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Report No: PAD149

#### INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

#### PROJECT APPRAISAL DOCUMENT

ON A

#### PROPOSED GRANT FROM THE

#### GLOBAL ENVIRONMENT FACILITY TRUST FUND

#### IN THE AMOUNT OF US\$ 2,538,900

#### TO THE

#### LEBANESE REPUBLIC

#### FOR A

#### PCB MANAGEMENT IN THE POWER SECTOR PROJECT

October 29, 2014

Environment and Natural Resources Global Practice Middle East and North Africa Region

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# CURRENCY EQUIVALENTS

## (Exchange Rate Effective May 30, 2014)

Currency Unit = Lebanese Pound US\$1 = LP 1,508

#### FISCAL YEAR

July 1 – June 30

# ABBREVIATIONS AND ACRONYMS

DA	Designated Account
COWI	Leading Consulting Group with 360 degree approach (Danish)
EDL	Electricité du Liban
EIA	Environmental Impact Assessment
ESIA	Environment and Social Impact Assessment
ESMP	Environment and Social Management Plan
FM	Financial Management
FO	Financial Officer
GC	Gas Chromatography
GDP	Gross Domestic Product
GEF	Global Environmental Facility
GOL	Government of Lebanon
ICB	International Competitive Bidding
IDF	Institutional Development Fund
IFR	Interim Unaudited Financial Reports
IRI	Industrial Research Institute
IPSAS	International Public Sector Accounting Standards
MENA	Middle East and North Africa
MOE	Ministry of Environment
MOEW	Ministry of Energy and Water
MTR	Mid Term Review
NIP	National Implementation Plan
PCBs	Polychlorinated biphenyls
PMU	Project Management Unit
POPs	Persistent Organic Pollutants
TOR	Terms of Reference
WB	World Bank

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# PAD DATA SHEET

# Lebanon

LB: PCB Management in the Power Sector Project (P122540) PROJECT APPRAISAL DOCUMENT

#### MIDDLE EAST AND NORTH AFRICA

#### Environment and Natural Resources Global Practice

# Report No.: PAD149

Basic Information									
Project ID		EA Category	7		Team	Leader			
P122540		A - Full Asse	essment		Maria Sarraf				
Lending Instrument		Fragile and/o	or Capacity	Constrain	nts [ ]				
Investment Project Finance	cing	Financial Int	Financial Intermediaries [ ]						
		Series of Pro	jects [ ]						
Project Implementation S	tart Date	Project Imple	ementation	End Date					
21-Nov-2014		01-Jan-2020							
Expected Effectiveness D	ate	Expected Clo	osing Date						
01-Apr-2015 30-Jun-2020									
Joint IFC						GEF Focal Area			
No						Persistent Organic Pollutants			
Practice Manager/Manager	Senior Glo Director	bal Practice Country Director				Regional Vice President			
Benoit Paul Blarel	ahill	Ferid Belhaj			Inger Andersen				
Borrower: Lebanese Repu	ıblic								
Responsible Agency: Mir	nistry of Env	vironment							
Contact: Manal	Moussaller	n	Title:	Advisor					
Telephone No.: 96119	81854		Email:	Manal.M lebproje		llem@undp-			
	Project Financing Data(in USD Million)								
[] Loan []	IDA Grant	[] Gua	rantee						
[] Credit [X]	Grant	[] Othe	er						
Total Project Cost:	2.54		Total Bank Financing:			g: 0.00			
Financing Gap:	0.00								

Year       Image       Image	
Total         Expected Disbursements (in USD Million)         Fiscal       2016       2017       2018       2019       2020       0000       0         Year       2016       2017       2018       2019       2020       0000       0         Annual       0.10       0.24       0.70       0.75       0.75       0.00       0         Cumulati       0.10       0.34       1.04       1.79       2.54       0.00       0         Proposed Global Environmental Objective(s)         The objective of the Project is to dispose of high risk PCBs and impritransformers in the power sector in an environmentally sound manner         Components         Component Name         Component 1: Inventory of PCB contaminated transformers         Component 2: Disposal of high content PCB equipment and contaminated oil       0         Institutional Data         Practice Area / Cross Cutting Solution Area         Environment & Natural Resources       Cross Cutting Areas         [ ]       Climate Change       [ ]         [ ]       Fragile, Conflict & Violence	000       0000       0000       0000         0.00       0.00       0.00       0.00         0.00       0.00       0.00       0.00         0.00       0.00       0.00       0.00         ove the inventory management of r.       0.7         Ocst (USD Million         0.7         1.1
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Major Sector %	Adaptation Mitigation Co-benefits %
Energy and mining General energy sector 100	)
Total 100	)

Themes							
Theme (Maximum 5 and total % must	equal 100)						
Major theme	Theme			%	6		
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Total				1	00		
	Complianc	e					
Policy							
Does the project depart from the CAS i respects?		Yes	[]	No [X			
Does the project require any waivers of	f Bank policies?			Yes	[]	No [X	
Have these been approved by Bank ma		Yes	[]	No [ ]			
Is approval for any policy waiver sough		Yes	[]	No [X			
Does the project meet the Regional crit	on?	Yes	es [X] No []				
Safeguard Policies Triggered by the	Y	es		No			
Environmental Assessment OP/BP 4.0	1			X			
Natural Habitats OP/BP 4.04				X			
Forests OP/BP 4.36						X	
Pest Management OP 4.09						X	
Physical Cultural Resources OP/BP 4.1	1					X	
Indigenous Peoples OP/BP 4.10						X	
Involuntary Resettlement OP/BP 4.12						X	
Safety of Dams OP/BP 4.37						X	
Projects on International Waterways O	P/BP 7.50					X	
Projects in Disputed Areas OP/BP 7.60	)					X	
Legal Covenants							
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Name	Recurrent	Due Date		F	requen	cy	
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**Description of Covenant** 

The recipient shall undertake in conjunction with the World Bank a mid term review of the Project.

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Source Of Fund		Name						Туре	2	
Description of Con	ditior	n								
				Team Co	mposit	ion				
Bank Staff										
Name Title					Specia	alization		Unit		
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Laurent Granier		Senior Env	vironme	ntal Specialist	POS N	POS Management			A	
Marie A. F. How Yew Kin		Language	Program	n Assistant	Language Program Assistant			GEND	R	
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Wolfhart Pohl		Adviser			Peer Reviewer			GCFDR		
Andrianirina Michel Eric Ra	anjeva	Finance O	fficer		Finance Officer			CTRLA		
Alaa Ahmed Sarhan		Senior Env	vironme	ntal Economist	TTL at PCN Stage			GENDR		
Maria Sarraf		Lead Envi	ronment	t Specialist	TTL			GENDR		
Ruma Tavorath		Senior Env	vironme	ntal Specialist	Senior	Environment	al Specialist	GENDR		
Katelijn Van den Berg		Senior Env	vironme	ntal Economist	Peer Reviewer			GENDR		
Chaogang Wang		Senior Soc Specialist	ial Devo	elopment	Senior Social Development Specialist			GURDR		
Suiko Yoshijima		Environme	ental Spo	ecialist	Enviro	onmental Spec	ialist	GENDR		
Mei Wang		Senior Co	unsel		Senior	Counsel		LEGAM		
Non Bank Staff										
Name			Title				City			
Michael Mueller	_		PCB E	xpert	_					
Locations										
Country		t ninistrat ision	ive	Location		Planned	Actual	Com	iments	
Lebanese Republic	Mor	nt-Liban		Zouq Mkay	vel	X				
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Lebanese Republic	Mor	nt-Liban		Jiyeh		X				
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### I. STRATEGIC CONTEXT

#### A. Country Context

1. Lebanon is a small country known for its complex political situation and its talent in banking, education, and engineering. It is an upper middle-income country of 4.4 million people and an average Gross Domestic Product (GDP) per capita of US\$9,750 in 2013.<sup>1</sup> Lebanon has an open and service-oriented economy, in which services and trade account for 60 percent of GDP and 73 percent of jobs. Industry contributes 26 percent of the GDP– an estimate higher than the average in other MENA countries (23 percent) and other upper middle-income countries (17 percent of GDP).<sup>2</sup> The economy is driven by a dynamic private sector and is dependent on financial flows from Arab Gulf countries. Lebanon invests heavily in human capital; worldwide, it ranks 10th in the overall quality of education and 4th in science and math.<sup>3</sup>

2. Lebanon's economy slowed down after 2011, primarily due to regional turmoil, political uncertainty and security incidents. After growing by an average of 7.5 percent in the four years through 2010, real GDP growth decreased to 3 percent in 2011 and to 1.4 percent in 2012.<sup>4</sup> The slowdown occurred primarily in the sectors of tourism, services, exports and construction. Moreover, the ongoing conflict in Syria resulted in an estimated 0.86 to 1.3 million refugees<sup>5</sup> in Lebanon by the end of 2013 or an additional 20-30 percent of the population in Lebanon prior to the crisis. This situation puts an additional strain on public services and resources. It also had a negative impact on investor and consumer confidence and disrupted trade routes for imports and exports of goods. In the near future, key risks include the uncertainties linked to the November 2014 parliamentary elections and additional spillovers from the Syrian civil war.

3. Lebanon made considerable progress in shaping the legal and institutional framework and restoring infrastructure after the wars. However, the country is still at an **early stage of transition to environmental sustainability**. The country ranks 90th among 163 countries in terms of Environmental Performance Index. Its physical and natural assets are declining over time, as shown by a negative trend of Adjusted Net Savings<sup>6</sup> during 2005-2010.

4. The cost of environmental degradation in Lebanon has been estimated at US\$800 million, or 3.7 percent of the country's GDP in 2005.<sup>7</sup> Water and air pollution are the major environmental problems in the country, and are substantially caused by industrial pollution. In addition, solid waste continues to be a serious issue, with more than 700 open dumps used by the municipalities, where some of the waste is still burned. Though the adverse impacts of industrial pollution are lower than those of other highly industrialized countries in the region (e.g. Egypt), growing industrial activities are putting increasing pressure on Lebanon's environment and human health.

<sup>&</sup>lt;sup>1</sup> World Bank. 2014. The Little Green Databook. Washington D.C.

<sup>&</sup>lt;sup>2</sup> IBRD/IFC. 2010. Country Partnership Strategy for the Lebanese Republic for the period F11-F14. Report No. 54690-LB. Data refer to 2009.

<sup>&</sup>lt;sup>3</sup> Bilbao-Osorio, B., S. Dutta and B. Lanvin (Eds.) 2013. The Global Information Technology Report 2013: Growth and jobs in a hyper-connected world. World Economic Forum. Geneva. pp. 324–325.

<sup>&</sup>lt;sup>4</sup> World Bank. Data Development Platform. 2013.

<sup>&</sup>lt;sup>5</sup> The lower bound estimate is based on UNHCR. The upper bound figure is drawn from ESIA Lebanon Economic and Social Impact Assessment of the Syrian Crisis: The World Bank. September 2013.

<sup>&</sup>lt;sup>6</sup> The Adjusted Net Savings or Genuine Savings measures the net savings of a country at a macro-economic scale, taking into consideration the investments in human resources, depreciation of physical assets, and decrease in natural resources.

<sup>&</sup>lt;sup>7</sup> World Bank. 2011. Lebanese Republic. Country Environmental Analysis. Report No. 62266-LB. Middle East and North Africa.

#### **B. Sectoral and Institutional Context**

5. The use of chemicals grew over time in Lebanon, particularly in industry and agriculture. Many of them include **Persistent Organic Pollutants** (POPs), which are chemical substances that persist in the environment, bio-accumulate through the food web, and can cause adverse effects to human health and the environment. Among the POPs, **Polychlorinated Biphenyls** (PCBs) are a group of organic compounds used in the manufacture of plastics, as lubricants, dielectric fluids in transformers, protective coating for wood, etc.<sup>8</sup> Exposure to PCBs is believed to cause cancer in humans and animals.<sup>9</sup> In 2001, the *Stockholm Convention* on POPs was adopted with the aim of eliminating or restricting the production and use of POPs - including PCBs.

6. Recognizing the importance of the issue, the Government of Lebanon (GOL) signed the **Stockholm Convention on POPs** on May 22, 2001 and became Party to the Stockholm Convention on January 3, 2003 (Law 432). The country completed its **National Implementation Plan (NIP)** in accordance with the Convention. According to the NIP, Lebanon's top priorities in POPs management are: (i) awareness raising; (ii) institutional and regulatory strengthening; (iii) PCB management; and (iv) management of emissions of dioxins and furans. Lebanon also signed and ratified the **Basel Convention on the control of Trans-boundary Movement of Hazardous Wastes** in 1994.

7. In addition, the GOL made significant **efforts to regulate the hazardous waste sector**. In 2009, the Ministry of Environment (MOE) prepared a draft decree related to the management of hazardous waste.<sup>10</sup> The decree has yet to be finalized and enacted by the Council of Ministers. In addition, the country banned imports and exports of PCBs (Decree 4461/2000) and enacted laws to preserve the environment against pollution from hazardous waste and PCBs (Law 64/1988) and to increase the safety conditions of workers while using chemical products (Decree 11802/2004). The GOL prepared also the Solid Waste Law, endorsed by the Council of Ministers on January 10, 2012, which defines the institutional and legal framework to organize the management of solid waste.

8. While basic legislation to regulate hazardous chemicals is in place, **legal gaps** include: no explicit regulation for PCB management and the phase-out of PCB-containing equipment; lack of classification and adequate packaging and labeling requirements for PCB and PCB-containing equipment; no *formal* protocols in place between government bodies to ban PCB imports and the movement of PCB material in-country; gaps on basic aspects of waste management, such as the absence of key definitions and principles on PCB and other hazardous waste management, and licensing for environmentally sound disposal/destruction of PCB-containing equipment (COWI, 2011). Strengthening the legal and regulatory framework with respect to PCBs is important.

9. The *Ministry of Environment* is in charge of environmental management and protection and has the specific mandate of regulating hazardous substances, including POPs. Established in 1993, the MOE has experience in handling public awareness, monitoring, environmental legislation, emissions regulation, biodiversity conservation and environmental impact assessment (EIA). It also has substantial capacity in planning and executing international projects. However, the MOE has

<sup>&</sup>lt;sup>8</sup> <u>https://stats.oecd.org/glossary/</u>

<sup>&</sup>lt;sup>9</sup> See USEPA. 2013. Health Effects of PCBs, and Kramer, S., Hikel, Stephanie Moller; Adams, Kristen; Hinds, David; Moon, Katherine (2012). "Current Status of the Epidemiologic Evidence Linking Polychlorinated Biphenyls and Non-Hodgkin Lymphoma, and the Role of Immune Dysregulation". *Environmental Health Perspectives* 120 (8): 1067–75.

<sup>&</sup>lt;sup>10</sup> The decree provides for: (i) classification and management of industrial and hazardous waste; and (ii) licensing and certification for institutions to discharge hazardous waste.

almost no experience in PCB management. Its ability to monitor compliance with relevant laws and regulations is also limited, due to understaffing. Thus, it is important to strengthen MOE's technical capacity, particularly related to PCB management.

