out, destruction in an environmentally sound manner, and use of substitute products and alternative processes, that lead to reduced environmental and health risks resulting from POPs.
Applicable GEF Outcome Indicators: (1) Indicators for Outcome 2: Legislative support to aid the operation of PCB management system a. legislative and regulatory framework in place in supported countries for the management of POPs and the sound management of chemicals in general; (2) Indicators for Outcome 3: Stakeholders and public sensitized and PCB equipment holders handle equipment in well informed and responsible manner (capacity building) a. Strengthened and sustainable administrative capacity, including chemicals management administration within the central government in supported countries; b. Strengthened and sustainable capacity for enforcement in supported countries. (3) Indicators for Outcome 4: Safe disposal of PCB equipment, oils and waste material a. POPs phased out from use (tons and cost per ton per compound) b. POPs destroyed in an environmentally sound manner (tons and cost per ton per compound and mode of destruction) Reduced exposure to POPs, measured as the number of people living in close proximity to POPs wastes that have been disposed of or contained

Project Strategy	Objectively verifiable indicators	Baseline	Target	Sources of verification	Assumptions
Objective: Minimizing environmental and health risks associated with PCBs through strengthening technical and regulatory capacity for the environmentally sound management and disposal of PCBs in Rwanda	Established and sustainable operational and regulatory capacity undertaking identification and management of PCBs in compliance with Stockholm Convention obligations by 2020 1. Legislation and guidelines adopted 2. Central warehouse with 350 tons of waste 3. Tonnage of PCBs safely disposed	NIP adopted based on preliminary knowledge of issue. Absence of implementation capacity, either institutionally or physically. Fragmented institutional responsibility for issue.	Functional regulatory regime covering import/export, identification, capture and securing PCBs for future disposal. Operation capacity for ESM of current and future stockpiles and waste. Informed PCB holders and qualified service providers to undertake PCB management activities. Clear assignment of responsibilities within the government.	Regulatory monitoring of sources of PCBs and work of service providers. National environmental performance reports. Country Convention compliance status reporting. Project Progress and M&E reports 1. Official Gazette 2. Visit reports with photographs 3. Disposal Certificate	Overall government commitment and assumption of appropriate responsibility. Regulatory enforcement resources and capacity available. Accurate monitoring and reporting. Availability of candidate service providers in the government and/or private sector.
Outcome 1: Updated PCB inventory per category of holders (database) and reinforced local capacity to maintain and update PCB inventory on annual basis					
Outcome 1.1: Updated the PCB inventory per category of holders (database) and reinforced local capacity to maintain and update PCB inventory on annual basis	Detailed inventory of PCB containing and contaminated equipment in service, existing PCB waste stockpiles and PCB contaminated sites in place end of 2011	Incomplete inventory of in service equipment and inventories of PCB waste stockpiles, cross contaminated equipment and contaminated sites.	Tracking system for in-service equipment, waste stockpiles and contaminated sites that will be maintained on an ongoing basis	On-site verification by trained experts. Screening sampling results. Regulatory reporting on labeling and registry measures. Convention reporting.	Cooperation of PCB holders (RECO and private sector). Parallel implementation of labeling and registration measures. Ongoing budget support for monitoring and sampling.
	Data management and tracking system operational and used for reporting end of 2011.	No formal consolidated PCB information system or associated reporting capability.	Publicly accessible PCB information system operational, maintained, and used for reporting and information exchange under the Convention	Obligation of response from stakeholders. Validation of information as PCB management activities are implemented. Use in convention reporting.: Database hosted in REMA	Responsible agency assigned and resourced to operate and maintain system. Detailed tracking system available
	Supply of lab equipment and consumables for the screening of 1200 units with staff trained in their use by 2011.	Absence of capability to cost-effectively identify and categorize PCB contaminated materials acting as a major barrier to inventory development and tracking Currently no laboratory is equipped to specifically undertake PCB analysis	One accredited national laboratory capable of doing routine PCB analysis in soil, water and air samples inclusive of trained personnel and accessible to responsible regulatory authorities, PCB holders and service providers Screening capacity to effectively support tracking database as PCB management is undertaken into the future.	Regulatory reporting on labeling and registry measures. Data base reports Project Progress and M&E reports. Legal agreements on access and use. Procurement documents on supply of equipment as necessary. Accreditation documents and training certificates. Laboratory records.	Cooperation of PCB holders Availability of personnel Availability and acceptance of internationally accepted screening tools. Commitment of authorities to sustain the capability. Availability and agreement on long term access to a suitable facility for purposes of upgrading. Government commitment to support the operation of such a facility in the long term.

