GEF

Global Environment Facility

1818 H Street, NW
Washington, DC 20433 USA
Tel: 202.473-0508
Fax: 202.522.3240/3245
Internet: www.theGEF.org

October 29, 2008

Dear Council Member:

The UNDP as the Implementing Agency for the project entitled: ***Ghana: Capacity Building for PCB Elimination***, has submitted the attached proposed project document for CEO endorsement prior to final Agency approval of the project document in accordance with UNDP procedures.

The Secretariat has reviewed the project document and found it consistent with the objectives of the program approved by the Council in November 2007. The scope of the project activities, however, has changed since work program entry. Please note that the GEF grant amount has decreased by $554,300. The changes in the various cost elements from the original concept approved by the Council and as recommended in the final project design is summarized in the attached note from the UNDP.

The proposal is being circulated for your comments/information. If by November 26, I have not received requests from at least four Council Members to have the proposed project reviewed at a Council meeting because in the Member's view the project is not consistent with the Instrument or GEF policies and procedures, I will complete the Secretariat's assessment with a view to endorsing the proposed project document.

Sincerely,

Monique Barbut
Chief Executive Officer and Chairperson

Attachment: Project Document

Copy to: Alternates, GEF Agencies, STAP, Trustee

REQUEST FOR CEO ENDORSEMENT/APPROVAL

PROJECT TYPE: Full-sized Project
THE GEF TRUST FUND

SSubmission Date: 9 Sept 2008
Re-submission Date: NA

GEFSEC PROJECT ID: 2785
GEF AGENCY PROJECT ID: 3527
COUNTRY(IES): Ghana
PROJECT TITLE: Capacity Building for PCB Elimination in Ghana
GEF AGENCY(IES): UNDP
OTHER EXECUTING PARTNERS: UNITAR
GEF FOCAL AREAS: Persistent Organic Pollutants
GEF-4 STRATEGIC PROGRAM(S): POPs-SP1, POPs-SP2

Expected Calendar	
Milestones	**Dates**
Work Program (for FSP)	Nov 2007
GEF Agency Approval	Nov 2008
Implementation Start	Dec 2008
Mid-term Review (if planned)	Dec 2010
Implementation Completion	Dec 2013

A. PROJECT FRAMEWORK (Expand table as necessary)

Project Objective:

Project Components		Expected Outcomes	Expected Outputs	GEF Financing*		Co-financing*		Total ($)
				($)	%	($)	%	
1. Legal and adminis-trative capacity building	TA	Legal framework, administrative and technical preparedness for sound PCB management strengthened.	1.1.Review, develop and adopt PCB legislation and policies 1.2. Capacity building for sound PCB management in the public sector (authorities) 1.3. Capacity building for sound PCB management (PCB holders) 1.4. Update and further refine the existing PCB inventory 1.5. Develop and implement administrative system for PCB-related enforcement and inspection activities.	566,500	49	591,000	51	1,157,500
2. Technical assistance for minimization of PCB release	TA	Infrastructure for Environmentally Sound Management of PCBs developed and in place	2.1.Identify, construct or upgrade of a secure, temporary storage facility(ies) 2.2 Upgrading of transportation safety for PCB-containing equipment and fluids	566,000	44	731,600	56	1,297,600
3. Technical assistance for export disposal of PCBs	TA	Environmentally sound replacement and disposal of PCB waste and equipment	3. 1.Development of a five year phase-out plan and its implementation for the various waste streams 3.2. Replacement and disposal of pure PCB oil containing equipment and associated waste 3.3. Decommissioning, washing, and disposal of phased- out PCB contaminated mineral oil and equipment in country	1,325,000	44	1,701,580	56	3,026,580

4. Monitor-ing, learning adaptive feedback, outreach, and evaluation	TA	4. Risk reduction verified and lessons learnt widely disseminated	4.1. Development and implementation of project monitoring and evaluation tools and systems 4.2 Information and outreach 4.3. External evaluation	200,000	71	81,000	29	281,000
5. Project management				288,200	38	466,000	62	754,200
Total Project Costs				2,945,700		3,571,180		6,516,880

* List the $ by project components. The percentage is the share of GEF and Co-financing respectively to the total amount for the component.

** TA = Technical Assistance; STA = Scientific & technical analysis.

B. FINANCING PLAN SUMMARY FOR THE PROJECT ($)

	*Project Preparation**	*Project*	*Agency Fee*	*Total at CEO Endorsement*	*For the record: Total at PIF*
GEF	350,000	2,945,700	329,570	3,625,270	4,235,000
Co-financing	135,000	3,571,180		3,706,180	4,788,000
Total	485,000	6,516,880	329,570	7,331,450	9,023,000

C. SOURCES OF CONFIRMED CO-FINANCING, including co-financing for project preparation for both the PDFs and PPG.

Name of co-financier (source)	*Classification*	*Type*	*Amount ($)*	*%**
Ghana EPA	Government	In-kind	500,000	13
Energy Commission	Government	In-kind	200,000	12
Volta River Authority	Private sector	Cash	950,000	26
Volta River Authority	Private sector	In-kind	500,000	13
Electricity Company of Ghana	Private sector	In-kind	514,500	14
Ghana Oil Company	Private sector	In-kind	200,000	6
PCB holders scrap value of recycled transformers	Private sector		456,680	12
UNITAR	IGO	Cash	150,000	4
UNITAR	IGO	In-kind	50,000	2
SAICM	IGO trust fund	Cash	50,000	2
Total Co-financing			3,571,180	100%

E. PROJECT MANAGEMENT BUDGET/COST

Cost Items	*Total Estimated person weeks*	*GEF ($)*	*Other sources ($)*	*Project total ($)*
*Local consultants**		50,000	356,000[1]	406,000
*International consultants**			50,000	50,000
*Office facilities, equipment, vehicles and communications***			60,000	60,000
*Travel***				
Audit		20,000		20,000
AOS		218,200		218,200
Total		288,200	466,000	754,200

1

F. CONSULTANTS WORKING FOR TECHNICAL ASSISTANCE COMPONENTS:

Component	*Estimated person weeks*	*GEF ($)*	*Other sources ($)*	*Project total ($)*
*Local consultants**	2,815	770,000	1,200,000	1,970,000
*International consultants**	122	218,000	136,000	354,000
Total	2,937	988,000	1,336,000	2,324,000

G. DESCRIBE THE BUDGETED M&E PLAN:

Project monitoring and evaluation will be conducted in accordance with established UNDP and GEF procedures. A Project Inception Workshop will be held within the first three months of the project implementation with the full project team, relevant government counterparts, key non-governmental counterparts, and UNDP. A Project Steering Committee (PSC) including the government, UNITAR, UNDP, industry, and NGO representatives will be constituted at project inception and will meet quarterly to review project progress, provide strategic guidance, and approve annual work plans and budgets.

Day-to-day monitoring of implementation progress will be the responsibility of the monitoring and evaluation expert. The monitoring and evaluation expert will, with assistance of international expertise, develop a project monitoring and evaluation system, including the project baseline during the first year of project implementation. The baseline will be validated by the PSC.

This baseline will be the benchmark against which progress of the project will be monitored. It is foreseen that the baseline will include both project output indicators as well as indicators for measuring actual PCB risk reduction.

In order to report on progress as well as POPs risk reduction, a comprehensive monitoring and evaluation component will be included. Apart from standard progress/administration and financial monitoring, the project aims at comprehensively report towards the GEF Strategic Objective 2 indicator "*Reduced exposure to POPs, measured as the number of people living in close proximity to POPs wastes that have been disposed of or contained*". As there are no clear guidelines on how this would be reported in such a project context, the project monitoring team will need to develop a system with baseline and intermittent observation points to report towards this indicator. The development of such PCB risk indicators could include restricted sampling and analysis or data collection from existing environmental or health statistics.

A mid-term review of the project will be conducted by a team of an independent international expert and independent national expert assisted by nominated government officials. The mid-term evaluation will determine progress being made towards the achievement of outcomes and will identify correction courses if needed. It will focus on the effectiveness, efficiency, and timeliness of project implementation; highlight issues requiring decisions and actions; and present initial lessons learned on project design, implementation, and management. As an output of this mid-term evaluation, an amended workplan will be developed and appropriate support for re-directing to project activities facing unforeseen challenges. The information and outreach material developed and particularly the lessons learned sections will also provide tools for evaluation. These sections will be partly based on review and evaluation findings and their wide distribution will generate feedback, further providing data on the impacts of the project.

A two-person team of national and international independent evaluators, strengthened with government-appointed experts will conduct a terminal evaluation with a lessons learned section for wide distribution to other countries planning similar PCB disposal and replacement projects.

The final evaluation will take place three months prior to the Terminal Project Implementation Review, and will focus on the same issues as the mid-term evaluation, but will concentrate on the wider impacts of the project activities. The final evaluation will also review the sustainability of results, including the contribution to capacity development and the achievement of global environmental goals. The final evaluation shall also provide recommendations for follow-up activities.

The findings of the final evaluation together with lessons learned documentation will be presented in a final project workshop which operationally closes the project. In preparation of this final workshop, the sustainability issues, particularly the legal enforcement and complete phase-out of both pure PCB and PCB-contaminated transformers (including safe continuation of the washing operations), will be given the highest importance.

FINANCIAL MONITORING

Financial monitoring and adherence to adopted yearly budgets will be controlled through annual project audits.

The financial audits will, in addition to ensuring adherence to bidding and other procedures, emphasize the cost-effectiveness of the action undertaken. The financial audits will further validate the input utilization or "budget-delivery" which may to a certain degree be used for monitoring the implementation efficiency or speed of the project.

Type of M&E activity	Lead responsible party	Budget (indicative)	Time frame
Inception Report	Project Team	None	At the beginning of project implementation
Development of M&E system	Project team, M&E expert government executing agency, international expert	42,000	At the beginning of project implementation
Baseline and update agreed monitoring variables	Project team, M&E expert, Project Steering Committee	64,000	First quarter of project implementation
Project Implementation Review (PIR)	Government, Implementing Agency (IA) Country Office, National Executing Agency, Project Team, IA Task Manager	None	Every year, at latest by July of that year
Implementing Agency (IA) annual reports	The Government, IA Country Office, National Executing Agency, Project Team, IA Task Manager, and Target Groups	None	Every year
Frequent Progress Reports	M&E expert	38,000	To be determined by Executing Agency and PSC
Mid-term Evaluation	Government, international expert, IA Country office	27,000 project + 6,000 government in-kind	Approximately 24 months from inception
Terminal Evaluation, including lessons learned	Project team, IA headquarters and Task Manager, IA Country Office, National Executing Agency	41,000 + 6,000 government in-kind	At the end of project implementation; 3 months prior to the Terminal Project Implementation Review
Terminal Report	UNITAR, IA Country Office, IA Task Manager, Project Team	None	At least one month before the end of the project
Audit	National Executing Agency, IA Country Office, Project Team	20,000 (total for project duration)	Yearly

PART II: PROJECT JUSTIFICATION

A. DESCRIBE THE PROJECT RATIONALE AND THE EXPECTED MEASURABLE GLOBAL ENVIRONMENTAL BENEFITS:

The Stockholm Convention on Persistent Organic Pollutants requires Parties to discontinue production and use of intentionally produced POPs and minimize releases of unintentional, by-product POPs. PCBs are the only intentionally-produced POPs which have been predominantly used in industrial applications. Experiences in different countries and regions on managing PCBs has highlighted the need for capacity building and technical assistance for developing countries to ensure that PCB-containing or PCB-contaminated wastes do not unnecessarily cause releases and environmental or human exposure. The Stockholm Convention requires parties to set up safe management and ensure that adequate steps are taken for phasing-out any material containing PCBs above a concentration of 50mg/kg by 2025.

Ghana has, as national reporting for Stockholm Convention, developed a National Implementation Plan (NIP) on POPs, including information on the PCBs and status of PCB management in the country.

While PCBs have never been manufactured in Ghana, they have been legally imported in significant quantities in transformers and capacitors. The NIP investigations revealed that there are possibly significant quantities of PCB-containing transformers and capacitors in Ghana. Further investigations confirmed that some 2-3% of the transformer park contains pure PCBs and a further 13% of transformers are PCB-contaminated to a level higher than the threshold set in the Stockholm Convention.

The Ghana POPs NIP acknowledges the challenges posed by PCBs and rates PCB management as one of the top priorities, agreed among NIP stakeholders, within and outside of government. The pertinent PCB actions as laid down in the NIP are included in Annex I of the UNDP Project Document submitted together with this CEO Endorsement Form.

The PCB situation in Ghana, as unfolded during the preparatory stage of this project, is typical for the region and current stage of economic development. However, the example and determination of the Ghanaian society to respond to the arising problem of PCB management gives a heightened global significance to the project. Ghana is the first country in sub-Saharan Africa to develop a single country Full Size Project (FSP) that aims at addressing PCB-containing equipment throughout their life-cycle, in line with the requirements of the Stockholm Convention. It can be expected that the example set by Ghana will be followed by other countries, particularly in Africa. The determination and demonstration of "can-do" attitude will increase the global significance of the project many-fold.

The global/regional significance will also be amplified by the PCB management experience gathered during the project and will be very relevant for the other countries in the region that are currently preparing their activities to eliminate PCB-containing equipment. Addressing PCBs in Ghana by introducing proper handling and management as well as safe disposal of the PCB-containing waste streams would reduce the releases of these POPs regionally and ultimately globally.

Finally and importantly, the project will safely dispose a minimum of 160 tons of PCB-containing transformers with approximately 40 tons of pure PCBs and approximately 5 tons of PCB-containing capacitors. The project will further set-up a system of safe collection of low-contaminated PCB oils with subsequent disposal through exports. This scheme will establish washing of transformer formerly containing low PCB-contaminated oils and recovery of metal in Ghana. It is estimated that 35 PCB-contaminated transformers are phased-out yearly, which would total the safe disposal of 450 tons of contaminated material including 150 tons of PCB-contaminated oils and associated non-cleanable waste. All these actions will destroy considerable quantities of PCBs and eradicate these from global circulation.

The introduction of safe in-country management practices for PCB contaminated transformers will contribute to the global benefits as the global community can be assured that the remaining PCBs in Ghana are being responsibly and sustainably managed and disposed.

Regionally the project will bring important benefits that may not be so tangible and easily calculated as direct POPs elimination. While PCBs are a common problem for most countries in the region, many of the neighbors are struggling to find the most appropriate way of dealing with similar problems. The project will demonstrate hands-on how a comprehensive management plan can be implemented in a single country context. Many times the impetus of dealing with a particular issue comes from neighboring countries, particularly as Ghana would be concerned about PCB releases into common environmental resources, such as shared waterbodies, etc. and can therefore stimulate its neighbors to implement the lessons learned in their respective practices.

The Ghana project will complement the UNEP lead regional approach for PCB management in the region and the Lessons Learnt from both of these processed will advice of the optimal for countries considering action on PCBs.

Nationally, there will be environmental and health benefits, as significantly less PCBs will enter into products, the food chain, and the environment in general. Quantification of these benefits is difficult as there is no quantitative baseline, nor a monitoring system allowing such quantification as a result of the project.

Another important national benefit is the experience and capacity gained by most stakeholders in developing a clear plan from cradle-to-grave on how to sustainably manage a particularly problematic industrial chemical. The overall approach and tools developed in the project can, with modifications, be utilized for other problematic chemicals within and beyond the sphere of the Stockholm Convention on POPs. This experience and approaches will contribute towards overall sustainable chemicals control as well as implementation of the Strategic Approach to International Chemicals Management (SAICM).

The projects' local benefits are most visible and tangible at places and neighborhoods where PCB sources are being removed thanks to the project activities. These include potentially leaking PCB-containing equipment and particularly close to the warehouses that are being closed/upgraded. It can be well assumed that people living in the vicinity of these storage facilities are highly exposed to PCBs and the project activities will practically eliminate this exposure. Also, the sound oil management and disposal practices introduced will decrease the PCB exposure of the people currently using PCB-containing oils in fuels, as cutting or even as baking oils or in cosmetics.

B. DESCRIBE THE CONSISTENCY OF THE PROJECT WITH NATIONAL PRIORITIES/PLANS:

PCB management has become a key environmental issue in Ghana. The NIP puts PCB management among the top three priorities, agreed among NIP developing parties comprising relevant ministries and a broad range of stakeholders outside of government.

This common understanding of the urgency to set-up appropriate systems for meeting the Convention deadlines has been further strengthened during the development of the NIP as well as of this project.

The drive and eagerness has not only been coming from the authority side, but also the power production and distribution sector has actively contributed in all stages of elaboration of the NIP, of the PDF-B, including the inventory, and of drafting this FSP. The PCB holding companies have provided all relevant information in their possession, and have also indicated how they currently manage their equipment and how they are prepared to strengthen their efforts to fully implement the Stockholm Convention. This desire is further underlined by the significant support in co-financing towards meeting of the goals of the project.

Specific attention should be drawn to the integration of PCB management project and the national priority initiatives for ensuring general and undisturbed access to electricity. The project activities are

intertwined with the GEFAD, Ghana Energy Development and Access Project, which will contribute through replacement equipment for existing PCB-containing equipment.

Also civil society organisations have followed with interest the various stages for the elaboration of this project and have actively contributed to its content.

C. DESCRIBE THE CONSISTENCY OF THE PROJECT WITH STRATEGIC PROGRAMS:

The objective and outcomes of the project will directly contribute towards the Strategic Objective of GEF-4 for Operational Programme 14 which sets the long term impact of GEF interventions as a reduction in the exposure to POPs of humans and wildlife.

The project outcomes and activities (see next section or project Logframe) are explicitly supporting Strategic Objective 1: Strengthening Capacity for NIP Development and Implementation; and Strategic Objective 2: Partnering in Investments for NIP Implementation of POPs Focal Area Strategy for Persistent Organic Pollutants.

The Strategic Objective 1 (b): Strengthening Capacity for NIP Implementation aims at supporting countries to increase their capacity to implement their Stockholm Convention obligations and NIPs in a sustainable, effective, and comprehensive manner.

The project works towards GEF POPs Strategic Objective 1 (b) by achieving, in particular, Outcome 1: Strengthening of the legal framework and administrative and technical preparedness for sound PCB management, which will develop a full-fledged PCB system and bring the skills of all stakeholders, including the enforcement officials, up to the technical knowledge level needed for efficiently implementing and enforcing PCB safety regulations developed.

The activities included in Project Outcome 1 will contribute towards the GEF Strategic Objective 1 indicators:

- Legislative and regulatory framework in place in supported countries for the management of POPs, and chemicals in general;
- Strengthened and sustainable administrative capacity, including chemicals management administration within the central government in supported countries; and
- Strengthened and sustainable capacity for enforcement in supported countries.

The GEF Strategic Objective 2: Partnering in Investments for NIP Implementation aims at reducing POPs production, use, and releases as well as the stress on human health and the environment caused by POPs.

The project as a whole is contributing towards POPs Strategic Objective 2, but specifically Project Outcome 3—Environmentally sound replacement and disposal of PCB waste and equipment—will contribute to the indicators of the GEF POPs Strategic Objective 2. This will address Strategic Objective 2 indicators:

- POPs phased-out from use (tons and cost per ton per compound); and
- POPs destroyed in an environmentally sound manner (tons and cost per ton per compound and mode of destruction).

Further, the GEF Strategic Objective 2 indicator—Reduced exposure to POPs, measured as the number of people living in close proximity to POPs wastes that have been disposed of or contained—will also be contributed towards by the project activities, particularly Outcome 2—Infrastructure for Environmentally Sound Management of PCBs Developed and in Place—as this outcome will ensure that the current unsafe PCB storage and re-cycling activities will cease.

The contribution towards the GEF Strategic Objective 2 indicator measuring reduced exposure will require setting up an appropriate system for documenting which PCB sources (equipment) have already caused exposure to people living in the vicinity and what the effect of the replacement will be. This will be done as part of the monitoring and evaluation activities.

There is also a number of people exposed to PCBs in their daily work practices during maintenance and dismantling and temporary storage, etc. who will, thanks to the project, no longer be exposed or who's PCB exposure will be considerably reduced. Again, an appropriate system for measuring this risk reduction needs to be set-up during the project for fully reporting on the contribution towards the GEF indicators.

The project is innovative in its approach to managing PCB waste. It will be the first to implement an approach where all PCB-containing waste, from low to high concentration, is disposed abroad with a pre-sorting and washing stage for low contaminated waste. No PCB decontamination technology will be established, but low PCB-contaminated equipment is cleaned in-country and cleaned metals recycled by local actors.
This approach introduces a lower capital cost scheme as compared with establishing treatment capacity for PCB waste streams. In the GEF context the proposed approach represents a third level of technical complexity, where the first level is represented by approaches disposing all PCB sources (Slovakia, PR.China), the second level is in-country treatment of low contaminated PCB oils (Morocco). Separation of valuable waste parts (metals) and cleaning these for cost-recovery (this project) represents the third level. The least in-country technology demanding approach is the complete export disposal approach (Latvia) where the amounts of PCB waste and the ease of transportation does not justify establishment of any level of in-country treatment. In this regard it should be noted that the Latvia project targets only pure PCB equipment.

Experiences from this third level approach as proposed may decrease PCB management costs particularly in countries with high quantities of lightly contaminated transformers and long (or expensive) transports to safe disposal facilities. The actual cleaning and re-cycling operation is self-sustaining and could be widely replicated.

D. OUTLINE THE COORDINATION WITH OTHER RELATED INITIATIVES:

The project will foster the ongoing linkages with the GEFAD, Ghana Energy Development and Access Project, in order to ensure an accelerated PCB equipment replacement as well as integrating PCB considerations and safe disposal issues in any further stages of that programme. The project will closely liaise with the GEFAD coordinating staff as well as African Development Bank, financing entity for GEFAD, and provide assistance for designing PCB-considering electrification/optimization interventions.

Due cooperation and coordination will be established with the planned GEF-supported regional UNEP PCB project "*Demonstration of a Regional Approach to Environmentally Sound Management of PCB Liquid Wastes and Transformers and Capacitors Containing PCBs*". Details of this cooperation will still need to be assessed, but given the similar scope of the projects an exchange of training materials and safety and maintenance manuals is envisaged. Given the language scope (Francophone Africa) of the UNEP project, the materials may not be directly used in Ghana without translation and adaptation. The technology established in the framework of the regional project will be given preference in deciding disposal options, provided that it can provide services in a cost effective way.