The Electricité du Liban (EDL) owns most PCB equipment in Lebanon. EDL is an 10. autonomous state-owned entity under the jurisdiction of the Ministry of Energy and Water (MOEW). It has exclusive authority to produce, transport and distribute electricity in Lebanon<sup>11</sup>. A survey of the PCB equipment and contaminated sites carried out in 2010<sup>12</sup> reveals that EDL possesses high-content PCB equipment (29 Askarel transformers and 495 PCB capacitors) and contaminated transformers (2,800). In addition, the Bauchrieh storage site and well are widely contaminated with PCB. The private sector appears to hold a relatively small amount of PCBcontaining equipment, i.e. about 5 tons of PCB capacitors.

11. The GOL approved in June 2010 the **Policy Paper for the Electricity Sector**. It provides a global framework and strategic initiatives to increase the total power capacity and upgrade the transmission and distribution infrastructures so as to cope with the demand and improve the operability of the system. The policy is expected to result in a solid power sector with more than 4,000 MW generation capacity in 2014 and 5,000 MW after 2015, reliable transmission and distribution networks, and efficient delivery of electricity in Lebanon. The action plan foresees the rehabilitation, upgrade and increased capacity of Zouk and Jieh power plants within five years with a total budget of US\$180 million. On the supply side, the policy also envisages that the capacity addition should include conventional energy sources that are most economical with the least environmental impact, such as natural gas. To meet this requirement, the World Bank is supporting a Partial Risk Guarantee to support the development of a Liquefied Natural Gas, Floating Storage and Regasification Unit close to the existing power station at Beddawi (435 MW).

12. Risks of environmental contamination from PCBs come from three major sources: PCBs containing equipment; equipment containing contaminated oil; and sites contaminated from leaking oil contaminated with PCBs. The GOL has recognized the urgent need of implementing environmentally sound management of PCBs according to international best practices. The proposed project will support achieving the objectives and targets laid out in the NIP. It will conduct an inventory of PCB contaminated equipment found in the electricity sector and will dispose of high content PCB equipment and contaminated oil in an environmentally sound manner.

#### **C**. **Higher Level Objectives to which the Project Contributes**

The project is aligned with the GOL's Progress and Development Program<sup>13</sup>, which seeks 13. to improve the quality of Lebanese life through better safeguarding the environment and recognizes the need to pay special attention to the challenges posed by environmental degradation. The project also contributes to the World Bank Group's Country Partnership Strategy for Lebanon 2011-2014 (Report 54690-LB), which identifies the environment as a priority focus area in which immediate reform and investment actions are needed.

<sup>&</sup>lt;sup>11</sup> Except for four private concessions for distribution.

<sup>&</sup>lt;sup>12</sup> COWI/ECODIT. 2011. PCB Inventory Update and Project Preparation Study- Final Report. (Hereafter referred to as COWI 2011). Using funds from the Canadian International Development Agency (CIDA) POPs Trust Fund, the Bank engaged consultants (COWI Consortium, Denmark), to undertake a project preparation study aimed at: updating and expanding earlier work on inventories of PCBs and PCB-contaminated equipment and sites; technical studies on cost-effective management and disposal options; and definition of capacity building needs. <sup>13</sup> The GOL established this program in November 2009. It embodies the economic and social development platform of the national unity Government.

14. By eliminating the PCBs, the project directly contributes to the overall objective of the *Stockholm Convention* to protect human health and the environment from POPs. Specifically, it responds to Article 3 of the Convention on measures to reduce or eliminate releases from intentional production and use; Article 6, on measures to reduce or eliminate releases from stockpiles and wastes; and Article 10 on public information, awareness and education.

15. The NIP prepared by the GOL defines the national strategy and identifies the activities responsive to the obligations under the *Stockholm Convention*. The proposed project supports key activities identified in the **NIP**, such as phasing-out and disposal of PCB containing products and equipment, information exchange and public awareness.

16. The project contributes also to the **GEF Chemicals Strategy**, whose main goal is to promote the sound management of chemicals throughout their life-cycle so as to minimize significant adverse effects on human health and the global environment. Specifically, by building capacity and demonstrating activities for managing and disposing of PCBs, the proposed project addresses the strategy's first objective of phasing out POPs and reducing POPs releases.

17. The World Bank Group has established **twin goals** to anchor its overarching mission and galvanize international and national efforts in this endeavor: (i) end extreme poverty at the global level within a generation and (ii) promote "shared prosperity" which is defined as a sustainable increase in the well-being of the poorer segments of society. The project contributes to the achievement of these goals by reducing the global and local environmental hazards, improving the general health condition and enhancing the productivity and quality of life of population living in proximity of contaminated sources. In addition, the project is also aligned with MENA's Regional Strategy, supporting the pillar on sustainable growth.

# II. PROJECT DEVELOPMENT OBJECTIVES

#### A. **PDO**

18. The project development objective is to dispose of high risk PCBs and improve the inventory management of transformers in the power sector in an environmentally sound manner.

#### B. Project Beneficiaries

19. The project will safely dispose of all of EDL's high-content PCB equipment and some of its contaminated oil. Direct beneficiaries of the project include EDL employees, who work close to these sources of contamination; and the population living in the areas surrounding the power plants and storage site, which are exposed to the risk of contamination via air, water and food chain. The number of EDL employees is estimated at about 490 people, and includes workers and technicians in Jieh power plant (228 employees), Zouk power plant (256) and Bauchrieh storage and repair workshop (5). The population living in the areas surrounding the power plants is about 205,000 individuals, and covers the population of Zouk (200,000 people<sup>14</sup>) and Jieh (5,000 people<sup>15</sup>)<sup>16</sup>. Overall, the number of direct project beneficiaries is estimated at **205,500 individuals**. In addition,

<sup>&</sup>lt;sup>14</sup> This accounts for the total number of residents in the areas of Zouk Mosbeh, Zouk Mikael and Jounieh (including Kaslik, Sarba and Haret Sakhr), based on MOE information.

<sup>&</sup>lt;sup>15</sup> COWI 2011. Sustainable POPs Management Project in Lebanon. PCB Inventory Update and Project Preparation Study. COWI/ECODIT.

<sup>&</sup>lt;sup>16</sup> The population of Bauchrieh (which include Jdeidet El Matn, Al Bouchrieh and Sadd Al Bauhrieh with an estimated 150,000) will also benefit from the project. This has not been accounted in this project as site contamination (from the well) will remain in Bauchrieh.

the project provides indirect benefits by reducing the potential of PCB contamination at regional and global levels

# C. PDO Level Results Indicators

- Direct project beneficiaries (number), of which female (percentage) Core Sector Indicator
   Persistent organic pollutants (POPs) and POPs waste destroyed, disposed of or contained in an environmentally sound manner (tons) Core Sector Indicator
- Transformers recorded in the inventory (number)

# III. **PROJECT DESCRIPTION**

20. **PCB equipment**. During the preparation of this project, a rapid inventory of PCB equipment and contaminated sites in Lebanon was conducted (COWI, 2011).<sup>17</sup> The inventory distinguished between two types of contamination indicated below and summarized in Table 1.<sup>18</sup>.

- **High-content PCB transformers and capacitors.** This includes: <u>Askarel transformers,</u> which are manufactured with liquids typically consisting of around 60 percent PCBs (600,000 mg/kg); and <u>PCB capacitors,</u> which contain about 33 percent PCB (333,000 mg/kg).
- **PCB contaminated transformers** are those contaminated with PCB in the range of hundreds to thousands mg/kg.<sup>19</sup>

Table 1 Inventory of High content PCB equipment and Contaminated Transfomers									
High-content PCB equipment	Out-of-service (Zouk, Jieh, Bauchrieh)	In-service (Jieh)	Total						
Askarel transformers									
- number	12	17	29						
- weight (tons)	21	147	168						
PCB capacitors									
- number	489	6	495						
- weight (tons)	22.4	0.3	23						
Total weight PCB equipment	44	147	191						
PCB Contaminated Transformers (Estimate)	Nb. of Transfomers	Nb of Contaminated	Contaminated oil						
rCB Contaminated Transformers ( <u>Estimate</u> )		Transfomer	( <b>t</b> )						
Distribution network	18,800	2,500	650-1050						
Substations and power plants	224	35	150-300						
Hydropower plant	76	25	70-100						
Bauchrieh (incl well)	1,900	280	100						
Total (round estimate)	21,000	2,800	1,000-1,600						
Source: COWI 2011 Data may not add up due to rounding									

Source: COWI, 2011. Data may not add up due to rounding

21. **Challenges**. COWI's rapid inventory <u>accurately</u> identifies the number of high content PCB transformers, based on thorough inspections of all thermal power plants in Lebanon.<sup>20</sup> By contrast, it

<sup>&</sup>lt;sup>17</sup> This inventory updated the preliminary inventory conducted in 2004 as part of the preparation for the National Implementation Plan for the management of POPs (ECODIT 2005).

<sup>&</sup>lt;sup>18</sup> The table includes some updates obtained during the project pre-appraisal mission (May 20-29, 2014).

<sup>&</sup>lt;sup>19</sup> They are either contaminated when manufactured or by replacing the oil, cleaning the oil or topping up with contaminated oil. In general, the PCB content of contaminated oil filled transformer is 1000 times lower than that of an Askarel transformer.

<sup>&</sup>lt;sup>20</sup> These include Beddawi (North of Lebanon), Hraiche-Qadisha (North), Zouk (Mount Lebanon), Jieh (Mount Lebanon), Zahrani (South), Sour (South) and Baalbeck (Bekaa) (COWI 2011, p. 38)

estimates the number of PCB contaminated transformers based on sampling and testing of a small share of existing transformers<sup>21</sup>, then extrapolating the findings to the total number of transformers owned by EDL. As a results, COWI's inventory provides only a <u>rough estimate</u> of the number of PCB contaminated transformers, without clearly identifying the contaminated transformers and their level of contamination in each site. Therefore, conducting a **complete inventory of PCB contaminated transformers** across the country is needed to get a realistic picture of the number of contaminated transformers, their location and level of contamination. Such an inventory will help Lebanon in any further action to remove PCBs in the country in compliance with the *Stockholm Convention*.

22. Prioritizing actions to remove the PCBs should be based on the risk of exposure to PCB. *Environmental exposure* to PCBs may originate from leaking PCB-containing liquids, which can then evaporate in the atmosphere or infiltrate in groundwater or surface water. In addition, *people* may be exposed to PCBs, either by direct contact with PCB-containing liquids, or indirectly, via the environment (water, food). The risk of contamination directly correlates with the amount of PCBs in the equipment, the condition and management of the equipment. Consequently, **high-content PCB equipment poses the highest risk** of contamination to people and environment. Eliminating this equipment is in accordance with the *Stockholm Convention*, which gives highest priority to removing equipment containing more than 10 percent PCB (>100,000 mg/kg) and volumes greater than 5 liters. In addition, **PCB contaminated transformers** also pose a high risk of contamination to employees, particularly those working in the repair shops, due to continuous exposure over years.

23. **Project approach**. Given the risk associated with high content PCB equipment and the priorities set by the *Stockholm convention* to eliminate PCB from Lebanon by 2025, this project will take action to: (i) conduct a **country-wide inventory** of the PCB contaminated transformers in the power sector in Lebanon, which will update the findings of the 2010 survey (COWI 2011); (ii) dispose of all **high content PCB equipment** owned by the EDL and potentially by the private sector, and of the PCB **contaminated oil** from Bauchrieh; (iii) provide **capacity building** to stakeholders for an improved PCB management in the future.

#### A. **Project Components**

24. The project includes three components. All GEF funded activities are implemented by the Ministry of Environment in close cooperation with EDL:

#### Component 1. Inventory of PCB contaminated transformers (US\$0.79 million)

25. This component will support a countrywide inventory of the 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).

26. The purpose of the inventory is twofold. At the country level, it will identify the contaminated transformers and their level of contamination in each site, thus providing a clear picture of the extent of PCB contamination in the power sector. At the local level (Bauchrieh), the inventory will result in good engineering practices, particularly in terms of health and safety protocols, sampling, testing and labeling of PCB oil. These practices will be reflected in on-site

<sup>&</sup>lt;sup>21</sup> Testing was conducted on 78 transformers from the distribution network (out of 19,000), 37 transformers from substations and power plants (out of 300 in total) and 24 transformers with Buchholz relay in Bauchrieh, older than 1985 (out of 2000 in total) (COWI 2011, p. 53).

training of local staff during the period of inventory, as well as in written guidelines to be used for the management of incoming transformers in Bauchrieh after the end of the project.

27. Conducting the inventory of PCB contaminated transformers is based on four steps: (i) desk *review* of EDL database<sup>22</sup> 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).

#### 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 28. and potentially by the private sector, and of the PCB contaminated oil from Bauchrieh.

#### Component 2.1 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 29. total weight of 44 tons.<sup>23</sup> 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 30. 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<sup>24</sup> and will perform drainage of transformers, collection of empty transformers, liquid, and capacitors, packaging, transport and destruction abroad.

#### Component 2.2 Disposal of in-service high content PCB equipment and contaminated oil (US\$0.89 million)

31. In-service high content PCB equipment in Jieh. The in-service equipment 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 17 in-service transformers. This component will finance the disposal of all in service Askarel transformers and capacitors in Jieh. As part of the project parallel financing, EDL will be responsible for purchasing and replacing these transformers to allow continuity of electricity generation.

<sup>&</sup>lt;sup>22</sup> EDL is currently updating its database through service provider companies. The project will make use of this updated database to undertake the desk review. <sup>23</sup> Transformers are located in Zouk power plant (10); Jieh (1) and Bauchrieh (1). Capacitors are found at 7 EDL sub-stations: Adma (35) Basta (66),

Bauchrieh (135), Deir nbouh (11) Gaz (171), Hazmieh (11) and Jamhour (60).

<sup>&</sup>lt;sup>24</sup> These include drums for Askarel, UN certified packages for capacitors and containers for empty Askarel transformers, tools for Askarel drainage, personal protective equipment for staff, absorbant material for emergency cases, tools for soil excavation, UN certified packaging for PCB contaminated soil; crane for loading, etc.

32. *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 as well as other agencies (e.g. concessions, etc.) to check their willingness to dispose of their PCB equipment (capacitors and transformers) through the proposed project.

33. *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 abroad of the contaminated oil. It is estimated that about **100 tons** of contaminated oil will be disposed of from Bauchrieh. As part of the project parallel financing, EDL will be responsible for purchasing PCB-free oil, to be used for transformers' maintenance and repair.

34. Similar to Component 2.1, the most cost-effective way of disposing in-service equipment and contaminated oil<sup>25</sup> 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)

35. 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.

#### B. **Project Financing**

36. The proposed lending instrument is an Investment Project Financing (IPF).

37. The project cost is US\$2.54 million and will be financed by a GEF Grant. The table below provides the detailed cost estimate by component and type of expenditure.