Project Strategy	Objectively verifiable indicators	Baseline	Target	Sources of verification	Assumptions
	Technical instructions on identification, sampling, data management	No consolidated guidance available to holders of PCBs, relevant authorities or service providers on the practical primary management of PCBs.	Availability and application of technical instructions for management of current and future PCB inventories and tracking system	Project Progress and M&E reports. Expanded identification of PCB equipment in inventory. Lab manuals	Implementation of regulatory labeling and registry measures. Cooperation of PCB holders. Availability of authorized service providers
Outcome 1.2: RECO (principal PCB holder) and other possible holders are accessed to establish partnership scheme(s) for early/mature equipment replacement	Phase out program and disposal plan established by the end of 2011 Purchase of new transformers	Phase out criteria limited to electricity supply and economical parameters	Availability and application of technical instructions for management of current and future PCB inventories and tracking system Reco staff technically able to manage disposal plan	Project Progress and M&E reports. Receipt for transformer purchase	Cooperation of PCB holders. Needed financial resources available for replacement cost
Outcome 2: Legislative support to aid the operation of PCB management system					
Outcome 2.1: PCB legislation and technical guidance developed and implemented	Regulations requiring registration, labeling and status reporting of potential all PCB and PCB containing materials in use end of 2010.	No current regulations requiring declaration/reporting/unique identification by holders of presence of PCB waste stockpiles or PCB containing equipment.	A comprehensive national regulatory registry of all PCB containing equipment in service that is maintained and updated such that its status and fate can be tracked	Project Progress and M&E reports National legal and regulatory registers. Official journal (gazette) Analysis report of PCB inventory results and response rates.	Cooperation and compliance of PCB holders and service providers. Government commitment to timely processing of required regulations. Sustaining government support for enforcement of regulatory measures and compliance reporting on them
	Adoption of appropriate hazardous waste classification of PCBs and PCB contaminated materials in 2010.	PCB waste classification not well defined in current waste management regulations allowing potential avoidance of proper management.	Explicit inclusion of high concentration PCB wastes as priority hazardous wastes in national waste management legislation/regulations. Consistency of these with applicable international standards and the Basel Convention on trans-boundary movement of hazardous waste.	National legal and regulatory registers. Equivalency comparisons with international standards. Basel convention reporting.	Government commitment to timely processing and application of required regulations. Acceptance of international experience and precedents respecting regulatory practice and standards.
	Enactment of legal ban on new use, re-use, trade, import, and export of PCBs and PCB contaminated equipment and materials in 2010.	No regulation of PCB trade, use and import/export. Uncontrolled trade in contaminated PCB equipment occurs including export of stockpiles and waste and import of used PCB equipment. Re-Use of PCBs occurs. In appropriate declassification of PCB contaminated equipment occurs	Effective implementation and enforcement of use, re-use, trade, import and export bans including ensuring trade in scrapped contaminated PCB equipment and import of used PCB equipment is eliminated.	National legal and regulatory registers. Customs reporting information Control through inventory reporting, and effective identification, labeling and registry of PCB contaminated equipment in service.	Cooperation and compliance of PCB holders, service providers and customs officials. Government commitment to timely processing of required regulations. Acceptance of international experience and precedents respecting regulatory practice and standards.