SAICM outlines a Global Action Plan for contributing towards the overall goal of achieving sound chemicals management as per the Johannesburg timeline. This Global Action plan is divided into a number of Work Areas where contribution to SAICM can be achieved. These Work Areas are given in the table below together with notes regarding where the proposed project's activities will make contributions to the Work Areas.

SAICM Global Action Plan Work Area	Project Activity
1. Assessment of national chemicals management to identify gaps and prioritize actions	Legislative analysis and developing legislative frameworks applicable to substances beyond PCBs
2. Human health protection	Securing and disposing sources of hazardous chemicals
3. Children and chemical safety	Replacement of PCB equipment within communities, sport facilities, etc. and strengthened management of hazardous industrial chemicals
4. Occupational health and safety	Providing safety training during operation, maintenance, and disconnection, etc. of PCB-containing equipment
5. Implementation of the Globally Harmonized System of Classification and Labelling of Chemicals (GHS)	N/A
6. Highly toxic pesticides – risk management and reduction	N/A
7. Pesticide programmes	N/A
8. Reduced health and environmental risks of pesticides	N/A
9. Cleaner production	In the meaning using less hazardous chemicals for producing an industrial service of power generation and distribution
10. Remediation of contaminated sites	Identification of PCB contaminated sites and policy advice
11. Lead in gasoline	N/A
12. Sound agricultural practices	N/A
13. Persistent, bioaccumulative and toxic substances (PBTs); very persistent and very bioaccumulative substances; chemicals that are carcinogens or mutagens or that adversely affect, inter alia, the reproductive, endocrine, immune or nervous systems; persistent organic pollutants (POPs)	In all project activities
14. Mercury and other chemicals of global concern; chemicals produced or used in high volumes; chemicals subject to wide dispersive uses; and other chemicals of concern at the national level	By targeting one particularly problematic substance. Further project increases government capacity to deal with high volume chemicals used in different sectors and sources
15. Risk assessment, management and communication	PCB exposure reduction, labeling, contingency planning; extrapolation to other chemicals
16. Waste management (and minimization)	Hazardous waste disposal
17. Formulation of prevention and response measures to mitigate environmental and health impacts of emergencies involving chemicals	PCB holder management plans including emergencies
18. Research, monitoring and data	Restricted soil and human exposure data for PCBs; extrapolation to other chemicals
19. Hazard data generation and availability	N/A
20. Promotion of industry participation and responsibility	High degree of involvement of PCB holders
21. Information management and dissemination	As a part of results dissemination and contact with other regional PCB initiatives; extrapolation to other chemicals
22. Life cycle	Included from possible imports to use, maintenance disconnection, and disposal
23. Pollutant release and transfer register (PRTRs) – creation of national and international registers	Not systematically but in a restricted manner dealing with PCBs, tracking of equipment, etc.
24. Education and training (public awareness)	Education of government officials and PCB holders, workers as well as restricted public awareness raising on PCBs
25. Stakeholder participation	Please see details in Project Document section
26. Implementation of integrated national programmes for the sound management of chemicals at the national level in a flexible manner	PCB management adapted to Ghanaian context; extrapolation to other chemicals
27. International agreements	Implementation of Stockholm Convention. Basel Convention for PCB exports
28. Social and economic considerations	Considered in project development and included in cost-effectiveness considerations
29. Legal, policy and institutional aspects	Creating a full-fledged PCB management legislation as legislative and process example for other chemicals
30. Liability and compensation	PCB holders made responsible for their hazardous chemicals and waste
31. Stock-taking on progress	Lessons learned and their dissemination
32. Protected areas	N/A
33. Prevention of illegal traffic in toxic and dangerous goods	Creation of legislative rules for PCB export import and enforcement training
34. Trade and environment	Importers of mineral oil and other chemicals are made aware of the impact of their chemicals
35. Civil society and public interest non-governmental organization (NGO) participation	By active involvement in project steering and other outreach activities
36. Capacity-building to support national actions	Over-arching objective to create capacity for continuing PCB and other hazardous chemicals management

E. DESCRIBE THE INCREMENTAL REASONING OF THE PROJECT:

No baseline exists for PCB management in Ghana. The only work and activities undertaken to manage PCBs so far have taken place within the framework of NIP investigation and elaboration as well as preparation of this project proposal. These processes have revealed a low awareness and even lower preparedness to management PCBs among various stakeholders, particularly the PCB holders. Furthermore, there are no indications that PCB management efforts would be planned and it can be safely assumed that any efforts in this regard will be marginal without a GEF intervention.

In the baseline scenario, with ongoing Stockholm Convention and SAICM activities, some capacity building in PCB management, at least among key officials, would be acquired and accomplished without the project. However, with various priorities, it is likely that no concerted action for strengthening the legal framework for managing PCB would take place during project period without the support of the project.

The mixing of PCB and non-PCB oils during maintenance would continue in the baseline scenario as well as unsafe handling and storage practices.

In the baseline scenario the disposal operations for PCB-containing equipment would continue with oil mixing and recycling for various uses. Without project-established disposal operations it is unlikely that PCB holders would commence developing PCB phase-out plans and budget additional resources for safe PCB disposal. In short the current unsafe practices would prevail.

Analysis of the situation on the ground indicates that very little tangible outputs towards safe PCB management would take place in Ghana without external inputs. In addition, the project activities are well in-line with Stockholm Convention requirements and obligations making the whole project incremental from a GEF perspective.

The table below outlines Baseline and Alternative Scenarios, the associated incremental costs, and the co-financing of the Alternative Scenario.

Outcome/Output	Baseline	GEF alternative	Incremental costs
1.Legal framework, administrative and technical preparedness for sound PCB management strengthened.	No PCB framework law. No secondary legislation/ guidelines covering PCBs. No environmental limit and quality standards for PCBs. Authorities without proper enforcement possibilities. No systematic identification of PCB sources undertaken as authorities lack the resources and routines resulting in PCB releases and exposure. Companies not considering PCBs in their operations, resulting in in-flux of more PCBs, further cross-contamination and releases into environment. No safety handling of PCB training conducted or PCB management plans developed. Inadequate PCB analysis possibilities. Oil recyclers not analyzing collected oils with resulting PCB recycling and release.	A comprehensive, fully consulted, accepted, and integrated PCB legislation covering all stages in the PCB life-cycle. PCB legislation enforceable by authorities. Systematic enforcement established and ongoing. All transformers checked for PCBs, identified, and labeled, reducing risk situations and releases. Companies informed and trained in safe management of PCBs reducing exposure and releases during all stages. PCB holders enabled to develop PCB management, reducing exposure from PCB equipment still in use and develop PCB phase-out plans. Existing laboratories tuned for PCB quantification. All transformer oils checked for PCBs before recycling	Total: US$ 1,320,500 <u>Incremental cost US$</u> 1,320,500 Co-financing US$ 591,000

Outcome/Output	Baseline	GEF alternative	Incremental costs
2. Infrastructure for Environmentally Sound Management of PCBs Developed and in Place	No PCB holders and transformer servicing companies take precautions for PCB exposure and releases during decommissioning, transport, and storage. PCBs released during maintenance and storage operations. Cross-contamination of mineral oil transformers.	All PCB holders and transformer servicing companies take measures to reduce exposure, cross-contamination, and releases. PCB releases minimized during maintenance transportation and storage. Provincial collection points upgraded and manned with trained staff. Transportation systems hardware made safe and prepared for PCB risks. Central Storage for PCBs in constructed provided with adequate safety precaution and trained staff.	Total US$ 1,297,600 Incremental cost US$ 1,297,600 Co-financing US$ 731,600
3. Environmentally sound replacement and disposal of PCB waste and equipment	No company PCB phase out-plans developed. No PCB-containing equipment replaced safely. PCB oil recycling would continue in various applications with consequent exposure and harm. No capacity to manage lightly contaminated equipment in country. PCB containing capacitors would be left at site even when PCB releases occur.	PCB phase-out plans developed and implemented by major PCB holders. Swift and safe dismantling collection and disposal of PCB-containing transformers leading to destruction of 460 tons of PCB containing transformers. In-country disassembling and washing operation established treating some 400 tons of contaminated transformers and ensuring sustainability of continuing implementation of the PCB phase-out plans. Identified PCB capacitors disposed as a part of the pure PCB transformer operation.	Total US$ 3,026,580 Incremental cost US$ 3,026,580 Co-financing US$ 1,701,580
4. Monitoring, Learning, Adaptive Feedback, Outreach and Evaluation	No activity in the baseline scenario.	Efficient project monitoring and evaluation, guiding activities towards achieving outcomes as well as establishing measurement of PCB risk reduction put in place.	Total US$ 281,000 Incremental cost US$ 281,000 Co-financing US$ 81,000
5. Project management	No project with resulting environmental degradation.	Efficient project implementation with resulting local and global environmental benefits.	Total US$ 754,200 Incremental cost: US$ 754,200 Co-financing: US$ 466,000
Total incremental cost: 6,516,880 US$ Co-financing of the incremental cost: 3,571,180; US$ GEF US$ 2,945,700			

INDICATE RISKS, INCLUDING CLIMATE CHANGE RISKS, THAT MIGHT PREVENT THE PROJECT OBJECTIVE(S) FROM BEING ACHIEVED AND OUTLINE RISK MANAGEMENT MEASURES:

Objective and outcomes	**Objective of the project** is to enhance the capacity for safe management of PCB oils and PCB-containing equipment at all stages of the PCB management cycle.		
	Issue	**Risks and Assumptions**	**Risk Management Measures**
Outcome 1. Legal framework, administrative and technical preparedness for sound PCB management strengthened	Ensuring quality PCB analysis supporting inventory and classification of PCB and non-PCB equipment	Risk: Without accurate analysis and appropriate analysis capacity borderline PCB concentrations may not be detected	In case of doubt, borderline cases will be classified as PCB-contaminated as per the precautionary principle. This may entail some additional expense in a fraction of cases
Outcome 2: Infrastructure for environmentally sound management of PCBs developed and in place	Ensure workers protection regarding PCB exposure and releases during decommissioning, transport, export preparation, and washing operations	Risk: Safety considerations put in place not sustained and transferred to new recruits	Outside central storage operations: Include checking of training need in M&E plan Within central storage: Workers safety training and exposure measurement integrated in site monitoring activities
Outcome 3: Environmentally sound replacement and disposal of PCB waste and equipment	Ensuring that all PCB-contaminated equipment are properly disposed	Risk: Unsafe oil/equipment disposal continued due to economic benefit to some stakeholders	Project-initiated information and awareness activities is targeting unofficial trade in oils, which will bring PCB-contaminated equipment and oils within proper management. Arrangements for re-using of dismantled PCB free oils can be established

EXPLAIN HOW COST-EFFECTIVENESS IS REFLECTED IN THE PROJECT DESIGN:

Cost-effectiveness considerations have been kept as a top variable in choosing the approach and designing the project outputs and activities. Besides the obvious need to economize with funds, GEF and others, the need to consider cost-effectiveness issues are particularly important in a developing country setting, where operational/ maintenance costs of applied technologies are key for ensuring sustainability of the intervention. This is particularly important with a potentially uneven flow of PCB waste due to unpredictable equipment replacement rate among PCB holders.

Consequently, for cost-effectiveness concerns the project approach chosen does not establish PCB disposal or decontamination technologies in Ghana. It will rely on established (or to be established) disposal capacity within the region or outside, depending of the most economical option. Pure PCB oils and associated equipment will be contracted for disposal in their entirety, while for low contamination equipment a local cleaning operation will be established. This will decrease the volumes and costs of contracted disposal considerably without performing unduly risky operations as high concentration PCB equipment will not be cleaned.

The actual disposal expenses will be determined by the competitive bidding among technically sound disposal providers. As per current market prices, such disposal is available for US$ 2-2,500 per ton of PCB waste including shipping from Ghana.

For project components not dealing with disposal operations, cost-effectiveness has been achieved by involving local partners to the maximum level in implementing project activities. PCB management is, however, a new issue in Ghana and consequently not all know-how is available in-country.

PART III: INSTITUTIONAL COORDINATION AND SUPPORT

A. PROJECT IMPLEMENTATION ARRANGEMENT:

The project will have a PSC chaired by Ministry of Local Government, Rural Development and Environment, and will include participation of all relevant government ministries and stakeholders outside of government as members, with Ghana EPA acting as secretariat. Participants will include:

- Ministry of Local Government, Rural Development and Environment, chair
- Ministry of Lands, Forestry and Mines
- Mines Department
- Ministry of Finance
- Customs, Excise and Preventive Service
- Ministry of Health/Ghana Health Service
- Ministry of Food and Agriculture
- Ministry of Trade, Industry, Private Sector Development and President's Special Initiatives
- Ghana Atomic Energy Commission
- Ministry of Energy
- Energy Commission
- Ministry of Manpower Development, Youth and Employment (Factories Inspectorate Department)
- Ministry of Justice and Attorney General's Dept.
- Ministry of Interior
- Association of Ghana Industries
- Ghana Water Company Limited
- Volta River Authority
- Environmental Protection Agency, secretary

UNITAR and UNDP will participate in the work of the PSC as full members and also other donors may be invited. Meetings of the PSC will be held quarterly. The PSC will ensure overall oversight of the project, ensure the relevance of activities towards project objectives and aims, and in particular assist project implementation by solving issues relating to stakeholder responsibilities.

Ghana EPA, as the national implementing agency, will act as the project secretariat. The secretariat will be responsible for the day-to-day management of the project and will be headed by a National Project Director (NPD) provided as an in-kind contribution from the government side. Ghana EPA, and NPD, will in this task be assisted by a project assistant as well as a monitoring and evaluation expert.

Financially, UNITAR will execute the project as per its internal operational and financial guidelines, and will receive an administrative operational support (AOS) cost to offset expenses. This administrative operational support shall also cover all additional project management costs accrued at Ghana EPA.

PCB holding companies will operate through their revised internal guidelines in procuring replacement equipment and other services as their part of project financing.

PART IV: EXPLAIN THE ALIGNMENT OF PROJECT DESIGN WITH THE ORIGINAL PIF:

The final project proposal is well in-line with the original PIF proposal. Outcomes and outputs are broadly similar. Due to unavailability of co-funding for PCB replacement equipment, the number of PCB equipment disposed within the project will be slightly lower than predicted at the time of submission of the PIF. As UNDP does not provide credits for project partners for investment the scope of the project is depending of the financial possibilities among the PCB holders. These financial circumstances were more optimistic at the time of submission of the PIF than at CEO Endorsement. This will have an impact on the actual tonnage of PCBs to be disposed during the project life-time as compared with the scenario at the time of submission.

However, the overall capacity building knowledge transfer and technical assistance goals will not be reduced due to the lower repetition rate of the disposal/ washing procedures.

The consequences will be that Ghana will take somewhat more time to fully adhere with the PCB provisions in the Stockholm Convention but will most certainly be in full compliance by the 2025 and 2028 deadlines. In UNDP's experience the additional co-financing may become available as project activities get off the ground and original co-financing and replacement targets may be met.

PART V: AGENCY(IES) CERTIFICATION

<table>
<tr><td colspan="2">This request has been prepared in accordance with GEF policies and procedures and meets the GEF criteria for CEO Endorsement.</td></tr>
<tr><td>GEF Agency Coordinator

 
John Hough
Deputy Executive Coordinator
UNDP-GEF
GEF Agency Coordinator</td><td>Project Contact Person

Dr. Suely Carvalho,
Principal Technical Advisor, POPs UNDP-MPU/Chemicals</td></tr>
<tr><td>Date: 9 Sept 2008</td><td>Tel. and Email: 1-212-906.6687
suely.carvalho@undp.org</td></tr>
</table>

ANNEX A: PROJECT RESULTS FRAMEWORK

Project Strategy	Objectively verifiable indicators					
Goal	The goal of the project is to protect human health and deterioration of the environmental quality by avoiding human and environmental exposure of PCB oil and PCB-contaminated oil, particularly in industrial-sized equipment.					
Project Objective	**Objective of the project** is to enhance the capacity for safe management of PCB oil and PCB-containing equipment at all stages of the PCB management cycle in Ghana.					
Outcome	**Output**	**Indicator**	**Baseline**	**Target**	**Sources of verification**	**Risks and Assumptions**
Outcome 1. Legal framework, administrative and technical preparedness for sound PCB management strengthened	**1.1.Review, develop and adopt legislation and policies**	1. PCB regulation drafted and adopted	1. Discussed while developing the POPs NIP	1. Adopted during first year of implementation	1. Official Gazette	Inter-ministerial agreement on need and contents assumed
		2. Development of technical guidance implementing PCB regulative framework	2. No legislation/ guidelines covering PCBs	2. 5 guidance documents covering various stages and stakeholders of PCB life-cycle	2. Ghana EPA official publications	Development of quality guidelines assumed to prioritize monitoring efforts Risk: Capacity constraints postpone adoption of quality guidelines
		3. Development and adoption of PCB environmental and food quality guidelines	3. No food and environmental quality guidelines exist	3. 3 quality guidelines developed covering abiotic environment, aquatic organism (fish) and meat/diary products	3. Official Gazette. Ghana EPA official publications	
	1.2. Capacity building for sound PCB management in the public sector (authorities)	1. Number of workshops for authorities conducted	1. Initial capacity building as a part of PCB project formulation	1. 3 sets of work-shops disseminated centrally and regionally	1.Project documents	Risk: Adopted procedures will not be properly documented and integrated
		2. Number of verified internal administrative guidelines pertaining to PCB-containing equipment adopted	2. No PCB specific administrative guidelines issued	2. 6 ministries/ services adopted administrative guidelines on PCB issues	2.Ministry documentation	

Outcome	Output	Indicator	Baseline	Target	Sources of verification	Risks and Assumptions
	1.3. Capacity building for sound PCB management (PCB holders) through a series of topic-specific training workshops for targeted groups	1. Number of workshops targeting PCB holding companies and handlers conducted 2. Number of companies (sites) advised and visited	1. Company repre-sentatives attended general, non-targeted, capacity building training 2. No PCB safety action taken by PCB holding companies	1. 6 workshops with specific PCB handling emphasis conducted. 2.15 sites visited for giving PCB safety advice.	1.Project documents 2. Project documents, PCB company records	Assumption: All companies willing for change Risk: Unsafe oil/equipment disposal continued due to economic benefit to some workers
	1.4. Update and further refine the existing PCB inventory to increase its comprehensiveness	1. Number of equipment surveyed 2. Number of equipment sampled 3. Number of equipment labeled 4. PCB content determination in the field undertaken 5. Ghana Atomic Energy Commission performing quantitative PCB analysis	1-3.1,000 pieces of equipment surveyed, sampled, and labeled during preparatory phase 4. Density and PCB kit testing done with 1,000 transformers 5. Capacity for PCB lab analysis non-existent	1-3.Target 11,000 equipment surveyed, sampled, and labeled 4. Target: 10,000 field PCB quantifications done 5. Target 2,000 laboratory PCB analysis performed	1-4. Project documents, company records 5. Laboratory proto-cols, analysis print-outs, compiled records	1-3. Training on equipment identification and labeling reaches all corners of the country assumed 5. Assumption: Sample prepara tion and equipment easily re-tuned for PCB analysis. Risk: GAEC's analysis capacity not able to cater for all planned samples

Outcome	Output	Indicator	Baseline	Target	Sources of verification	Risks and Assumptions
	1.5. Develop and implement administrative system for PCB-related enforcement and inspection activities after inventory compilation	1. PCB equipment checked during industrial inspection 2. PCB equipment checked at entry/exit in the country 3. Reports on PCBs and PCB-containing equipment movements received by EPA	1. PCB-containing equipment not included in ongoing industrial inspection schemes 2. Customs officials not checking potential PCB-containing equipment/oil at entry/ exit of country 3. PCB equipment not tracked by authorities	1. Target: PCB equipment checked in 1,000 inspections 2. Target: 500 inspections done by all customs stations 3. Target: 400 reports of PCB equipment movement	1. Inspection documents 2. Customs reports, chemical analysis referrals 3. EPA records, PCB database	1. Participation of industrial inspectors in PCB workshops assumed 2. Risk: Rate of inspected equipment at some customs points too low for becoming integrated as a part of routine checks
Outcome 2: Infrastructure for environmentally sound management of PCBs developed and in place	**2.1. Identify, construct or upgrade of a secure, temporary storage facility(ies)**	1. Number of regional temporary PCB collection points established 2. Central storage site, permitted, constructed, equipped, and made operational 3. Number of full time employees at central site	1. No regional temporary sites 2. High risk central storage exists 3. 4 employees	1. 3 temporary "PCB prepare" regional storage site 2. New, appropriate and safe PCB equipment storage constructed 3. 8 full-time employees	1. PCB holding company documents 2. VRA documents, inspection reports 3. VRA documents inspection reports	Assumption: 3 collection points can cater for whole country. Risk: collection points too few in case of uneven equipment flow Assumption: 8 persons able to both manage ware house and washing operations
	2.2 Upgrading of transportation safety for PCB-containing equipment and fluids	1. Number of vehicles upgraded 2. Number of drivers received training	1. Trucks have no spill containment or PPE equipment 2. Drivers unaware of PCB risks, safety issues during loading and transport	1. 6 vehicles upgraded for safe transports 2. 30 drivers trained in safe PCB movements and emergencies	1. VRA and ECG company records 2. Project documents.	Assumption: Trained safety practices expected to be incorporated even when new drivers are recruited

Outcome	Output	Indicator	Baseline	Target	Sources of verification	Risks and Assumptions
Outcome 3: Environmentally sound replacement and disposal of PCB waste and equipment	**3. 1. Development and implement five year phase-out plans for various waste streams.**	1. Company-wise phase out plans developed	1. PCB phase-out not planned for among equipment holders	1. 5 PCB holders done comprehensive phase-out plans including VRA, ECG and mining companies	1. Company records	Assumption: Smaller holders (mines) are well integrated in the project
	3.2. Replacement of pure PCB oil containing equipment and associated waste	1. Replacement transformers procured 2. Pure PCB transformers disconnected decommissioned and transported to central temporary warehouse 3. Pure PCB transformers disposed	1. No systematic PCB equipment replacement 2. No systematic PCB equipment replacement 3. Zero, no safe PCB disposal carried out	1. 80 PCB replacement transformers procured 2. 80 transformers disconnected decommissioned and transported to central temporary warehouse 3. 80 transformers, total weight 160 (+ 5 tons of capacitors) tons with 40 tons of PCB oils	1. Company and GEFAD procurement invoices 2. Central warehouse book-keeping 3. Freight documents and disposal certificates	No sharp price increases on transformers or disposal assumed Risks: Exchange rate risk increasing disposal prices

Outcome	Output	Indicator	Baseline	Target	Sources of verification	Risks and Assumptions
	3.3. Decommissioning, washing, and disposal of phased-out PCB contaminated mineral oil and equipment in country	1. Treatment (washing and dismantling) equipment procured 2. Central warehouse workers trained in washing and dismantling of transformers 3. Number of PCB contaminated transformers drained and dismantled. 4. Tons of PCB contaminated oil and associated waste disposed through exports	1. No safe transformer washing and dismantling operation 2. No formalized training 3. Unknown, PCB transformers not recorded or treated separately 4. Zero, no safe PCB disposal carried out	1. One dismantling and washing line operating 2. Recruited storage personnel trained skills and safety 3. Target: 170 transformers 4. Target: 150 tons of waste exported	1. Project documents 2. Project documents training certificates 3. Central storage center records 4. Freight documents and disposal certificates	Risk: Resistance to change among people benefitting from current oil sales
Outcome 4: Monitoring, learning, adaptive feedback, outreach, and evaluation	**4.1. Development and implementation of Project Monitoring and evaluation tools and systems**	1. Number of monitoring updates 2. Number of topical/lessons learned/ technical modules prepared for dissemination 3. Number of awareness/information workshops	1. None, project specific 2. None, project specific. 3. None, project specific.	1.Target: every quarter = 20 times 2. Target 5 topical modules developed. 3. Target: 4 workshops conducted	Project documents, M&E reports	No risks identified Regional interest particularly in Anglophone West Africa assumed

ANNEX B: RESPONSES TO PROJECT REVIEWS (from GEF Secretariat and GEF Agencies, and Responses to Comments from Council at work program inclusion and the Convention Secretariat and STAP at PIF)

WORK PROGRAM: COMMENTS FROM COUNCIL MEMBERS
(REFERENCE TO GEF C.32/6 REV.1)
PERSISTENT ORGANIC POLLUTANTS

22. Ghana: Capacity Building for PCB Elimination [UNDP]

COMMENTS FROM FRANCE
The project objective is to enhance the capacity for safe management of PCB oils and PCB-containing equipment at all stages of PCB management cycle.
Opinion: Favourable but with the following question and remark to be taken into account: The PIF states that there is a national plan in Ghana whereas we can't find it on the website of the Stockholm Convention (Perhaps the website is not upgraded). Furthermore, there is no enough in the project to improve monitoring of PCB movements.