<sup>&</sup>lt;sup>25</sup> In theory, purchase of rental of a dechlorination unit to decontaminate oil on-site is feasible. However, in practice, such an investment is economically viable only for quantities higher than 300 tons (see economic analysis for more details).

Project Component	Non Consulting Services	Works	Goods	Consultant Services	Training	Conting ency	Total
1. Inventory of PCB contaminated transformers							
- Inventory of PCB contaminated transformers in Bauchrieh	0.21					0.02	0.23
- Inventory of PCB contaminated transformers in the remaining	0.51					0.05	0.56
Sub-total							0.79
2. Disposal of high content PCB equipment and contaminated oil							
- Disposal out of service high content PCB transfomers and capacitors		0.18				0.03	0.21
- Disposal of in service high content PCB equipment		0.46				0.07	0.53
- Disposal of PCB contaminated oil from Bauchrieh		0.29				0.04	0.34
- Disposal of capacitors from private sector		0.02				0.00	0.03
Sub-total							1.10
3. Project management and capacity building							
- PMU staff				0.32			0.32
- Capacity building/training/workshop					0.07		0.07
- Consultant services (incl audit)				0.14			0.14
- Minor goods (safety equipment, etc)			0.04				0.04
- Operating costs				0.08			0.08
Sub-total							0.65
Total Project Cost							2.54

 Table 2: Project Cost by Component and Expenditure (million US \$) including contingency

38. In addition, the counterparts will provide **parallel financing**. Parallel financing accounts for about **US\$4.7 million** and is provided by the MOE (US\$2.5 million) and the EDL (US\$2.2 million). MOE's parallel financing will mainly include in kind contribution to cover its staff time and cash contribution for a site assessment of Bauchrieh (component 2) and institutional strengthening (component 3). EDL's parallel financing will mainly include in kind contribution of its staff time as well as cash contribution for the replacement of transformers in Jieh power plant (component 2).

Table 3: Parallel Financing by MOE and EDL			
Project Components	Project cost (GEF)	MOE parallel financing	EDL parallel financing
	(US\$ million)	(US\$	
		million)	million)
1. Inventory of PCB contaminated transformers	0.79	0.2	0.3
2. Disposal of high content PCB equipment and contaminated oil	1.10	1.5	1.4
3. Project management and capacity building	0.65	0.8	0.5
Total	2.54	2.5	2.2

39. **Retroactive financing**. Retroactive financing of up to 10 percent of the grant amount (i.e. US\$254,000) for payments made against eligible expenditures starting 12 months before the expected date of grant signing shall be allowed provided that the procurement procedures are acceptable to the Bank.

#### C. Lessons Learned and Reflected in the Project Design

40. The project design draws upon the Bank's considerable experience in working with countries on chemicals, in particular on PCBs. This includes projects in Belarus (P114515), China (P082993), Egypt (P116230), Kosovo<sup>26</sup>, Moldova (P090037), Nigeria (P113173), Tunisia (P100478) and Vietnam (P099460). However, only the projects in Moldova and China have completed

<sup>&</sup>lt;sup>26</sup> Consulting Services for PCB Inventory and Feasibility Study for Treatment and/or Removal of PCB Contaminated Equipment: Kosovo. SNC-LAVALIN for the World Bank Final Report, May 2011

implementation, while the others are under preparation or at early stages of implementation. Lessons learned and reflected in the project design include:

41. **Simplify project design**. Clean-up projects are inherently complex involving a certain amount of risk and uncertainty. Maintaining a simple design will minimize delay in project implementation. The proposed project has adopted a relatively simple design; consisting mostly of two operations (a full inventory of contaminated transformers and the removal and disposal abroad of high content PCB equipment and contaminated oil).

42. **Stakeholder commitment is essential**. Extensive involvement of national and local institutions and communities has been a critical factor in the success of other environmental cleanup projects managed by the Bank. From the very beginning, the proposed project seeks the local communities' feedback to assess its potential environmental and social impacts. Throughout project implementation, capacity building and training to local stakeholders concerning sustainable PCB management and safety issues will be provided.

43. **Prioritize actions based on risk assessment study.** International experience in environmental clean-up projects demonstrated the importance of using a risk-based assessment approach to prioritize actions needed for POPs removal. The project team carried out a detailed assessment that resulted in a risk ranking of PCB equipment; this was helpful in prioritizing the actions so as to meet the country's highest priorities in POPs agenda.

44. Set realistic targets. In situations where baseline data – e.g. number of sites contaminated, the extent of the site-specific contamination and the level of clean up required – are insufficient, outcome indicators should err towards the conservative side. This is to avoid overly ambitious targets that may require downgrading through future restructuring. For example, in China, even though site locations were confirmed through interviews and geo-radar testing prior to implementation, it was discovered that PCB coffins had disappeared. Thus, the proposed project sets conservative targets concerning the outcome indicators.

45. **Conducting a PCB inventory is important before taking action**. The POPs Stockpile Management Component III (P11110) of the World Bank/GEF Integrated Solid Waste Management Project in Belarus (P114515) successfully eliminated 1,800 tons of POPs stockpiles. One lesson learned from this component is that conducting preliminary inventories before removing POPs is essential, given the uncertainty related to the amount that needs to be disposed of. The project ended up disposing of a much higher amount than originally anticipated due to the uncertain quantity of hazardous material.

46. **Conduct a thorough assessment of alternative technologies**. Effective PCB management in accordance with *Stockholm Convention* guidelines involves treatment and disposal using technologies that meet best available techniques and best environmental practices. A certain technology could be cost-efficient in large countries (China), but very expensive in remote locations (due to added cost of transport, for example). The proposed project has made a comprehensive assessment of technology options in order to choose the cost-effective ones that best meet the site-specific requirements.

#### 47. Dispose of PCB equipment in accordance with well-established regulations. The World

Bank - GEF funded PCB management project in **China**<sup>27</sup> revealed the importance of licensing for operating and handling of PCB treatment equipment for PCBs and associated PCB wastes. Project implementation suffered delays due to lack of licensed operators. Underestimation of costs for best available techniques also delayed procurement of equipment. The Implementation Completion and Results Report recommended that thorough prior assessment must be undertaken on the proposed alternatives before investing in expensive and sophisticated treatment technology. Similar lessons were obtained from a UNDP-GEF funded project in **Kazakhstan**<sup>28</sup>, which faced delays in implementation due to lack of regulation for PCB management and under-estimation of the cost of equipment.

# IV. IMPLEMENTATION

#### A. Institutional and Implementation Arrangements

48. **The Ministry of Environment**, which has a responsibility for regulating hazardous substances including POPs in Lebanon, will be the implementing agency of this project. It will have the principal responsibility for project oversight and implementation and will establish a **Project Management Unit (PMU)**, to be headed by a Project Manager with expertise in hazardous waste management and will include procurement and financial management specialists. The project will be mapped to the *Department of Chemical Safety* under the *Service of Environmental Technology*. Since the Ministry of Environment is also implementing other WB funded projects, fiduciary staff of the MOE already trained and familiar with WB procedures will work across projects to ensure cost effectiveness.

49. Electricité du Liban is an autonomous state-owned entity under the jurisdiction of the Ministry of Energy and Water. As it owns most PCB equipment in Lebanon, EDL has been heavily involved in the preparation of this project. The Director General of EDL released an administrative circular<sup>29</sup> appointing five staff from EDL to form a PCB Committee at EDL. The committee includes representatives from the departments of production, transmission and distribution. The committee was mandated to coordinate with MOE on PCB issues. It has been active during preparation and the intention is for it to continue to be active during implementation.

#### B. **Results Monitoring and Evaluation**

50. Project Results Indicators have been developed related to the project design. MOE will be responsible for the overall monitoring and supervision of the project. It will report on implementation progress and achievement towards the targets stipulated in the Results Framework on a half-yearly basis to the Bank.

51. The Bank will undertake Implementation Support missions twice a year to monitor implementation, compliance with environmental and safeguard provisions, and will evaluate project performance according to established performance monitoring indicators. One implementation support mission will take place in the country and one is likely to take place virtually between the team in headquarters and the counterparts in the Lebanon. Implementation Support missions in the country will include field visits and discussion with relevant stakeholders, government agencies and

<sup>&</sup>lt;sup>27</sup> World Bank-GEF China PCB Management and Disposal Demonstration Project (P082993)

<sup>&</sup>lt;sup>28</sup> UNDP-GEF Design and Execution of a PCB management plan Kazakhstan

<sup>&</sup>lt;sup>29</sup> No. 163 dated November 19, 2010

implementing agencies. All project monitoring reports would be made public in accessible forms. A Mid Term Review (MTR) of project performance will be carried out about three years after project effectiveness and an Implementation Completion and Results Report will be prepared within six months of the project closing. Prior to these, MOE will carry out its own review of the project progress and implementation performance.

# C. Sustainability

52. Sustainability is among the main considerations in the preparation of the proposed project. Through its very objective, the project supports the GOL in meeting its legal obligations under the *Stockholm convention* to identify, manage and dispose of PCBs in an environmentally sound manner, and to eliminate its PCBs by 2025. In addition, the design of the project reflects the following sustainability elements:

53. **Institutional sustainability**. The project benefits from strong buy-in from stakeholders, as reflected in their commitment to provide significant parallel financing (MOE, EDL). Moreover, it provides: (i) a countrywide inventory of PCB contaminated transformers, which is pre-condition for any further effort of decontamination/disposal of PCB contaminated oil; (ii) capacity building of institutions (e.g. MOE, EDL) on improved PCB management, which will set the stage for future actions to eliminate the remaining PCB in the country; (iii) training local staff (workers, technicians) on reviewing, sampling, testing, draining and labeling of PCB contaminated oil, thus providing them with useful knowledge for the identification of the remaining PCB transformers in the country.

54. **Environmental and social sustainability**. By eliminating the PCBs that pose the highest risk to people and environment (i.e. high content PCB equipment), the project will generate significant environmental and social benefits (e.g. reduced risk of water contamination, cancer). Besides, the project implementation pays due attention to possible negative impacts, through the preparation of the Environmental and Social Impact Assessment (ESIA).

55. **Economic sustainability**. Based on an economic analysis of different alternatives to eliminate PCBs, the project promotes the most cost-effective options, e.g. export and destruction of the high-content PCB equipment and contaminated oil by licensed facilities.

# V. KEY RISKS AND MITIGATION MEASURES

#### A. **Risk Ratings Summary Table**

Risk Category	Rating
Stakeholder Risk	Moderate
Implementing Agency Risk	
- Capacity	Substantial
- Governance	Moderate
Project Risk	
- Design	Substantial
- Social and Environmental	Substantial
- Program and Donor	Low
- Delivery Monitoring and Sustainability	Low
Overall Implementation Risk	Substantial

#### B. **Overall Risk Rating Explanation**

56. The project design involves the management of PCBs for mitigating health and environmental risks using skills and techniques not extensively available in Lebanon. It will require coordination between MOE and EDL. During project preparation, extensive effort was put on operational, institutional and governance and safeguards risk identification and mitigation. The use of International Competitive Bidding (ICB) contracts for the two major operations will be strategic in mitigating risks associated with project design, and in drawing on international expertise with proven results. The capacity of the MOE and EDL will be strengthened in order to implement the project in its technical, procurement, safeguards and financial management aspects.

57. The overall political and security situation in Lebanon remain tense and this can have direct implication on project implementation (travel to Lebanon can be restricted). Given the existing security situation and the fact that this project involves the management of hazardous substance, the overall project rating is assessed as **Substantial**. To ensure the adequate implementation of risk mitigation actions, the Bank will maintain close oversight of project implementation (including implementation support for close and continuous supervision).

#### VI. APPRAISAL SUMMARY

#### A. Economic Analysis

58. This section describes the expected project impact; the justification for public sector provision; the World Bank value added; and results of cost-effectiveness analyses carried out for the disposal of PCB equipment. The lack of sufficient baseline data and the difficulty to identify the dose-response effect between exposure to PCBs and health outcomes makes it impossible to carry out cost-benefit analysis of the project.

59. *Expected project impact*. The existing PCBs in the country's power sector expose people and the environment to a high risk of contamination. Any PCB liquid leaking from transformers can affect people (via the food chain) and the environment (via water flows). Lebanon also faces the additional risk of air strikes: the Jieh power plant, for example, was targeted by air strikes in the past.<sup>30</sup> Such strikes could burn PCBs and cause the formation of dioxins and furans in the atmosphere, with serious impacts on population and environment. Therefore, the project provides **global public goods** by reducing the risk of exposure to PCBs and that of forming dioxins and furans. It also contributes to **local public goods**, by averting potential illnesses (e.g. cancer) and environmental pollution around the contaminated sites.

60. *Justification for public sector provision.* Emissions of PCBs are externalities caused by the power sector, which is primarily owned by the GOL. Thus, using public funds to eliminate externalities caused by the public sector is considered appropriate. In addition, this funding arrives in a timely manner to help the GOL address its priorities set by the *Stockholm Convention* by 2025.

61. *World Bank value added*. As Lebanon moves towards meeting its obligations set by the *Stockholm convention*, the Bank is uniquely positioned to provide expert technical input based on

<sup>&</sup>lt;sup>30</sup> In 2006, an Israeli strike bombed the Jieh power plant causing the release about 12,000 to 15,000 tons of stored intermediate fuel oil (IFO) into the Mediterranean Sea. This had devastating consequences for the environment, and the costs were estimated at over US\$200 million, or 1 percent of Lebanon's GDP (World Bank 2007).

the lessons learned from several years of operations in the chemicals area, particularly PCBs. Examples include PCB management projects in Tunisia (P100478), Egypt (P116230), Vietnam (P099460), China (P082993), Moldova (P090037), Nigeria (P113173) and Kosovo. Based on this experience, the Bank will ensure that the proposed activities are pragmatic and yield concrete results in terms of PCB elimination.

62. The following paragraphs provide the results of cost effectiveness analyses conducted for the disposal of PCB equipment.

#### Disposal of out-of-service high content PCB equipment

63. This component will dispose of about **44 tons** of high content PCB equipment and **10 tons** of contaminated soil and concrete. This can be done in several ways: (i) building a stationary facility for treating hazardous waste; (ii) building a mobile waste incinerator and pre-treatment facility; and (iii) exporting and destroying the equipment in licensed facilities. The first two options are not feasible for Lebanon, because of high costs and timing issues. For example, a stationary facility in Europe costs about US\$100 million and a mobile one is at least US\$10 million. In addition, international experience demonstrated that the expected time span between the final decision on the establishment of elimination capacity and the day-to-day operation is 6-8 years. The third option involves exporting and destroying the high-content PCB equipment by licensed facilities abroad according to the requirements of Basel Convention. Implementation of this option would cost about US\$3,400/ton eliminated.<sup>31</sup> Estimates for other countries include US\$4,200/ton in Moldova<sup>32</sup> and US\$4,100/ton in Shenyang, China.<sup>33</sup> A comparison among these estimates suggests that *export and destruction* of the out-of-service high-content PCB equipment in licensed facilities is the most cost-effective option in Lebanon.

