



GEF-6 PROJECT IDENTIFICATION FORM (PIF)

PROJECT TYPE: FULL-SIZED PROJECT

TYPE OF TRUST FUND: GEF TRUST FUND

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PART I: Project Information

Project Title:	Reduction and elimination of POPs and other chemical releases through implementation of environmentally sound management of E-Waste, healthcare waste and priority U-POPs release sources associated with general waste management activities		
Country(ies):	Kingdom of Jordan	GEF Project ID: ¹	9189
GEF Agency(ies):	UNDP	GEF Agency Project ID:	5667
Other Executing Partner(s):	Ministry of Environment	Submission Date:	15 July 2015
GEF Focal Area(s):	Chemicals and Waste	Project Duration (Months)	60
Integrated Approach Pilot	IAP-Cities <input type="checkbox"/> IAP-Commodities <input type="checkbox"/> IAP-Food Security <input type="checkbox"/>	Corporate Program: SGP <input type="checkbox"/>	
Name of parent program:	N/A	Agency Fee (\$)	483,550

A. INDICATIVE FOCAL AREA STRATEGY FRAMEWORK AND OTHER PROGRAM STRATEGIES²

Objectives/Programs (Focal Areas, Integrated Approach Pilot, Corporate Programs)	Trust Fund	(in \$)	
		GEF Project Financing	Co-financing
CW-2 Program 3: Reduction and elimination of POPs	GEFTF	5,090,000	24,150,000
Total Project Cost		5,090,000	24,150,000

B. INDICATIVE PROJECT DESCRIPTION SUMMARY

Project Objective: Protection of human health and the environment through reduction and elimination of POPs, and other chemicals through implementation of environmentally sound management (ESM) for e-waste, healthcare waste and priority U-POPs release sources associated with general waste management activities						
Project Component	Financing Type ³	Project Outcomes	Project Outputs	Trust Fund	(in \$)	
					GEF Project Financing	Co-financing
1. 0 Development of ESM E-waste management system	Inv.	1.1 Environmentally sound E-waste collection, processing and residuals management capability developed	1.1.1 Effective policy implementation and regulatory control for ESM of E-waste in place 1.1.2 Sustainable financial mechanism supporting E-waste management established and implemented 1.1.3 E-waste collection and primary processing capability established 1.1.4 Awareness and human resource strengthening for e-waste management delivered.	GEFTF	1,000,000	6,200,000
2. 0 Achieving environmentally sound healthcare waste management	Inv.	2.1 BAT/BEP healthcare waste management practice and technology implemented nationally	2.1.1 Program of replacement of small sub-standard incineration facilities in 10 hospitals with non-combustion shredding/sterilization/autoclave units fully implemented 2.1.2 Qualification to demonstrate international performance of up to 3 high capacity incineration facilities providing regional services	GEFTF	2,300,000	10,800,000

¹ Project ID number will be assigned by GEFSEC and to be entered by Agency in subsequent document submissions.

² When completing Table A, refer to the excerpts on [GEF 6 Results Frameworks for GETF, LDCF and SCCE](#).

³ Financing type can be either investment or technical assistance.

			undertaken 2.1.3 Training and formal certification program for in-hospital waste management personnel developed and implemented 2.1.4 Development of optimized waste management service provider arrangements through private public partnerships pursued.			
3.0 Developing waste diversion/resource recovery capacity for GHG and U-POPs reduction		3.1 Releases from priority U-POPs sources reduced and current chemical waste legacies eliminated.	3.1.1 Open burning associated with smaller landfills assessed and effective prevention measures implemented. 3.1.2 Pilot MSW landfill operation optimized to provide for effective diversion to environmentally sound management through treatment, recycling and/or resource recovery. 3.1.3 Elimination of primary stockpiles of chemical waste at the national hazardous waste storage site and qualification of in-country disposal options undertaken. 3.1.4 National energy from waste management capability through utilization of refuse derived fuel in commercial cement kilns developed and qualified, inclusive of development of national point source sampling and monitoring capability.	GEFTF	1,400,000	6,750,000
4.0 Project Monitoring and Evaluation	TA	4.1: Monitoring and evaluation; knowledge sharing and information dissemination	4.1.1 Monitoring, evaluation and impact assessment 4.1.2 Knowledge sharing and post-project action plan	GEFTF	150,000	150,000
Subtotal					4,850,000	23,900,000
Project Management Cost (PMC) ⁴					GEFTF	240,000
Total Project Cost						5,090,000
						24,150,000

