89839

LEBANESE REPUBLIC

Ministry of Environment

Draft REPORT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA)

Executive Summary

PCB Management Project

June 2014

AUTHORS

This report has been prepared by Mr. Khalil Zein for the Ministry of Environment (MoE), with all responsible skill, care and due diligence within the terms of reference, taking into account the resources devoted to it by agreement with the project owner [MoE & Electricité du Liban (EDL)]. A group of key experts assisted Mr. Zein to execute some of the sub-tasks that are mainly related to the social development (Mr. Haytham Mokahhal) and treatment technologies (Mrs. Amin Dagher).

Mr. Zein is a Senior Environmental Geologist with over 18 years of experience involved in related projects such as; Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA) preparations, economical feasibilities, environmental public services, site development, supervision, remediation and decontamination works.

ACKNOWLEDGEMENTS

This Report would not have been possible without the essential and gracious support of many individuals:

- The administrative support and interest of the staff at the Ministry of Environment for their assistance throughout the period of the ESIA study preparation;
- Administrative support and technical information of the EDL assigned team;
- The technical support of the World Bank concerned staff; and
- The help and assistance of the Institutional Support of the Ministry of Environment Unit-United Nations Development Programme (UNDP).

EXECUTIVE SUMMARY

A. Context

Polychlorinated biphenyls known as PCBs are mostly used as coolants and insulating fluids for transformers and capacitors. However, PCBs are chemical substances that persist in the environment, bio-accumulate through the food web and pose a risk of causing adverse effects to the human health and environment. Due to their environmental toxicity and their classification as a persistent organic pollutant (POP), the PCBs production and uses were restricted and eliminated in many countries by the *Stockholm Convention* on Persistent Organic Pollutants in 2001.

In Lebanon, PCBs are mainly found in the electric power sector. Prior to the mid-1990, they were widely used in power transformers, capacitors at various levels of the power plants, substations and the distribution network. Most of this equipment is considered property of Electricité du Liban (EDL), the state-owned power utility, while only few are owned by some smaller distribution facilities and by power consumers, such as industries and hospital.

Considering the wide distribution of PCB-containing equipment all over the Lebanese territory and the lack of well-defined strategies for adequate relative management, a rapid inventory was conducted to assess the PCB contamination situation. Further investigation was performed to evaluate high-risk PCB contaminated sites within several stations. Subsequently, findings of the inventory placed the problem of diffuse PCB contamination in Lebanon on the top of concerned stakeholders' agenda.

The Ministry of Environment in collaboration with EDL requested an *Environmental and Social Impact Assessment* (ESIA) study as the proposed project is classified as Category "A" under the World Bank's operational policy (OP) 4.01. The ESIA aims at eliminating potential environmental and public health problems emanating from the project. The project covers several public sector sites and may involve some of the private sectors sites.

The main objective of the proposed project is to dispose of high risk PCBs in the power sector in an environmentally sound manner. In so doing, the project involves the handling, packaging, transporting and disposal of PCB equipment and wastes. The limited number of high-content PCB equipment in Lebanon does not justify the establishment of a permanent local disposal facility. Therefore, they will be exported to licensed facilities abroad in accordance with the requirements of the Basel Convention.

B. ESIA Structure

The ESIA is divided into the following sections:

1. ***Introduction:*** This section includes an overview of the current situation in the country in terms of PCB contamination. It highlights the importance of the project implementation to alleviate the impacts of years of neglect of PCBs management.
2. ***Administrative and legal framework:*** This section provides a review of relevant national

legal instruments as well as legislation and regulations, and policy documents, which are applicable to (or have implications for) the management of POPs/PCB in the Republic of Lebanon.

3. ***Public participation:*** This section focuses on public consultation activities conducted, under the scope of the project.
4. ***Description of the project components:*** This section describes the different activities to be undertaken under the proposed project.
5. ***Baseline environmental conditions:*** This section describes the current status of the different environmental media (such as air, water, soil, biodiversity, etc…) that might be affected by the project activities as well as available infrastructure (such as solid and liquid waste management, roads' network, etc…).
6. ***Impacts evaluation:*** This section focuses on the adverse impacts generated depending on the particular activities conducted. This section highlights the need to focus on reducing the impacts of soil and water contamination in the event of accidental spills as well as health deterioration as result of occupational exposure.
7. ***Analysis of alternatives:*** This section lists and evaluates the different alternatives available as a substitute of the proposed project.
8. ***Environmental and social management plan:*** This section proposes different protocols to be adopted during the project implementation to avoid and mitigate impacts identified in the impacts evaluation section. It also includes monitoring plans necessary to evaluate environmental quality throughout the process.
9. ***Conclusion:*** This section consists of a summary of the findings of the report. It also includes recommendations for further improvements in the project.