Project Strategy	Objectively verifiable indicators	Baseline	Target	Sources of verification	Assumptions
				Compliance reporting required of potential PCB holders under applicable regulations. Basel Convention reporting.	Sustaining government support for enforcement of regulatory measures and compliance reporting on them
	Legal measures allowing unrestricted regulatory access to information and locations that may have PCBs, (wastes stockpiles, PCB containing equipment and site contamination) in 2010	Legal barriers on the ability of authorities to inspect and access sites.	Allowance in practice of access by mandated regulatory authorities to sites potentially containing or contaminated by PCBs, including rights to initiate assessment.	Project Progress and M&E reports National legal and regulatory registers. Compliance reporting required of potential PCB holders under applicable regulations.	Cooperation and compliance of PCB holders and service providers. Government commitment to timely processing of required regulations. Sustaining government support for enforcement of regulatory measures and compliance reporting on them
Outcome 2.2: Developed and established rules to avoid cross-contamination of the oils and equipment; rules/procedures on handling contaminated oils/equipment and labeling	Legal measures related to the reuse of PCB oil and PCB contaminated mineral oil transformers Legal measures on the handling, transport of dangerous chemical substances	No regulation on use and reuse of PCB oil and PCB contaminated mineral oil No regulation for handling and transport of dangerous substances	Mitigation of cross contamination Mitigation of risks of leakage and PCB pollution during transport and handling	Transport equipment authorized and controlled by competent authorities PCB management chart in force in RECO utilities during maintenance operations	Cooperation and compliance of PCB holders and service providers. Government commitment to timely processing of required regulations. Sustaining government support for enforcement of regulatory measures and compliance reporting on them
Outcome 3: Stakeholders and public sensitized and PCB equipment holders handle equipment in well informed and responsible manner (capacity building)					
Outcome 3.1 Public awareness campaigns conducted.	Publicly accessible information on PCBs and their management including: i) a maintained official web site; ii) a widely distributed brochure; iii) media exposure (two annual campaigns during project); iv) information events (two during project).	Low level of general awareness related to PCBs and chemicals management generally across all stakeholders. No current information products or programs.	Widely accessible current information on PCBs and ongoing management activities. Integration into a national information program on sound chemicals management	Project Progress and M&E reports. Monitoring of press and media coverage. Web site utilization	Sustaining capacity to maintain awareness efforts and key programs. Active participation and partnership with NGO community. Interest and participation of stakeholders.
	Educational curricula related to chemicals (including PCBs) impacts on environment and human health, and management actions for addressing the issue during the project.	Limited active educational efforts or tools available.	Inclusion of chemicals management and particularly PCBs in relevant educational programs, and active R&D interest in addressing it.	Project Progress and M&E reports. Content of educational and academic publications. Enrollment in relevant courses	Sustaining interest and capacity in educational institutions to maintain educational programs. Active participation and partnership with educational and research institutions.

Project Strategy	Objectively verifiable indicators	Baseline	Target	Sources of verification	Assumptions
	Training and information seminars on chemicals management including PCBs for relevant government agencies, the academic community, affected communities, NGOs, and holders of PCBs (22 workshops)	Key stakeholders generally have limited awareness of the issue or actions required of them to address it.	Well informed stakeholder community engaged in addressing the issue with a high level of understanding and technical capacity.	Project Progress and M&E reports. Attendance at training information events. NGO/stakeholder feedback.	Active participation and partnership with NGO community. Interest and participation of stakeholders.
	Publicly accessible information on PCBs and their management including: i) a maintained official web site; ii) a widely distributed brochure; iii) media exposure (two annual campaigns during project); iv) information events (two during project).	Low level of general awareness related to PCBs and chemicals management generally across all stakeholders. No current information products or programs.	Widely accessible current information on PCBs and ongoing management activities. Integration into a national information program on sound chemicals management	Project Progress and M&E reports. Monitoring of press and media coverage. Web site utilization	Sustaining capacity to maintain awareness efforts and key programs. Active participation and partnership with NGO community. Interest and participation of stakeholders.
	Educational curricula related to chemicals (including PCBs) impacts on environment and human health, and management actions for addressing the issue during the project.	Limited active educational efforts or tools available.	Inclusion of chemicals management and particularly PCBs in relevant educational programs, and active R&D interest in addressing it.	Project Progress and M&E reports. Content of educational and academic publications. Enrollment in relevant courses	Sustaining interest and capacity in educational institutions to maintain educational programs. Active participation and partnership with educational and research institutions.
	Training and information seminars on chemicals management including PCBs for relevant government agencies, the academic community, affected communities, NGOs, and holders of PCBs (22 workshops)	Key stakeholders generally have limited awareness of the issue or actions required of them to address it.	Well informed stakeholder community engaged in addressing the issue with a high level of understanding and technical capacity.	Project Progress and M&E reports. Attendance at training information events. NGO/stakeholder feedback.	Active participation and partnership with NGO community. Interest and participation of stakeholders.
	Training and information seminars on chemicals management including PCBs for relevant government agencies, the academic community, affected communities, NGOs, and holders of PCBs (22 workshops)	Key stakeholders generally have limited awareness of the issue or actions required of them to address it.	Well informed stakeholder community engaged in addressing the issue with a high level of understanding and technical capacity.	Project Progress and M&E reports. Attendance at training information events. NGO/stakeholder feedback.	Active participation and partnership with NGO community. Interest and participation of stakeholders.