If Multi-Trust Fund project: PMC in this table should be the total and enter trust fund PMC breakdown here (N/A)

⁴ For GEF Project Financing up to \$2 million, PMC could be up to 10% of the subtotal; above \$2 million, PMC could be up to 5% of the subtotal. PMC should be charged proportionately to focal areas based on focal area project financing amount in Table D below.

C. INDICATIVE SOURCES OF CO-FINANCING FOR THE PROJECT BY NAME AND BY TYPE, IF AVAILABLE

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Amount (\$)
GEF Agency	UNDP	Grant	150,000
GEF Agency	UNDP	In-Kind	75,000
Recipient Government	Ministry of Environment	Grant	2,050,000
Recipient Government	Ministry of Environmental	In-Kind	675,000
Recipient Government	MoE –E-waste Financial Mechanism	Grant	2,700,000
Recipient Government	Ministry of Health	Grant	4,000,000
Recipient Government	Ministry of Health	In-kind	400,000
Recipient Government	Ministry of Defense (Royal Hospitals)	Grant	1,000,000
Recipient Government	Ministry of Defense (Royal Hospitals)	In-kind	150,000
Recipient Government	Municipal Government	Grant	100,000
Recipient Government	Municipal Government	In-kind	250,000
Academic Institution	JUST	Grant	1,400,000
Academic Institution	JUST	In-kind	100,000
Private Sector	Private Hospitals	Grant	1,000,000
Private Sector	Private Hospitals	In-kind	150,000
Private Sector	E-waste service providers	Grant	3,000,000
Private Sector	E-waste service providers	In-Kind	150,000
Private Sector	Healthcare Waste Service Providers	Grant	2,000,000
Private Sector	Healthcare Waste Service Providers	In-Kind	100,000
Private Sector	Cement Industry	Grant	2,000,000
Private Sector	Cement Industry	In-Kind	200,000
Donor Agency	Government of Canada	Grant	2,000,000
Donor Agency	Kuwait Fund	Grant	500,000
Donor Agency	Gulf Fund	Grant	TBD
Donor Agency	US AID	Grant	TBD
Donor Agency	European Commission	Grant	TBD
Total Co-financing			24,150,000

D. INDICATIVE TRUST FUND RESOURCES REQUESTED BY AGENCY(IES), COUNTRY(IES) AND THE PROGRAMMING OF FUNDS ^{a)}

GEF Agency	Trust Fund	Country/ Regional/ Global	Focal Area	Programming of Funds	(in \$)		
					GEF Project Financing (a)	Agency Fee (b) ^{b)}	Total (c)=a+b
UNDP	GEFTF	Kingdom of Jordan	Chemicals and Waste	POPs	5,090,000	483,550	5,573,550
Total GEF Resources					5,090,000	483,550	5,573,550

a) Refer to the [Fee Policy for GEF Partner Agencies](#).

E. PROJECT PREPARATION GRANT (PPG)⁵

Is Project Preparation Grant requested? Yes ☒ No ☐ If no, skip item E.

⁵ PPG requested amount is determined by the size of the GEF Project Financing (PF) as follows: Up to \$100k for PF up to \$3 mil; \$150k for PF up to \$6 mil; \$200k for PF up to \$10 mil; and \$300k for PF above \$10m. On an exceptional basis, PPG amount may differ upon detailed discussion and justification with the GEFSEC.