#### Disposal of in-service high content PCB equipment and contaminated oil

64. The <u>in-service high content PCB equipment in Jieh</u> includes **147 tons** of Askarel transformers and capacitors. This can be achieved in two ways: (i) retrofilling, i.e. emptying and disposing of the Askarel in the transformers and refilling the transformers with PCB-free liquid with similar characteristics; (ii) exporting and destroying the equipment in licensed facilities.

65. The first option is not feasible for the transformers in Jieh. UNEP's guide to the management and reclassification of PCB transformers<sup>34</sup> suggests that the viability of retrofilling depends on several local factors, including the age of equipment. In Jieh, the in-service transformers are 45 and 35 years old, which is well beyond the lifetime of the equipment (30 years). Thus, any retrofilling operation would be economically ineffective, since the transformers would be taken out of service anyway.

66. The second option envisages exporting, destroying and replacing the equipment. Export and

<sup>&</sup>lt;sup>31</sup> The estimation is based on two steps: (i) calculating the total cost of transformer preparation, drainage of liquid, packaging, transport and destruction; (ii) dividing the total by the weight of the equipment. Accordingly, US\$2,800/ton has been obtained and considered a lower bound estimate. Estimates from other projects (China, Moldova) show higher figures of over US\$4,000/ton. The economic analysis uses the average between the two, i.e. US\$3,400/ton.

<sup>&</sup>lt;sup>32</sup> Moldova POPs Stockpiles Management and Destruction Project.

<sup>&</sup>lt;sup>33</sup> China PCB Management and Disposal Demonstration Project.

<sup>&</sup>lt;sup>34</sup> UNEP. 2002. PCB Transformers and Capacitors from Management to Reclassification and Disposal. Prepared by UNEP Chemicals.

destruction would cost about US\$3,100/ton.<sup>35</sup> This estimate compares well with the above estimates for Moldova (US\$4,200/ton) and China (US\$4,100/ton), suggesting that export and destruction of the in-service high-content PCB equipment in licensed facilities is the most cost-effective option in Lebanon.

67. In addition, this component will finance the disposal of 100 tons of <u>contaminated oil</u> from Bauchrieh. This can be done in two ways: (i) buying a dechlorination unit, or (ii) exporting and disposing in licensed facilities abroad. The first option involves purchasing a dechlorination unit, which eliminates PCBs from oil based on sodium reduction technology. Further, the treated oil can be sold as fuel (US\$500/ton). In addition to the cost of purchase and oil treatment, it is often necessary to prepare a storage site for the unit and drums of oil. Thus, the option of buying the dechlorination unit to decontaminate 100 tons of PCB oil would cost about US\$7,300/ton of oil (if no storage site is needed) or US\$9,200/ton (if a storage site is needed).<sup>36</sup>

68. The second option involves draining PCB transformers, shipping and destroying the contaminated oil abroad and would cost about US\$2,900/ton.<sup>37</sup> A comparison among the above estimates indicates that exporting and disposing of the contaminated oil abroad is the most cost-effective option. In fact, COWI (2011) suggests that buying a dechlorination unit becomes more cost-effective for quantities larger than 300 tons.

#### B. Technical

69. The technical design of the project has followed the international best practices of sound PCB management. Identification of the options for the destruction of the PCBs is based on a comprehensive review of PCB destruction technologies concerning each component (COWI, 2011), as described below.

70. *Disposal of out-of-service high content PCB equipment*. Based on the assessment of three possible alternatives, the assessment recommended the export and destruction of the equipment in licensed facilities according to the requirements of the *Basel Convention*. The rationale for the selected technology is provided below.

- building a <u>stationary facility</u> for treating hazardous waste. No plans exist so far for the building of this type of facility in Lebanon. Even if they existed, it would not be possible to make it operational within the time limits of the project.
- building a <u>mobile waste incinerator</u>. Mobile waste incinerators that can incinerate high content PCB exist in countries such as Canada. However, international experience demonstrates that the expected time span between the final decision on building the incinerator and the day it starts operation is 6-8 years. Thus, this option is not feasible in the context of this project.

<sup>&</sup>lt;sup>35</sup> Similar to the case of out-of-service high-content equipment, this estimation is based on dividing the total cost (preparation of transformer, drainage of liquids, packaging, transport and destruction) by the weight of equipment. Accordingly, US\$2,200/ton of equipment has been obtained and considered a lower bound estimate. Estimates from other projects (China, Moldova) show higher figures of over US\$4,000/ton. The economic analysis uses the average between the two, i.e. US\$3,100/ton.

<sup>&</sup>lt;sup>36</sup> These estimates include the cost related to preparation of a storage site (US\$200,000), dechlorination facility (US\$700,000 if bought and US\$1,400/day if rented), draining and packaging (US\$100/ton), storage tanks (US\$11,000/tank), treatment (US\$400/ton) as well as the benefit in terms of market value of dechlorinated oil (US\$500/ton).

<sup>&</sup>lt;sup>37</sup> This estimate is obtained by dividing the total disposal cost (drums, pumps, pellets, drainage, shipment and disposal) by the weight of contaminated oil.

• <u>exporting and destroying</u> the equipment in licensed facilities. The operation includes packaging, transport, dismantling, cleaning of transformers and final disposal. Among the technologies available<sup>38</sup> for PCB elimination, incineration is currently the least cost available technology for destruction of PCB-containing capacitors and Askarel transformers in Europe

71. *Disposing of in-service high content PCB equipment*. Based on the assessment of two possible alternatives, it is recommended to export and destroy the equipment in licensed facilities in accordance with the requirements of the Basel Convention. The rationale for the selected technology is provided below.

- <u>retrofilling</u>. This involves emptying and disposing of the Askarel in the transformers, and refilling them with PCB-free liquid with similar characteristics. However, replacing the PCB oil in old transformers is generally not a cost-effective solution because the PCB concentration in the liquid after the replacement will still be in the range of 30,000 60,000 mg/kg; and the costs of disposing the transformer when taking it out of use would be similar to those for Askarel transformers. In Jieh, the in-service transformers are 45 and 35 years old, which is well beyond the lifetime of the equipment (30 years). Thus, any retrofilling operation would be economically ineffective, since the transformers would be taken out of service anyway.
- <u>exporting and destroying</u> the equipment in licensed facilities. Similar to the case of out-ofservice high content PCB equipment, this operation includes packaging, transport, dismantling, cleaning of transformers and final disposal (incineration at high temperatures).

72. *Disposal of PCB contaminated oil*. A review of different technologies revealed three possible options for disposal/decontamination of PCB oil:

- decontamination using <u>dechlorination unit</u> in Lebanon. An established technology to eliminate PCBs from oil is the alkali metal reduction (sodium reduction) technology. It has been extensively used in North America and Germany. The technology involves the treatment of oil with sodium, which results in a salt solution that contains oil and biphenyl polymer. The process does not produce hazardous waste. However, it is not a cost-effective option for quantities lower than 300 tons.
- co-incineration in <u>cement plants</u>. Co-processing of hazardous waste in cement kilns has been practiced in numerous countries, such as Norway. The temperature in the kilns and the residence time is sufficient for the destruction of the PCB. However, burning PCBs in these kilns can potentially lead to formation of dioxins and furans. In addition, in some countries, disposal of PCBs in some kilns has not been competitive compared to disposal in waste incinerators and dechlorination processes. In Lebanon, there are three cement companies, none of which expressed interest in the possibilities of co-incineration of PCB oil. Given the above reasons, it has been recommended not to go further with this option.
- <u>disposal abroad</u>. From the organizational perspective, this option is simple, as the operation is similar to that of eliminating high-content PCB equipment.

<sup>&</sup>lt;sup>38</sup> These include high-temperature incineration, co-incineration in cement kilns, plasma arc, sodium and ammonium reduction technologies, hydrogen technology, base catalyzed decomposition, gas-phase chemical reduction, pyrolysis, geo-melt and bio-degradation.

#### C. Financial Management

73. The Financial Management (FM) assessment of the MOE was carried out in order to ensure that an adequate financial management system is in place that satisfies the Bank's OP/BP 10.00 requirements for the proposed Project. According to the requirements of OP/BP 10.00, the Borrower and the project implementing entity should maintain a financial management system, including accounting, financial reporting, and auditing systems, adequate to ensure that they can provide accurate and timely information regarding project resources and expenditures.

74. The overall financial management risk for this Project is assessed as "Substantial". Annex 3 provides additional information on the financial management assessment, the recommended measures to be maintained and FM arrangements.

75. MOE will be responsible for preparing <u>quarterly un-audited Interim Financial Reports (IFRs)</u> detailing the grant: (i) sources and uses of funds; (ii) contract expenditures; and (iii) uses of funds by grant activity, component and category and consolidated list of assets purchased through the project. The IFRs will be submitted to the Bank no later than 45 days after the end of the quarter to which they relate.

76. MOE will also prepare an <u>annual Project Financial Statements (PFS)</u> which will be audited by an independent private external auditor acceptable to the World Bank, to be engaged within six months after project effectiveness. The audit Terms of Reference (TORs) will be developed by the project team and cleared by the World Bank. The external audit report and audited PFS will be submitted to the World Bank no later than six months after the end of each fiscal year and will be made public as per the World Bank disclosure policy. A management letter will also be expected to provide the external auditor's assessment of the project internal controls. The project audited PFS and management letter will be due for submission by no later than 6 months after the end of each fiscal year.

77. MOE will be responsible for preparing a <u>financial management manual</u>, which will include a detailed description of all activities, roles and responsibilities, flow of information and funds for the project and each of its components. The financial management manual has been finalized.

78. To ensure that funds are readily available for project implementation, MOE will open a <u>segregated Designated Account</u> (DA) in US Dollars at the Central Bank of Lebanon. The DA will be maintained and managed by MOE. Deposits into, and payments from the DA will be made in accordance with the provisions stated in the grant agreement and as outlined in the World Bank "Disbursements Guidelines for Projects". DA replenishments will be on the basis of Withdrawal Applications. The funds will channeled from the World Bank to *the Ministry of Finance* (*MOF*) *Account for Grants and Donations* and then to the project DA based on claim requests submitted by the MOE to MOF. Other disbursement methods will be available as per the project Disbursement Letter.

#### D. **Procurement**

79. **A procurement capacity assessment** of MOE was conducted to identify risks and mitigation measures. MOE is building its experience in preparation and implementation of large projects, is exposed to international projects, and lately has participated in preparation and implementation of

projects under IBRD and IDF grant. The procurement function in the ministry is limited to budget execution of purchasing office supplies. Related record keeping is observed and needs to be enhanced with the growing number of transactions. The procurement and financial management functions are not segregated. Procurement processing needs to be better defined and standardized.

80. **Risks and mitigations**. The identified risks are related to (i) weak implementation capacity, (ii) unclear document processing and flow within the ministry, (iii) undefined control mechanism, and (iv) delays in decision taking due to coordination with EDL. The following mitigation measures are proposed: (i) appointment of an experienced PMU by agreement signing (not condition of effectiveness), (ii) training of the procurement staff, (iii) determining in particular the procurement related roles and responsibilities of the stakeholders, (iv) diligent maintenance of procurement planning, and (v) prior review of first contract under each procurement method.

81. **Project guidelines**: World Bank procurement guidelines are applied for the project.<sup>39</sup>

82. **Procurement methods** for goods, works and non-consulting service: For the procurement of Goods, Works and Non-Consulting Services, the following methods shall be used: (i) international competitive bidding (ICB); (ii) national competitive bidding (NCB) for which shall be used either ICB -or a translated version- or develop Standard Bidding Documents acceptable to the Bank as mentioned in clauses 3.3 and 3.4 of the procurement guidelines, (iii) force account, (iv) shopping; (v) framework agreements, (v) direct contract.

83. **Selection of Consultants**: For the selection of consultants, the following methods shall be used: (i) Quality-and-Cost-Based-Selection (QCBS), (ii) Selection under a Fixed Budget (FBS); (iii) Least-Cost-Selection (LCS), (iv) Selection based on Consultants' Qualifications (CQS); (v) Quality Based Selection (QBS); (vi) Single Source Selection (SSS); (vii) Selection of Individual Consultants; (viii) Selection of UN agencies.

84. An initial **procurement plan dated June 5, 2014** was developed by the Government. It defines the prior review and procurement methods thresholds. It will be updated and reviewed by the Bank at least twice a year or as seen necessary. The initial procurement plan for the whole project is attached to the legal agreement.

85. Frequency of implementation support mission and post procurement review is *foreseen* respectively twice and once yearly. In post procurement review, a sample of 10% of contracts eligible for post review shall be covered.

# E. Social (including Safeguards)

86. A detailed **Environment and Social Impact Assessment** (ESIA) undertaken during project preparation indicates that while the power stations are not in close proximity of habitation, the proposed storage site is within a residential area. However, the proposed storage area is within the confines of the existing Bauchrieh service station and the proposed activity is primarily to undertake a full inventory of transformers and to drain and ship the contaminated oil. Therefore **no land is to be acquired** and there will be **no involuntary displacement** or total or even partial loss of livelihoods. The Operational Policy 4.12 on Involuntary Resettlement is not triggered. Public

<sup>&</sup>lt;sup>39</sup> Refer to Annex 3 for a complete list of these guidelines

consultations and disclosure took place during the preparation of the ESIA (see section on Environment below).

#### F. Environment (including Safeguards)

87. The nature of the project is to safely manage polluting PCB-containing equipment and thus the project, by its very nature, is a public good and will result in significant environmental improvements and long-term public health benefits. Since Lebanon does not have a local disposal facility; the PCB containing equipment will be exported to licensed facilities abroad (such as in Germany, Denmark, Sweden, or any country that has suitable incinerators for hazardous waste) in accordance with the requirements of the Basel Convention.

88. However there are risks associated with the handling of PCBs, both to humans and the environment, if appropriate safeguards measures are not implemented. The potential risks associated with the inadequate management of PCBs with a concentration of more than 50 ppm by weight include contamination of soils, groundwater and surface water resulting in long-term local and global impacts. The persistent and toxic nature of PCBs has high risks to human health, including being a potential carcinogen and having possible developmental impacts. Poor management of PCBs can involve a high risk to the neighborhood community and to the project site employees.

89. Due to the diverse nature of the risks associated with the project activities, the project is classified as Category A, in accordance with World Bank Operational Policy 4.01, requiring a full environmental and social impact assessment, and extended disclosure, including multiple rounds of consultations. Especially, Component 2: *Disposal of high-content PCB equipment and contaminated oil* has potential negative impacts if not managed properly. The entire operation of Component 2 including packaging, transport, dismantling and cleaning of transformers and the final disposal will be the responsibility of an international contractor. The Contractor is required to have in place an Environmental Management System (EMS) to implement the necessary mitigating measures and includes training of local staff and occupational health and safety measures. A qualified expert (from MOE or PMU) will monitor the work of the contractor. As part of project appraisal, the scope of work of the expert who will monitor the work of the contractor was prepared.