Project Strategy	Objectively verifiable indicators	Baseline	Target	Sources of verification	Assumptions
Outcome 3.2: Promoted safe and proper equipment handling at holders; holders trained on leak handling, safeguarding and repairing of old/damaged equipment	Strategy and plan for pre-treatment and disposal of PCB stockpiles and wastes in place end of 2011.	No plan in place to develop or access pre-treatment or disposal capacity exists for PCB waste stockpiles.	Comprehensive strategy and plan adopted, defining selection and the process of implementation of pre-treatment and disposal options both to be applied in the country (i.e. equipment decontamination, soil management, potential cement kiln utilization) and through export, including potential regional initiatives.	Project Progress and M&E reports. Expert assessment of strategy and plan documentation. Evaluation against international practice and experience, standards, and guidance documents (i.e. Basel Convention, GEF/STAP) government policy adoption here, like minutes of meeting , order of minister of Environment	Detailed inventory accurately estimates long term pre-treatment and disposal needs. Participation of PCB holders, local service providers, scientific experts, and international technology suppliers.
	Development of standards and methodologies for ongoing identification and assessment of contaminated sites, inclusive of RECO staff to undertake it.	No capacity exists respecting contaminated site clean- up generally and specifically with respect to PCB contamination.	Operational capability within responsible government agencies and/or commercial service providers to undertake assessment and clean-up of PCB contaminated sites consistent with international practice.	Project Progress and M&E reports. Expert assessment of standard and methodology documentation. Evaluation against international practice and standards.	Designation of responsible operational authorities and availability of local service providers. Detailed PCB inventory accurately identifies potential contaminated sites.
	Long term plan for the monitoring in place and phase out of PCB containing equipment in service consistent with Convention requirements (2025) formally adopted.	The phase out of PCB equipment is currently uncontrolled and includes practices such as selling/exporting PCB contaminated equipment for scrap, importing used PCB equipment for new or replacement installations, and replacing PCB oils in transformers to de-classify the equipment.	A fully elaborated detailed plan endorsed by responsible authorities and PCB holders for replacement of in service PCB equipment identified in the detailed national inventory (Outcome 1), consistent with Convention obligations.	Project Progress and M&E reports. Expert assessment of the plan. Concordance evaluation with Convention requirements.	Detailed PCB inventory accurately identifies PCB containing equipment in service and projects its operation life. Effective regulatory controls are in place governing the identification, labeling, and status reporting of PCB containing equipment. PCB equipment holder assumption of replacement responsibility.
	Technical guidance and training available for handling, transport and safeguarding	No technical capacity available for handling, transport and safeguarding in the country	Secure PCB handling, transport, storage operations	Reporting procedures related to transport of dangerous substances Register output / input for storage	Effective regulatory controls are in place governing the identification, labeling, and status reporting of PCB containing equipment. PCB equipment holder assumption of replacement responsibility.

Project Strategy	Objectively verifiable indicators	Baseline	Target	Sources of verification	Assumptions
Outcome 4. Safe disposal of PCB equipment, oils and waste material					
Outcome 4.1. Assessed existing locations for safe PCB equipment storage; 4.2. Collected PCB equipment / packaged oils and waste sent for storage location(s)	Secure storage capacity for PCB stockpiles and wastes at RECO sites for PCB material and PCB wastes by end of 2012 Operational rules for handling and transport adopted by RECO management	No hazardous waste storage suitable for PCB waste stockpiles is available. No provision for secure storage at holders sites. No handling equipment and secure transport infrastructure available	1 national designated secure storage facility established in RECO premises and equipped with necessary infrastructure for PCB waste stockpiles under continuing care and custody of a responsible government authority. Major holders have secure storage facilities to accommodate PCB contaminated equipment when retired as an option. Mitigation of risks associated with handling and transport of PCBs	Project Progress and M&E reports. Design review documents. Procurement documents. Facility regulatory approvals site visit reports etc.	PCB regulations and detailed inventory in place, phasing out program in place Establishment of sustainable operational and custody arrangements. Timely regulatory approvals.
4.3 Agreed disposal plan put in place: shipment overseas and final disposal	Trained and equipped service providers capable of undertaking packaging, transportation end of 2010	Limited trained capability in the safe handling of PCB contaminated materials and general absence of such capability among holders of PCBs and private service providers.	Fully operational service provider capacity to support the securing of PCB waste stockpiles and transport to the designated national facility or export for disposal.	Certifications of service providers and staff.(packing certificate, trans frontier shipment documents).	PCB holder cooperation Cooperation of potential service providers.
	Residual contamination cleanup for PCB solid wastes including training of RECO staff by end of 2010.	Some PCB containing electrical equipment (transformers) are in critical applications and have long remaining service lives. Current practices involving replacement of oil do not meet international standards and result in retention of PCB contaminated equipment.	Establish the feasibility of environmentally sound transformer decontamination locally as an option to replacement and export of large volumes of materials for ESM disposal	Project Progress and M&E reports. Expert assessment of assessment results and demonstration performance	Local decontamination is cost effective relative to replacement. Existing transformers can be practically decontaminated to a low POBs level based in international benchmarks.
	Feasibility assessment and decision respecting cleaning of PCB containing equipment to allow recycling of metallic scraps Disposal of 150 MT of PCB stockpiles by export to a qualified disposal facility by 2012. Safety storage of 350 tons of solid wastes until recycling	No identified and secured stockpiles with most stockpiles likely being exported as scrap but leaving residual contamination in the form of waste materials and contaminated soils at unknown locations. No assigned responsibility for hazardous waste management generally and PCBs in particular.	Environmentally sound disposal of 150 MT of PCB oil and PCB contaminated mineral oil and local experience for future disposal requirements.	Destruction certificates Basel convention notices and consent documentation Waste transport tracking documents. Applicable government resolutions. Budget allocations. Demonstration of effective assumption of responsibility by designated organizations.	Availability of suitable disposal facilities. Transit permissions from transit countries. Government leadership in undertaking clear designation of responsible organizations. Cooperation of stakeholder agencies and other organizations.