C. Administrative and Legal Framework

The administrative and legal framework chapter of the ESIA provides a review of relevant national legal instruments as well as legislation and regulations, and policy documents, which are applicable to (or have implications for) the management of POPs/PCB in the Republic of Lebanon. The main purpose of the legal chapter is to provide a comprehensive but succinct review of all planning, development, environmental, building and monitoring legislation that is of particular relevance with regard to the Project. A brief description of some of Lebanon's international agreements is also discussed, and the shortcomings in implementation of the legal framework.

D. Project Description

Component 1. Inventory of PCB contaminated transformers (US$0.79 million). This component will support a countrywide inventory of PCB contaminated transformers in the power sector in Lebanon. The inventory will focus on the entire stock of transformers in Bauchrieh (about 2,000) and in the EDL's distribution network (about 19,000). Conducting the inventory of PCB contaminated transformers is based on four steps: (i) desk review of EDL database to identify the number of transformers potentially contaminated; (ii) sampling, which involves taking a 50 ml sample of oil from each transformer; (iii) on-site testing of PCB, which identifies

the PCB-free transformers by testing the samples through a rapid method (Clor-N-Oil technique); and (iv) lab testing of PCB, which identifies the PCB contaminated transformers and their contamination level by testing the samples through an accurate laboratory method (Gas Chromatography analysis, GC). The inventory will provide a clear picture on the extent of PCB contamination in the power sector across country. In particular, it will identify the PCB contaminated transformers and will label their contamination level in each of the sites.

Component 2. Disposal of high-content PCB equipment and contaminated oil (US$1.10 million). This component will support the disposal of high content PCB equipment owned by the EDL and potentially by the private sector, and of the PCB contaminated oil from Bauchrieh.

(i) Disposal of out-of-service high content PCB equipment (US$0.21 million): EDL's out-of-service equipment includes 12 Askarel transformers and 489 capacitors, with a total weight of 44 tons . Removing this equipment will also require to dispose of 10 tons of contaminated soil and concrete from PCB leakages, particularly from Zouk. Thus, this component will finance the disposal of about 44 tons of high-content PCB equipment and 10 tons of contaminated soil and concrete. The limited number of high-content PCB equipment in Lebanon does not justify the establishment of a permanent local disposal facility; the most cost-effective solution is exporting them to licensed facilities abroad in accordance with the requirements of the Basel Convention. This operation will be the responsibility of a contractor selected based on international tendering procedure. The contractor will provide all required packaging materials and will perform drainage of transformers, collection of empty transformers, liquid, and capacitors, packaging, transport and destruction abroad.

(ii) Disposal of in-service high content PCB equipment and contaminated oil (US$0.89 million):
- In-service high content PCB equipment in Jieh includes 17 Askarel transformers and 6 capacitors, with a total weight of 147 tons. All in-service Askarel transformers are located in Jieh power plant. The Jieh plant includes 5 old units (with 5 in-service transformers) and 2 new units (with 12 in-service transformers). This component will finance the disposal of all in service Askarel transformers and capacitors in Jieh. As part of the project co financing, EDL will be responsible for purchasing and replacing these transformers to allow continuity of electricity generation.
-Capacitors in the private sector. The rapid inventory (COWI, 2011) also identified three private companies that held PCB containing capacitors with a total weight of about 5 tons. MOE will contact these companies and check their willingness to dispose of these capacitors through the proposed project.
-Contaminated oil in Bauchrieh. As mentioned previously EDL's repair and storage site in Bauchrieh contains about 2,000 transformers; a large percentage of them being contaminated. The inventory undertaken under Component 1 will identify all contaminated transformers. The proposed project will finance the drainage, packaging and disposal aboard of the contaminated oil. It is estimated that about 100 tons of contaminated oil will be disposed of from Bauchrieh.
The most cost-effective way of disposing in-service equipment and contaminated oil is export to licensed facilities abroad in accordance with the requirements of the Basel Convention. The responsibility of this work will be with a contractor selected based on international tendering procedure. The contractor will provide all required packaging materials and will perform drainage, dismantling and removal of all in-service Askarel transformers, collection of

transformer carcasses, liquid, and capacitors, package, transport and destruction abroad

Component 3. Capacity building and project management (US$0.65 million): This component will support: (i) establishment of a Project Management Unit (PMU) within MOE; (ii) monitoring of indicators and reporting on project performance; (iii) training and capacity building of MOE, EDL and other stakeholders (e.g. customs administration, on site workers technicians etc.) on sustainable management of PCB equipment and storage sites.