Reply: At time of submission of the PIF, the POPs National Implementation Plan was finalized, but not posted on the Convention website, where it has been available since 21 January 2008.

The requested special focus on monitoring PCB movements and tracking PCB-containing equipment has been addressed in output 1.5. "Develop and implement administrative system for PCB-related enforcement and inspection activities after inventory compilation", under which a PCB tracking scheme is established.

Moreover, output 1.4. "Update and further refine the existing PCB inventory to increase its comprehensiveness", provides a new solid baseline for the PCB tracking as the whole PCB situation is mapped out in order to register the exact whereabouts of all PCBs and associated equipment or waste.

COMMENTS FROM THE UNITED STATES
Pleased that this project links closely with the priorities established in Ghana's NIP.
The project should quantify the quantity of PCBs eliminated or destroyed.

Reply: The quantity of pure PCB containing equipment is 165 tons with 45 tons of pure PCBs as well as some 450 tons of PCB contaminated waste including 120 tons of contaminated oil.

ANNEX C: CONSULTANTS TO BE HIRED FOR THE PROJECT

Position Titles	*$/ person week*	*Estimated person weeks*	*Tasks to be performed*
For Project Management			
Local			
Administrative Assistant	200	250	Liaison at EPA Ghana financial control and administrative support
International			
For Technical Assistance[2]			
Local			
1. Legal and administrative capacity building	500-1,000	400	Draft legislation, technical guidance, develop training and conduct workshops, organize report further inventorying, support analysis
2. Technical assistance for minimization of PCB release	240-1,000[3]	1,000	Temporary regional storage assessment, assist in central storage planning, blue prints, EIA; Assessment and technical advice on upgrading of vehicles, drivers' training
3. Technical assistance for export disposal of PCBs	500-1000	1,250	Assist with phase-out plan; Setting up washing infrastructure, local contracting for transport, packing, installation, dismantling, and washing supervision
4. Monitoring, learning adaptive feedback, outreach and evaluation	500-1000	164	Determining baseline setting up of monitoring and evaluation frame work; Perform monitoring reporting to steering committee, compile lessons learned, organizing awareness workshops, outreach, etc.
International			
1. Legal and administrative capacity building.	3,000	40	Laboratory needs assessment and training, advice and setting-up PCB tracking systems
2. Technical assistance for minimization of PCB release	3,000	12	Temporary regional storage assessment, assist in central storage planning, blue prints, EIA, and monitoring plan
3. Technical assistance for export disposal of PCBs	3,000	36	Assist PCB holders to make and budget PCB phase-out plans, decommissioning and spill-up cleaning training, plan and supervise equipment washing infrastructure; Draft tender documents and evaluate disposal bids
4. Monitoring, learning adaptive feedback, outreach and evaluation	3,000	10	Mid-term and final impact evaluations

[2] Only positions covered with GEF grant listed. Please see corresponding UNDP Project document Annex III for further details.
[3] Includes input from a range of personnel from storage site operators to highly experienced professionals. For details please see UNDP Prodoc with detailed budget and input.

ANNEX D: STATUS OF IMPLEMENTATION OF PROJECT PREPARATION ACTIVITIES AND THE USE OF FUNDS

A. EXPLAIN IF THE PPG OBJECTIVE HAS BEEN ACHIEVED THROUGH THE PPG ACTIVITIES UNDERTAKEN.

The PPG(PDF-B) objectives have been broadly met in the project preparation phase. The overall design of the final proposal is well in-line with the originally envisaged project outcomes. These original outcomes were:

Outcome 1: Availability of Tools Required to Build PCB Management Capacity in Ghana and Trained Personnel in Place to Cover all Major Aspects of PCB Management
Outcome 2: Infrastructure for Environmentally Sound Management of PCBs Developed and in Place
Outcome 3: Destruction of Identified PCBs in Ghana Completed
Outcome 4: Regional/International Awareness Raised on Effective Capacity Building Strategies for ESM of PCBs
Outcome 5: Effective Project Management

B. DESCRIBE IF ANY FINDINGS THAT MIGHT AFFECT THE PROJECT DESIGN OR ANY CONCERNS ON PROJECT IMPLEMENTATION.

No information is available at the submission stage that would affect the project design or implementation.

C. PROVIDE DETAILED FUNDING AMOUNT OF THE PPG ACTIVITIES AND THEIR IMPLEMTATION STATUS IN THE TABLE BELOW:

Project Preparation Activities Approved	*Implementation Status*	*GEF Amount ($)*				*Co-financing ($)*
		Amount Approved	*Amount Spent To-date*	*Amount Committed*	*Uncommitted Amount**	
Activity 1: A PDF-B coordination function in Ghana EPA will be established. UNDP and UNITAR will also formalize modalities for their participation in the project.	Implemented	13,500	13,500	0	0	5.000
Activity 2: A national-level Project Steering Committee, comprising the current NIP committee and any additional participants determined through a stakeholder analysis (or as a subcommittee of the NIP committee), will also meet monthly during the PDF-B phase. Its Terms of Reference will include, *inter alia*, and be subject to the approval of the committee*:* identification of possible NIP elements (e.g. suggested activities, indicators, outputs, milestones, and objectives) that can be incorporated into the full project; develop the situation analysis/needs assessment for the PDF-B (including Terms of Reference for its development); identification of key national and local stakeholders needed for full project implementation; and determination of full project design and implementation aspects.	Implemented	26,000	26,000	0	0	30,000

Activity 3: Holding of a refresher training workshop on project planning. This workshop will refresh skills attained during the NIP development phase, to assist in developing the full project. Given UNITAR's extensive experience in this area, it will be delivered by UNITAR with assistance from Ghana EPA.	Implemented	45,250	45,250	0	0	5.000
Activity 4: A situation analysis/needs assessment, based on information from the NIP (including the PCB action plan and preliminary NIP inventory in particular), and the addition of updated/ new information through interviews and other means. (As the inventory developed under the NIP did not meet minimal standards, it was updated as part of the PDF-B as an additional activity.)	Implemented	124,000	116,000	8,000	0	20,000
Activity 5: Development of and agreement on basic project scope, objective, outcomes, outputs and activities; time frame; budget; and implementation arrangements (e.g. project IA, and project execution arrangements).	Implemented	21,500	21,500	0	0	10,000
Activity 6: Based on the findings/outcomes of the preceding PDF-B activities, a UNDP Project Document, GEF Executive Summary, and all required and optional annexes will be drafted with assistance from an international consultant. The project will include a detailed monitoring and evaluation plan and a public participation plan.	Implemented	119,750	117,152	2,598	0	15,000
Total		**350,000**	**339,402**	**10,598**	**0**	**75,010**

* Uncommitted amount should be returned to the GEF Trust Fund. Please indicate expected date of refund transaction to Trustee.

Project Document

Government of Ghana

United Nations Development Programme

PCB Management in Ghana, from Capacity Building to Elimination

Brief description

This project is aimed at strengthening the capacities and capabilities of government officials and stakeholders outside of government to address PCB identification, and manage existing sources of PCBs as well as their elimination/destruction, as identified as a priority in the National Implementation Plan for Persistent Organic Pollutants for the Republic of Ghana.

The project develops and implements a strategy, and the required steps, from the current unsustainable management of PCB-containing equipment to sound management and disposal practices. The strategy commences by strengthening the legal framework and the management capacity both within government institutions and among PCB holders. The project will also eliminate, as a first step, the PCB-containing equipment, mainly transformers, and in a second step start phasing out PCB-contaminated equipment. The project is the first major step to meet the obligations of Ghana under the Stockholm Convention.

Ghana is the first country in the sub-region that has developed a Full Size Project (FSP) of this nature to eliminate PCBs as required under the Stockholm Convention. The experiences obtained during the implementation of the project will be shared with the other countries in the sub-region that are currently developing concrete phase-out activities. The project is part of the general strategy of Ghana to significantly improve power production and distribution and to strengthen the management of the sector.

Table of Contents

Acronyms

ECG	Electricity Company of Ghana
FSP	Full Size Project
GAEC	Ghana Atomic Energy Commission
IOMC	Inter-Organization Programme for the Sound Management of Chemicals
GEFAD	Ghana Energy Development and Access Project
NEX	National Execution Modality in UNDP projects
NIP	National Implementation Plan
PCBs	Polychlorinated biphenyls
PCB-containing	Pure PCB oil or equipment intentionally filled with PCBs
PCB contaminated	Mineral oil contaminated above 50 ppm or equipment containing such oil
PDF-B	Programme Development Funding, type B
SBC	Secretariat of the Basel Convention
UNDP	United Nations Development Programme
UNEP	United Nations Environmental Programme
UNITAR	United Nations Institute for Training and Research
VRA	Volta River Authority

SECTION I: Elaboration of the Narrative

PART I: Situation Analysis

Context and global significance

The Stockholm Convention on Persistent Organic Pollutants requires Parties to discontinue production and use of intentionally-produced POPs and minimize releases of unintentional, by-product POPs. PCBs are the only intentionally-produced POP which have been predominantly used in industrial applications. Experiences in different countries and regions on managing PCBs has highlighted the need for capacity building and technical assistance for developing countries to ensure that PCB- containing or PCB-contaminated wastes do not unnecessarily cause releases and environmental or human exposure. The Stockholm Convention requires parties to set up safe management and ensure that adequate steps are taken for phasing out any material containing PCBs above a concentration of 50mg/kg by 2025.

Ghana has, as national reporting for Stockholm Convention, developed a National Implementation Plan (NIP) on POPs, including information on the PCBs and status of PCB management in the country.

While PCBs have never been manufactured in Ghana, they have been legally imported in significant quantities in transformers and capacitors. The NIP investigations revealed that there are possibly significant quantities of PCB-containing transformers and capacitors in Ghana. Further investigations confirmed that some 2-3% of the transformer park contains pure PCBs and a further 13% of transformers are PCB-contaminated to a level higher than the threshold set in the Stockholm Convention.

The Ghana NIP acknowledges the challenges posed by PCBs and rates PCB management as one of the top priorities, agreed among NIP stakeholders, within and outside of government. The pertinent PCB actions as laid down in the NIP are included in Annex I.

The PCB situation in Ghana, as unfolded during the preparatory stage of this project, is typical for the region and current stage of economic development. However, the example and determination of the Ghanaian society to respond to the arising problem of PCB management gives a heightened global significance to the project. Ghana is the first country in sub-Saharan Africa to develop a single country Full Size Project (FSP) that aims at addressing PCB-containing equipment throughout their life-cycle, in line with the requirements of the Stockholm Convention. It can be expected that the example set by Ghana will be followed by other countries, particularly in Africa. The determination and demonstration of "can-do" attitude will increase the global significance of the project many-fold.

The global/regional significance will also be amplified by the PCB management experience gathered during the project and will be very relevant for the other countries in the region that are currently preparing their activities to eliminate PCB-containing equipment. Addressing PCBs in Ghana by introducing proper handling and management as well as safe disposal of the PCB-containing waste streams would reduce the releases of these POPs regionally and ultimately globally.

Finally and importantly, the project will safely dispose a minimum of 160 tons of PCB-containing transformers with approximately 40 tons of pure PCBs and approximately 5 tons of PCB-containing capacitors. The project will further set-up a system of safe collection of low-contaminated PCB oils with subsequent disposal through exports. This scheme will establish washing of transformer formerly containing low PCB-contaminated oils and recovery of metal in Ghana. It is estimated that 35 PCB-contaminated transformers are phased-out yearly, which would total the safe disposal of 450 tons of contaminated material including 150 tons of PCB-contaminated oils and associated non-cleanable waste. All these actions will destroy considerable quantities of PCBs and eradicate these from global circulation.

Threats, root causes, and barriers analysis

For several decades, Ghana, like virtually all countries, has imported transformers and electrical equipment with PCBs as dielectric fluid. Very little attention was given to the chemical composition of the dielectric fluids during the time of imports. The electro-technical performance and the costs were the guiding criteria, and in any case the awareness of possible environmental and health consequences of PCB exposure was not high.

Unmanaged PCB-containing equipment and materials will give rise to releases of PCBs during all stages of their life-cycle. During operation, maintenance workers will be exposed; and improper re-use will expose oil-recyclers and end-users, which in the local context can be ordinary consumers. Released PCB oils will bio-accumulate in biota and bio-magnify in higher tiers of the food webs. This will lead to harmful effects in wildlife and disrupt the balance in ecosystems. Also, humans, at top of many food chains, will be affected by the higher exposure to PCBs through this route.

It is difficult, due to absence of systematic monitoring and research data from Ghana, to ascertain the influence of PCB releases and exposure to wildlife and human health. While no data points to a widespread contamination of food or water sources, elevated local PCB-contamination does occur in places where PCB-containing equipment has been manipulated or where installed equipment has been leaking. With an aging transformer park, the probability of increased failure rates in the pure PCB-containing transformers is augmented every year. Breakdown of a PCB-filled transformer could lead to widespread contamination or even worse acute effects in the case of fire. The age of many transformers is well above normally expected service life (see annex I), which seriously increases the risk of leakage.

The lack of awareness is still the main barrier to safe PCB management in Ghana. Practically all other identified barriers and unpreparedness to manage PCBs safely can be derived from the lack of awareness. Only in recent years PCB management has been given some attention. To better identify the required steps and find the most appropriate ways to tackle the challenges in PCB management in Ghana, this awareness barrier has been divided into three barriers, namely, (i) legal and administrative; (ii) technical and infrastructure; as well as (iii) financial barriers.

Legal and administrative barriers

There are no legal provisions covering PCBs in the Ghanaian regulatory framework. Consequently, little attention has been given to identify PCBs or taking precautions in the different stages of the management of the substances. Without legal obligations, all action taken by PCB holders are voluntary. Indeed, the only administrative action taken in Ghana pertaining to PCBs is an internal Directive of the state owned electricity distribution company, Electricity Company of Ghana (ECG), that banned importation of PCB containing equipment in 1972. However, due to a lack of enforcement mechanisms, this action has had little or no effect in practice. Although regulatory and enforcement action can in principle be taken based on the Environmental Protection Agency Act (EPA Act), this has not been done so far.

Due to the lack of regulatory coverage of PCBs, no sub-legislation or guidelines on PCB imports/ exports, storage, handling, transportation, or disposal exist. As government resources are already stretched by mandatory legal obligations, no administrative structures have been developed to manage various aspects of PCBs and PCB-containing equipment.

There exists consequently an overarching regulatory and administrative barrier for having clear management roles and responsibilities among different ministries and within central and local administrations. The underlying administrative barrier results in an absence of systematic structures for PCB reporting and control as well as clear technical guidelines on various risky stages in PCB management. In addition, the level of knowledge about PCBs and appropriate measures for managing them are not adequate among concerned government institutions and employees to develop clear guidance for PCB holders.

Technical and infrastructure barriers

The technical and infrastructure barriers can be identified throughout at practically all stages of the PCB management cycle, stretching from PCB identification to final disposal of PCB-containing and PCB-contaminated material. It should further be acknowledged that the technical and infrastructure barriers exist both in the government (control) as well as in the PCB holding companies.

Though the responsibility of the safe management of PCBs is a shared responsibility, the main responsibility for ensuring proper functioning of equipment, regular maintenance for avoiding releases, and regarding transport, storage, and disposal, lies with the holder of the equipment.

Technical barriers at government

For the government technical barriers can be mainly identified in the analysis capacity for identifying/ verifying PCB content in various samples. The primary need is found among the identification of PCBs at points of entry in the country (customs) as well as pursuing any future enforcement action. The technical capacities to analyse PCBs in all types of matrices is lacking, making overall environmental and food quality monitoring difficult in addition to the problems for enforcing polluter pays and other obligations in cases of releases.

Technical barriers among PCB holders

The technical barriers for proper PCB management are mainly know-how related: the PCB holders are not knowledgeable in proper equipment identification and handling practices for equipment in-service. There exists no technical knowledge of how to plan and set-up proper temporary storage sites or how PCB risks can be mitigated during transport. Further, the possible disposal options for different PCB waste streams are not clear.

1. In-service equipment

Tracking and identification of PCBs

There are several barriers for efficiently identifying and tracking PCB-containing equipment in Ghana. The main barrier is due to the limited knowledge of how to identify PCB equipment and measure possible contamination. The companies do not take the possible presence of PCBs into account in their current management system. The presence of PCBs is not covered at the procurement stage, making it possible that new (re-conditioned) equipment or maintenance oils contain PCBs. The difficulties with PCB equipment identification is further aggravated by the poor administrative practices where potential PCB holders do not keep a systematic register on the presence and distribution of their equipment and related basic information such as date of manufacture, brand, properties, location, maintenance, etc.

The pure PCB equipment may be identified by type of and technical information on the equipment, as well as simple testing. However, for quantitative analysis of PCBs, the equipment holders share the same technical barriers as governmental actors. These barriers will be more impeding when the main emphasis is shifted from management of pure PCB equipment to PCB-contaminated ones.

2. Maintenance operations

Another pressing technical and infrastructure barrier for PCB holders is ensuring that appropriate practices are implemented throughout the PCB handling and maintenance cycle. Currently, all equipment is maintained in common maintenance lines and stations, which is a serious cause of cross-contamination between PCB(-containing) equipment and non-PCB-containing equipment. The technical and organizational challenges lie in ensuring that such cross-contamination no longer occurs.

Further, very little attention has been given to protecting workers during maintenance of potential PCB-containing equipment. There is very little knowledge, and even less use, of appropriate personal protection as well as possible action during leaks, spillages, etc.

3. Equipment disconnection, transportation, and storage

PCB holders have adequate technical knowledge and practices from an electro-technical point of view for carrying out transformer (and capacitor) disconnection, equipment movement, and transportation. The above operations become, however, somewhat more complicated when PCB exposure needs to be taken into consideration. PCB exposure to personnel and spill prevention as well as avoiding any unnecessary risks to the communities and environment needs to be carefully included together with the overall efficiency of the operation. Also, vehicles and drivers need to be technically updated and prepared for any eventualities. This knowledge and technical preparedness is largely lacking among PCB holding organizations in Ghana.

The knowledge of proper storage and minimization of releases during storage of PCB-containing equipment is also new territory for PCB holders. There exists infrastructure and practice (know-how) barriers both at central storages as well as provincial collection points.

Disposal of PCB waste streams

The disposal of PCBs is a barrier with both technical and financial dimensions. While no existing installation in Ghana is able to handle PCB waste, technical or at-least knowledge barriers exist for tendering export disposal of PCBs in compliance with international standards and agreements.

Further, technical barriers have been identified in setting-up transformer draining and cleaning facilities for equipment with different degrees of PCB-contamination. No consideration is currently being given to the nature of the drained dielectric fluid, nor are measures taken to treat the drained fluids as hazardous waste. Again the main barrier concerns the planning and establishment of the technical set-up and ensuring the safety of such operations rather than a lack of hands-on skills to perform the required action and the supervision of such operations in practice.

Financial barriers

The management of PCBs—as this entails equipment replacement and hazardous waste disposal—is extremely costly, particularly in a developing country setting with restricted possibilities of passing on increased management costs to final consumers.

The role of government in PCB management is largely regulating and controlling, hence the cost of establishing proper PCB management for the government ministries and services is not huge. It will mainly require administrative and legal work and skills updating. In addition, resources for setting-up and running costs of enforcement infrastructure and training are needed. However, in a developing country context, hiring appropriate expertise and other essential tools for raising the skills and capacity of the administration and technical services may prove prohibitive for setting-up the structures.

For PCB holders the cost for sound PCB management and equipment replacement/phase-out are considerable. Calculations for different scenarios for PCB management by equipment holders in Ghana sets the price tag for PCB holders between US$ 3-15 million depending on the scope, approach, and timeline chosen for managing the issues. Nearly all of these expenses are in addition to the normal operational and investment budgets among the PCB holders. With a less than well-off client base, the companies, particularly the electricity distribution companies, can hardly transfer the additional costs of PCB equipment replacement and disposal to end-consumers. The financial barrier for these PCB holders is further aggravated by competing needs for investment, particularly ensuring undisturbed supply of electricity through-out the country and further expanding the electricity grid to remote parts of the country. As Ghana faces a serious energy crisis (which began several years ago), the need for investment in additional infrastructure for production and distribution is a major challenge that the government is currently trying to tackle together with the sector. Replacement of PCB-containing equipment has to financially compete with this major challenge.