90. An Environment and Social Impact Assessment (ESIA) was prepared by MOE and EDL in January 2013, which details the status of baseline environment and describes the potential impacts of project activities. This ESIA was conducted in a comprehensive manner and went beyond the scope of the project in case MOE and EDL decide to manage PCB on their own in the future. The report also includes an Environment and Social management Plan (ESMP) which defines safeguard measures needed to be taken with respect to project activities and identifies capacity building and institutional strengthening activities. MOE will need to ensure that all project activities (those funded from the Grant and those funded by GOL) are implemented in accordance with the ESMP. Multiple rounds of consultations have been held, including individual discussions with key stakeholders and two workshops (November 2012 and May 2013). The Executive Summary was translated into Arabic and the draft ESIA was disclosed in-country and in the Bank Infoshop on March 21, 2014.

#### **Annex 1: Results Framework and Monitoring**

#### **Country: Lebanese Republic**

#### **Project Name: LB: PCB Management in the Power Sector Project (P122540)**

#### **Results Framework**

#### **Global Environmental Objectives**

PDO Statement: The objective of the project is to dispose of high risk PCBs and improve the inventory management of transformers in the power sector in an environmentally sound manner.

These results are at : Project Level

		Global	Environm	ental Obj	ective Indi	cators			
			С	umulative T	Target Value	es			
Indicator Name	Baseline	YR1	YR2	YR3	YR4	YR5	End Target	Frequency/Source	Responsibility
Direct project beneficiaries (Number) - (Core)	0	0	0	200,000	200,000	205,500	205,500	Biannual Progress Report	PMU
Female beneficiaries (Percentage)	0						50.00		
POPs& POPs waste destroyed, disposed or contained in environmentally sound manner (Metric ton) - (Core)	0	0	0	50	50	300	300	Biannual Progress Report	PMU
EDL transformers recorded in the inventory (Number)	0	0	2,000	2,000	21,000	21,000	21,000	Biannual Progress Report	PMU
	-		Intermedi	ate Results	Indicators			-	
			Cumu	lative Target	Values				
Indicator Name	Baseline	YR1	YR2	YR3	YR4	YR5	End Targe	t Frequency/Sour ce	Responsibility
Contract for Inventory signed (Number)	0	1	1	1	1	1	1	Biannual Progress Report	PMU
Contract for First Shipment and Disposal of PCB signed (Number)	0	0	1	1	1	1	1	Biannual Progress Report	PMU
Client days of training provided (Number) - (Core)	0	0	10	20	30	40	40	Biannual Progress Report	PMU
Client days of training provided - Female (number) (Core)	0	0	2	4	6	8	8	Biannual Progress Report	

#### **Annex 2: Detailed Project Description**

#### A. Background

91. **Persistent Organic Pollutants (POPs)** are chemical substances that persist in the environment, bio-accumulate through the food web and pose a risk of causing adverse effects to human health and the environment.<sup>40</sup> POPs have four key characteristics. They are: (i) *toxic*, causing adverse health effects, such as birth defects, damage to immune and respiratory systems, and critical organs; (ii) environmentally *persistent*, by resisting breakdown by natural processes, and, in some cases, remaining in the environment for decades; (iii) *soluble* in fatty tissue, therefore they bio-accumulate exponentially up in the food chain; (iv) *semi-volatile*: through cycles of evaporation and atmospheric cycling and deposition they are capable of traveling very long distances. POPs have been found on every continent on the planet, and in every major climatic zone.

92. The POPs include nine pesticides (DDT being the best known), **polychlorinated biphenyls** (**PCBs**), dioxins and furans. PCBs are a group of organic compounds used in the manufacture of plastics, as lubricants, dielectric fluids in transformers, protective coating for wood, etc. due to their excellent dielectric properties and low inflammability.<sup>41</sup> However, exposure to PCBs is believed to cause illnesses such as cancer in humans and animals.<sup>42</sup>

93. The GOL is committed to eliminate the PCBs and became Party to the *Stockholm convention* on January 3, 2003 (Law 432). It completed its National Implementation Plan (NIP), which identified the following priorities in terms of POPs management: (i) awareness raising; (ii) institutional and regulatory strengthening; (iii) PCB management; and (iv) management of emissions of dioxins and furans. Lebanon banned imports and exports of PCBs (Decree 4461/2000) and enacted laws to preserve the environment against pollution from hazardous waste and PCBs (Law 64/1988) and to increase the safety conditions of workers while using chemical products (Decree 11802/2004).

94. To address its commitments towards the *Stockholm Convention*, a preparatory study conducted a <u>rapid inventory</u> of PCB equipment and contaminated sites in Lebanon's public and private sectors in 2010 (COWI, 2011).<sup>43</sup> The inventory focused on the high-content PCB equipment, contaminated transformers and contaminated sites. The results show that EDL possesses the majority of PCB equipment, i.e. **29** Askarel transformers and **495** PCB capacitors, with a total weight of 191 tons; and 2,800 PCB-contaminated transformers, containing 1,000-1,600 tons of PCB contaminated oil. In addition, the Bauchrieh storage site and well contain at least 100 tons of PCB contaminated oil. The following paragraphs provide a summary of the findings of high-content PCB equipment and PCB contaminated transformers.

<sup>40</sup> UNEP Chemicals: http://www.chem.unep.ch/pops/

<sup>&</sup>lt;sup>41</sup> https://stats.oecd.org/glossary/

<sup>&</sup>lt;sup>42</sup> See USEPA. 2013. Health Effects of PCBs, and Kramer, S., Hikel, Stephanie Moller; Adams, Kristen; Hinds, David; Moon, Katherine (2012). "Current Status of the Epidemiologic Evidence Linking Polychlorinated Biphenyls and Non-Hodgkin Lymphoma, and the Role of Immune Dysregulation". *Environmental Health Perspectives* 120 (8): 1067–75.

<sup>&</sup>lt;sup>43</sup> This study updated the previous inventory of PCB oils and PCB contaminated equipment in Lebanon done during the preparation of the NIP and financed by GEF (2005).

#### High-content PCB equipment

95. *Askarel transformers* are manufactured with liquids typically consisting of around 60 percent PCBs (600,000 mg/kg). These are transformers intentionally filled with PCB by the manufacturers. Experience shows that more than 99 percent of these transformers can be identified by indication of PCB presence on the nameplate (Askarel, Pyralene, Sibanol, etc.). The table below shows the information on Askarel content and total weight of in-service and out-of-service transformers.

Table 4: Inventory of	f Askarel tran	sformers				
Site	Capacity (KVA)	Type of Askarel	Number of transformers	Transformer weight without liquid (t/transformer)	Weight of liquid (t/transformer)	Total weight (t)
IN SERVICE						
Jieh	7000	Pyralene	3	11.2	7.5	56.1
Jieh	750	Pyralene	8	2	1	24.2
Jieh	400	Pyralene	1	1.4	0.7	2.1
Jieh	6000	Sibanol	2	13.2	9.9	46.2
Jieh	750	Sibanol	3	3.8	2.2	18
Sub-total			17	89	58	147
OUT OF SERVICE						
Jieh	750	Sibanol	1	3.8	2.2	6
Zouk	200	Askarel	4	0.8	0.4	1.2
Zouk	315	Askarel	2	0.8	0.5	1.3
Zouk	315	Askarel	2	1.1	0.5	1.6
Zouk	400	Askarel	2	1.2	0.5	1.7
Bauchrieh	n.i.	n.i.	1	0.8	0.1	0.9
Sub-total			12	14	7	21
TOTAL			29	103	65	168

Note: The sub-totals of columns 5 and 6 reflect total weight (tons) instead of unit weight (ton/transformer).

96. *PCB capacitors* are closed containers, which have about 33 percent PCB (333,000 mg/kg). In some cases, it is specifically mentioned that the capacitors are filled with PCB (e.g. Pyralene, Sibanol, etc.), but often it is necessary to determine the content based on information on which the capacitors were produced with PCB. The table below provides the results of the inventory of PCB capacitors.

Table 5: Inventory of PCB	capacitors		
Substation	Capacitors (number)	Estimated Weight of capacitors (tons)	
IN SERVICE			
Jdeideh	6	0.3	
Total in service	6	0.3	
OUT OF SERVICE			
Adma	35	2.1	
Basta	66	2.8	
Bauchrieh	135	8.1	
Deir Nbouh	11	0.5	
Gaz	171	5.4	
Hazmieh	11	0.5	
Jamhour	60	3.0	
Total out of service	489	22.4	
TOTAL	495	23	

Data may not add up due to rounding

#### **PCB** contaminated transformers

97. As indicated in the table below, there are about 21,000 transformers in the electrical network, most of them located in the distribution network, transformers are used to reduce the primary voltage of the electric distribution system to the utilization voltage serving the customer. The distribution transformers are typically mounted on a pole in the street, located in a transformer box or inside a building. Damaged transformers are sent to a central repair shop in Bauchrieh. The repair shop at Bauchrieh can handle light repairs. Transformers that require extensive repair are transferred to one of two private contractors (Lebanese Electrical Services (LES) or Matelec). Non reparable transformers are stored on site at Bauchrieh storage site, for up to several years until they are sold as scrap.

98. Contaminated transformers are those contaminated with PCB in the range of hundreds to thousands mg/kg. These transformers have not been intentionally filled with PCB, but they are either contaminated when manufactured or by replacing the oil, cleaning the oil or topping up with contaminated oil. In general, the PCB content of contaminated oil filled transformer is 1000 times lower than that of an Askarel transformer.

	Nb. of Transfomers	Nb of	Contaminated oil
PCB Contaminated Transformers ( <u>Estimate</u> )		Contaminated	( <b>t</b> )
		Transfomer	
Distribution network	18,800	2,500	650-1050
Substations and power plants	224	35	150-300
Hydropower plant	76	25	70-100
Bauchrieh (incl well)	1,900	280	100
Total (round estimate)	21,000	2,800	1,000-1,600

 Table 6: Estimated Number of PCB Contaminated Transformers

99. *Distribution network*. EDL's database holds information for 18,800 transformers in the distribution network. The database includes information on the location, serial number, capacity (kVA), manufacturer and year of manufacture. It does not include information on the weight of

transformers, amount of liquid, type of liquid filling or presence of PCB.

100. *Bauchrieh Storage*. The Bauchrieh storage site stores three groups of distribution network transformers (each in a separate area). At any point in time, the site is likely to have the following:

- New or refitted transformers ready to be taken into use (about 400). These transformers come from the Matelec or LES and are stored in Bauchrieh until they are taken into service.
- Transformers taken out of service and waiting for inspection (1,200 1,500).
- Irreparable transformers (about 160)

101. **Contamination**. Based on site visits and analysis conducted during the preparation of the project (COWI, 2011) it was possible to roughly estimate the extent of PCB contamination. It was found that the PCB concentration of the transformers varies between 50 and 2,000 mg/kg with the highest concentration found in pre 1985 transformers stored in Bauchrieh.

102. A clear distinction between out of service and in service transformers is only possible for the relatively few stored decommissioned transformers in Bauchrieh. Otherwise a number of transformers change status every year. It is complicated to get an exact picture as transformers may move several times between the repair shop and the storage. A simplified idea can be summarized as follow: around 600 transformers arrive in Bauchrieh every year. Of these about 50 are decommissioned, 250 are repaired at Bauchrieh and 300 sent to Matelec and LES for repair. Based on the survey it is estimated, that for these 600 transformers, about 205 tons of oil will be drained **annually**<sup>44</sup>, of which about 50 tons of oil will be contaminated.

#### **B. Project description**

103. **Project rationale**. COWI's rapid inventory <u>accurately</u> identifies the number of high content PCB transformers, based on thorough inspections of all thermal power plants in Lebanon.<sup>45</sup> By contrast, it estimates the number of PCB contaminated transformers based on sampling and testing of a small share of existing transformers<sup>46</sup>, then extrapolating the findings to the total number of transformers owned by EDL. Because of that, COWI's inventory provides only a <u>rough estimate</u> of the number of PCB contaminated transformers, without clearly identifying the contaminated transformers and their level of contamination in each site. Therefore, conducting a **complete inventory of PCB contaminated transformers** across country is absolutely needed to get a realistic picture of the number of contaminated transformers, their localization and level of contamination. Such an inventory will set the stage for any action to remove PCBs from the country beyond the proposed project.

104. Prioritizing actions to remove the PCBs should be based on the risk of exposure to PCB. *Environmental exposure* to PCBs may originate from leaking PCB-containing liquids, which can then evaporate in the atmosphere or infiltrate in groundwater or surface water. In addition,

<sup>&</sup>lt;sup>44</sup> Assuming average oil content of 340 kg per transformer.

<sup>&</sup>lt;sup>45</sup> These include Beddawi (North of Lebanon), Hraiche-Qadisha (North), Zouk (Mount Lebanon), Jieh (Mount Lebanon), Zahrani (South), Sour (South) and Baalbeck (Bekaa) (COWI 2011, p. 38)

<sup>&</sup>lt;sup>46</sup> Testing was conducted on 78 transformers from the distribution network (out of 19,000), 37 transformers from substations and power plants (out of 300 in total) and 24 transformers with Buchholz relay in Bauchrieh, older than 1985 (out of 2000 in total) (COWI 2011, p. 53).

*people* may be exposed to PCBs, either by direct contact with PCB-containing liquids, or indirectly, via the environment (water, food). The risk of contamination directly correlates with the amount of PCBs in the equipment, the condition and management of the equipment. Consequently, **high-content PCB equipment poses the highest risk** of contamination to people and environment. Eliminating this equipment is in accordance with the *Stockholm convention*, which gives highest priority to removing equipment containing more than 10 percent PCB (>100,000 mg/kg) and volumes greater than five liters. In addition, **PCB contaminated transformers** also pose a high risk of contamination to employees, particularly those working in the repair shops, due to continuous exposure over years.

105. **Project approach**. Given the risk of high content PCB equipment and the priorities set by the *Stockholm convention* to eliminate PCB from Lebanon by 2025, this project will take action to: (i) conduct a **country-wide inventory** of the PCB contaminated transformers in the power sector in Lebanon, which will update the findings of the 2010 survey; (ii) dispose of all the **high content PCB equipment** owned by the EDL and potentially by the private sector, and of the PCB **contaminated oil** from Bauchrieh; (iii) provide **capacity building** to stakeholders for an improved PCB management in the future.

106. **Project components**. The project includes three components:

# **Component 1. Inventory of PCB contaminated transformers (US\$0.79 million)**

107. This component will support a countrywide inventory of the 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).

108. The purpose of the inventory is twofold. At the country level, it will identify the contaminated transformers and their level of contamination in each site, thus providing a clear picture of the extent of PCB contamination in the power sector. At the local level (Bauchrieh), the inventory will result in good engineering practices, particularly in terms of health and safety protocols, sampling, testing and labeling of PCB oil. These practices will be reflected in on-site training of local staff during the period of inventory, as well as in written guidelines to be used for the management of incoming transformers in Bauchrieh after the end of the project.