The project activities are to be located in the following three main locations, which are found in the outskirts of Greater Beirut in Industrial or commercial zone:

1. **Baouchriyeh** Electricity Company: Mten Caza, Mount Lebanon Mohafazah.
2. **Zouk Power Station,** Zouk Mkayel Cadastral Area, Kesrouane Caza, Mount Lebanon Mohafazah
3. **Jiyeh Power Station**: Jiyeh Cadastral Area, Chouf Caza, Mount Lebanon Mohafazah

E. Public Participation

Particular attention was given to timely disclosure of relevant documents to stakeholders (in a form that they can understand). Therefore the ESIA (with an executive summary in Arabic) has been disclosed on the MOE's website in March 2014. Attention was also given to consultation with stakeholders on the scope of the impact assessment and on the content of the draft final ESIA and ESMP, and to ensuring timely delivery of the outputs of the assessment. Consultation meetings were held on November 29, 2012 and May 23, 2013. The following parties were invited:

- Ministry of Environment;
- EDL;
- Ministry of Public Health;
- Universities;
- Private sector (ECODIT Company);
- Environmental unions and societies (some includes more than 20 societies)
- Municipalities and local authorities;
- relevant communities

During the consultations, some of the attendees had concerns on the available guarantees that the work will be conducted in an environmental safe manner and especially on the part of external disposal. This will be addressed through contracting international technical consultants who will be responsible for managing the disposal in line with international good practices and contractual arrangements. The need to strengthen the safety procedures during the project operation by indicating the best practices during testing and handling of the contaminated materials was further emphasized.

F. Analysis of Disposal Options

Criteria	Disposal abroad	Buy dechlorination facility, without Fuller Earth	Buy dechlorination facility, with Fuller Earth	Rent dechlorination facility, without Fuller Earth	Rent dechlorination facility, with Fuller Earth	Co-incineration in cement plants
Relative Financial Costs	Medium	High	Medium	Medium	Medium	Not Estimated
Technical Capacity	Sufficient	Insufficient	Insufficient	Sufficient	Sufficient	Sufficient
Human Capacities	Sufficient	Insufficient	Insufficient	Sufficient	Sufficient	Insufficient
Time needed	Medium	Long	Long	Medium	Medium	Long
Social Risks	**Low**	**Low**	**Low**	**Low**	**Low**	**High**
Env. Risks	**Low**	**Medium**	**Medium**	**Medium**	**Medium**	**High**
Probability of implementation Success	**High**	Low	Low	Medium	Medium	Low
Conclusion	**Most Preferable**	**Not preferable**	**Not preferable**	**Not preferable**	**Not preferable**	**Not preferable**
Reasons	This option provides a radical solution to PCBs problem at reasonable cost, with low- to-medium environmental and low social risks	Lack of local technological and human capacities. Low-to-medium environmental and low social risks	Lack of local technological and human capacities. Low-to-medium environmental and low social risks	Need for relative large interim storage capacity Low-to-medium environmental and low social risks	Need for relative large interim storage capacity low-to- medium environmental and low social risks	Lack local human capacities. No business interest from local cement companies. Very high social and high environmental

G. Environmental Impacts

The environmental impact analysis showed that environmental impacts will occur mostly during the operation phases of the project particularly with respect to water quality, air quality, dust and noise emissions, visual intrusion, waste generation, safety concerns, and socio- economic impacts. The table below summarizes the potential environmental impacts that are associated with the operational period.

Impact	Presence of PCB containing materials	Testing equipment	Handling oils, materials and waste (packaging, labelling)	Temporary storage	Transportation	Final disposal of PCB containing equipment, oil and waste (Abroad)	Sites Remediation
Water and aquatic resources							
Ground water contamination	X*	X**	X	X	X	X	X
Surface water contamination	X	X	X	X	X	X	X
Soil and waste							
Soil contamination	X	X	X	X	X	X	X
Waste production	X		X	X			X
Climate, air and noise							
Air emissions of POPs	X			X			X
Dust formation				X	X	X	X
Noise production					X	X	X
Ecosystems							
Loss of ecol. valuable areas					X	X	
Ecotoxicity to terrestrial life	X		X				

Impact	Presence of PCB containing materials	Testing equipment	Handling oils, materials and waste (packaging, labelling)	Temporary storage	Transportation	Final disposal of PCB containing equipment, oil and waste (Abroad)	Sites Remediation
Ecotoxicity to aquatic life	X		X				
Man and his social economic living environment							
Direct health risks (direct exposure)	X	X	X	X	X	X	X
Indirect health risk	X			X	X	X	X
Nuisance (dust, noise)					X	X	X
Social effects (employment)			X	X	X		X
*Potential environmental impact **Potential environmental impact not likely to occur.							