Institutional, sectoral, and policy context

Ghana Environmental Action Plan

The environmental impacts of the Structural Adjustment Programme (SAP) and Economic Recovery Programme (ERP) in the early 1980s in Ghana led to the development of the Ghana Environmental Action Plan (EAP): a set of policy actions, related investments, and institutional strengthening activities to make Ghana's development strategy more environmentally sustainable. The areas directly linked to the EAP are:

- Land management;
- Water management;
- Marine and coastal systems;
- Industrial pollution;
- Mining;
- Hazardous chemicals management; and
- Human settlements.

This Action Plan which is incorporated in the National Environmental Policy, was published in 1991. The ultimate aim of Ghana's environmental policy is to improve the surroundings, living conditions, and the quality of life of the entire citizenry, both present and future. The policy, specifically, seeks to:

- Maintain the ecosystems and ecological processes essential for the functioning of the biosphere;
- Ensure sound management of natural resources and the environment; adequately protect humans, animals and plants, their biological communities and habitats against harmful impacts and destructive practices, and preserve biological diversity;
- Guide development in accordance with quality requirements to prevent, reduce, and as far as possible, eliminate pollution and nuisances;
- Integrate environmental considerations in sectoral, structural, and socio-economic planning at the national, regional, district, and grassroots levels; and
- Find common solutions to environmental problems in West Africa, Africa, and the world at large.

The National Environmental Policy stated above has some relevance, in a broad sense, for the management of potentially bioaccumulative and toxic substances, such as PCBs in Ghana. It is, however, insufficient and incapable of dealing with the specific requirements of the Stockholm Convention on PCBs.

POPs national priorities and key issues

The elaboration of the first NIP provided an opportunity to re-assess and detail the overall policy towards persistent and bio-accumulative chemicals. The agreed overall objective of the sound management of POPs in Ghana is to strengthen the national capacity and capability to deliver a comprehensive assessment of the threats posed by POPs to human health and the environment. The POPs management action should further reduce and ultimately eliminate POPs from the environment as envisaged under the Stockholm Convention on POPs.

The main priority areas of national concern have been identified as follows:

i. Public education and awareness creation;
ii. Monitoring, control, and evaluation;
iii. Development of new legislation, harmonizing of existing legislation;
iv. Detailed inventory of POP chemicals and identification of hot spots;
v. Capacity building towards the elimination of PCBs in Ghana;
vi. Capacity building towards the implementation of BAT and BEP guidelines for source reduction of POPs emissions;
vii. Strengthening the institutional capacity in terms of the legal infrastructure, technical infrastructure, and human resources (e.g. training of Customs Officers and Environmental Inspectors, etc.) to manage POPs;
viii. Information exchange and networking;

ix. Identification and management of contaminated sites including remediation; and
x. Research into the extent of exposure of the population to POPs and the search for safer alternatives.

It is further foreseen that the NIP will form an integral part of the national integrated chemicals management programme and the implementation strategy would be based on the following principles:

- Public and stakeholder participation;
- Transparency in information sharing and exchange;
- Adherence to polluter-pays-principle;
- Integration with overall environmental management and sustainable development policies;
- Adherence to and use of technologies and applications of international standards;
- Commitments regarding public awareness and education; and
- Adherence to international requirements.

Main PCB holding sectors

Volta River Authority (VRA) is the sole electricity generating company in Ghana. The overall electricity generation capacity is 7,300 GWh (2006). This is made up of 4,800 GWh hydro and 2,457 GWh thermal energy respectively.

VRA sells power to seven major bulk customers. The biggest customer is the Volta Aluminium Company (VALCO) in Tema, followed by Electricity Company of Ghana (ECG). Bulk sales are also made to a number of smaller industrial and mining consumers. From a PCB point of view it is important to note that these bulk consumers are transforming and distributing the purchased energy with their own equipment and systems. Industry consumes around 70% of the supplied electricity, while the residential use stands for approximate 25%, and public and commercial use makes up for the balance.

Apart from power generation VRA also has a transmission system made up of 42 substations and approximately 4,000 kilometres of transmission lines that cover the entire country. VRA further distributes electricity directly to end-users in parts of Ashanti, Brong-Ahafo, Northern, Upper East and Upper West Regions, as well as the northern parts of the Volta Region.

ECG is responsible for the distribution of the bulk of local electricity consumption in Ghana. It operates principally in the six southern regions of Ghana, with the most dense transformer network.

Ghana, like many countries in the region has been facing problems meeting the growing electrical power demand. Consequently, the government is in the process of developing a five-year plan with the strategic goal of addressing the difficulties within the sector, particularly those on infrastructural development, institutional reforms, and regulatory lapses including inadequate pricing. It has been estimated that Ghana requires approximately US$ 4.5 billion in the short- to medium-term to meet the infrastructure requirements for reliable and efficient production and supply of energy.

These plans are already being put in practice also with assistance of the international monetary institutions like the African Development Bank, which has recently granted a US$ 45 million concessional credit for such upgrading work in Kumasi.

While such investments aim to increase power supply, a sizeable distribution loss reduction can be also be achieved by developing a more efficient transmission and distribution system. This provides an opportunity to also replace PCB transformers and ensure a safe phase-out of PCB-containing equipment.

Stakeholder analysis

The NIP highlights the priority given by all sectors to the implementation of the Stockholm Convention and in particular to the sound elimination of PCBs. Strengthening the environmental sector at all levels has been a long standing priority of the government of Ghana.

From the government side, PCB management takes place under supervision of the Ghana Environmental Protection Agency (EPA), closely collaborating with the other relevant government ministries (energy, trade, health, labour, mining, etc.) and other concerned parties, in particular the power production and distribution companies (ECG and VRA), the mining sector, the Energy Commission that oversees these companies, and a number of stakeholders in civil society.

Roles and responsibilities of ministries, departments, and agencies (MDAs) involved in PCBs life-cycle, from source to disposal, environmental fate, and health monitoring, are presented in Table 1 below.

Table 1: Roles and responsibilities of ministries, departments, and agencies (MDAs) involved in PCBs life -cycle

Agency/Organization/Institution	Statutory Roles Relevant to POPs			
	Policy	Monitoring or Research	Regulatory and/or Enforcement	Service Provider
Ministry of Local Government, Rural Development and Environment	■			
Environmental Protection Agency		■	■	
Council for Scientific and Industrial Research		■		■
Department of Town and Country Planning			■	
Ministry of Lands, Forestry and Mines	■			
Mines Department		■	■	
Minerals Commission		■	■	
Ministry of Finance	■			
Customs, Excise and Preventive Service		■	■	
Ministry of Education, Science and Sports	■			
Ministry of Health/Ghana Health Service	■	■	■	
Food and Drugs Board		■	■	
Ministry of Food and Agriculture	■			
Ministry of Trade, Industry, Private Sector Development and President's Special Initiatives	■			
Ghana Standards Board		■	■	
Ghana Atomic Energy Commission		■	■	
Ministry of Energy	■			
Energy Commission		■	■	
Ghana National Petroleum Corporation		■	■	
Ministry of Roads and Transport	■			
Ministry of Ports, Harbors and Railways	■			
Ghana Ports and Harbors Authority		■	■	
Regional Maritime Academy		■	■	
Ministry of Works and Housing (Hydro Department)	■			
Water Resources Commission		■	■	
Ministry of Manpower Development, Youth and Employment (Factories Inspectorate Department)		■	■	
Ministry of Justice and Attorney General's Dept.	■			
Ministry of Women and Children's Affairs	■			
Judiciary			■	

Agency/Organization/Institution	Statutory Roles Relevant to POPs			
	Policy	Monitoring or Research	Regulatory and/or Enforcement	Service Provider
Ministry of Interior				
Ghana Police Service				
Ministry of Defense				
Pharmacy Council				
Association of Ghana Industries				
Electricity Company of Ghana				
Ghana Water Company Limited				
Volta River Authority				
Universities (UG, KNUST, UCC, UDS, UEW)				

Each of the institutions listed in Table 1 above has either a management or regulatory function or a combination of both. Their functions are often not coordinated, with some institutions experiencing conflicts in the execution of their duties leading to duplication of efforts, gaps in regulation and control, and inefficient use of resources.

Baseline analysis

Legal baseline

Currently, there is no specific legislation on PCBs in Ghana. Various pieces of legislation, however, exist to address food safety, animal and plant health, and the environment in Ghana.

The 1992 Constitution, does not expressly address PCBs but the following provisions under the Directive Principles of State Policy are relevant:

- Article 36 (9): The State shall take appropriate measures needed to protect and safeguard the national environment for posterity; and shall seek co-operation with other states and bodies for the purposes of protecting the wider international environment for mankind;
- Article 36 (10): The State shall safeguard the health, safety and welfare of all persons in employment, and shall establish the basis for the full deployment of the creative potential of all Ghanaians; and
- Article 41 (k): The exercise and enjoyment of rights and freedoms is inseparable from the performance of duties and obligations, and accordingly, it shall be the duty of every citizen to protect and safeguard the environment.

The Policy Statement on the Environment requires the State to "take appropriate measures, irrespective of the existing levels of environmental pollution and extent of degradation, to control pollution and the importation and use of potentially toxic chemicals".

The above constitutional requirements expect a comprehensive policy on toxic substances (including POPs) for the country. This expectation is responded to in The Environmental Protection Agency Act, (Act 490) of 1994. The Act, establishing the EPA, seeks among other things to control the volumes, types, constituents, and effects of waste discharges, emissions, deposits or other sources of pollutants and/or substances which are hazardous or potentially dangerous to the quality of life, human health, and the environment through the issuance of environmental permits and pollution abatement notices.

Further, Section 10 of the EPA Act establishes the Hazardous Chemicals Committee with the following functions:

- monitor the use of hazardous chemicals by collecting information on the importation, exportation, manufacture, distribution, sale, use, and disposal of such chemicals;
- advise the Board and the Executive Director on the regulation and management of hazardous chemicals; and
- perform other functions relating to such chemicals as the Board or the Executive Director may determine.

For the Hazardous Chemicals Committee, the EPA is the coordinating institution and the key ministries, departments, and agencies (MDAs) that are represented in the various committees aimed at sound management of chemicals in the country include:

- Plant Protection and Regulatory Services Directorate (PPRSD) of the Ministry of Food and Agriculture;
- Ghana Standards Board;
- Ghana Atomic Energy Commission;
- Customs, Excise and Preventive Service;
- Ministry of Health/Ghana Health Service;
- Food and Drugs Board; and
- Universities, Research Institutions, and Non-Governmental Organisations (NGOs).

Other chemical-related laws in operation in the country with some relevance to PCB control and management include:

- The Food and Drugs Law, 1992, (PNDCL 305B), which was enacted to control the manufacture, import, export, distribution, sale, use, and advertisement of foods, drugs, cosmetics, household chemicals, and medical devices
- The Factories, Offices and Shops Act, (Act 328) 1970
- The Standards Decree, 1973 (NRCD 173)
- The Draft Policy and Bill on Occupational Safety and Health, 2000
- The Mercury Law, 1989
- The Minerals (Off-Shore) Regulations, 1962 (as amended)
- The Oil in Navigable Waters Act, 1964
- Infectious Disease Ordinance (Cap 78)
- The Prevention and Control of Pests and Diseases of Plants Act, 1965 (Act 307)
- Prevention of Damage by Pests Decree, 1968 (NLCD 245)
- Cocoa Industry Regulations, 1968 (NLCD 278)
- Merchant Shipping (Dangerous Goods) Rules, 1974 (LI 971)
- Customs, Excise and Preventive Service Law (Provide law)
- Local Government Act, 1992 (Act 462)
- Export and Import Act, 1995 (Act 528)
- Environmental Assessment Regulations, 1999 (LI 1652)

Administrative baseline

As mentioned earlier, in the absence of regulatory coverage very few steps have been taken to create a conducive administrative environment and set-up for PCB management. However, both the NIP process as well as the preparatory stages of the current project proposal has brought the main stakeholders together several times creating some clarity in the roles, responsibilities, and expectations, as well as some structures of cooperation. Also, many ministries and organizations have now officials or offices that serve as the entry or focal points for building the administrative capacity further.

Within EPA considerable professional development has already taken place as a part of compiling the data for the initial PCB inventories and the more detailed inventories used for dimensioning this project.

A nucleus of a database has been developed and with minor assistance an appropriate administrative set-up can be made operational. The PCB holders are not up to the same level of preparedness, however, and will need further assistance in order to be able to fully gather, report, and provide information as required.

Other departments and ministries, particularly those of Customs (a service under the Ministry of Finance) and Industries, will require some more support for including PCB issues, such as source identification and management advice, in their day-to-day routines.

PCB sources

Limited inventories on production, export, import, use, and distribution of PCBs and PCB containing-equipment were compiled in 2003.

This first information indicated that the Electricity Company of Ghana (ECG) as well as the Volta River Authority (VRA), and their clients (individual customers and industry particularly the mining sectors), are the major custodians of PCB-containing equipment, power transformers, and capacitors in Ghana. The data have been further refined by a nationwide transformer inventory conducted in 2006. The detailed findings of this inventory are briefly given below and more comprehensively in Annex II.

Although there is currently no legislation that formally prohibits import of PCBs and PCB-containing equipment, such imports (and exports) are clearly in contravention of the Stockholm Convention. While the internal rule of the Electricity Company of Ghana (ECG) of 1972 should have prevented import of PCB-containing equipment since that date, there is no indication that in practice import of PCB-containing equipment has been stopped. Recent information, that still needs to be further verified, suggests that in the last few years tens of transformers with pure PCBs as dielectric fluid have been imported. For companies, possible PCB contents have not played any role when tendering for new equipment, nor has any registration of the nature of the dielectric fluid in the equipment taken place.

Currently the official importation of transformers and PCB-containing equipment into the country is not subject to EPA's or Custom's control. It is therefore possible that transformers and other PCB-containing equipment enter the country without the necessary checks on their PCB status.

Importation and use of semi-closed application equipment in the country is not properly monitored and documented. Discarded switches, voltage regulators, etc. are dotted all over the country, particularly in electrical and factory workshops, and documents concerning the traceability of these equipment is unavailable.

PCB transformers

An exact number of transformers included in the electricity generation, transmission, and distribution networks in Ghana does not exist. It is estimated that approximately 12,000 transformer units are in service. These are owned by the two electricity companies VRA and ECG and by some major electricity consumers, mainly in the mining sector.

None of the major transformer holders have a systematic replacement scheme in place for transformers; transformers are purchased and replaced as they break down beyond repair. No replacement is done in anticipation of equipment failure, which hence usually leads to a disruption in power supply when the transformer finally breaks down.

Preliminary data indicates that around 170 transformers are replaced annually. This figure is lower than expected but it may also indicate that major parts of the Ghana transformer network are not yet in a mature, steady-state, situation. Another reason for the low replacement rate in the transformer network

may be the low work/equipment cost ratio, which would justify spending considerable time repairing transformers as compared to countries with higher salaries.

PCBs are currently not an issue that influences replacement of equipment. In the baseline scenario, there is little or no chance that replacement transformers would be procured making elimination of PCBs possible. The current system of piecemeal replacement when the equipment breaks down and the subsequent unsafe disposal would continue. However, the average age of many transformers might indicate that a high rate of replacement might occur in future years.

Current inventory information

The most recent PCB inventory covering detailed information on 1,045 transformers was compiled in 2006. The inventory carried out in preparation of this project covers 8% of the total transformer population, covering all administrative regions of the country. The transformers sampled for the survey were selected at random (see Annex II).

The inventory shows that about 2% of all transformers are filled with pure PCBs and about 13% of transformers contain mineral oil that is contaminated with PCBs, at a level exceeding 50 mg/kg, the threshold set by the Stockholm Convention. The low level contamination in these transformers is most probably due to cross-contamination during maintenance operations on the equipment originally filled with mineral oil. A cross contamination of 15% is quite typical internationally before setting-up PCB replacement and management in a country, though higher rates of contamination are not unheard of.

The level of contamination of the PCB-contaminated mineral oil equipment has not been quantified, but the equipment has been recorded as PCB-contaminated when the level exceeded 50 ppm using chloride quick tests.

Based on the inventory, it can be extrapolated that Ghana has currently PCB oil and PCB-contaminated mineral oil as indicated in table 2 below.

Table 2: Inventory findings and extrapolation to PCBs in transformers

Number of transformers	**1,045 population sample**			**Extrapolation to 12,000 units**
Type of oil	**PCB Test**	**Total**	**% of total**	**Number of units**
Mineral oil	< 50 ppm	846	84.6%	**10,152**
PCB-contaminated mineral oil	> 50 ppm	132	13.2%	**1,584**
Pure PCB oil	D > 1	22	2.2%	**264**

Weight of PCB waste	**1,045 population sample**			**Extrapolation to 12,000 units**	
Level of PCBs	**Total weight**	**Total weight of dielectric**	**Total weight of drained transformer**	**Total weight (tons)**	**Total weight of dielectric (tons)**
PCB-contaminated equipment	638.363	144.030	439.740	**7,660**	**1,728**
Pure PCB equipment	40.202	10.180	30.020	**482**	**120**

There are some variations in the PCB inventory findings depending of the year of manufacture and installation. Surprisingly, the majority of equipment found to contain pure PCBs were those installed after 1985. Even more surprisingly is that equipment installed as recently as 2003 were found to contain

pure PCBs. Overall it is impossible to attribute a higher PCB contamination rate to transformers manufactured during a specific time period.

Some of the equipment that tested positive for PCBs were located in sensitive areas such as schools, water treatment works, markets, hospitals, and hotels raising the possibilities for PCB exposure among the general population.

Capacitors

The possible PCB content in the power capacitors have been studied in less detail than in transformers. Currently, no PCB-containing capacitors are identified in the electrical distribution system. It is unknown, however, whether such equipment is still present at the various sites of the relevant companies, apart from the capacitors identified during the NIP data compilation process (see below).

Further, PCB capacitors may be found in heavy industries, particularly the mines, but this needs to be further investigated. Overall it is not expected that PCB capacitors will be a major waste stream and the volumes found can be considered to be within the error margins of the overall PCB calculations and integrated in the disposal operations.

To date, 147 pieces of 11kV and 33kV possible PCB-containing capacitors were found at the Achimota and Tema power stations. Thirty-one out of these decommissioned and discarded capacitors had been kept in a basement with concrete flooring at the Achimota Power Station. Some of the capacitor cans had broken at the insulator end while others had their cans bulging out. Oil leakage was observed.

PCB management baseline

Analysis capacity

Due to the novelty of managing PCB issues in Ghana, no laboratories are currently performing quantitative analysis of PCBs in oils. For the inventories, the PCB identification has been performed through simple density testing and PCB analysis kits. While future identification investigations can continue using rapid testing, such as colorimetric chlorine quick test kits methods, the lack of possibilities of exactly determining the concentration of PCBs needs to be addressed. This need is particularly urgent for supporting enforcement efforts both at entry in the country as well as solving the exact concentration levels when determining the adequate disposal requirements.

There are very few institutions in Ghana which would have basic analysis equipment performing PCB quantification, and unfortunately none these can be devoted for solely analyzing oil samples. The Ghana Atomic Energy Commission holds X-ray fluorescence equipment that can be tuned for semi-quantitative analysis of PCBs in oil samples.

For analyzing biota and soil matrices for restricted investigations, GC/MS equipment held at Kwame Nkrumah University of Science and Technology (KNUST) may be utilized. A more systematic PCB monitoring of food, etc. would require setting up dedicated analysis equipment as well as appropriate sample preparation and analysis protocols.

PCB handling, transportation, and storage

Due to the absence of regulatory requirements and awareness of possible health and environmental hazards, no specific measures have been taken to avoid PCB releases or exposure during handling, transportation, and storage of decommissioned PCB-containing equipment.

Consequently, no training or specific personal protection has been employed for minimizing PCB exposure during maintenance or decommissioning of PCB-containing or PCB-contaminated equipment.

For transportation, ordinary trucks, without leak containment or emergency equipment, have been utilized irrespective of the type of insulating oils in the transformers. No other risk mitigation measures, such as route planning or scheduling, have been considered. No permit/license system exists for transporting PCB-containing equipment. The drivers have not been aware of the risky cargo they are carrying nor are they aware of the correct emergency measures in case of accidents.

As mentioned earlier, there is no preventive/precautionary replacement scheme based on equipment age or condition in place. Consequently transformers and capacitors are replaced only when they have broken down beyond repair possibilities, mostly due to being struck by lightning. These decommissioned transformers and other industrial-sized electric equipment are brought to two storage sites, Accra Central Station G and Material Stores at Tema, under the ownership of ECG and VRA respectively.

At the workshops, the copper core in the damaged transformer are removed and the oil and/or PCBs content are emptied into a poly tank reservoir labelled "DIRTY OIL" at Accra and in drums at the Tema storage. In the process there is spillage of PCBs/oils on the floor.

Available evidence indicates that the dirty oil reservoir at the Accra Central Station G never required emptying. Apparently the contents as well as the oil in drums at Tema are unofficially and illegally sold out to:

- enterprising women who illegally use the oils (possibly containing PCBs) to formulate beauty creams for sale on the open market;
- welders for use in welding machines;
- people who apply them as lubricants in domestic sewing machines and other small appliances; and
- other entrepreneurs who mix it with sawdust for industrial and domestic use as fuel.

When assessing the state of the warehouses, spills of transformer oil could be found in choked drains around the building at the Accra Central Power Station G This is very worrisome as the storage is adjacent to the Central Makola market, which attracts several thousands of traders and customers daily. Runoffs from the station may contaminate the entire market environment especially during the rainy season.

Disposal operations and capacity

There are no hazardous waste treatment facilities in Ghana. Hazardous waste is mainly landfilled at non-engineered landfill sites.

In addition, there are no dedicated disposal technologies and practices established for used transformer oils. The disposal practice undertaken is irrespective of whether the transformers are filled with PCBs, PCB-contaminated oils or non-PCB-containing mineral oils. Transformers are simply drained and the various materials sold for re-use or scrap. The transformer oil is disposed as discussed under the storage section.

Scrap transformers are dismantled, and the copper cores are dissembled without decontamination and sold to local scrap handlers. These scrap handlers are cutting the casings and sell them together with the cores to secondary steel and copper producers both in Ghana and abroad.