109. Conducting the inventory of PCB contaminated transformers is based on the following steps:

- (i) *Desk review* of EDL database to identify the number of transformers potentially contaminated;
- (ii) *Sampling*, by taking a 50 ml sample of oil from each transformer potentially contaminated.
- (iii) On-site testing of PCB by using the Clor-N-Oil technique a method to test electrical insulating fluids for the presence of PCB. The analysis takes less than 5 minutes per sample and results in either 'below 50 ppm' or 'above 50 ppm'. If the result is 'below 50 ppm', the transformer is labeled PCB-free. If the result obtained is 'above 50 ppm', then additional testing is needed (see point iv).

(iv) *Lab testing of PCB*. If the result of Clor-N-Oil test is 'above 50 ppm', the sample will be tested in a lab by using Gas Chromatography (GC) analysis. This analysis provides an accurate estimation of the number of ppm contained in the tested oil. If this number is below 50 ppm, then the oil is PCB-free and the transformer will be labeled accordingly. If the result is above 50 ppm, the transformer will be included in the inventory of the PCB transformers.

110. As mentioned a large number of contaminated transformers are expected to be found in Bauchrieh as it holds the highest number of pre 1985 stored transformers. It is expected that about 45 tons of contaminated oil can be drained from the stored transformers in Bauchrieh. This quantity along with any stored barrels of contaminated oil will be disposed of under Component 2.1; so as to totally eliminate any contaminated oil from Bauchrieh repair site. This will contribute to **substantially reduce cross contamination**.

# Component 2. Disposal of high-content PCB equipment and contaminated oil (US\$1.10 million)

111. This component will support the sustainable disposal of all high-content PCB equipment owned by the EDL and the replacement of the in-service PCB equipment.

#### Component 2.1 Disposal of out-of-service high content PCB equipment (US\$0.21 million)

112. EDL's out-of-service equipment includes 12 Askarel transformers and 489 capacitors, with a total weight of 44 tons.<sup>47</sup> Removing this equipment will also require to dispose of 10 tons of highly 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.

113. 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<sup>48</sup> and will perform drainage of transformers, collection of empty transformers, liquid, and capacitors, packaging, transport and destruction abroad. The tender for this contract will be launched as soon as the project becomes effective.

# Component 2.2 Disposal of in-service high content PCB equipment and contaminated oil (US\$0.89 million)

114. *In-service high content PCB equipment in Jieh*. The in-service equipment includes 17 Askarel transformers and six capacitors, with a total weight of **147 tons**. All in-service Askarel

<sup>&</sup>lt;sup>47</sup> Transformers are located in Zouk power plant (10); Jieh (1) and Bauchrieh (1). Capacitors are found at 7 EDL sub-stations: Adma (35) Basta (66), Bauchrieh (135), Deir nbouh (11) Gaz (171), Hazmieh (11) and Jamhour (60).

<sup>&</sup>lt;sup>48</sup> These include drums for Askarel, UN certified packages for capacitors and containers for empty Askarel transformers, tools for Askarel drainage, personal protective equipment for staff, absorbant material for emergency cases, tools for soil excavation, UN certified packaging for PCB contaminated soil; crane for loading, etc.

transformers are located in Jieh power plant. The Jieh plant includes five old units with 17 inservice transformers. This component will finance the disposal of all in service Askarel transformers and capacitors in Jieh. As part of the project parallel financing, EDL will be responsible for purchasing and replacing these transformers to allow continuity of electricity generation.

115. *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 **five tons**. MOE will contact these companies as well as other agencies (e.g. concessions, etc.) to check their willingness to dispose of their PCB equipment (capacitors and transformers) through the proposed project.

116. *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. As part of the project parallel financing, EDL will be responsible for purchasing PCB-free oil, to be used for transformers' maintenance and repair.

117. Similar to Component 2.1, the most cost-effective way of disposing in-service equipment and contaminated oil<sup>49</sup> is export to licensed facilities abroad in accordance with the requirements of the Basel Convention. The responsibility for 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. The tender for this contract is expected to be launched a year and a half after the project becomes effective.

#### Component 3. Capacity building and project management (US\$0.65 million)

118. 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.

119. **PMU staffing**. Given the size of the project, it is expected to establish a small PMU and to use existing technical and fiduciary staff within MOE to the extent possible. It is foreseen that a Project Manager and assistant Project Manager will be recruited for the PMU and will work on a full time basis. With regard to Procurement and FM support, the project will rely on the fiduciary staff of MOE who will also be working on another WB funded project (LEPAP). The two staff members have already received fiduciary training and are starting to become familiar with WB procedures.

<sup>&</sup>lt;sup>49</sup> In theory, purchase of rental of a dechlorination unit to decontaminate oil on-site is feasible. However, in practice, such an investment is economically viable only for quantities higher than 300 tons (see economic analysis for more details).

120. **Monitoring and reporting**. PMU will be responsible for monitoring project performance. This will involve constant coordination with various consultants, contractors, EDL, repair shops to ensure the implementation of the project ison time. Close monitoring will enable to catch problems early on and avoid long delays in implementation.

121. **Training** to institutions (e.g. MOE, EDL) on improved management of PCBs, working with databases, and other project management aspects (procurement, etc.). This will facilitate implementation of future actions to eliminate the remaining PCB in the country. In addition, the component will offer capacity building to local staff (workers, technicians) on reviewing, sampling, testing, draining and labeling of PCB contaminated oil. This will enable them with useful knowledge for the identification of the remaining PCB transformers in the country.

## C. Parallel financing by the Government of Lebanon

122. Both MOE and EDL have committed to provide parallel financing to this project (EDL Board Decision of Oct 11, 2011 and MOE letter dated June 15, 2012) for a total contribution of about **US\$4.7 million** both in kind and cash over the duration of the project. This contribution will go towards reinforcing activities under the proposed project. All parallel financed activities will complement GEF funded activities. Activities funded by the GEF grant have been kept clearly separate from activities that will be funded by MOE and EDL, to the possible exception of the replacement of in-service Askarel transformers for Jieh. In this case, EDL has started the tendering process of purchasing new transformers. If, for any reason, the tendering fails, EDL is still committed to dispose of Askarel transformers in Jieh.

123. **MOE** contribution (both cash and in kind) will cover:

- a. Laboratory accreditation (Component 1)
- b. Investigation and site assessment of Bauchrieh well (Component 2)
- c. Coordinating with private companies on the disposal of PCB capacitors (Component 2)
- d. Strengthening the legal framework for improved PCB management (Component 3)
- e. Public awareness (Component 3)
- a. **Laboratory upgrade**. Currently, no laboratories in Lebanon hold accreditation for the analysis of PCB in dielectric oil, waste products, soil or any other media. The Lebanese National Implementation plans for the Management of Persistent Organic Pollutants provides an overview of laboratory infrastructure for regulatory chemical analysis. Of 16 listed laboratories, only two have in-house PCB testing capabilities: Environmental Core Laboratory of the American University of Beirut and the laboratory of the Industrial Research Institute. Both of them have the necessary equipment for performing GC/Electro Capture Detector analyses at the desired detection level. It is thus envisaged to upgrade one of the laboratories to a level where it can obtain international accreditation for the identification of PCB in dielectric oils, waste oils and soil.
- b. **Investigation, assessment of Bauchrieh site**. Bauchrieh storage site and well are widely contaminated. This activity involves site investigation (e.g. lab analyses), assessment (e.g. preparing detailed plan for emptying the well, establishing capacity for the interim

storage of the oil removed from the well in drums or tanks, investigating the depth of sludge/sediment layer and estimating the quantities of sludge/sediment in the well), initial removal of some contaminated oil and sludge/sediment from the well and its preparation for shipment.

- c. **Coordinating with private companies on the disposal of PCB capacitors**. The rapid inventory (COWI, 2011) identified three private companies that held PCB containing capacitors with a total weight of about five tons. MOE will be responsible for contacting and coordinating the disposal of this equipment through the project.
- d. **Strengthening the legal framework for improved PCB management**. This includes preparation of a PCB decree with implementation guidelines for PCB management. The application decree for PCB management should be pursuant to Law 432 of 29/07/2002 (the law ratifying the *Stockholm convention*) and should be based on Law 64 of 1988 and would supersede Decision 71.1 of 1997 (on waste import). The recommended scope of the decree should ensure compliance with the PCB requirement set out in the *Stockholm convention*. The proposed scope of the Decree is described in the box below.

The main	n elemei	its of the pi	roposed decree on PCB:	
		C 1 1	1 1 6 1.1	

- The objective of the decree and definitions;
- **Production, placing on the market, use and maintenance of PCB and equipment containing PCB**. It implements the deadline for phasing out of PCB-containing equipment set in the *Stockholm convention* (equipment containing PCBs in volumes more than dm3 (5 litre) shall be taken out of service no later than 2020; where such equipment contains only between 0.005% and 0.05% PCB it may be used until 2025);
- For what, by whom and how inventory of PCB-containing equipment shall be made;
- Provisions for the **labelling**;
- Provisions for **storage, transport, decontamination and disposal of equipment containing PCB.** It implements the deadline for disposal/decontamination of PCB-containing equipment set in *Stockholm convention* (2028 for equipment subject to inventory).
  - Equipment containing PCB and any mixture containing more than 0.005% PCB shall ultimately either be incinerated on land or be decontaminated/destructed by biological or physico-chemical treatment; It is prohibited to landfill this waste.
  - Transport, storage and disposal of equipment and other waste containing PCB are only to be undertaken by companies holding an appropriate permit.
  - PCB-disposal undertakings shall keep registers of the quantity, origin, nature and PCB content of used PCBs delivered to them. They shall communicate this information to the Ministry of Environment.
- Define analysis methods for **analysis of PCB**.
- **Permitting requirements** including how to apply and the condition for obtaining a permit. Decontamination of PCB-containing transformers are only to be undertaken by specialized companies
- Administrative provisions, including enforcement.
- e. **Public awareness**. It will include awareness raising activities targeting MOE, EDL staff, workers and managers of repairs shops, electricians and managers of potential holders of PCB equipment, as well as the general public.
- 124. **EDL** contribution will cover:
  - a. Database update for EDL (Component 1)
  - b. Replacement of transformers in Jieh power plant and purchase of PCB-free oil (Component 2)
  - c. Coordination in project implementation (Component 3).

- a) **Database update for EDL**. This activity will support: (i) updating the database of PCB contaminated transformers based on the results of the countrywide inventory conducted during Component 1; and (ii) ensuring a continued system of monitoring and updating the database.
- b) **Replacement of transformers in Jieh power plant and purchase of PCB-free oil.** EDL is responsible for purchasing and replacing transformers of Jieh power plants so that the existing 17 in-service Askarel transformers and six PCB capacitors can be disposed of through the project. In addition, EDL will purchase PCB-free oil that will be needed for the transformers' maintenance and repair in Bauchrieh.
- c) **Coordination in project implementation**. EDL will work in close collaboration with MOE to ensure timely implementation of the project. In particular, EDL will be responsible for the tendering process of purchasing and replacing the in-service Askarel transformers and PCB capacitors at Jieh. EDL will ensure good coordination between the dismantling and removal of in-service Askarel transformers (by MOE) and the replacement with PCB-free transformers (by EDL).

#### **Annex 3: Implementation Arrangements**

## Lebanese Republic: PCB Management in the Power Sector Project (P122540)

### A. Project Institutional and Implementation Arrangements

125. **The Ministry of Environment**, which has a responsibility for regulating hazardous substances including POPs in Lebanon, will be the implementing agency of this project. It will have the principal responsibility for project oversight and implementation and will establish a **PMU** to be headed by a Project Manager with expertise in hazardous waste management and will include procurement and financial management specialists. The project will be mapped to the *Department of Chemical Safety* under the *Service of Environmental Technology*. Since the Ministry of Environment is also implementing other WB funded projects, fiduciary staff already trained and familiar with WB procedures will work across projects to ensure cost effectiveness.

126. The **Electricité du Liban** is an autonomous state-owned entity under the jurisdiction of the Ministry of Energy and Water. As it owns most PCB equipment in Lebanon, EDL has been heavily involved in the preparation of this project. The Director General of EDL released an administrative circular<sup>50</sup> appointing a five staff from EDL to form a **PCB Committee at EDL**. The committee includes representatives from the departments of production, transmission and distribution. The committee was mandated to coordinate with MOE on PCB issues. It has been very active during preparation and the intention is for it to continue to be active during implementation.

- 127. The **PMU** will be composed of:
  - a. A full time Project Manager (PM). The PM should have expertise in hazardous waste management. S/he will be responsible for project oversight, coordination with EDL, coordination with other department within MOE to ensure that information and project progress is constantly being shared with the ministry; project monitoring and reporting. The PM will be fully funded from the GEF Grant. The PM will also oversee the proper implementation of the ESMP.
  - b. An Assistant Project Manager who will assist the PM in day to day administrative procedures. The assistant PM will be fully funded from the GEF Grant.
  - c. A Procurement and Financial Management specialists will oversee the fiduciary requirement of the project. As MOE will be implementing another WB funded project, it will make use of the same fiduciary staff to the extent possible in order to be as cost effective as possible.
  - d. Two focal points (one from MOE and one from EDL) will be nominated to be part of the PMU to ensure full and constant coordination between MOE and EDL during project implementation.
  - e. Expertise in sectors related to the project such as: pollution control, awareness, media, monitoring, legal and institutional <u>will be drawn from existing staff within MOE</u>. This is part of the in kind contribution of MOE.

<sup>&</sup>lt;sup>50</sup> No. 163 dated November 19, 2010

f. In addition, technical experts can be recruited on a needs basis to complement PMU/MOE qualification.

128. MOE and EDL will coordinate the implementation of the project with a broader set of institutions and bodies with potential competence in PCB management, a list of which is provided in the table below:

Main Institution	Competencies
Council of Ministers	• Enacts regulations in the form of Decisions and Decrees related to PCB use, storage and final disposal
MOE	<ul> <li>Focal point for Stockholm and Basel Conventions.</li> <li>Control compliance with legislation on environment in the process of manufacturing, storage, transport, use and disposal of dangerous substances and their wastes including PCBs.</li> <li>Monitors pollution (Service of Environmental Technology &amp; Service of Regional Departments and Environmental Police) including leakages from PCB contaminated equipment, PCB contaminated areas, etc.</li> </ul>
MOEW/EDL	<ul> <li>MOEW prepares plans and strategies related to Energy and Water in the country.</li> <li>Energy Regulatory Agency under MOEW specifies standards and technical requirements applicable to electrical equipment (<i>including PCB free equipment</i>).</li> <li>Ensures that electrical equipment are <i>PCB free</i> and do not cause any damage to public health, public safety and the environment.</li> <li>At EDL, the Department of workshops, equipment, spare parts and transformers deals with the management and reparation of transformers, monitors their movements and storage and registers all related information including receiving and delivery of transformers, and their redirection.(<i>Separation of PCB contaminated transformers from non-PCB transformers and final safe storage a/o disposal of PCB contaminated transformers</i>).</li> <li>Department of workshops, equipment, spare parts and transformers at EDL is also in charge of testing transformer oils continuously (<i>PCB testing in oil in the future</i>), refining them when necessary and maintaining refining equipment.</li> </ul>
Ministry of Industry/ Industrial Research Institute (IRI)	• IRI earned accreditation for more than 300 testing methods used in a dozen lab units ( <i>PCB testing method is to be accredited</i> ).
Ministry of Labor	• Defines specific conditions related to occupational health and safety of workers including workers handling chemicals, special products and <i>PCB equipment</i> .
Ministry of Finance /Customs	• Prohibit the import and export of PCB contaminated oil and PCB contaminated equipment(transformers and capacitors)

### **B.** Financial Management and Disbursement Arrangements

#### **Financial Management Risk Assessment**

129. The Bank assessed the adequacy of the project FM arrangements proposed by the implementing entity. The arrangements are considered acceptable if the entity budgeting, accounting, internal controls, funds flow, financial reporting, and auditing arrangements are: (a) capable of correctly and completely recording all transactions and balances relating to the project; (b) facilitate the preparation of regular, timely, and reliable financial statements; (c) safeguard the project's assets; and (d) are subject to auditing arrangements acceptable to the Bank.