H. Environment Management Plan

In order to ensure the proper integration of the project to the existing environment, an Environmental and Social Management Plan (ESMP) was developed. The ESMP will ensure as a minimum that potential negative impacts are mitigated, effluent quality is monitored, the appropriate staff are trained efficiently, precise record keeping is maintained in an orderly fashion and that effective contingency measures are prepared for. Mitigation measures to reduce the likelihood and magnitude of negative impacts that may be directly associated with the construction, operation and post-operation of the proposed project are summarized below.

Environmental Management Plan - Mitigation Measures and Monitoring

Project components	Activity	Potential Adverse Impacts	Mitigation Measures	Capacity Development and Training	Monitoring of Mitigation Measures and Procedures	Institutional Responsibility Mitigation / Monitoring
Component 1: PCB inventory	Sampling of transformer oil	Spill from transformers by sampling	Measures for reducing spill, and use of adequate procedures for spill response (e.g. use of metal tray and inert absorbent)	Training of inventory teams on sampling procedures and on spill response	Reporting on any major spill by sampling and the applied spill response.	Consultant responsible for inventory, EDL, & PMU
		Accidental electrical shock	Samples of in-service transformers taken by trained electricians		No monitoring envisaged	Consultant responsible for inventory, EDL
	Disposal of waste from sampling	Releases of PCB to the environment from PCB-containing waste from sampling disposed of inadequately	Careful separation of PCB-contaminated waste from other waste. Implementation of procedures for collection of PCB- containing waste (including absorbent) and interim storage of the waste	Training of inventory teams in sampling procedures and waste management	No monitoring envisaged	Consultant responsible for inventory, EDL
Component 2: **2.1** Dismantling and packing of Askarel transformers and PCB capacitors	All physical activities	Occupational exposure of workers to PCB Accidents where workers are being crushed underneath the transformers Accidental electrical shock	Control the health status of workers; Use adequate personal protection equipment; Use adequate procedures for reducing spills and accidents; Ensure all equipment is inspected by trained electricians before being handled.	Training of workers on PCB health risks and use of personnel protection equipment Training of workers in handling of transformers and capacitors	Contractor's immediate reporting on any incidents	Contractor, MOE-PMU
	Draining and packing of transformers	Spill of PCB to the ground with subsequent releases to the atmosphere	Use of spill trays and inert absorbent	Training workers on the safe draining of equipment	Contractor's reporting on any spill and the applied spill response PMU monitoring report	Contractor, MOE-PMU
	Storage of oil and transformers before shipment	Leakages of PCB from the containers Accidental fire with formation of PCDD/PCDF	Store the equipment and oil in UN certified transport containers; Store drained transformers in metal trays within the container; Keep stored equipment away from combustible material;	Training of workers on dry agents extinguishers and their use	Contractor's immediate reporting on any incidents PMU monitoring report	Contractor, MOE-PMU

			Emergency plan with procedures for notification of authorities; Dry agent extinguishers available in quantities sufficient to control a large fire until the arrival of the fire service.			
	Dismantling and packaging capacitors	Leakages of PCB from damaged capacitors	Avoid breakage of ceramic bushings on the capacitors; Pack capacitors in IBC with sufficient inert absorption material to absorb any leakages; Use plastic bags to prevent further leakages when leaking or damaged capacitors are moved to the IBC; Remove any visible leakages on the ground beneath the capacitors together with the capacitors; Mark the area beneath leaking capacitors for any follow-up activities.		Contractor's immediate reporting on any incidents PMU monitoring report	Contractor, MOE-PMU
2.1 Shipment and destruction of <u>Askarel</u> transformers and <u>PCB capacitors</u>	All transport activities	Releases of PCBs from leaking containers	Transport of equipment and oil in UN certified transport containers; Inspection of containers prior to loading; Store drained transformers in metal trays within the container; Use inert absorption material Emergency plan including procedures for notification of authorities.	Training of drivers in safety and emergency plans. (Possibly) a mock accident drill.	Contractor's immediate reporting on any incidents PMU monitoring report	Contractor
	Road transport	Releases of PCB from crushed containers in case of traffic accidents – exposure of the general population in the area	Trucks shall be led by internal security forces to provide free road access and uninterrupted routing; Transport during day time outside rush hours; All trucks shall be checked for proper operation and for safety (brakes, tires, extinguishers) prior to driving.		Contractor's immediate reporting on any incidents PMU monitoring report	Contractor, MOE-PMU
		Formation of PCDDs/PCDFs in case of fire by traffic	Trucks shall be escorted by a firefighter vehicle with equipment for dry agent fire		Contractor's immediate reporting on any incidents	Contractor, MOE-PMU