It should be noted that these operations cause serious risk to the workers performing the dissembling and especially those cutting pure PCB-containing transformers as PCBs burn to dioxins and furans when heated by the drills and saw blades. This may cause acute toxic reactions if no proper protective measures are taken.

The current baseline for disposal transformers at the end of their service life is about 170 transformers per year. As there is no clear pattern in the PCB-contamination based on the age distribution, one has to assume that in this manner about four pure PCB (2%) and 22 (13%) PCB-contaminated transformers are disposed of unsafely each year. This will give releases to approximately two tons of PCBs annually into the Ghanaian environment and further to global re-distribution.

PART II: Strategy

GEF alternative scenario

As explained in the baseline and barriers sections, the regulatory coverage of PCB and the management of PCBs is virtually absent in Ghana. This creates a regulatory vacuum as well as inappropriate management of PCBs with consequent releases. In addition there are a considerable number of transformers containing pure PCBs waiting to be replaced (estimated at 264). At the current rate, their replacement, without safe disposal, would continue for more than 50 years. Also there is an urgent need to establish capacity for sustainably managing transformers with low concentrations of PCBs.

The project, the GEF Alternative Scenario, will tackle these obvious shortcomings in the overall PCB management in Ghana by a number of activities contributing towards the Project Objective of protecting human health and of the environmental quality by avoiding human and environmental exposure to PCB oils and PCB-contaminated oil, particularly from industrial-sized equipment.

1. Regulatory strengthening, enforcement, and source identification

The Alternative GEF Scenario would commence with a solid effort of strengthening the regulatory provisions with appropriate guidelines covering all stages of managing PCB-containing or PCB-contaminated equipment and materials. This guidance scheme would be incorporated in the day-to-day management practices among PCB holders, supporting services (transformer maintenance, oil recyclers, etc.), as well as government officials.

The government would focus on developing regulatory provisions to a full-fledged regulatory scheme with appropriate guidelines covering all stages of managing PCB-containing or PCB-contaminated equipment and materials. Further, the government would take appropriate steps for enforcement and control and strengthen the relevant structures for this throughout the full life-cycle, from import to final disposal.

Further action to identify PCB-containing materials would take place in the Alternative Scenario through targeted actions and by the officials in charge of industrial inspection and border control. These officials would be appropriately trained to enforce the legislation and thus identifying further PCB sources and effectively control that no new PCBs are entering Ghana in the future.

As part of the project, all equipment, currently in use or in stock, not yet tested in the preparatory stage (PDF-B) would be sampled and tested for its PCB status and receive an appropriate non-detachable label according to its status: pure PCB, PCB-contaminated mineral oil, or PCB free. This label will also guide all future handling and operations with the equipment in question.

The Ghana Atomic Energy Commission laboratory would receive capacity building for PCB analysis and could be envisioned to perform some of project's analysis needs. This upgrading will also ensure the sustainability of PCB management in Ghana as today quantifying analysis for PCB oils needs to be performed abroad.

2. Exposure reduction at handling, transport, and storage

In the GEF Alternative Scenario, PCB holding companies and supporting services (transformer maintenance, oil importers and recyclers, etc.) would develop company-wise PCB management plans incorporating the guidance scheme into their day-to-day management practices. This process would be facilitated by a series of workshops and hands-on training sessions.

The companies would also upgrade their transport systems and vehicles to take PCB risks into consideration. This process would be supported by providing technical assistance in the form of expertise to train drivers in route planning and emergence situations

Consequently under the Alternative Scenario, human and environmental exposure of PCBs during handling, maintenance, de-commissioning, as well as disposal stages will diminish considerably. Also leakages and other emergencies will be avoided or minimized by clear company-wise plans for leak containment and actions in case of emergencies with PCB-containing material.

The safety of storage would be addressed in the Alternative Scenario both at regional and central levels. Equipment holders would be supported with expertise and disposable operational items in their investments and management efforts to ensure minimization of PCB releases and further cross-contamination of transformers.

The main transformer holders would construct/upgrade appropriate regional temporary storages as well as a fully furbished central storage in Accra/Tema region. This central storage will serve as the storage and repacking center for the export disposal of pure PCB equipment as well as include the transformer washing and dismantling of PCB-containing transformers (see below). The main PCB holders will further provide operational staff for the set up.

3. Sustainable replacement and disposal of PCBs

Replacement of pure PCB equipment

In the GEF Alternative Scenario, during project operations some 80 (or approximately one third of all) pure PCB-containing transformers and capacitors would be replaced and disposed in a cooperative action between private and public sector PCB holders in an environmentally sound manner at accredited foreign disposal facilities. It is calculated that a minimum 160 tons of PCB-containing transformers and capacitors can be replaced and safely disposed with the combined resources of the project partners and the project.

There is a strong commitment to expedite the replacement and disposal operation of pure PCB transformers. However, the financial constraints among transformer holders are restricting the procurement of more PCB-free replacements. Hence the project can only dispose of the end-of-life pure PCB transformers[1] and the ones replaced as a part of the GEFAD project targeting modernization of the electricity networks in Kumasi and Northern areas.

The gradual phase-out of PCB contaminated equipment

Finally, a scheme including dismantling, waste separation, and washing of PCB-contaminated transformers, with consequent waste operations would be established. This scheme would be demonstrated with contaminated transformers as they are being phased-out as part of the ongoing replacement within the companies during the project. In this washing and recycling scheme, the PCB-contaminated oil will be drained and shipped for disposal together with any porous waste. The remaining parts of the transformers would be solvent washed and the metal parts will be sold as scrap.

It is expected that initially, during project time, some 35 transformers annually would be treated in this manner. This scheme for PCB contaminated transformers is self-financing, as the operational costs of the dismantling and washing operations can be borne by the revenue from the sold scrap metal. The operation is expected to continue years after the closure of the project as PCB-contaminated transformers are being taken off the grid with an increasing frequency.

[1] Not calculated as co-financing as this is GEF baseline procurement. Only waste operations are included in the project.

Overall in the GEF Alternative Scenario, authorities' control over the PCB situation would be considerably increased, PCB imports stopped, and PCB exposure of professional handlers and consumers in Ghana would be greatly reduced. Further, 160 tons of PCB-containing transformers with approximately 80 tons of pure PCBs, and approximately 5 tons of PCB-containing capacitors would be safely disposed.

Further, a system of safe disposal of low contaminated PCB oils through exports with subsequent washing of the equipment and material recovery would be set-up in Ghana. It is estimated that 35 PCB-containing transformers are phased-out yearly during the project (some 20 as end-of-life and an additional 15 annually due to GEFAD initiative). This would total, in safe disposal, of 450 tons of contaminated material including 120 tons of PCB-contaminated oil and associated non-recyclable waste streams.

GEF Policy Conformity

The objective and outcomes of the project will directly contribute towards the Strategic Objective of GEF-4 for Operational Programme 14 which sets the long term impact of GEF interventions as a reduction in the exposure to POPs of humans and wildlife.

The project outcomes and activities (see next section or project Logframe) are explicitly supporting Strategic Objective 1: Strengthening Capacity for NIP Development and Implementation; and Strategic Objective 2: Partnering in Investments for NIP Implementation of POPs Focal Area Strategy for Persistent Organic Pollutants.

The Strategic Objective 1 (b): Strengthening Capacity for NIP Implementation aims at supporting countries to increase their capacity to implement their Stockholm Convention obligations and NIPs in a sustainable, effective, and comprehensive manner.

The project works towards GEF POPs Strategic Objective 1 (b) by achieving, in particular, Outcome 1: Strengthening of the legal framework and administrative and technical preparedness for sound PCB management, which will develop a full-fledged PCB system and bring the skills of all stakeholders, including the enforcement officials, up to the technical knowledge level needed for efficiently implementing and enforcing PCB safety regulations developed.

The activities included in Project Outcome 1 will contribute towards the GEF Strategic Objective 1 indicators:

- Legislative and regulatory framework in place in supported countries for the management of POPs, and chemicals in general;
- Strengthened and sustainable administrative capacity, including chemicals management administration within the central government in supported countries; and
- Strengthened and sustainable capacity for enforcement in supported countries.

The GEF Strategic Objective 2: Partnering in Investments for NIP Implementation aims at reducing POPs production, use, and releases as well as the stress on human health and the environment caused by POPs.

The project as a whole is contributing towards POPs Strategic Objective 2, but specifically Project Outcome 3—Environmentally sound replacement and disposal of PCB waste and equipment—will contribute to the indicators of the GEF POPs Strategic Objective 2. This will address Strategic Objective 2 indicators:

- POPs phased-out from use (tons and cost per ton per compound); and

- POPs destroyed in an environmentally sound manner (tons and cost per ton per compound and mode of destruction).

Further, the GEF Strategic Objective 2 indicator—Reduced exposure to POPs, measured as the number of people living in close proximity to POPs wastes that have been disposed of or contained—will also be contributed towards by the project activities, particularly Outcome 2—Infrastructure for Environmentally Sound Management of PCBs Developed and in Place—as this outcome will ensure that the current unsafe PCB storage and re-cycling activities will cease.

The contribution towards the GEF Strategic Objective 2 indicator measuring reduced exposure will require setting up an appropriate system for documenting which PCB sources (equipment) have already caused exposure to people living in the vicinity and what the effect of the replacement will be. This will be done as part of the monitoring and evaluation activities.

There is also a number of people exposed to PCBs in their daily work practices during maintenance and dismantling and temporary storage, etc. who will, thanks to the project, no longer be exposed or who's PCB exposure will be considerably reduced. Again, an appropriate system for measuring this risk reduction needs to be set-up during the project for fully reporting on the contribution towards the GEF indicators.

Project Goal, Objective, Outcomes and Outputs/activities

The goal of the project is to protect human health and the environmental quality by avoiding human and environmental exposure of PCB oil and PCB-contaminated oil, particularly from industrially-sized equipment.

The project objective is to enhance the capacity for the safe management of PCB oil and PCB-containing equipment at all stages of the PCB management cycle.

The detailed outcomes, outputs, and activities identified during formulation of the project are given in following tables. The required inputs for achieving these outputs can be found in Annex III and the financial section of the proposal.

Table 3: Project outcomes, outputs, and activities

Outcomes	Outputs	Activities	Sub-activities identified
Outcome 1: **Strengthening of the legal framework, administrative and technical preparedness for sound PCB management**	**1.1.Review, develop, and adopt legislation and policies**	1.1.1. PCB regulation including: - Identification, labeling, and inspection - Controlling of PCB at the import and export points - Licensing of PCB related activities, handling, transport, and storage - Controlling of used mineral oil and metallic scraps, recycling - Requirement for holders to develop a PCB management plan including control and tracking of PCB in use until the end-of-life	- Refining the scope and structure of legislation - Drafting of legislation, technical guidelines, and training material facilitating implementation of the guidelines - Seeking input and consensus on legislation and guidelines
		1.1.2. Developing technical guidance implementing PCB regulative framework	
		1.1.3. Developing PCB environmental and food quality guidelines	
	1.2. Capacity building for sound PCB management in the public sector (authorities)	1.2.1.Disseminating the adopted PCB legislation and agreement on implementation arrangements and procedures	- Workshops - Inter-ministerial input
		1.2.2. Capacity building of Customs for targeted identification and procedures at Customs entry points	- Preparing workshops and development of customs procedures - Workshops
	1.3. Capacity building for sound PCB management (PCB holders) through a series of topic-specific training workshops	1.3.1. Supporting PCB holders in the development of PCB management plans and their implementation	- Developing training material - Conducting workshops - Company visits supporting the development, implementation and advice on safety
		1.3.2. Training of personnel in the safe handling of PCBs and PCB-containing equipment, including for their temporary storage and transportation.	
		1.3.3. Technical support for development of phase-out and disposal management plans.	
		1.3.4. Ensuring identification and procedures for avoiding PCB handling at scrap metal recycling operations	
		1.3.5. Strengthening management capacity of PCB holders to manage PCB containing equipment during all phases of the life cycle	

Outcomes	Outputs	Activities	Sub-activities identified
	1.4. Update and further refine the existing PCB inventory to increase its comprehensiveness	1.4.1. PCB field data collection and equipment labeling	- Inventory planning and coordination, inventory compilation - PCB database development - Regional data collection - Data-input - Procurement of: PPE, vials, labels field identification equipment etc.
		1.4.2 Tuning in X-ray fluorescence equipment for PCB analysis at Ghana Atomic Energy Commission and laboratory verification and quantification	- Assessment of equipment and methods - Upgrading - Training - PCB quantification analysis
	1.5. Develop and implement administrative system for PCB-related enforcement and inspection activities after inventory compilation	1.5.1. Industrial and import inspection	- Develop equipment reporting requirements and procedures - Training workshops for PCB holders and industrial inspectors, customs officials - Inspections - Reporting on PCB movements by holders - Updating of PCB inventory
		1.5.2. Tracking movements of PCBs and PCB-containing equipment by PCB holders	

Outcomes	Outputs	Activities	Sub-activities identified
Outcome 2: Infrastructure for environmentally sound management of PCBs developed and in place	**2.1. Identify, construct or upgrade of a secure, temporary storage facility(ies)**	2.1.1. Establishment of provincial PCB collection points	- Identifying suitable locations for provincial temp storage - Assessing suitability, upgrade planning, and permitting - Upgrading provincial storage - Operation of storage sites
		2.1.2. Planning, construction, and operation of a technically sound central storage site in Accra/Tema area	- Identifying suitable site - Storage site planning, EIA, permitting - Land purchasing - Blue-prints, construction (65x15 m) - Procurement of equipment (incl. forklift pumping, safety and PPE) - Establishing environmental and health monitoring and its implementation during the project -Operation during project
	2.2 Upgrading of transportation safety for PCB-containing equipment and fluids	2.2.1. Ensuring appropriateness of road vehicles used for PCB transport	- Assessing current practices and vehicles - Upgrading of equipment and amelioration of skills

Outcomes	Outputs	Activities	Sub-activities identified
Outcome 3: Environmentally sound replacement and disposal of PCB waste and equipment	**3. 1. Development of a five year phase-out plan and its implementation for the various waste streams**	3.1.1. Estimating yearly waste flows of pure PCB and PCB-contaminated transformers 3.1.2. Making province-wise replacement plans for minimizing disruption in power supply	- Analyzing inventories - Visiting transformer sites for detailed condition checks. - Developing equipment wise replacement schedule
	3.2. Replacement of pure PCB oil containing equipment and associated waste	3.2.1. Procurement of replacement equipment	-Deciding on replacement equipment characteristics -Tendering and procurement of replacement equipment - Installing new equipment
		3.2.2 Decommissioning of PCB containing transformers and in-country transport to temporary storage	-Decommissioning 80 pieces and preparing for transport - In-land transport from provincial to central storage
		3.2.3. Final disposal tendering and packaging and maritime stowing, transportation, and final disposal	- Tendering preparation and evaluation -Packaging -Stowing as per IMO rules - Transportation - Disposal
	3.3. Decommissioning, washing, and disposal of phased-out PCB-contaminated mineral oil and equipment in country	3.3.1 Setting up and supervision of washing and dismantling at central storage site.	-Procurement of washing and cutting equipment, PPE -Installing washing and dissembling line
		3.3.2 Decommissioning and in-country transport to temporary storage	- Decommissioning - In-land transport from provincial to central storage
		3.3.3. Draining, dismantling, and washing of transformers (and material recuperation) - Establishing environmental and health monitoring ensuring minimum releases and exposure during washing operations and its implementation during the project	- Emptying PCB contaminated oil from transformers - Solvent/oil washing of transformer casings - Disassembling /cutting of casings

			- Separation of metals - Vending of separated metals
		3.3.4. Final disposal tendering of PCB-contaminated oils, packaging, and maritime stowing	- Tender preparation and evaluation - Stowing as per IMO rules
		3.3.5. Transportation and final disposal	Maritime Transport Disposal

Outcomes	Outputs	Activities	Sub-activities identified
Outcome 4: Monitoring, learning, adaptive feedback, outreach, and evaluation	**4.1. Development and implementation of project monitoring and evaluation tools and systems**	4.1.1. Developing M&E system	- Drawing-up monitoring scheme based on project outcomes and output and measured risk reduction - Validation of M&E system
		4.1.2. Implementing M&E system	- Setting-up baseline, update against baseline
	4.2. Information and outreach	4.2.1. National awareness raised for effective capacity building strategies for ESM of PCBs	- Compiling project results and lessons learned
			- Information exchange particularly targeting authorities and private/public electricity operators
	4.3. External Evaluation	4.3.1. Mid-term evaluation	- Verifying that all project activities in line with target
		4.3.2. Final evaluation	- Evaluating project outcomes

Project indicators, risks, and assumptions

Detailed project indicators, especially those more specifically measuring risk reduction for the environment and human health, rather than measuring project outputs/outcomes will be developed as a part of the monitoring and evaluation activities of the project.

The tables below compile efficiency indicators as well as list possible risks that may imperil the success of the project. The risks have been taken into consideration when outlining the activities as well as roles and responsibilities during project implementation.

Table 4: Project outcomes, outputs, indicators, and risks/assumptions

Outcomes	Outputs	Indicator	Risk/assumptions
Outcome 1: **Strengthening of the legal framework, administrative and technical preparedness for sound PCB management**	**1.1.Review, develop and adopt legislation and policies**	1. PCB Regulation drafted and adopted. Target: 1 2. Development of technical guidance implementing PCB regulative framework Target: 5 different guidance documents covering various stages and stakeholders of PCB life-cycle 3. Develop and adopt PCB environmental and food quality guidelines Target: 3 quality guidelines developed covering abiotic environment, aquatic organism (fish), and meat/diary products	Assumption: Inter-ministerial agreement on need and contents assumed Development of quality guidelines assumed to prioritize monitoring efforts Risk: Capacity constraints postpone adoption of quality guidelines
	1.2. Capacity Building for sound PCB management in the public sector (authorities)	1. Number of workshops for authorities conducted Target: 3 workshops 2. Number of verified internal administrative guidelines pertaining to PCBs containing equipment adopted	Risk: Adopted procedures will not be properly documented and integrated
	1.3. Capacity Building for sound PCB management (PCB holders) through a series of topic-specific training workshops for targeted groups	1. Number of workshops targeting PCB holding companies and handlers conducted: Target: 6 workshops 2. Number of companies (sites) advised and visited Target: 15 sites visited	Assumption: All companies willing for change Risk: Unsafe oil/ equipment disposal continued due to economic benefit to some workers

	Outputs	Indicator	Risk/assumptions
	1.4. Update and further refine the existing PCB inventory to increase its comprehensiveness	1. Number equipment surveyed. Target 11,000 2. Number of equipment sampled. Target:11,000 3. Number of equipment labeled Target 11,000	Assumption: Training on equipment identification and labeling reaches all corners of the country
		1. PCB content determination in the field undertaken. Target: 7,500 2.Ghana Atomic Energy Commission performing quantitative PCB analysis Target: 2,000 analysis	Assumption: Sample preparation and equipment easily re-tuned for PCB analysis. Risk: GAEC's analysis capacity not able to cater for all samples
	1.5. Develop and implement administrative system for PCB-related enforcement and inspection activities after inventory compilation	1. PCB equipment checked during industrial inspection Target: 1,000 inspections 2. PCB equipment checked at entry/exit in the country. Target: 500 inspections 3. Reports on PCBs and PCB-containing equipment movements received by EPA Target: 400	Assumption: Participation of industrial inspectors in PCB workshops assumed Risk: Rate of inspected equipment at some customs points too low for becoming integrated as a part of routine checks
Outcome 2: Infrastructure for Environmentally Sound Management of PCBs Developed and in Place	**2.1.Identify, construct or upgrade of a secure, temporary storage facility(ies)**	1. Number of regional temporary PCB collection points established. Target: 3 2. Central storage site, permitted, constructed, equipped and made operational 3. Number of full time employees at central site Target: 8 employees	Assumption: 3 collection points can cater for whole country Risk: Financial implications for PCB holders higher than calculated Risk: Collection points too few in case of uneven equipment flow Assumption: 8 persons able to both manage ware house and washing operations
	2.2 Upgrading of transportation safety for PCB-containing equipment and fluids	1. Number of vehicles upgraded Target: 6 vehicles 2. Number of drivers received training Target: 30 drivers	Assumption: Trained safety practices expected to be incorporated even if new drivers are recruited

Outcomes	Outputs	Indicator	Risk/assumptions
Outcome 3: Environmentally sound replacement and disposal of PCB waste and equipment	**3. 1.Development and implement five year phase-out plans for various waste streams**	1. Company-wise phase out plans developed Target: 5 plans	Assumption: Smaller holders (mines) are well integrated in the project
	3.2. Replacement of pure PCB oil containing equipment and associated waste	1. Replacement transformers procured Target: 80 2. Pure PCB transformers disconnected decommissioned and transported to central temporary warehouse Target 80 3. Pure PCB transformers disposed Target. 80 transformers, total weight: 160 tons with 40 tons of PCB oils	Assumption: No sharp price increases on transformers or disposal assumed Risks: Exchange rate risk increasing disposal prices
	3.3. Decommissioning, washing, and disposal of phased-out PCB-contaminated mineral oil and equipment in country	1. Treatment (washing and dismantling) equipment procured 2. Central warehouse workers trained in washing and dismantling of transformers 3. Number of PCB-contaminated transformers drained and dismantled Target: 170 4. Tons of PCB-contaminated oil and associated waste disposed through exports Target: 120 tons	Risk: Resistance to change among people benefitting from current oil sales
Outcome 4: Monitoring, learning, adaptive, feedback, outreach, and evaluation	**4.1. Development and implementation of Project Monitoring and evaluation tools and systems**	1. Number of Monitoring updates Target: Every quarter = 15 times 2. Number of topical/lessons learned/technical modules prepared for dissemination Target 5 3. Number of awareness/information workshops conducted Target:4	

Expected global, national, and local benefits

The main global benefit from the project will be the safe disposal of an estimated 40 tons of pure PCB oil and 120 tons of PCB-contaminated oil. These POPs will be destroyed and the risk that these will be globally redistributed will be eliminated. The introduction of safe in-country management practices for PCB-contaminated transformers will contribute to the global benefits as the global community can be assured that the remaining PCBs in Ghana are being responsibly and sustainably managed and disposed.

Regionally the project will bring important benefits that may not be so tangible and easily calculated as direct POPs elimination. While PCBs are a common problem for most countries in the region, many of the neighbors are struggling to find the most appropriate way of dealing with similar problems. The project will demonstrate hands-on how a comprehensive management plan can be implemented in a single country context. Many times the impetus of dealing with a particular issue comes from neighboring countries, particularly as Ghana would be concerned about PCB releases into common environmental resources, such as shared waterbodies, etc. and can therefore stimulate its neighbors to implement the lessons learned in their respective practices.