130. The FM risk was assessed as "**Substantial**" before mitigation measures; however this rating is expected to be lowered to "Moderate" when the proposed mitigation measures are

effectively implemented. The key risks are the following: (i) no experienced and dedicated staff member to undertake the FM activities; (ii) lack of accounting system to record and produce financial reports; (iii) weak internal control system; (iv) lengthy process of opening a DA for a previous IDF Grant implemented by MOE and (v) weak external audit function.

131. MOE will need to implement the following mitigating measures to reduce the FM risk level to moderate: (i) to recruit an experienced Financial Officer (FO) according to terms of reference (TORs) acceptable to the Bank (ii) to adopt a ring fenced accounting system based on excel spread sheets to record daily transactions and produce the periodical financial reports; (iii) to prepare a financial management manual (iv) to open a segregated bank account for the purpose of the grant. This needs to be clearly spelled out in the grant endorsement decree and closely followed up by MOE; and (v) to ensure that an independent qualified external auditor is contracted according to TORs acceptable to the Bank; the audit report will be delivered to the Bank no later than six months after the end of each fiscal year.

## **Financial Management Arrangements:**

132. **Staffing & Organization**. The MOE is understaffed and has limited experience in implementing Bank financed projects. Therefore for the purpose of the project, a FM specialist will be assigned from the MOE staff to carry out the FM implementation of the Project. The FM specialist will also be working on other Bank financed projects implemented by MOE. The World Bank will provide the necessary training and support in FM procedures and reporting guidelines.

133. **Internal Controls.** The MOE has weak internal control function. The internal controls are set as per the internal bylaws of the MOE. The MOE is subject to the audit of the Court of Accounts on post review. For this purpose, the project will prepare a <u>financial management</u> <u>manual</u> containing detailed information about the FM procedures and rules governing the flow of activities, internal control procedures in addition to specific responsibilities undertaken by each member of the unit.

134. **Budgeting**. Grant's funds will be channeled through the single treasury account, thus the project flow of funds will go through the transit account of MOF and they will be transferred to the DA of the project. For the purpose of the project, a project annual budget and disbursement plan will be produced and maintained by the project based on the project procurement plan and implementation schedule to ensure timely availability of funds. It will be used as an effective monitoring tool for comparing planned expenditures with actual ones and monitoring the existing variances.

135. Accounting System and Financial Reporting. The MOE does not have an accounting information system to process accounting transactions. Accordingly, the financial data are compiled manually on the "Grand Livre" and financial reports required as per the internal control law are prepared manually. For the purpose of this grant, a ring fenced accounting system will be adopted where excel spreadsheets will be used to generate the required Project Interim Un-audited financial reports (IFRs) and the Project Financial Statements (PFS). The documentation and supporting documents shall be maintained at MOE for subsequent review

and audit. The Bank will provide further trainings and guidance to set up the recording format for spreadsheets when project starts. The IFRs will be in compliance with International Public Sector Accounting Standards (IPSAS) format of financial statements as the Project will be recording the grant transactions using the cash basis of accounting. The IFRs will be composed of the following:

- a "Statement of Cash Receipts and Payments by category" and
- Accounting policies and explanatory notes including a footnote disclosure on schedules: (i) "the list of all signed Contracts per category" showing Contract amounts committed, paid, and unpaid under each contract, (ii) Reconciliation Statement for the balance of the Project's DA, (iii) Statement of Cash payments made using Statements of Expenditures (SOE) basis, and (iv) Statement of Fixed Assets.

136. These Project IFRs will be prepared on a quarterly basis and submitted to the Bank within 45 days at the end of each quarter.

137. The PFSs, prepared in accordance with IPSAS – Cash Basis - should contain the same information as the quarterly IFRs but cover an annual period. The audited PFS would be submitted to the Bank no later than six months after the end of each fiscal year<sup>51</sup> (see External Audit Arrangements below).

138. **External Auditing.** The PFS will be audited by an independent private external auditor acceptable to the World Bank. The audit will be comprehensive and will cover all aspects of the project, including compliance with the financial management manual, review of effectiveness of the internal controls system, and compliance with the Financing Agreement. The audit will be carried out in accordance with International Standards on Auditing. The audit report and audited PFSs, along with management letter, will be submitted to Bank no later than six months after the end of each fiscal year. In addition, the project management letter will contain the external auditor assessment of the internal controls, accounting system, and compliance with financial covenants in the Grant Agreement. The audit TORs will be finalized and agreed upon with the Bank three months after project effectiveness. Moreover, the Bank makes publicly available the borrowers' audited annual financial statements for all investment project financing operations.

139. Flow of Funds and Cash Management. The funds will be transferred from the Bank to the project in accordance with the provisions of the Financing Agreement. The funds will be channeled first from the World Bank to the *MOF Account for Grants and Donations* and then transferred – without delay- to the DA opened for the project under the treasury account. MOE will open a separate DA in US\$ at the Central Bank of Lebanon to receive the Grant proceeds. Deposits into, and payments from the DA will be made in accordance with the provisions stated in the Grant Agreement and disbursement letter and as outlined in the World Bank "*Disbursements Guidelines for Projects*".

140. To note that for a previous IDF grant "Supporting the Judiciary for the Enforcement of Environmental Legislation" implemented by MOE, there were **delays in opening the DA** due

<sup>&</sup>lt;sup>51</sup> Project fiscal year ends December 31.

to delays in issuing the decree by the Council of Ministers allowing the opening of the DA, in addition, the decree stated that the MOE will use its main account to receive the funds. Therefore, to avoid a similar situation, this needs to be closely followed upon by MOE at the endorsement of the grant degree by the Council of Ministers where it should be clearly stated that a **separate DA needs** to be opened at the Central Bank of Lebanon for depositing the World Bank grant funds.

### **Disbursement Arrangements**

141. To ensure that funds are readily available for project implementation, MOE through MOF will open a DA in US Dollars under the treasury account at the Central Bank of Lebanon. Deposits into, and payments from, the DA will be made in accordance with the provisions stated in the Grant Agreement and as outlined in the World Bank "Disbursements Guidelines for Projects" by means of advances, replenishment and reimbursements. Replenishments of the DA will be against Withdrawals Applications. The Ceiling of the DA is set at US\$ 250,000. MOE will be responsible for submitting monthly replenishment applications with appropriate supporting documentation. The funds will be channeled from the World Bank to the MOF Account for Grants and Donations, and then the funds will be channeled through this account to the DA of the project based on claim requests submitted to MOF by MOE. Other disbursement methods will be available as per the project Disbursement Letter. The categories of eligible expenditures that will be financed out of the proceeds of the Grant are provided below:

Category	Amount of the Grant Allocated (expressed in USD)	Percentage of Expenditures to be Financed (inclusive of Taxes)
(1) Goods, works and non-consulting services, consultants' services, Training and Operating Costs	2,538,900	100%
TOTAL AMOUNT	2,538,900	

142. The proceeds of the Grant will be disbursed in accordance with the traditional disbursement procedures of the Bank and will be used to finance project activities through the disbursement procedures currently used: i.e. Advances and Reimbursement. Replenishment and Reimbursement Withdrawal Applications will be accompanied by Statements of Expenditure (SOEs) in accordance with the procedures described in the Disbursement Letter and the Bank's "Disbursement Guidelines". Interim Unaudited Financial Reports and Annual Financial Statements will be used as a financial reporting mechanism and not for disbursement purposes. The minimum application size for reimbursements and direct payments will be the equivalent of US\$ 25,000 of the Advance ceiling amount.

143. E - Disbursement: The World Bank has introduced e-disbursement for all Lebanon supported projects. Under e-disbursement, all transactions will be conducted and associated

supporting documents scanned and transmitted on line through the Bank's Client Connection system. E-disbursement will considerably speed up disbursements and facilitate project implementation.

144. Necessary supporting documents will be sent to the Bank in connection with contracts that are above the SOE thresholds, except for expenditures under Contracts with an estimated value of: (a) US\$ 200,000 or less for goods; (b) US\$ 100,000 or less for Consulting Firms; (c) US\$ 50,000 or less for Individual Consultants as well as incremental operating costs, training, workshops and study tours which will be claimed on the basis of SOEs. The documentation supporting expenditures will be retained by the project and will be readily accessible for review by the external auditors and periodic Bank Implementation Support missions.

145. **Retroactive financing** of eligible and agreed completed expenditures and rendered services will apply based on the conditions and time-frame disclosed in the Financing Agreement. The project has to actually make payments to the providers of these expenditures during the retroactive financing period to get reimbursed, as per the World Bank Disbursement Guidelines.

146. The Bank will honor eligible expenditures completed, services rendered and goods delivered by the project closing date. A four months' grace period will be granted to allow for the payment of any eligible expenditure incurred (i.e., services, goods or works, received and accepted) before the Grant Closing Date.

147. *Authorized Signatories*: Authorized signatories will be nominated by MOE to sign the Withdrawal Applications (WAs). Names and corresponding specimen signatures will be submitted to the Bank prior to the receipt of the first WA (advance to DA). Each WA will be approved and signed by the authorized signatories.

148. **Governance and Anti-Corruption**. Fraud and corruption may affect the project resources, and thus impact negatively the project outcomes. The Bank team developed with the team an integrated understanding of possible vulnerabilities, and agreed on actions to mitigate the risks. The above proposed fiduciary arrangements, including the financial management manual, reporting and external audit are expected to address the risk of fraud and corruption that are likely to have a material impact on the project outcomes.

Action	Date Due	Responsible
Open a separate designated bank account	15 days from effectiveness	MOE
Adopt a ring fenced accounting system	30 days from effectiveness	MOE
Quarterly IFRs submitted to the Bank	45 days after the end of each quarter	MOE
Appoint an external auditor with TORs acceptable to the Bank	Within 6 months from effectiveness	MOE
Audit of project financial statements and management letter	Within 6 months after the end of each fiscal year	MOE

## **Financial Management Action Plan**

149. **World Bank** Implementation Support. An Implementation Support mission will be conducted at least twice a year based on the risk assessment of the project. Among the Implementation Support mission objectives is to ensure that strong financial management systems are maintained throughout the life of the project. The IFRs will be reviewed on a regular basis by the World Bank and the results and issues will be followed up during Implementation Support missions. Financial audit reports will be reviewed and issues will be identified and followed up by the Project FO. Additionally, during Implementation Support missions, the Project's financial management and disbursement arrangements (including a review of a sample of SOEs and movements of the DA) will be reviewed to ensure compliance with the Bank's requirements.

## C. <u>Procurement</u>

## **Procurement Capacity Assessment**

150. *Implementing agency*. The project will be implemented centrally by a PMU housed at MOE and will entail solid coordination with EDL. The project activities include (i) undertake an inventory of all EDL transformers that are on the distribution network; (ii) disposal of PCB contaminated equipment and materials; and (iii) selection of consulting firms and individual consultants.

151. *Past experience of MOE* in internationally funded projects: MOE is building its experience in large projects' preparation and implementation, is exposed to international projects, and lately has participated in preparation and implementation of projects under IBRD and IDF grant. The ministry has:

- a) implemented ABQAR project (financed by the European Commission "EC LIFE") for the rehabilitation of the quarries. The project (2005-2006) was of EUR316,167 (Disbursed for EUR273,000). The project was interrupted and closed following 2006 war.
- b) participated in the implementation of SISPAM (financed by the European Commission "EC LIFE") for the management of natural reserves. The project was managed/implemented by UNDP (procurement, financial) but with the close involvement of MOE. The grant amount of US\$299,686 was totally disbursed (2004-2006).
- c) prepared actively the Lebanon Environmental Pollution Abatement Project (LEPAP) (US\$15 million)- IBRD loan (not yet signed).
- d) initiated implementation of "Improve Capacity for <u>Environment Compliance Project"–</u> <u>IDF grant (US\$300,000).</u>

152. *Procurement processing and current ministry staffing:* The procurement function in the ministry is limited to budget execution of purchasing office supplies. Related record keeping is observed and needs to be enhanced with the growing number of transactions. The procurement and financial management functions are not segregated. Procurement processing needs to be better defined and standardized.

153. Procurement methods thresholds: The MOE abides by the procurement Law No. 14969

dated December 30, 1963, and operates under the ceiling of L.L.100 Million (US\$67,000 equivalent). Above that ceiling, bidding is processed centrally by the central tender board. The public procurement regulations allow the implementing agencies to follow the donors' guidelines, when needed.

154. *Audit*: The ministry does not have an internal audit but relies on the court of account for ex-ante and ex-post reviews, and the ministry of finance for financial inspection. The project shall appoint an independent external audit for the grant proceeds.

155. <u>Applied taxes:</u> The ministry observes the following taxation: (i) Stamp Duties of (a) three per thousand of the contract price for contract registration at ministry of finance (MOF), and (b) three per thousand (3‰) on each payment; (ii) Value Added Taxes (VAT) of 10 percent applied on consultants and contractors who are registered and eligible to pay VAT; and (iii) Income Taxes that are a flat rate of 7.5 percent deducted by the employer for consultants who are not registered as tax payers in MOF and variable for registered consultants depending on their job classification at MoF. Exemption of consultants from Income Taxes may be observed if they are registered in countries that have entered with Lebanon into agreements prohibiting double taxation. Contracts financed by international donor proceeds are exempted from VAT (Law No 379 dated December 14, 2001).

## **Overall Procurement Risk Assessment**:

156. The risk rating is **Moderate**. The identified risks are related to (i) weak implementation capacity, (ii) unclear document processing and flow within the ministry, (iii) undefined control mechanism, and (iv) delays in decision taking due to coordination with EDL. The following mitigation measures are accordingly proposed: (i) appointment of an experienced PMU by agreement signing (not condition of effectiveness), (ii) training of the procurement staff, (iii) determining in particular the procurement related roles and responsibilities of the stakeholders, (iv) diligent maintenance of procurement planning, and (v) prior review of first contract under each procurement method.