PPG AMOUNT REQUESTED BY AGENCY(IES), TRUST FUND, COUNTRY(IES) AND THE PROGRAMMING OF FUNDS

Project Preparation Grant amount requested: \$150,000					PPG Agency Fee: \$14,500		
GEF Agency	Trust Fund	Country/ Regional/Global	Focal Area	Programming of Funds	(in \$)		
					PPG (a)	Agency Fee ⁶ (b)	Total c = a + b
UNDP	GEFTF	Kingdom of Jordan	Chemicals and Waste		150,000	14,250	164,250
Total PPG Amount					150,000	14,250	164,250

⁶ PPG fee percentage follows the percentage of the Agency fee over the GEF Project Financing amount requested.

F. PROJECT'S TARGET CONTRIBUTIONS TO GLOBAL ENVIRONMENTAL BENEFITS⁷

Provide the expected project targets as appropriate.

Corporate Results	Replenishment Targets	Project Targets
1. Maintain globally significant biodiversity and the ecosystem goods and services that it provides to society	Improved management of landscapes and seascapes covering 300 million hectares	<i>hectares</i>
2. Sustainable land management in production systems (agriculture, rangelands, and forest landscapes)	120 million hectares under sustainable land management	<i>hectares</i>
3. Promotion of collective management of transboundary water systems and implementation of the full range of policy, legal, and institutional reforms and investments contributing to sustainable use and maintenance of ecosystem services	Water-food-ecosystems security and conjunctive management of surface and groundwater in at least 10 freshwater basins;	<i>Number of freshwater basins</i>
	20% of globally over-exploited fisheries (by volume) moved to more sustainable levels	<i>Percent of fisheries, by volume</i>
4. Support to transformational shifts towards a low-emission and resilient development path	750 million tons of CO _{2e} mitigated (include both direct and indirect)	<i>metric tons</i>
5. Increase in phase-out, disposal and reduction of releases of POPs, ODS, mercury and other chemicals of global concern	Disposal of 80,000 tons of POPs (PCB, obsolete pesticides) ⁸	<i>See footnote</i>
	Reduction of 1000 tons of Mercury	<i>metric tons</i>
	Phase-out of 303.44 tons of ODP (HCFC)	<i>ODP tons</i>
6. Enhance capacity of countries to implement MEAs (multilateral environmental agreements) and mainstream into national and sub-national policy, planning financial and legal frameworks	Development and sectoral planning frameworks integrate measurable targets drawn from the MEAs in at least 10 countries	<i>Number of Countries: 1</i>
	Functional environmental information systems are established to support decision-making in at least 10 countries	<i>Number of Countries: 1</i>

Part II: Project Justification

1. Project Description. Briefly describe: 1) the global environmental and/or adaptation problems, root causes and barriers that need to be addressed; 2) the baseline scenario or any associated baseline projects, 3) the proposed alternative scenario, GEF focal area⁹ strategies, with a brief description of expected outcomes and components of the project, 4) [incremental/additional cost reasoning](#) and expected contributions from the baseline, the GEFTF, LDCF, SCCF, and [co-financing](#); 5) [global environmental benefits](#) (GEFTF) and/or [adaptation benefits](#) (LDCF/SCCF); and 6) innovation, sustainability and potential for scaling up.

Background and Baseline

Jordan is one of the most advanced developing countries in the Middle East with a growing economy, high literacy rate, comprehensive health care system and generally declining poverty rate. In terms of environmental management it has aggressively pursued implementation of sound environmental management including investment in modern basic infrastructure in areas such as solid waste and wastewater treatment. However, gaps remain that urgently need

⁷ Provide those indicator values in this table to the extent applicable to your proposed project. Progress in programming against these targets for the projects per the *Corporate Results Framework* in the [GEF-6 Programming Directions](#), will be aggregated and reported during mid-term and at the conclusion of the replenishment period. There is no need to complete this table for climate adaptation projects financed solely through LDCF and/or SCCF.