Expected Outcomes	Expected Outputs
Outcome 1: PCBs numbers in stocks, equipment and waste are updated; and early/mature equipment replacement schemes are in place to be subject to agreed disposal options	1.1. Updated the PCB inventory per category of holders (database) and reinforced local capacity to maintain and update PCB inventory on annual basis;
	1.2.RECO (principal PCB holder) and other possible holders are accessed to establish partnership scheme(s) for early/mature equipment replacement
Outcome 2: PCB legislation and management guidelines adopted	2.1 PCB legislation and technical guidance developed and implemented
	2.2 Developed and established rules to avoid cross-contamination of the oils and equipment; rules/procedures on handling contaminated oils/equipment and labelling
Outcome 3: - Public sensitization and information of PCB risks. - PCB holders aware and avoid equipment leakages and cross-contamination.	3.1 Public awareness campaigns conducted: PCB stakeholders trained in technical guidelines adopted
	3.2. Promoted safe and proper equipment handling at holders; holders trained on leak handling, safeguarding and repairing of old/damaged equipment
Outcome 4: PCB equipment and oils collected, transported and stored; export for disposal of PCBs equipment, oils and waste is operational	4.1. Assessed existing locations for safe PCB equipment storage; selected existing storage facility upgraded for storage and transformer draining and PCB packaging, facility safety procedures setup.
	4.2. Collected PCB equipment / packaged oils and waste sent for storage location(s);
	4.3. Agreed disposal plan put in place and completed
	- equipment replacement scheme promoted at RECO to replace up to 42 transformers in use; - Max150 tons of PCB oil disposed of through export; - Max 350 tons of PCB contaminated solid waste material packed and safely stored

Annex 7: 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 8: 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 9: List of Documents Consulted

1. Guidelines for GEF Agencies in Conducting Terminal Evaluation for Full-sized Projects, GEF, April 2017
2. The GEF Monitoring and Evaluation Policy, GEF Evaluation Office, 2010
3. Outcome-Level Evaluations, A Companion Guide, UNDP, 2011
4. Glossary of Key Terms in Evaluation and Results Based Management, OECD, 2010
5. Ethical Guidelines for Evaluations, UNEG, 2008
6. Integrating Human Rights and Gender Equality in Evaluations, UNEG, 2014
7. Management and Disposal of PCBs in Rwanda; UNDP Rwanda Project Document, 2011
8. Management and Disposal of PCBs in Rwanda; UNDP Rwanda Annual Progress Report 2014
9. Management and Disposal of PCBs in Rwanda; UNDP Rwanda Annual Progress Report 2015
10. Management and Disposal of PCBs in Rwanda; UNDP Rwanda Annual Progress Report 2016
11. Management and Disposal of PCBs in Rwanda; UNDP Rwanda Progress Report January –March 2017
12. Management and Disposal of PCBs in Rwanda, UNDP Rwanda Progress Report April – June 2017
13. Stockholm Convention on Persistent Organic Pollutants; UNTC 2001
14. Rotterdam convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, UNTC
15. Updated technical guidelines for the environmentally sound management of wastes consisting of, containing or contaminated with polychlorinated biphenyls (PCBs), polychlorinated terphenyls (PCTs) or polybrominated biphenyls (PBBs), Basel Convention Series, 2005

Annex 10: Evaluation Consultant Agreement Form

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 System¹⁸

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 19 February 2018

Signature: _____

¹⁸ www.unevaluation.org/unegcodeofconduct

Annex 11: Audit Trail – annexed as separate file