### **Proposed Procurement Arrangements:**

157. *Project guidelines:* The following shall be applied to the project: (i) "Guidelines On Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants" dated October 15, 2006 revised in January 2011, (ii) World Bank "Guidelines: Procurement of Goods, Works and Non-consulting Services under IBRD Loans and IDA Credits and Grants by World Bank Borrowers" dated January 2011 and (iii) World Bank "Guidelines: Procurement of Goods, Works and Non-consulting Services under IBRD Loans and IDA Credits and Grants by World Bank Borrowers" dated January 2011.

Methods of Procurement and prior review threshold:

a) *Procurement methods for goods, works and non-consulting services*: For the procurement of Goods, Works and Non-Consulting Services, the following methods shall be used: (i)

international competitive bidding (ICB); (ii) national competitive bidding (NCB) for which shall be used either ICB -or a translated version- or develop Standard Bidding Documents acceptable to the Bank as mentioned in clauses 3.3 and 3.4 of the procurement guidelines, (iii) force account, (iv) Shopping; (v) Framework agreements, (vi) Direct contract.

- b) Selection of Consultants: For the selection of consultants, the following methods shall be used: (i) Quality-and-Cost-Based-Selection (QCBS), (ii) Selection under a Fixed Budget (FBS); (iii) Least-Cost-Selection (LCS), (iv) Selection based on Consultants' Qualifications (CQS); (v) Quality Based Selection (QBS); (vi) Single Source Selection (SSS); (vii) Selection of Individual Consultants; (viii) Selection of UN agencies.
- c) The use of Particular methods are justified by the following: due to the nature of the project and the interaction that environment has with multiple ministries such as ministry of energy and water (Electricity Du Liban in particular), the project foresees using force account for works such as construction and installation of equipment and non-consulting services carried out by a government department using its own personnel and equipment, in specific circumstances where this method is the only practical method of procurement.

158. **Proposed project staff**: Staffing for the project will be outsourced and will be supported by the ministry staff in order to build internal capacity. The procurement shall involve the engagement of a project manager, support staff, procurement officer and financial officer. Since the ministry is also implementing other WB funded projects, procurement staff already trained and familiar with WB procedures will be retained to work across projects to ensure cost effectiveness.

159. **Project Operational Manual**: No program manual is needed for the project, but there will be a need to determine the different roles and responsibilities of the stakeholders (e.g. EDL) especially those that may affect decision taking with respect to procurement processing.

160. **Procurement Plan:** An initial procurement plan dated June 5, 2014 was developed by the Government. It defines the prior review and procurement methods thresholds. It will be updated and reviewed by the Bank at least twice a year or as seen necessary. The initial procurement plan for the whole project is attached to the legal agreement. The following are the major activities under Works and non-consulting services

Proc. System Ref. <b>#</b>	Comp	Location! Description of Assignment	Estimated Cost (US <b>\$</b> )	Selection Method	Ban k Rev.	Bid. Doc/Spe cs prep. Start Date	Invitatio n Date	Evaluatio n & Recomm.	Start Date	Completi c on Date c (original)
*	×	¥	Ŧ	Ŧ	Ŧ	×	Ŧ	*	*	× ×
PW001	C1	Inventory of PCB contaminated transformers at Bauchrieh and remianing locations (including contingencies of 10%)	788,700	NCB	PR	5-Mar-15	19-Apr-15	14-Jun-15	15-Jul-15	8 11-Mar-16
PW002	C2	Disposal of out of service high content PCB equipment+ disposal capacitors from private sector (including 15%	235,750	ICB	PR	5-Apr-15	20-May-15	29-Jul-15	29-Aug-15	12 29-Aug-16
PW003	C2	Disposal of in service high content PCB equipment and contaminated oil+ PCB contaminated oil from Bauchrieh (from contaminated transformers + well) (including 15% contingencies)	865,950	ICB	PR	5-Apr-16	20-May-16	29-Jul-16	29-Aug-16	8 26-Apr-17

#### Works and non-consulting services

161. Frequency of Implementation Support missions and post procurement review is *foreseen* respectively twice and once yearly. In post procurement review, a sample of 10 percent of contracts eligible for post review shall be covered

### **Environmental and Social (including safeguards)**

162. The nature of the project is to safely manage polluting PCB-containing equipment and thus the project, by its very nature, is a public good and will result in significant environmental improvements and long-term public health benefits. Since Lebanon does not have a local disposal facility, the PCB containing equipment will be exported to licensed facilities abroad (such as in Germany, Denmark, Sweden, or any country that has suitable incinerators for hazardous waste) in accordance with the requirements of the Basel Convention.

163. However there are risks associated with the handling of PCBs, both to humans and the environment, if appropriate safeguards measures are not implemented. The potential risks associated with the inadequate management of PCBs with a concentration of more than 50 ppm by weight include contamination of soils, groundwater and surface water resulting in long-term local and global impacts. The persistent and toxic nature of PCBs has high risks to human health, including being a potential carcinogen and having possible developmental impacts. Poor management of PCBs can involve a high risk to the neighborhood community and to the project site employees.

164. Due to the diverse nature of the risks associated with the project activities, the project is classified as Category A, in accordance with World Bank Operational Policy 4.01, requiring a full environmental and social impact assessment, and extended disclosure, including multiple rounds of consultations. Especially, Component 2: *Disposal of high-content PCB equipment and contaminated oil* has potential negative impacts if not managed properly. The entire operation of Component 2 including packaging, transport, dismantling and cleaning of transformers and the final disposal will be the responsibility of an international contractor. The Contractor is required to have in place an Environmental Management System (EMS) to implement the necessary mitigating measures and includes training of local staff and occupational health and safety measures. A qualified expert (from MOE or PMU) will monitor

the work of the contractor.

165. An Environment and Social Impact Assessment (ESIA) was prepared by MOE and EDL in January 2013, which details status of baseline environment and describes the potential impacts of project activities. This ESIA was conducted in a comprehensive manner and went beyond the scope of the project in case MOE and EDL decide to manage PCB on their own in the future. The report also includes an Environment and Social management Plan (ESMP) which defines safeguard measures needed to be taken with respect to project activities and identifies capacity building and institutional strengthening activities. MOE will need to ensure that all project activities (those funded from the Grant and those funded by GOL) are implemented in accordance with the ESMP. Multiple rounds of consultations have been held, including individual discussions with key stakeholders and two workshops (November 2012 and May 2013). The Executive Summary has been translated into Arabic and the draft ESIA was disclosed in-country and in the Bank Infoshop on March 21, 2014.

#### Annex 4

### **Operational Risk Assessment Framework (ORAF)**

### Lebanese Republic: LB: PCB Management in the Power Sector Project (P122540)

## Risks

Project Stakeholder Risks											
Stakeholder Risk	Rating	N	Ioderate								
Risk Description:	Risk Mana	agei	ment:								
There is strong interest for this project from the Ministry of Environment (MOE) and the Electricité du Liban (EDL). However, frequent change in Government may impact this interest.	<i>Stockholm Convention</i> provides an overarching commitment to PCB management. EDL has embarked program to increase its power generation and rehabilitate Zouk and Jieh power plants; the proposed of the program to increase its power generation and rehabilitate Zouk and Jieh power plants; the proposed of the program to increase its power generation and rehabilitate Zouk and Jieh power plants; the proposed of the program to increase its power generation and rehabilitate Zouk and Jieh power plants; the proposed of the proposed of the program to increase its power generation and rehabilitate Zouk and Jieh power plants; the proposed of the program to increase its power generation and rehabilitate Zouk and Jieh power plants; the proposed of the proposed of the program to increase its power generation and rehabilitate Zouk and Jieh power plants; the proposed of the program to increase its power generation and rehabilitate Zouk and Jieh power plants; the proposed of the proposed of the program to increase its power generation and rehabilitate Zouk and Jieh power plants; the proposed of the program to increase its power generation and rehabilitate Zouk and Jieh power plants; the proposed of the proposed of the program to increase its power generation and rehabilitate Zouk and Jieh power plants; the proposed of the pr								nbarked in a r osed operatic ncluding PCE	on is Bs and	
	Resp: Cl	ient	Status:	In Progress	Stage:	Both	Recurrent:	Due Date:		Frequency:	
Implementing Agency (IA) Risks (including Fide	uciary Risks	5)									
Capacity	Rating	S	ubstantial								
Risk Description:	Risk Mana	agei	ment:								
The implementing agency (MOE) has limited capacity in (i) management of PCB and (ii)	The disposal of high content PCB will be done through an international bidding and with an international firm competent and experienced in this field.								m		
implementation of WB / GEF funded projects. There is a risk of delay in opening the	Resp: Bo	oth	Status:	Not Yet Due	Stage:	Imple mentat ion	Recurrent:	Due Date:	20-Nov-2018	Frequency:	
Designated Account, transferring funds to the account and making payment to consultants and contractors (due to heavy internal bureaucratic procedures within MOE).	other intern PCB mana value of di	MU natio gem rect	will be estonal projected. To the	t accountine extent po	ng. Adeo ssible, t facilitat	quate trai he ceiling e paymer	ancial and Procu ining will be prov g of the designate nt. Recurrent:	ided both	n in project imple	ementation an	ıd
Governance	Rating	N	Ioderate		ļ	·	I	1		I	•

Risk Description:	Risk Management:											
Adequacy of management and accountability of MOE and EDL and inter-agency coordination.	Inter-agency coordination mechanisms will be part of project design. MOE will be the implementing agency for this project. It will work in close coordination with the PCB Committee nominated by EDL.											
	Resp: Cl	lient	Status:	In Progress	Stage:	Implem entation	Recurrent:		Due Date:		Frequency:	Cont nous
Project Risks	· · · · · ·							·				
Design	Rating	S	Substantial									
Risk Description:	Risk Man	nage	ment:									
Project design has been kept simple and is relatively straightforward; but it involves the										oad) will be done berienced in such		
management of hazardous substances and hence is inherently risky.	Resp: Bo	oth	Status:	Not Yet Due	Stage:	Implem entation	Recurrent:		Due Date:	20-Nov-2018	Frequency:	
Social and Environmental	Rating	S	Substantial									
Risk Description:	Risk Man	Risk Management:										
Project is assigned Category A for the purpose of OP 4.01.	During the preparation of the ESIA two consultations have taken place. The ESIA was fully disclosed on the MOE website on March 21, 2014 and on the WB Infoshop.											
Risk of human and environmental exposure to toxic chemicals. Project will involve the management, storage, remediation, transport and disposal of PCBs and PCB-contaminated	The ESIA also includes an Environmental and Social Management Plan where best practice have been adapted to Lebanese conditions for the management, storage, remediation, transport and disposal of PCBs and PCB-contaminated equipment. This will also be incorporated in the disposal contracts.											
equipment, with potential negative impacts on human health and the natural environment.	Resp: Cl	lient	Status:	Not Yet Due	Stage:	Imple mentat	Recurrent:		Due Date:		Frequency:	
Lack of public awareness. Civil society is generally unaware of the risks posed by the present unsatisfactory situation regarding the safeguarding of PCBs and there is some potential risk of panic once these are disclosed.						ion		<				
Program and Donor	Rating	L	Low		,		•			•		
Risk Description:	Risk Man	nage	ment: N/A									
The proposed project does not include support from other donors.	Resp: N/	/A	Status: N/A		Stage:	N/A			Due Date:	N/A	Frequency:	N/A
									2			

Risk Description:	Risk Management:									
Monitoring of project delivery is relatively straightforward and does not entail any risk.		The PMU will have the responsibility to monitor the project on a daily basis. On a bi-annual basis they will prepare a project progress report. The TOR of the Project Manager already reflect this task.								
	Resp:	Client	Status:	Not Yet Due	Stage:	Implem entation	Recurrent:	1	Due Date:	Frequency:
Overall Risk										
Overall Implementation Risk: Substantial										
The overall rating of this project is substantial due to the existing security situation in Lebanon and the fact that this project involves the management of hazardous substances. The overall political and security situation in Lebanon remains tense, this can have direct implication on project implementation (travel to Lebanon car be restricted). To ensure the adequate implementation of risk mitigation actions, the Bank will maintain close oversight of project implementation (including implementation support for close and continuous supervision).										

### Annex 5: Implementation Support Plan

## Lebanon: PCB Management in the Power Sector Project (P122540)

### Strategy and Approach for Implementation Support

166. The strategy for the Bank's Project Implementation Support reflects the nature of the Project and its risk profile (outlined in the Project ORAF, Annex 4) and aims to enhance the quality of the client's delivery of proposed project interventions. As such, the implementation support focuses on risk mitigation measures identified in the ORAF, as well as the traditional supervision focus areas, including safeguards and fiduciary aspects.

167. The Bank team will plan to provide implementation support by either combining missions with other environmental projects (e.g. *Lebanon Environmental Pollution Abatement Project*, and *Lake Qaraoun Pollution Prevention Project*) or by undertaking virtual implementation support missions. Missions will focus on::

(a) **Technical inputs**. Hazardous waste inputs are required to review bid documents to ensure fair competition through proper technical specifications and fair assessment of the technical aspects of the bids. Such expertise will be provided by the PM (expert in hazardous waste management), other staff from the Department of Chemical Safety, supported by a national consultant on a needs basis.

(b) **Fiduciary**. The PMU will use part-time fiduciary staff who is already working in other Bank projects, thus being familiar with Bank procedures. To strengthen its capacity, the Bank's financial management and procurement specialists will provide training to the PMU's fiduciary staff before the commencement of the project implementation. Supervision of financial management and procurement arrangements will be carried out on a timely basis, to respond to client's needs.

(c) **Safeguards**. The environmental specialist will ensure that training is provided to relevant counterpart staff. In addition, the team will make sure to include environmental supervision updates in regular project progress reports.

(d) **Client Relations.** The Task Team Leader (TTL), based in headquarters, will provide day-to-day supervision of all operational aspects, as well as coordination with the client and among team members. The members of the team based in Lebanon (i.e. procurement, FM) will facilitate the linkage with the client in between formal missions.

(e) **Mid-Term Review.** A mid-term review will be carried out in the third year of project implementation in which a comprehensive review of the project implementation experience will be undertaken and adjustments made to improve the project's design and/or execution, if needed.

# **Implementation Support Plan**

Time	Supervision Focus	Frequency*	Staff
Horizon			
Year 1	• Start-up challenges	Two	• TTL
	Conditions of effectiveness		Environmental Specialist
	Establishing PMU		Procurement Specialist
	Engaging consultants		• Financial Management Specialist
	Bidding packages		
Years 2		Two per	• Same team as above with
to 5		year	additional technical experts as
			required (such as PCB Specialist)

168. The main elements are shown in the following table:

\*As indicated above at least one mission per year will take place in country (in combination with other project), the second one is likely to take place virtually due to budget constraint.

## **Skills Mix Required**

169. The following table shows the mix of the skills required for the project's implementation support:

Skills Needed	Number of Staff Weeks per Year	Number of Trips per Year
Procurement	3	In country
Financial management	2	In country
Technical	4	1
Environment	2	1
Social	0.5	1