Nationally, there will be environmental and health benefits, as significantly less PCBs will enter into products, the food chain, and the environment in general. Quantification of these benefits is difficult as there is no quantitative baseline, nor a monitoring system allowing such quantification as a result of the project.

Another important national benefit is the experience and capacity gained by most stakeholders in developing a clear plan from cradle-to-grave on how to sustainably manage a particularly problematic industrial chemical. The overall approach and tools developed in the project can, with modifications, be utilized for other problematic chemicals within and beyond the sphere of the Stockholm Convention on POPs. This experience and approaches will contribute towards overall sustainable chemicals control as well as implementation of the Strategic Approach to International Chemicals Management (SAICM0.

SAICM outlines a Global Action Plan for contributing towards the overall goal of achieving sound chemicals management as per the Johannesburg timeline. This Global Action plan is divided into a number of Work Areas where contribution to SAICM can be achieved. These Work Areas are given in the table below together with notes regarding where the proposed project's activities will make contributions to the Work Areas.

Table 5: SAICM Work Areas and related contributions

SAICM Global Action Plan Work Area	Project Activity
1. Assessment of national chemicals management to identify gaps and prioritize actions	Legislative analysis and developing legislative frameworks applicable to substances beyond PCBs
2. Human health protection	Securing and disposing sources of hazardous chemicals
3. Children and chemical safety	Replacement of PCB equipment within communities, sport facilities, etc. and strengthened management of hazardous industrial chemicals
4. Occupational health and safety	Providing safety training during operation, maintenance, and disconnection, etc. of PCB-containing equipment
5. Implementation of the Globally Harmonized System of Classification and Labelling of Chemicals (GHS)	N/A
6. Highly toxic pesticides – risk management and reduction	N/A
7. Pesticide programmes	N/A
8. Reduced health and environmental risks of pesticides	N/A
9. Cleaner production	In the meaning using less hazardous chemicals for producing an industrial service of power generation and distribution
10. Remediation of contaminated sites	Identification of PCB contaminated sites and policy advice
11. Lead in gasoline	N/A
12. Sound agricultural practices	N/A
13. Persistent, bioaccumulative and toxic substances (PBTs); very persistent and very bioaccumulative substances; chemicals that are carcinogens or mutagens or that adversely affect, inter alia, the reproductive, endocrine, immune or nervous systems; persistent organic pollutants (POPs)	In all project activities
14. Mercury and other chemicals of global concern; chemicals produced or used in high volumes; chemicals subject to wide dispersive uses; and other chemicals of concern at the national level	By targeting one particularly problematic substance. Further project increases government capacity to deal with high volume chemicals used in different sectors and sources
15. Risk assessment, management and communication	PCB exposure reduction, labeling, contingency planning; extrapolation to other chemicals
16. Waste management (and minimization)	Hazardous waste disposal
17. Formulation of prevention and response measures to mitigate environmental and health impacts of emergencies involving chemicals	PCB holder management plans including emergencies
18. Research, monitoring and data	Restricted soil and human exposure data for PCBs; extrapolation to other chemicals
19. Hazard data generation and availability	N/A
20. Promotion of industry participation and responsibility	High degree of involvement of PCB holders
21. Information management and dissemination	As a part of results dissemination and contact with other regional PCB initiatives; extrapolation to other chemicals
22. Life cycle	Included from possible imports to use, maintenance disconnection, and disposal
23. Pollutant release and transfer register (PRTRs) – creation of national and international registers	Not systematically but in a restricted manner dealing with PCBs, tracking of equipment, etc.
24. Education and training (public awareness)	Education of government officials and PCB holders, workers as well as restricted public awareness raising on PCBs
25. Stakeholder participation	Please see details in Project Document section
26. Implementation of integrated national programmes for the sound management of chemicals at the national level in a flexible manner	PCB management adapted to Ghanaian context; extrapolation to other chemicals
27. International agreements	Implementation of Stockholm Convention. Basel Convention for PCB exports
28. Social and economic considerations	Considered in project development and included in cost-effectiveness considerations
29. Legal, policy and institutional aspects	Creating a full-fledged PCB management legislation as legislative and process example for other chemicals
30. Liability and compensation	PCB holders made responsible for their hazardous chemicals and waste
31. Stock-taking on progress	Lessons learned and their dissemination
32. Protected areas	N/A
33. Prevention of illegal traffic in toxic and dangerous goods	Creation of legislative rules for PCB export import and enforcement training
34. Trade and environment	Importers of mineral oil and other chemicals are made aware of the impact of their chemicals
35. Civil society and public interest non-governmental organization (NGO) participation	By active involvement in project steering and other outreach activities
36. Capacity-building to support national actions	Over-arching objective to create capacity for continuing PCB and other hazardous chemicals management

The projects' local benefits are most visible and tangible at places and neighborhoods where PCB sources are being removed thanks to the project activities. These include potentially leaking PCB-containing equipment and particularly close to the warehouses that are being closed/upgraded. It can be well assumed that people living in the vicinity of these storage facilities are highly exposed to PCBs and the project activities will practically eliminate this exposure. Also, the sound oil management and disposal practices introduced will decrease the PCB exposure of the people currently using PCB-containing oils in fuels, as cutting or even as baking oils or in cosmetics.

Country Ownership, Country Eligibility, and Country Drivenness

Country eligibility

Ghana signed the Stockholm Convention on 23 May 2001 and became a Party on 30 May 2003.

Ghana is eligible for GEF funding under paragraph 9(b) of the GEF Instrument. The project is eligible under POPs Operational Programme 14, supporting Outcomes such as strengthening institutional and human resource capacity and management of POPs stockpiles in an environmentally sound manner. The project falls under eligible activities under Capacity Building, particularly sections 13 a. and c. of the Operational Programme.

Country ownership and drivenness

PCB management has become a key environmental issue in Ghana. The NIP puts PCB management among the top three priorities, agreed among NIP developing parties comprising relevant ministries and a broad range of stakeholders outside of government.

This common understanding of the urgency to set-up appropriate systems for meeting the Convention deadlines has been further strengthened during the development of the NIP as well as of this project.

The drive and eagerness has not only been coming from the authority side, but also the power production and distribution sector has actively contributed in all stages of elaboration of the NIP, of the PDF-B, including the inventory, and of drafting this FSP. The PCB holding companies have provided all relevant information in their possession, and have also indicated how they currently manage their equipment and how they are prepared to strengthen their efforts to fully implement the Stockholm Convention. This desire is further underlined by the significant support in co-financing towards meeting of the goals of the project.

Also civil society organisations have followed with interest the various stages for the elaboration of this project and have actively contributed to its content.

Sustainability

The sustainability of the mechanisms created by the project will be ensured by integrating all project components in existing structures or under the responsibility of existing entities which are assisted to take on these additional responsibilities during the project implementation. The following processes will be utilized for ensuring the sustainability.

For integration of PCB issues in governmental regulatory, administrative, and control structures

The project will directly involve the National Coordinating Committee for the development of the Ghana NIP, which will ensure that all relevant government institutions are kept onboard and their capacity, responsibility, and knowledge of their role in PCB management is clarified and integrated.

All training conducted under the project will be required to submit proper training material ensuring that there are both "trained trainers" as well as suitable material to be used for future training of new personnel.

For supporting financial sustainability of the increased administrative burden, the project will also catalyse the exploration of cost recovery mechanisms for financial sustainability of the new PCB management systems. Such mechanisms can include:

- taxes on industries that currently utilize PCBs or, alternatively, tax credits for industries for replacement of PCBs by an environmentally-friendlier alternative(s) (thereby creating an incentive to meet the 2025 goal in advance);
- investment incentives for private capital, if available, for project matching funds;
- fines for illegal use/import of PCBs/PCB-containing equipment; and
- user fees/credits for those who use/do not use electricity provided through PCB-containing equipment.

In developing such mechanisms, all cost recovery measures will be tested to ensure that any negative impacts on vulnerable groups are mitigated.

For integration of PCB management at holder level

It is expected that PCB management plans will be developed for all PCB equipment holders during the project. Following and completing these plans will require action and activity beyond the project completion. The follow-up on these plans is envisaged to be integrated with ongoing industrial inspection processes.

Secure storage facilities and transportation structures will be established by the waste holders and their running expenses can be borne by the scrap metal operations making the sustainability a relatively small concern. Also the needed expendables for transport and storage (beside petrol) are relatively inexpensive (absorbents, gloves, drums, etc.) making it possible to easily keep-up the safety measures.

As already noted, all training given under the project will require proper training material ensuring that there are both "trained trainers" as well as suitable material to be used for future training of new personnel. This will ensure that PCB holding companies have training material available for giving refresher courses in PCB safety.

Disposal of PCBs

It can be safely expected that ensuring sustainability of safe disposal of pure PCB will not present a large problem. Though some PCB transformer holders may be tempted to return to old unsustainable disposal practices., the baseline situation at end of the project is, however, very different from the today's situation.

Firstly, PCBs and PCB-containing equipment will be clearly subject to legislation at the end of the project. Secondly, the PCB holders already know the procedures/costs, etc. and can budget accordingly when replacing pure PCB equipment. Thirdly, it can be expected that the PCB holders have been coached to take PCBs seriously during the five years of the project and will include in their budgets the additional resources to safely ship such equipment for disposal.

In this regard it should be borne in mind that an export disposal of PCB equipment will only be 25% of the whole replacement expenses and affects only 2-3% of the total transformer population, making the additional expense very small when calculating to overall equipment replacement or electricity distribution costs.

With raised, awareness, legislation, equipment tracking and other enforcement steps it can, therefore, be expected that the safe PCB disposal operations will be continued after completion of the project.

The washing and disassembling operation of slightly PCB-contaminated equipment is a profitable operation. Any solvents, oils, PPE, or associated equipment as well as salaries can be easily recuperated from selling the cleaned scrap metal, especially copper. Therefore the operations established for PCB-contaminated equipment does not raise sustainability concerns.

Replicability

Many parts of the project activities can be replicated in different country contexts. The regulatory, administrative, and inventory measures are as such not trying to introduce any novel approaches. However, being the first single country PCB project in sub-Saharan Africa, important lessons can be gathered for replication in other countries.

The project is also the first to implement an approach where all PCB-containing waste, low to high concentration, is disposed abroad with a pre-sorting and washing stage for low contaminated waste. No PCB decontamination technology will be established, but low PCB contaminated equipment is cleaned in-country and cleaned metals recycled by local actors.

This approach introduces a lower capital cost scheme as compared with establishing treatment capacity for PCB waste streams. In the GEF context the proposed approach represents a third level of technical complexity, where the first level is represented by approaches disposing all PCB sources (Slovakia, PR.China), the second level is in-country treatment of low contaminated PCB oils (Morocco). Separation of valuable waste parts (metals) and cleaning these for cost-recovery (this project) represents the third level. The least in-country technology demanding approach is the complete export disposal approach (Latvia) where the amounts of PCB waste and the ease of transportation does not justify establishment of any level of in-country treatment.

Experiences from this third level approach as proposed may decrease PCB management costs particularly in countries with high quantities of lightly contaminated transformers and long (or expensive) transports to safe disposal facilities. The actual cleaning and re-cycling operation is self-sustaining and could be widely replicated.

One of the issues which may indeed be most interesting to follow and replicate in other countries in the region is the way PCB replacement can be financed as a part of further electrification and energy efficiency efforts. The project will use financing from the regional development bank for energy efficiency to also replace PCB equipment.

PART III: Management Arrangements

The project will have a Steering Committee (PSC) chaired by Ministry of Local Government, Rural Development and Environment, and will include participation of all relevant government ministries and stakeholders outside of government as members, with Ghana EPA acting as secretariat.

- Ministry of Local Government, Rural Development and Environment, chair
- Ministry of Lands, Forestry and Mines
- Mines Department
- Ministry of Finance
- Customs, Excise and Preventive Service
- Ministry of Health/Ghana Health Service
- Ministry of Food and Agriculture
- Ministry of Trade, Industry, Private Sector Development and President's Special Initiatives
- Ghana Atomic Energy Commission
- Ministry of Energy
- Energy Commission
- Ministry of Manpower Development, Youth and Employment (Factories Inspectorate Department)
- Ministry of Justice and Attorney General's Dept.
- Ministry of Interior
- Association of Ghana Industries
- Ghana Water Company Limited
- Volta River Authority
- Environmental Protection Agency, secretary

UNITAR and UNDP will participate in the work of the PSC as full members and also other donors may be invited. Meetings of the PSC will be held quarterly. The PSC will ensure overall oversight of the project, ensure the relevance of activities towards project objectives and aims, and in particular assist project implementation by solving issues relating to stakeholder responsibilities.

Ghana EPA, as the national implementing agency, will act as the project secretariat. The secretariat will be responsible for the day-to-day management of the project and will be headed by a National Project Director (NPD) provided as an in-kind contribution from the government side. Ghana EPA, and NPD, will in this task be assisted by a project assistant as well as a monitoring and evaluation expert.

UNITAR will execute the project as per its internal operational and financial guidelines, and will receive an administrative operational support (AOS) cost to offset expenses. Apart from an Administrative assistant position at Ghana EPA and audit expenses, this administrative operational support shall also cover all additional project management costs accrued at Ghana EPA.

PCB holding companies will operate through their revised internal guidelines in procuring replacement equipment and other services as their part of project financing.

PART IV: Monitoring and Evaluation Plan and Budget

Project monitoring and evaluation will be conducted in accordance with established UNDP and GEF procedures. A Project Inception Workshop will be held within the first three months of the project implementation with the full project team, relevant government counterparts, key non-governmental counterparts, and UNDP. A PSC including the government, UNITAR, UNDP, industry, and NGO representatives will be constituted at project inception and will meet quarterly to review project progress, provide strategic guidance, and approve annual work plans and budgets.

Day-to-day monitoring of implementation progress will be the responsibility of the monitoring and evaluation expert. The monitoring and evaluation expert will, with assistance of international expertise, develop a project monitoring and evaluation system, including the project baseline during the first year of project implementation. The baseline will be validated by the PSC.

This baseline will be the benchmark against which progress of the project will be monitored. It is foreseen that the baseline will include both project output indicators as well as indicators for measuring actual PCB risk reduction.

In order to report on progress as well as POPs risk reduction a comprehensive monitoring and evaluation component will be included. Apart from standard progress/administration and financial monitoring, the project aims at comprehensively reporting towards GEF. Regarding the GEF Strategic Objective 2 indicator *"Reduced exposure to POPs, measured as the number of people living in close proximity to POPs wastes that have been disposed of or contained"*, as there are no clear guidelines on how this would be reported in such a project context, the project monitoring team will need to develop a system with baseline and intermittent observation points to report towards this indicator. The development of such PCB risk indicators could include restricted sampling and analysis or data collection from existing environmental or health statistics.

A mid-term review of the project will be conducted by a team of an independent international and an independent national expert assisted by nominated government officials. The mid-term evaluation will determine progress being made towards the achievement of outcomes and will identify correction course if needed. It will focus on the effectiveness, efficiency, and timeliness of project implementation; highlight issues requiring decisions and actions; and present initial lessons learned on project design, implementation, and management. As an output of this mid-term evaluation an amended workplan will be developed and appropriate support for re-directing to project activities facing unforeseen challenges.

The information and outreach material developed and particularly the lessons learned sections will also provide tools for evaluation. These sections will be partly based on review and evaluation findings and their wide distribution will generate feedback, further providing data on the impacts of the project.

A two-person team of national and international independent evaluators, strengthened with government-appointed experts will conduct a terminal evaluation with a lessons learned section for wide distribution to other countries planning similar PCB disposal and replacement projects.

The final evaluation will take place three months prior to the Terminal Project Implementation Review, and will focus on the same issues as the mid-term evaluation, but will concentrate on the wider impacts of the project activities. The final evaluation will also review the sustainability of results, including the contribution to capacity development and the achievement of global environmental goals. The final evaluation shall also provide recommendations for follow-up activities.

The findings of the final evaluation together with lessons learned documentation will be presented in a final project workshop which operationally closes the project. In preparation of this final workshop,

the sustainability issues, particularly the legal enforcement and complete phase-out of both pure PCB and PCB-contaminated transformers, particularly safe continuation of the washing operations, will be given highest importance.

Financial Monitoring

Financial monitoring and adherence to adopted yearly budgets will be controlled through annual project audits.

The financial audits will, in addition to ensure adherence to bidding and other procedures, emphasize the cost-effectiveness of the action undertaken. The financial audits will further validate the input utilization or "budget-delivery" which may to a certain degree be used for monitoring the implementation efficiency or speed of the project.

Type of M&E activity	**Lead responsible party**	**Budget (indicative)**	**Time frame**
Inception Report	Project Team	None	At the beginning of project implementation
Development of M&E system	Project team, M&E expert government executing agency, international expert	42,000	At the beginning of project implementation
Baseline and update agreed monitoring variables	Project team, M&E expert, Project Steering Committee	64,000	First quarter of project implementation
Project Implementation Review (PIR)	Government, Implementing Agency (IA) Country Office, National Executing Agency, Project Team, IA Task Manager	None	Every year, at latest by July of that year
Implementing Agency (IA) annual reports	The Government, IA Country Office, National Executing Agency, Project Team, IA Task Manager, and Target Groups	None	Every year
Frequent Progress Reports	M&E expert	38,000	To be determined by Executing Agency and PSC
Mid-term Evaluation	Government, international expert, IA Country office	27,000 project + 6,000 government in-kind	Approximately 24 months from inception
Terminal Evaluation, including lessons learned	Project team, IA headquarters and Task Manager, IA Country Office, National Executing Agency	41,000 + 6,000 government in-kind	At the end of project implementation; 3 months prior to the Terminal Project Implementation Review
Terminal Report	UNITAR, IA Country Office, IA Task Manager, Project Team	None	At least one month before the end of the project
Audit	National Executing Agency, IA Country Office, Project Team	20,000 (total for project duration)	Yearly

PART V: Legal Context

This project document shall be the instrument referred to as in Article I of the Standard Basic assistance Agreement between the Government of Ghana and United Nations Development Programme, signed by the parties. The host country implementing agency shall, for the purpose of the Standard Basic Assistance Agreement, refer to the government co-operating agency described in that Agreement.

UNDP acts in this Project as Implementing Agency of the Global Environment Facility (GEF), and all rights and privileges pertaining to UNDP as per the terms of the SBAA shall be extended *mutatis mutandis* to GEF.

The UNDP Resident Representative in Ghana is authorized to effect in writing the following types of revision to this Project Document, provided that he/she has verified the agreement thereto by GEF Unit and is assured that the other signatories to the Project Document have no objection to the proposed changes:

a) Revision of, or addition to, any of the annexes to the Project Document;

b) Revisions which do not involve significant changes in the immediate objectives, outputs or activities of the project, but are caused by the arrangement of the inputs already agreed to or by cost increases due to inflation;

c) Mandatory annual revisions which re-phase the delivery of agreed project inputs or increased expert or other costs due to inflation or take into account agency expenditure flexibility; and

d) Inclusion of additional annexes and attachments only as set out here in this Project Document.

Audit Clause

The Government will provide the Resident Representative with certified periodic financial statements, and with an annual audit of the financial statements relating to the status of UNDP (including GEF) funds according to the established procedures set out in the Programming and Finance manuals. The Audit will be conducted by the legally recognized auditor of the Government, or by a commercial auditor engaged by the Government.

SECTION II: STRATEGIC RESULTS FRAMEWORK AND GEF INCREMENT

PART I : Incremental Cost Analysis[2]

Outcome/Output	Baseline	GEF alternative	Incremental costs
Legal framework, administrative and technical preparedness for sound PCB management strengthened.	No PCB framework law. No secondary legislation/ guidelines covering PCBs. No environmental limit and quality standards for PCBs. Authorities without proper enforcement possibilities. No systematic identification of PCB sources undertaken as authorities lack the resources and routines resulting in PCB releases and exposure. Companies not considering PCBs in their operations, resulting in in-flux of more PCBs, further cross-contamination and releases into environment. No safety handling of PCB training conducted or PCB management plans developed. Inadequate PCB analysis possibilities. Oil recyclers not analyzing collected oils with resulting PCB recycling and release.	A comprehensive, fully consulted, accepted, and integrated PCB legislation covering all stages in the PCB life-cycle. PCB legislation enforceable by authorities. Systematic enforcement established and ongoing. All transformers checked for PCBs, identified, and labeled, reducing risk situations and releases. Companies informed and trained in safe management of PCBs reducing exposure and releases during all stages. PCB holders enabled to develop PCB management, reducing exposure from PCB equipment still in use and develop PCB phase-out plans. Existing laboratories tuned for PCB quantification. All transformer oils checked for PCBs before recycling	Total: US$ 1,320,500 <u>Incremental cost US$</u> 1,320,500 Co-financing US$ 591,000

[2] There exists no baseline for PCB management in Ghana. It can further not be expected that any quantifiable activities to ensure reduction in PCB exposure or releases or their safe disposal would take place in the Baseline Scenario. Hence the whole project is incremental. For detailed information on the distribution of funds please see, UNDP Atlas budget below, detailed budget in Annex III and Request for GEF CEO Endorsement document.