		accidents	fighting Dry agent extinguishers available in quantities sufficient to control a large fire until the arrival of the fire service Follow the ADR/RID rules		PMU monitoring report	
	Sea transport of equipment	Significant releases of PCB from crushed containers – exposure of the crew; Formation of dioxins and furans in case of fire	Ship shall hold all necessary permits and comply with all requirements according to the IMDG code		Contractor's immediate reporting on any incidents PMU monitoring report	Contractor / Shipment company
	Dismantling and cleaning of transformers (activities undertaken abroad)	Occupational exposure of workers to PCB; Accidents where workers are injured by the transformers; Releases of PCB from the dismantling and cleaning of transformers and from waste; Formation of PCDDs/PCDFs in case of accidental fire in dismantling facility	The contractor should hold the necessary permits for the operations and follow the national occupational health regulation	All activities to be done by the Contractor's trained staff	Contractor's immediate reporting on any incidents PMU monitoring report	Contractor
		Releases of non-destructed PCBs in waste products from de-chlorination processes	Requirements of PCB destruction efficiency of >99.9999%		Contractor's proper decontamination of equipment PMU monitoring report	Contractor
		Emission of non-destructed PCBs from incineration	Requirements of PCB destruction efficiency of >99.9999%		Contractor's proper decontamination of equipment PMU monitoring report	Contractor
		Formation of PCCD/PCDF from incineration	Emission should be <0.1 ng I-TEQ/Nm^3 at 11% O_2		Contractor's documentation of PCCD/PDCF emission PMU monitoring report	Contractor
2.2 Disposal of in-service Askarel transformers in Jieh Power Plant	Replacement of transformers (dispose of Askarel transformers, install PCB	Occupational exposure of workers be involved in the replacement transformers Accidents where workers are injured by the transformers	Control health status of workers; Use adequate personal protection equipment; Use adequate procedures for reducing spill and accidents,	Training of workers in PCB health risks and use of personnel protection equipment;	EDL's immediate reporting on any incidents	EDL for installation of PCB free transformers and Contractor for disposal of

	free transformers)			Training of workers in handling spill.		Askarel transformers.
	Interim storage of high PCB equipment	Leakages from stored equipment and waste	Store all waste in UN certified containers; Use inert absorption material		EDL's immediate reporting on any incidents	EDL /PMU
		Formation of PCCD/PCDF in case of fire in storage	Install facility away from causes of fires (high voltage, scrap shop, etc.) All measures coordinated with the measures on the equipment in service Implementation of fire protection and emergency plan Installation of fire alarm systems Dry agent extinguishers on site	Training of workers on first immediate emergency and protection measures in case of fire	Monitoring coordinated with monitoring of transformers in service Fire inspection by Fire Authorities EDLs immediate reporting on any incidents	EDL /PMU
2.2 Draining PCB contaminated transformers	Interim storage of PCB containing oil	Release of PCB in case drums are overturned or break	Store drums properly; Store oil in closed UN certified drums; Keep adsorbent materials in reach Use adequate personal protection equipment; Use adequate procedures for reducing spill and accidents	Training of workers in PCB health risks and use of personnel protection equipment; Training of workers on handling of transformers, capacitors and drums/tanks Training of workers in measures in case of spills	Contractor's immediate reporting on any incidents; PMU monitoring report	Contractor, MOE-PMU
		Formation of PCCD/PCDF in case of fire	Implementation of fire protection and emergency plan; Dry agent extinguishers on site	Training EDL on first immediate emergen-cy and protection measures in case of fire (in addition to the general measures)	Fire inspection by Fire Authorities EDL's immediate reporting on any incidents	EDL / Fire authorities , PMU
2.2 Destruction of PCB-contaminated oil	All physical activities (activities undertaken abroad)	If dechlorination: Same impacts as for draining, and decontamination If export: Same impacts as for export of high-content PCB equipment described above	If dechlorination: Same measures as for facility for retrofilling If export: Same measures as for export of high-content PCB equipment		Contractor's immediate reporting on any incidents PMU monitoring report	Contractor, MOE-PMU