Outcome/Output	Baseline	GEF alternative	Incremental costs
Infrastructure for Environmentally Sound Management of PCBs Developed and in Place	No PCB holders and transformer servicing companies take precautions for PCB exposure and releases during decommissioning, transport, and storage. PCBs released during maintenance and storage operations. Cross-contamination of mineral oil transformers.	All PCB holders and transformer servicing companies take measures to reduce exposure, cross-contamination, and releases. PCB releases minimized during maintenance transportation and storage. Provincial collection points upgraded and manned with trained staff. Transportation systems hardware made safe and prepared for PCB risks. Central Storage for PCBs in constructed provided with adequate safety precaution and trained staff.	Total US$ 1,297,600 Incremental cost US$ 1,297,600 Co-financing US$ 731,600
Environmentally sound replacement and disposal of PCB waste and equipment	No company PCB phase out-plans developed. No PCB-containing equipment replaced safely. PCB oil recycling would continue in various applications with consequent exposure and harm. No capacity to manage lightly contaminated equipment in country. PCB containing capacitors would be left at site even when PCB releases occur.	PCB phase-out plans developed and implemented by major PCB holders. Swift and safe dismantling collection and disposal of PCB-containing transformers leading to destruction of 460 tons of PCB containing transformers. In-country disassembling and washing operation established treating some 400 tons of contaminated transformers and ensuring sustainability of continuing implementation of the PCB phase-out plans. Identified PCB capacitors disposed as a part of the pure PCB transformer operation.	Total US$ 3,026,580 Incremental cost US$ 3,026,580 Co-financing US$ 1,701,580
Monitoring, Learning, Adaptive Feedback, Outreach and Evaluation	No activity in the baseline scenario.	Efficient project monitoring and evaluation, guiding activities towards achieving outcomes as well as establishing measurement of PCB risk reduction put in place.	Total US$ 281,000 Incremental cost US$ 281,000 Co-financing US$ 81,000
Project management	No project with resulting environmental degradation.	Efficient project implementation with resulting local and global environmental benefits.	Total US$ 754,200 Incremental cost: US$ 754,200 Co-financing: US$ 466,000
Total incremental cost: 6,516,880 US$ Co-financing of the incremental cost: 3,571,180; US$ GEF US$ 2,945,700			

PART II : Logical Framework Analysis

Refer to Annex A of the Request for GEF CEO Endorsement document

tal Budget and Workplan

lget at the activity is provided in Annex III
ork Plan

	PIMS 3527 Ghana, Capacity Building for PCB Elimination
	PIMS 3527 PCB management in Ghana, from Capacity Building to Elimination
	UNITAR

Responsible Party/ Implementing Agent	Fund ID	Donor Name	Atlas Budgetary Account Code	ATLAS Budget Description	Amount Year 1 (USD)	Amount Year 2 (USD)	Amount Year 3 (USD)	Amount Year 4 (USD)	Amount Year 5 (USD)	Total (USD)
UNITAR	62000	GEF	71200	International Consultants	15,000	11,000				26,000
			71300	Local Consultants	70,000	100,000	58,500			228,500
			72100	Contractual services	30,000	20,000				50,000
			71600	Travel (in-land & int.)	30,000	40,000	17,000			87,000
			72100	Workshops	60,000	30,000				90,000
			72200	Analysis equipment	25,000					25,000
			74500	Analysis and safety disposables	30,000	20,000	10,000			60,000
				Total Outcome 1						**566,500**
UNITAR	62000	GEF	71200	International Consultants	22,000	20,000				42,000
			71300	Local Consultants	50,000	91,000	50,000	50,000		241,000
			71600	Travel	5,000	5,000				10,000
			72100	Contractual services	20,000	30,000				50,000
			72200	Safety disposables	30,000	40,000	35,000			105,000
			72200	Equipment	80,000	30,000				110,000
			72100	Workshops	8,000					8,000
				Total Outcome 2						**566,000**

Responsible Party/ Implementing Agent	Fund ID	Donor Name	Atlas Budgetary Account Code	ATLAS Budget Description	Amount Year 1 (USD)	Amount Year 2 (USD)	Amount Year 3 (USD)	Amount Year 4 (USD)	Amount Year 5 (USD)	Total (USD)
UNITAR	62000	GEF	71200	International Consultants	18,000	70,000	15,000	15,000		118,000
			71300	Local Consultants	25,000	60,000	40,000	25,000	17,000	143,000
			71600	Travel	10,000	10,000	8,000	9,000		37,000
			72100	Contractual services		250,000	250,000	250,000	81,000	803,000
			72200	Operational and Safety disposables	30,000	17,000	5,000	5,000	5,000	62,000
			72200	Equipment	50,000	100,000				150,000
			72100	Workshops	15,000					12,000
				Total Outcome 3						**1,325,000**
UNITAR	62000	GEF	71200	International Consultants			14,000		18,000	32,000
			71300	Local Consultants	40,000	40,000	30,000	40,000	29,000	108,000
			71600	Travel			5,000		10,000	15,000
			72100	Workshops			5,000		10,000	5,000
			72100	Contractual services	20,000	5,000	5,000	5,000	5,000	40,000
				Total Outcome 4						**200,000**
UNITAR	62000	GEF	71300	Local Consultants	7,000	12,000	12,000	12,000	7,000	50,000
			74500	Miscellaneous (Audit)	4,000	4,000	4,000	4,000	4,000	20,000
			75100	Administrative Operational Support	60,000	60,000	40,000	40,000	53,480	218,200
				Total Management						288,200
				PROJECT TOTAL						2,945,700

GEF			2,945,700
Gov. of Ghana in-kind			700,000
UNITAR (including SAICM QSP)			250,000
Private sector procurement			1,906,680
Private sector (in-kind)			714,500
TOTAL			6,,516,880

disposal contracts for both pure PCB equipment as well as the PCB-containing fraction originally in slightly contaminated transformers and from related washing operations.

3. Includes sampling and chemical analysis for setting-up risk baseline and measurement of risk-reduction to people and communities exposed to PCB as well as printing of project related information and outreach material, lessons learned, etc.

uts	Quarter/year	I/01	II/01	III/01	IV/01	I/02	II/02	III/02	IV/02	I/03	II/03	III/03	IV/03	I/04	II/04	III/04	IV/04	I/05
Review, develop, adopt lation and ies																		
Capacity ling for sound management e public sector norities)																		
Capacity ling for sound management B holders) ugh a series of -specific ing workshops																		
Update and her refine the ing PCB inven- to increase its prehensiveness																		
Develop and ement inistrative m for PCB- ed enforcement inspection ities after ntory pilation																		

tputs	Quarter/year	I/01	II/01	III/01	IV/01	I/02	II/02	III/02	IV/02	I/03	II/03	III/03	IV/03	I/04	II/04	III/04	IV/0
.Identify, construct upgrade of a secure, nporary storage ility(ies)																	
. Upgrading of nsportation safety PCB-containing uipment and fluids																	
1.Development of a e year phase out n and its plementation																	
. Replacement of re PCB oil ntaining equipment d associated waste																	
. Decommissioning, ashing and Disposal phased- out PCB ntaminated mineral and equipment in untry																	
. Development and plementation of oject Monitoring d evaluation tools d systems																	
. Information and treach																	
. External aluation																	

Synergies with other programmes in the region

There are a number of ongoing programmes and projects, which are being supported by different donors related to the proposed project, and which provide leverage for obtaining further donor support. A summary of the ongoing programmes and projects is given below.

African Stockpiles Programme (ASP)

The World Bank and other donors have approved a subprogram under ASP for disposal of obsolete stockpiles of pesticides including POPs. The ASP project is aimed at clearing and disposing stocks of obsolete pesticides including POPs with a view to preventing further stockpiles and contamination of the environment. This proposed project would complement the ASP project by identifying potential contamination of the environment from PCB releases.

Demonstration of a Regional Approach to Environmentally Sound Management of PCB Liquid Wastes and Transformers and Capacitors Containing PCBs

This regional UNEP/GEF lead initiative will introduce steps for sound PCB management in francophone West-African countries. It envisages developing various tools for PCB management and test number of approaches for regional replication. It is also envisaging establishment of PCB disposal capacity in the region.

Strategic Approaches to International Chemicals Management (SAICM)

SAICM includes a Global Action Plan that has put forward a number of concrete measures mainly intended to facilitate implementation of global conventions and agreements including the relevant chapters of Agenda 21 dealing with environmentally sound management of chemicals and chemical wastes. Ghana participated fully in the development of the Global Action Plan and played an important role in the African Regional Consultation to the Action Plan. In addition, under the SAICM Quick Start Programme Trust Fund, Ghana is implementing a project with the technical assistance of UNITAR on "Updating a National Chemicals Management Profile, Developing a National SAICM Capacity Assessment, and Holding a National SAICM Priority Setting Workshop".

Country Environment Analysis (CEA) in Ghana

The CEA in Ghana is a multi-donor support programme to carry out a country environmental analysis, focusing on forestry, wildlife, urban/rural development, and land degradation. The project support provides assistance for and promotion of water and sanitation facilities, sustainable agricultural practices, and reclamation of degraded mining lands. This current project will strive to complement the CEA through contributing to the safety and quality of underground water from POPs-contamination and enhancement of agricultural productivity, urban/rural development

NGO/Industries Cooperation

On 1 May 2004, the International POPs Elimination Network (IPEN), in partnership with UNIDO and UNEP, began a global NGO project called the International POPs Elimination Project (IPEP). The

- Help establish regional and national NGO coordination and capacity in all regions of the world in support of long-term efforts to achieve chemical safety.

Two NGOs covering Anglophone Africa in Tanzania and Francophone Africa in Senegal are signatories to this agreement and will be linked on a long-term objective.

Oil and mining industries play a key economic role in Ghana. As already mentioned, NGOs and the industries themselves are aware of the health and environmental effects of POPs chemicals such as PCBs. Based on discussions during the PDF-B implementation, the government, private and public industries, and the NGOs have shown great interest in the project and will be joining in the capacity building aspects of the project.

Most countries with developing economies and economies in transition lack adequate and appropriate technical capacity to properly destroy PCBs and PCB-containing equipment. Building capacity and developing guidelines for the sound management of PCBs and PCB-containing equipment would provide a model for the management of PCBs in the region. The World Bank document (2005) entitled "Opportunities for Integrating the Sound Management of Chemicals to the Millennium Development Goals (MDG)" in particular draws links to:

MDG 1: Eradicate poverty and extreme hunger
MDG 4: Reduce child mortality
MDG 5: Improve maternal health
MDG 6: Combat /HIV/aids, malaria and other diseases
MDG 7: Ensure environmental sustainability
MDG 8: Build a global partnership for development.

This document clearly cites the vulnerability of poor people in particular to chemical risks, and links agricultural, fishing, health, energy, mining, water and sanitation sectors' exposure to POPs implicated in Stockholm Convention.

chair the PSC. Other ministries relevant to different project activities such as Ministry of Trade, Industry, Private Sector Development and President's Special Initiatives, Ministry of Interior, Ministry of Transport, Ministry of Energy, Ministry of Lands, Forestry and Mines (Mines Department), Ministry of Energy and Ministry of Health will be also included in the PSC. These ministries will be closely involved in the strategic planning of project activities as part of the PSC project guidance. The PSC will be meeting on a quarterly basis and the key ministries will be providing their strategic input as preparation and follow-up to these meetings.

Apart from the official PSC it is envisaged that a broader group of organizations and interests will be represented in a series of technical consultations at various stages of the project. The technical working groups will provide input on practical issues for consideration of the National PCB Committee, and herewith help in making the National PCB Committee operational.

The key stakeholders to be represented in these technical working groups are the given in the table below. It is foreseen that the representation in these working groups would be more oriented towards technical experts as compared with the PSC, which would comprise decision-makers from the concerned organizations.

The involvement of various stakeholders for the agreed project outputs are given in the table below.

ke-holder	Role/ Responsibility	1.1 Review, develop and adopt legislation and policies	1.2. Capacity building for sound PCB management in the public sector	1.3. Capacity building for sound PCB management (PCB holders)	1.4. Update and further refine the existing PCB inventory	1.5. Administrative system for PCB-related enforcement and inspection	2.1. Construct or upgrade of a secure, temporary storage	2.2 Transportation PCB-containing equipment and fluids	3. 1 Phase-out plans for various PCB waste streams	3.2. Replacement of pure PCB
istry of Local ernment, RD Environment	Implementing Agency, PSC, technical adminis - trative enforcement input	**x**	x	x	**x**	x	x	x	**x**	
istry of Trade Industry	PSC, technical input	**x**	x	x	**x**	x			**x**	
istry of Interior	PSC, technical and administrative input, emergency response	x	**x**			**x**	x	x		
istry of Health	PSC, public health issues	x	x		**x**					
istry of Energy	PSC	x	x	x		x			x	
istry of Finance	Beneficiary, enforcement (Customs), proponent economic instruments	x	x		x	x				
rgy mmis sion	Oversight of PCB holders in power sector	x	x		x	x				
nsformer and ecyclers	Beneficiary, service provider	x		x	x		x	x	x	
A, Electricity luction and onal grid	Beneficiary			x	x		x	x	x	
G, Ghana tricity mpany	Beneficiary			x	x		x	x	x	

ke-holder	Role/ Responsibility	1.1 Review, develop and adopt legislation and policies	1.2. Capacity building for sound PCB management in the public sector	1.3. Capacity building for sound PCB management (PCB holders)	1.4. Update and further refine the existing PCB inventory	1.5. Administrative system for PCB-related enforcement and inspection	2.1. Construct or upgrade of a secure, temporary storage	2.2 Transportation PCB-containing equipment and fluids	3. 1 Phase-out plans for various PCB waste streams	3.2. Replacement of pure PCB
ing companies	Beneficiary			x	x		x	x	x	
EC	Laboratory, service provider	x			x	x				

SIGNATURE PAGE

Country: _____

UNDAF Outcome(s)/Indicator(s):
_____
(Link to UNDAF outcome., If no UNDAF, leave blank)

Expected Outcome(s)/Indicator (s):
_____
(CP outcomes linked t the SRF/MYFF goal and service line)
_____

Expected Output(s)/Indicator(s):
_____
(CP outcomes linked t the SRF/MYFF goal and service line)
_____

Implementing partner: _____
(designated institution/Executing agency)

Other Partners: _____

_____

Programme Period:_____
Programme Component:_____
Project Title:_____
Project ID: _____
Project Duration: _____
Management Arrangement: _____

Total budget: _____
Allocated resources: _____
- Government _____
- Regular _____
- Other:
  - Donor _____
  - Donor _____
  - Donor _____
- In kind contributions _____

Agreed by Government of Ghana:_____
Agreed by UNITAR:_____
Agreed by (UNDP):_____

Annexes:

Annex I. Pertinent PCB information included in National Implementation Plan for POPs.
Annex II. Summary PCB Inventory for Ghana.
Annex III. Detailed project budget.

Pertinent PCB information included in National Implementation Plan for POPs.

Table 14: Production, Import and Export, Use, Identification, Labelling, Removal, Storage and Disposal of PCBs and Equipment Containing PCBs (Annex A, Part II chemicals)

Objectives	Activities	Key performance indicators	Time Frame	Implementers	Resource / Needs
) To carry out etailed inventory on CBs and equipment ontaining PCBs Annex A, Part II hemicals)	• Identify additional source categories for PCB to include unclassified closed transformers and capacitors and especially partially closed and open applications. • Identify PCBs and PCB-containing equipment • Prepare an inventory of PCBs and PCB containing equipment. • Identify PCB-contaminated sites.	Inventory of PCBs and PCB containing equipment updated Contaminated sites mapped out	8 months	EPA, Relevant Stakeholders	Financial Assistance, Vehicles
) To analyse PCBs in ansformers and apacitors and other artially closed and pen applications in hana.	• Identify suitable analytical capacity for PCBs in Ghana. • Establish reference methods for measuring content of PCBs in closed, partially closed and open applications. • Test for the actual presence and concentrations of PCBs in these applications and in new imported transformers oils of (dubious origin).	PCBs in equipment identified and analysed.	5 years	EPA, GAEC, GSB, VRA, ECG, Research Institutions	Financial assistance, Sampling equipment, Training
) To develop a atabase on PCBs in hana See 3.3.3 activity 2)	• Establish a database of results of analysis.	Database established	2 years	EPA, GAEC, GSB, VRA, ECG, Research Institutions	Computer software and hardware, Training, Technical expertise

	Activities	Key performance indicators	Time Frame	Implementers	Resource / Needs
ıibit the use of PCB and activity	• Draft new regulations on imports, use, of PCBs and PCB containing equipment. • Establish policies and guidelines for the management of PCBs including those on imports to Ghana • Identify safer substitutes. • Develop detailed phase out programmes for organisations and institutions using of PCBs.	• Legislation passed • Policies/guidelines initiated • Safer substitutes identified • Phase out programme developed	5 years	EPA, AG, Parliamentary Select Committee On Environment. MES, MOE, EPA VRA, ECG	Financial assistance Consultants, Equipment
note osure to lth and nt to e.	• Place warning notices near equipment, especially where decommissioned ones are kept prior to disposal. • Regularly inspect PCB containing equipment. • Install receptor tanks to replace concrete bunds. • Establish emergency plans for PCBs spillage and accidents. • Organize training for personnel involve in handling of PCBs. • Establish mechanism for reporting accidents to authorities.	• Warning signs and notices in place • Inspection programme developed • Receptor tanks built • Emergency plans in pace • Training programme organised. • Mechanism for reporting accidents established	2 years	EPA, VRA, ECG	Financial assistance, Vehicles, Training, equipment.
re safe nt of PCB	• Develop guidelines on safe handling of PCBs. • Develop guidelines for collection and transport of PCBs and PCB containing equipment • Establish permitting system for the collection and transport of PCBs and PCB containing equipment • Establish criteria for selection of appropriate storage areas • Procedures to identify appropriate storage sites for PCBs and Equipment containing PCBs. • Develop/upgrade infrastructure for safe storage • Establish system for proper labeling of stored items	• Guidelines on safe handling developed. • Guidelines for collection and transport of PCBs in place • Permitting system established. • Criteria developed • Storage sites established • Storage infrastructure upgraded • Requisite labelling system in place	10 years	EPA, VRA, ECG, local authorities	Financial assistance, Training, Equipment, Technical expertise / consultants

	Activities	Key performance indicators	Time Frame	Implementers	Resource / Needs
tify and m use quipment PCBs.	• Establish appropriate procedures for the decommissioning of damaged equipment or that removed from use and its sound disposal • Cleaning of equipment earmarked for decommissioning	Equipment decommissioned	10 years	EPA, VRA, ECG, local authorities	Financial assistance, Training, Technical expertise / consultants
d facilities for al of all PCB ontaining	Identifying and finalizing arrangements for the disposal of PCB and PCB containing equipment. Packaging of equipment for disposal. Identify appropriate technology for disposal of PCBs.	Mechanism for disposal established. Procedures for packaging for disposal developed Technology for disposal identified	5 years	EPA, VRA, ECG, International consultants	Training, financial assistance, feasibility studies
itor and assess PCBs in human nmental media	• Develop programme for the monitoring of the entire PCB management processes. • Establish a countrywide programme of monitoring exposure of PCBs in human fluids. • Monitor to ensure that PCB reduction is not causing adverse impacts on the industry. • Monitor the efficacy and safety of PCBs in areas where they continue to be used until their elimination and disposal. • Analysis of food, soil samples and water bodies for presence of PCBs. • Analysis of identified PCB contaminated sites	• Monitoring programmes in place • Analysis programme established • Industry feedback • Monitoring programme in place • Analysis report	15 years	EPA, GAEC, VRA, ECG, MOH/GHS, GSB	Financial assistance, vehicles, equipment, training
ild the capacity ons to handle PCB equipment and	Identify and Prepare programme for institutional strengthening and capacity building. Involve relevant stakeholder in education and training.	Capacity of institutions developed and strengthened.	5 years	EPA, Research Institutions, VRA, ECG, CEPS	Financial assistance, Training, Technical expertise / consultants
se awareness n dangers of uman health nment. 3)	Develop awareness creation strategy on environmental and health impact of PCBs. Development of a website and information exchange networks on PCBs.	Development of awareness creation materials, Functional Website developed	5 years	EPA, ECG, VRA, GES, AGI, MOH/GHS, MOFA, Oil Marketing Companies	Financial assistance, vehicles, Training, Technical expertise / consultants

Annex II. Summary PCB Inventory in transformers for Ghana 2006

PCB Inventory Data

Number of inspection and Tests

Number of transformer inspected	1045
Number of transformer tested by density	1045
Number of transformers Chlorine Test	1045

Distribution of the population sample

Distribution of the population sample per period of age

Period of manufacture	Number	% sur total
Unknown	113	10.81%
< 1972	325	31.10%
1972-1984	197	18.85%
> 1984	410	39.23%

Distribution of the population sample per type of transformer

Type of transformer	No
Distribution	1018
Not applicable	1
Production	1
Transport (Transmission transformer)	24
Unknown	1

PCB Classification results on the population sample

Per transformer units

PCB classification	PCB Test	Total PCB	% on total
Mineral oil	< 50 ppm	889	85,07%
PCB contaminated mineral oil	> 50 ppm	132	12,63%
PCB oil	D > 1	22	2,11%
Unknown	< 50 ppm	2	0,19%

Per quantity in kgs

PCB classification	Total weight	Total weight of dielectric	Total weight of drained transformer
PCB contaminated mineral oil	638 363	144 030	439 740
PCB oil	40 202	10 180	30 020
Unknown	3 290	917	2 373

PCB contamination result per period

< 1972			
PCB classification	PCB Test	Total PCB Test	% on total
Mineral oil	< 50 ppm	268	25,65%
PCB contaminated mineral oil	> 50 ppm	49	4,69%
PCB oil	> 50 ppm	7	0,67%
Unknown	< 50 ppm	1	0,10%
Total no		325	
1972- 1984			
PCB classification	PCB Test	Total PCB Test	% on total
Mineral oil	< 50 ppm	163	15,60%
PCB contaminated mineral oil	> 50 ppm	30	2,87%
PCB oil	> 50 ppm	4	0,38%
Total no		197	
> 1984			
PCB classification	PCB Test	Total PCB Test	% on total
Mineral oil	< 50 ppm	359	34,35%
PCB contaminated mineral oil	> 50 ppm	42	4,02%
PCB oil	> 50 ppm	8	0,77%
Unknown	< 50 ppm	1	0,10%
Total no		410	
UNKNOWN			
PCB classification	PCB Test	Total PCB Test	% on total
Mineral oil	< 50 ppm	99	9,47%
PCB contaminated mineral oil	> 50 ppm	11	1,05%
PCB oil	> 50 ppm	3	0,29%
Total no		113	

PCB classification	Period of manufacture	PCB Test	Total PCB Test	% on total
Mineral oil	< 1972	< 50 ppm	268	25,65%
	> 1984	< 50 ppm	359	34,35%
	1972-1984	< 50 ppm	163	15,60%
	Unknown	< 50 ppm	99	9,47%
PCB contaminated mineral oil	< 1972	> 50 ppm	49	4,69%
	> 1984	> 50 ppm	42	4,02%
	1972-1984	> 50 ppm	30	2,87%
	Unknown	> 50 ppm	11	1,05%
PCB oil	< 1972	> 50 ppm	7	0,67%
	> 1984	> 50 ppm	8	0,77%
	1972-1984	> 50 ppm	4	0,38%
	Unknown	> 50 ppm	3	0,29%
Unknown	< 1972	< 50 ppm	1	0,10%
	> 1984	< 50 ppm	1	0,10%

Comment :

The quantity of PCB contaminated equipment is not decreasing after 1984. This is due probably to cross contamination trough filtration process of mineral oil and topping up with PCB contaminated mineral oil.

Origin of transformers

Pure PCB Oil

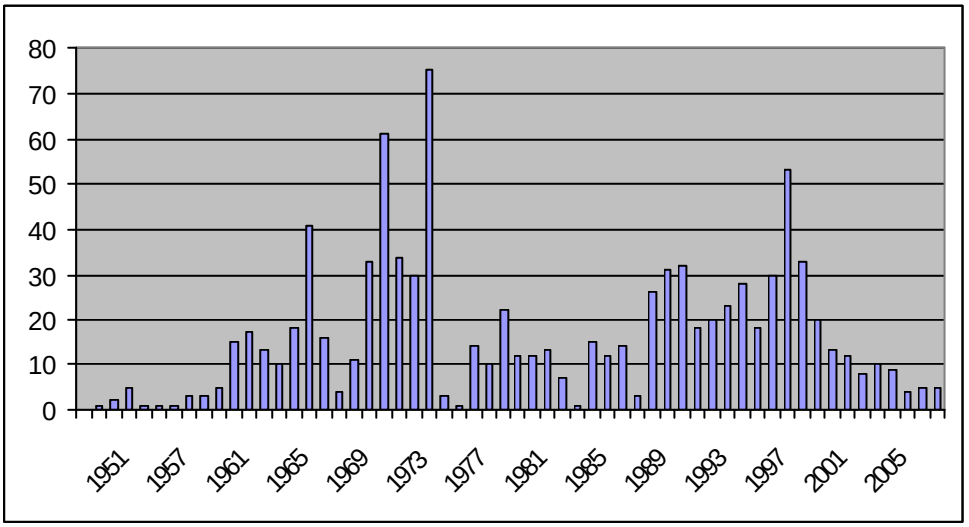
Manufacturer name	Total per manufacturer
SCHORCH	4
SOUTH WALSE ENGLAND	2
ASGEN	1
BONAR LONG	1
COLOMBINI	1
ELECTROME	1
ELETRO MOTOANACA	1
ENERGO INVEST	1
ANSALDO SANGIORGIO	1
NIA	1
Unknown	1
SOUTH WALES	1
STARKSTROM	1
stromberg Ab	1
THOMPSON	1
TRAFO - UNION	1
TRAFO MILANO	1
NANTONG YANBONG	1

PCB contaminated oil transformers by manufacturer

Manufacturer name	Total
SCHORCH	26
SOUTH WALES	24
SOUTH WALSE ENGLAND	7
ENERGO INVEST	6
BONAR LONG	6
BRUSH	5
STARKSTROM	4
COLOMBINI	3
ABB	3
Brush Electricals	3
ANSALDO SANGIORGIO	3
UNELEC	3
CIMMCO	2
NEI MAKERS	2
Unknown	2
LINDLEY THOMSON	2
ASGEN	2
TRAFO MILANO	2
BABCOCK TRANS.	1
BEZ	1
ATELIERS CONSTRUCTION	1
ANSALDO	1
BRYCE	1

Manufacturer name	Total
CANADIAN GENERAL	1
AEG	1
ABB POWER T&D LIMITED _SCOTLAND	1
BBT	1
NIA	1
UNALECK	1
TRAFOMILANO	1
TRAFO - UNION	1
terrazo tile factory	1
stromberg Ab	1
SOUTH WALSE SWITCHES	1
GEC ALSTHOM	1
PAUWELS	1
COSMELEKTRA	1
NEC	1
MEL TRAFO	1
MARELLY	1
ZENNARO	1
GSB	1
DOMINIT	1
DENIS FERRANT LTD	1
PAUWELS TRAFO	1

Data on population sample age



PCB per transformer power capacity

PCB contaminated mineral transformer

Power Kva	Kva
500	36
300	19
315	18
750	14
800	8
200	7
100	5
50	3
1000	3
250	2
10000	2
10	1
13	1
150	1
295	1
385	1
1600	1
2500	1
6300	1
15000	1
33000	1

The most important part of PCB contaminated mineral transformer are distribution transformer (from 100 to 800 KVA)

Pure PCBs

Power Kva	No
300	4
500	4
200	3
50	2
100	2
400	2
750	2
315	1
3500	1

Most pure PCB oil filed transformer are distribution transformers (from 100 to 800 KVA)

Statistical extrapolation of the inventory result on the whole transformer population

Considering that the assumed total quantities of transformers in Ghana is 12 000 units, the expected population of transformers contaminated by PCB (> 50 ppm) could be evaluated as following:

	1045 population sample			Extrapolation on 12000 units		
PCB classification	Total weight	Total weight of dielectric	Total weight of drained transformer	Total weight	Total weight of dielectric	Total weight of drained transformer
PCB contaminated mineral oil	638 363	144 030	439 740	7 330 484	1 653 933	5 049 646
Pure PCB oil	40 202	10 180	30 020	461 650	116 900	344 727

PCB contamination	1045 population sample			Extrapolation on 12000 units
PCB classification	PCB Test	Total	% on total	PCB Test
Mineral oil	< 50 ppm	889	85,07%	**10 209**
PCB contaminated mineral oil	> 50 ppm	132	12,63%	**1 516**
PCB oil	D > 1	22	2,11%	**253**
Unknown	< 50 ppm	2	0,19%	**23**

Annex 1: Criteria for sampling and site inspections

Number of transformers to be inspected and tested	1000 units
Priorities for site inspection	Over aged transformers
Weight ratio	> 30 % (if available)
Type of cooling	PCB (if available)
Distribution of the equipment population sample	
Inventory and site inspection	PCB task team (pilot inventory)
Sampling	Local technician in presence of member of the task team
Analysis	PCB task team: 1 for each region (EPA supervision)
Database	EPA

Determination of the number of equipments containing insulating oil to be inspected and tested

Designation	Percentage	No of units	< 1972		1972 – 1985		> 1985	
Distribution per manufacturing year			60%		30%		10%	
Power generation equipments	1 %	10	6		3		1	
Transmission equipments	2 %	20	12		6		2	
Distribution equipments	97 %	970	582		290		97	
	Distribution per status		Out of use	In use	Out of use	In use	Out of use	In use
			20%	80%	20%	80%	20%	80%
			116	466	58	232	19	78

Per region	Greater Accra		Ashanti Brong Ahafo		Western Central		Northern Upper East Upper West		Volta Eastern	
	Out of use	In use	Out of use	In use	Out of use	In use	Out of use	In use	Out of use	In use
	40 %		18 %		15 %		10 %		17 %	
Distribution	77	310	35	140	29	116	19	78	33	133
Power generation	O		0		0	2	0		0	8
Transmission	0	5	0	5	0	5	0	2	0	3
TOTAL	77	315	35	145	29	123	19	80	33	144

Annex III. Detailed project budget.

Outcomes	Outputs	Activities	Sub-activities identified	Input	Quantity	Total	GEF	Co-fi
Outcome 1:Strengthening of the legal framework, administrative and technical		Technical backstopping	Technical advice ensuring require - ments coordinated between legislation, government control and PCB holder action	National expert	24 m	58,000	x	
preparedness for sound PCB management.	**1.1.Review, deve- lop and adopt le- gislation and policies**	PCB Regulation including:Identification, labelling and inspection	Refine the scope and structure of legislation	National expert	5 m	12,500	x	
		-Control of PCB at the import and export points	Drafting of legislation	Int expert	2 m	24,000		x
		- Licensing of PCB rela- ted activities, handling, transport, storage		Legal expert	3 m	9,000	x	
		-Control of used mineral oil and metallic scraps, recycling	Seek input and consensus on the legislation	Ministerial experts	8 m	20,000		x
		- Requirement for holders to develop a PCB management Plan including control and tracking of PCB in use until the end of life.	Workshops			10,000	x	

Outcomes	Outputs	Activities	Sub-activities identified	Input	Quantity	Total	GEF	Co-fi
				Travel and subsistence		10,000		x
		Development of technical guidance implementing PCB regulative framework	Design and draft guidance and training materials for implementing PCB regulation.	National expert	4 x4 m	32,000	x	
				Int. expert	3m	35,000		x
				Inter- minis terial input	4 m	10,000		x
				Travel and subsistence		10,000		x
		Develop PCB environ-mental and food quality guidelines	Refine the scope and structure of legislation	National expert	2 m	5,000	x	
			Drafting of legislation	Legal expert	2 m	8,000	x	
			Seek input and con-sensus on the legislation	Ministerial experts	6 m	15,000		x
	1.2. Capacity building for sound PCB mana-gement in the public sector	Presentation of the adopted PCB legislation and practical consequences of implementation	Workshops			10,000	*x*	
			Preparation of workshops	National expert	3m	8,000	*x*	
			Inter-ministerial input	Ministerial experts	6m	15,000		*X*
		Capacity building of	Workshops			10,000	*x*	

Outcomes	Outputs	Activities	Sub-activities identified	Input	Quantity	Total	GEF	Co-fi
		Customs for targeted identification and procedures at Customs entry points. (NB. Tools. ie. Quick tests etc. to be provided from output 1.4)	Preparation of workshops and development of customs procedures	National expert	3m	8,000	*x*	
			Training of customs		6m	10,000		*x*
	1.3. Capacity Building for sound PCB management	Support to PCB holders in the development of PCB management plans and their implementation	Develop training material	National expert	2 m	5,000	x	
	(PCB holders) through a series of topic-specific training workshops for targeted groups			INt. expert	0.5 m	6,000		x
			Conduct workshops			5,000	x	
			Make company visits supporting the development and implementation	National expert	2 m	5,000	x	
				Int. expert	0.5 m	6,000		x
		Training of personnel in the safe handling of PCBs and PCB-	Develop training material	National expert	2 m	5,000	x	
				INt. expert	0.5 m	6,000		x

Outcomes	Outputs	Activities	Sub-activities identified	Input	Quantity	Total	GEF	Co-fi
		containing equipment, including for their temporary storage and transportation.	Conduct workshops			5,000	x	
			Make company visits supporting the development and implementation	National expert	2 m	5,000	x	
				Int. expert	0.5 m	6,000		x
		Technical support for development of phase-out and disposal management plans.	Develop training material	National expert	2 m	5,000	x	
				INt. expert	0.5 m	6,000		x
			Conduct workshops			5,000	x	
			Make company visits supporting the development and implementation	National expert	2 m	5,000	x	
				Int. expert	0.5 m	6,000		x
		Ensure identification and procedures for avoiding PCB handling at scrap metal recycling operations.	Develop training material	National expert	2 m	5,000	x	
				INt. expert	0.5 m	6,000		x
			Conduct workshops			5,000	x	
			Make company visits supporting the development and implementation	National expert	2 m	5,000	x	
				Int. expert	0.5 m	6,000		x
				Travel ans subsistence		14,000		x

Outcomes	Outputs	Activities	Sub-activities identified	Input	Quantity	Total	GEF	Co-fi
	1.4. Update and further refine the existing PCB inventory to increase its comprehen-siveness.	Field data collection and labelling	Inventory planning and coordination, inventory compilation	Inventory coordinator	12m	24,000	x	
			Planning and training regional officials	workshops		20,000	x	
			Data-base development	Sub-contract		20,000	x	
			Data-input			10,000		x
			Regional data collection	Regional teams	2x10x 6 m	120,000		x
			PCB holders input in identification			100,000		x
			PPE, vials, labels etc	Sampling and labeling disposables	10x	30,000	x	
			Semi-field PCB identification equipment	PCB electrodes	2 x	10,000	x	
			Field identification equipment	Quick tests	3,000	25,000	x	
				Team transportation		70,000		x
				Team trans-portation and subsistence	10x 7,000	70,000	x	

Outcomes	Outputs	Activities	Sub-activities identified	Input	Quantity	Total	GEF	Co-fi
		Laboratory verification and quantification. Tuning in X-ray fluorescence equipment at Ghana Atomic Energy Commission	Assessment of equipment and methods and training	Int.expert	1.5 m	14,000	x	
			Upgrading	Equipment and disposables		20,000	x	
				Travel		10,000	x	
			PCB quantification analysis			30,000	x	
	1.5. Develop and implement administrative system for PCB-related enforcement and inspection activities after inventory compilation.	1. Inspection	Develop equipment reporting require-ments and procedures	National expert	8 mon	20,000	x	
		2. tracking of PCBs and PCB-containing equipment	Training workshops for PCB holders and industrial inspectors, customs officials	Int expert	0.5	6,000	x	
				National expert	2 months	4,000	x	
				Int. expert	0.5	6,000	x	
				Travel int. and inland		7,000	x	
				Workshops		20,000	x	
			Inspections	200 visits		20,000		x
			Reporting PCB move-ments by holders	100		50,000		x
			Updating of PCB inventory	100		10,000		x
				Subtotal 1:			**1,157,500**	

Outcomes	Outputs	Activities	Sub-activities identified	Input	Quantity	Total	GEF	Co-fi
Outcome 2: Infrastructure for Environ-mentally Sound Management of PCBs Deve-loped and in Place	**2.1.Identify, construct or upgrade of a secure, temporary storage facility(ies)**	1. Provincial collection points	Identification of suitable locations for provincial temp storage.	Local expert (company)	1 m x 3	6,000		x
			Assessment of suitability needs for upgrade	Local expert	1m x 3	8,000	x	
				Int.Expert	1m	14,000	x	
				travel		5,000	x	
			Upgrade provincial storage	Local expert	1mx3	6,000	x	
				Infrastructure and operation	20,000 x 3	60,000	x	
				Draining equip-ment, drums etc material	10000 x 3	30,000	x	
				Safety material	5,000 x 3	15,000	x	
				Personnel	3x6 mx4y	72,000	x	
				Company personnel		61,600		x
		2. Central storage site in Accra/ Tema area	2.1. Identification of suitable site	Local expert	2 month	6,000	x	
			2.2. storage site plan-ning, EIA, permitting	Local experts	8 months	25,000	x	
				Int. expert	2 month	28,000	x	
				Travel		5,000	X	
			2.3. Land purchase	Procurement		100,000		x

Outcomes	Outputs	Activities	Sub-activities identified	Input	Quantity	Total	GEF	Co-fi
			2.4 Blue-prints, Cons-truction (65 x 15 m)			400,000		x
			2.5. Equipment (incl.forklift pumping)			50,000	X	
			2.6. Safety and PPE			30,000	X	
			2.7. Operation during project	Personnel	4 years x2 people x12 months	100,000	X	
				Personnel co-financed	4 years x3 people x12 months	150,000		x
			2.8. Site Environmental and health monitoring system	Development of and imple-mentation of monitoring		50,000	x	
	2.2 Upgrading of transportation infrastructure for PCB-containing equipment and fluids	Ensuring appropriateness of road vehicles used for PCB transport	Assessment of current practices and vehicles	Company expert	4m	14,000		X
				National expert	3m	8,000	x	
			Up-grading of equipment and amelioration of skills	National expert	3m	8,000	x	
				National expert	3m	8,000	x	
				Workshops		8,000	x	
				Upgrading	5 vehicles	30,000		x
				Subtotal 2:			**1,297,600**	

Outcomes	Outputs	Activities	Sub-activities identified	Input	Quantity	Total	GEF	Co-fi
Outcome 3:Disposal of PCBs	**3. 1. Develop-ment of five year phase-out plans**			National expert	5 months	15,000	X	
				Int. expert	1 months	12,000	X	
					Travel	5,000	X	
				PCB holder experts	24 months	50,000		X
	3.2. Replacement of pure PCB oil containing	Procurement of replacement equipment		Personnel at PCB holders	24 months	50,000		X
	equipment and associated waste (Calculated for 80 pieces of and 160		Tendering and pro-curement of replacement equipment	Procurement		450,000		x
	tons of equip-ment containing 40 tons of pure PCBs)		Installation of new equipment	Personnel at PCB holders or maintenance companies	48 months	90,400		X
			Technical support and company backstop-ping and logistics support	National expert	24 months	48,000	X	
			Training in safe trans-former decommis-sioning, draining and minor spill clean-up	International expert	2m	28,000	X	
				workshops and hands-on training		12,000	X	
				travel		7,000	X	

Outcomes	Outputs	Activities	Sub-activities identified	Input	Quantity	Total	GEF	Co-fi
		Decommissioning and in-country transport to temp. storage.	Decommissioning 60 pieces	Technical expert PCB holder	60 x 200	30,000		x
			Draining at site, drums, pumps spill prevention and containemnt, PPE etc.	Material PPE	60x 200	12,000	X	
			In-land transportation from provincial to central storage.	Subcontract transport company or PCB holder	60 x US$ 500	30,000	X	
		Final disposal tendering and packaging + maritime stowing	Tender preparation and evaluation	National Expert	4 months	10,000	X	
				Int. Expert	1 months	14,000	X	
				Nat. evaluation	3 months	6,000		X
				Travel		6,000	X	
			Stowing as per IMO rules	Subcontract, material etc. with temporary storage	160 tons x 200	32,000	X	
		International transportation and final disposal	Transportation	Sub-contract	160 tons x 500	80,000	X	
				Scrap-metal cost	160 x 932	149,120		x
			Disposal	Sub-contract	160 tons x 1,700	272,000	X	
				Subtotal			**1,408,520**	

Outcomes	Outputs	Activities	Sub-activities identified	Input	Quantity	Total	GEF	Co-fi
	3.3.Decommissio-ning, Washing and Disposal of phased- out PCB contaminated mineral oil and equipment in country.	Setting up and and supervision of washing and dismantling at central storage site.	Local contracting, procurement, deve-lopment of economic incentives for ensu-ring financial sustain-nability (waste flow), supervision of washing.	National expert	8 months	20,000	x	
	(35 per year=170 transformers totaling in 450 tons of equipment and 120 tons of oil)		Planning of washing operations. Blue prints. Tendering of necessary hardware. Supervision of set-ting-up of dismantling and washing. During a trial period	Int. Experts	4 months	50,000	x	
				Travel		14,000	x	
			Replacement transformers	Procurement		500,000		x
			Decommissioning, draining 150 pieces and made ready for transport	Technical expert PCB holder	150 x 200	27,500		x
				PCB holder in-kind transport-tation support		35,000		
		In-country transport to temp. storage.		Subcontract transport company	100 x US$ 450	45,000	x	

Outcomes	Outputs	Activities	Sub-activities identified	Input	Quantity	Total	GEF	Co-fi
		Draining, dismantling and washing of transformers	Washing operation, infrastructure and staff cost under central storage	Washing tanks, pumps drums PPE, expendables,		120,000	x	
				Solvent, Spares etc.		50,000	x	
			Disassembling/cutting	Hydraulic tractor mounted or handheld		30,000	x	
			Supervision	National Expert	24 months	50,000	x	
			Washing operations environmental and health monitoring			50,000	x	
			Cost-recovery from metal scrap and oil of equipment for final disposal	Scrap-metal income	330x 932$	307,560		x
		Final disposal tendering and packaging + maritime stowing	Tender preparation and evaluation	Int. Expert	1 months	14,000	x	
					Travel	5,000	x	
				Nat. evaluation	3 months	6,000		X
			Transportation packing as per IMGC	Subcontract, material temporary storage	100 tons x 300	30,000	x	
		Transportation and final disposal	International transport	Sub-contract	120 tons x 500	60,000	x	
			Disposal	Sub-contract	120 tons x 1,700	204,000	x	
				Sub-total 3.3:			1,618,060	
				Sub-total 3:			**3,026,580**	

Outcomes	Outputs	Activities	Sub-activities identified	Input	Quantity	Total	GEF	Co-fi
Outcome 4: Monitoring Learning	Project inception	Inception workshop	Approval workplan Clarification of roles and responsibilities	Workshop		15,000		X
Adaptive Feedback and Evalaution	Development and implementation of Project Monitoring and evaluation tools and systems	Develop M&E system	Monitoring scheme based on project outcomes and output Monitoring scheme based on measured risk reduction	National expert	3 m	8,000	X	
			Validation of M&E system	Int. Expert	1m	14,000		x
				Measurements, analysis		20,000	x	
				Travel		5,000	x	
			Setting-up baseline	Workshop		5,000	X	
		Implementation of M&E system	Up-date against baseline	National exp. input	5m	10,000		x
				Measurements, analysis		20,000	x	
			Compiling project results, M&E update, and technical information as well as lessons learned.	National exp.	24 m	72,000	x	
		Project mid-term workshop	Revision of workplans and inputs	National exp	4m	10,000	x	
				workshop		10,000		x

Outcomes	Outputs	Activities	Sub-activities identified	Input	Quantity	Total	GEF	Co-fi
	External Evaluation	Mid-term evaluation		National expert	2m	8,000	x	
				Int. Exp	1 m	14,000	x	
				Travel+subs		5,000	x	
		Final evaluation		National expert	3m	10,000	x	
				Gov.expert	2m	6,000		x
				Int. Exp	1.5 m	18,000	x	
		Final project workshop		Travel+subs		10,000	x	
				Gov.expert	2m	6,000		x
				Workshop		15,000		x
					Sub-total		**281,000**	
				Gov. Inkind	22,000			
				GEF	200,000			
				UNITAR	59,000			

Outcomes	Outputs	Activities	Sub-activities identified	Input	Quantity	Total	GEF	Co-fi
Outcome 5:	Personnel		Government oversight	National Pro-ject Director	30 months	75,000		X
Project management			Project Steering committee and other government expert input	Ministerial experts	15 months a year x 5	150,000		x
			Government administrative input	Gov. adminsitrative support	10 months	15,000		x
			Gov. Expert input		20 months	66,000		x
			Administrative assistant		60 months	50,000	x	
			PCB holder reporting and project steeri ng input			50,000		
			International Consultant		4 months	50,000		x
	Infrastructure and supplies		Office premises		60 months	60,000		X
	Financial control		Audit		5 times	20,000		
				Subtotal			536,000	
				Grand total	**6,298,680**			

Outcomes	Outputs	Activities	Sub-activities identified	Input	Quantity	Total	GEF	Co-fi
		Co-financing	Gov in-kind (in red)	700,000		700,000		
			Company soft (in blue)	714,500		**714,500**		
			Company hardware (in green)	1,906,680		**1,906,680**		
			Committed	1,450,000				
			Scrap estimate	456,680				
			UNITAR+SAICM QSP	250,000		**250,000**		
			Total Co-finance	3,571,180		**3,571,180**		
			Co-finance without scrap	3,114,500				
			GEF	2,727,500		2,727,500		
			UNITAR AOS 8%	218,200				
			GEF total	2,945,700				
				6,516,880		6,516,880		