⁸ **GEBs: Release of approximately 500 kg of commercial PBDE and other brominated flame retardants prevented and release of approximately 60 g TEQ PCDD/F prevented**

⁹ For biodiversity projects, in addition to explaining the project's consistency with the biodiversity focal area strategy, objectives and programs, please also describe which [Aichi Target\(s\)](#) the project will directly contribute to achieving.

to be addressed and this is currently compounded by the substantial increase in unofficial population resulting from political/economic instability and conflict in neighboring countries. It is estimated that this accounts for approximately 2.5 million people added to an official population of 7 million over the past several years, including refugees from Syria, Iraq and Yemen as well as migrant workers from elsewhere in the region which is compounding these deficits and impeding the country's progress generally. In this regard, waste management generally is considered a major priority and, within that, the management of waste streams and resulting contamination that present specific hazards to both environmental resources, food supply and human health is a major concern. The proposed Project as outlined in this PIF is intended to address several specific priorities related to E-waste, health care waste (HCW) and hazardous/chemicals waste management including POPs in a manner consistent with the GEF-6 Programing Strategy applicable to the Chemicals and Waste Focal Area. More broadly, the proposed project is linked into the emerging overall waste integrated waste management strategy in the country as the current institutional, regulatory and operational framework builds out consistent with international practice emphasizing waste diversion to productive use such as recycling and waste derived fuel/fossil fuel substitution options.

The country's environmental policy emphasizes the need for coordination in effort on regional and global basis in close cooperation with concerned international bodies and agencies addressing all global environmental issues, including chemicals management. As a consequence, it has been a proactive participant in international chemicals conventions and multi-lateral initiatives. More specifically, it ratified or acceded to the Basel Convention in 1992, the Stockholm Convention in 2004, and the Rotterdam Convention in 2002 and has now signed the Minamata Convention with ratification being processed and expected in 2015. UNDP and MoE are currently preparing a GEF EA proposal supporting country implementation for this Convention. Specifically in relation to the Stockholm Convention, MoE developed the required National Implementation Plan (NIP) and submitted it in 2006 with GEF assistance and has been undertaking its implementation since that time. This is currently being updated again with GEF assistance. With respect to chemicals management generally Jordan is an active participant in the International Conference on Chemicals Management (ICCM) and through the SAICM program has developed a National Chemicals Profile and is pursuing a national sound chemicals management policy.

Institutionally, the national focal point for chemicals and waste management in the country is the Ministry of Environment (MoE) and within it, the Directorate of Hazardous Substances and Waste Management. Within the overarching Environmental Protection Law No. 52/ 2006, waste management is currently covered by regulations covering hazardous waste (Hazardous Materials Management Regulation No. 24/ 2005, Instruction for Hazardous Waste Management and Handling - 2003), solid waste (Solid Waste Management Regulation No. 27/2005, Instructions for the Management of Solid Waste - 2006), and healthcare waste (Medical Waste Management Regulation No. 1 for 2001). A regulation specific to PCBs was adopted in 2014 and development of a regulation covering E-waste is being undertaken as noted below. Also pending endorsement and adoption is a comprehensive solid waste management strategy emphasizing waste diversion to productive use.

Solid Waste Management (SWM): Jordan's generation of municipal solid waste (MSW) is reasonably typical of a developing country with a rapidly growing economy and urban population. Estimated generation in 2010 was approximately 2.2 million t/year with urban and rural generation of 0.95 and 0.85 kg/day in urban and rural areas respectively and an estimated growth rate of 3.3%/year¹⁰. This has recently been further accelerated by the large increase in transient population particularly refugees that are taxing capacity particularly in border areas. A current World Bank financed study developing a long term SWM strategy¹¹ estimates actual generation is currently 2.65 million t/year considering the additional load of new populations. In terms of solid waste management infrastructure, the country is reasonably well served with organized collection operations serving 90% of urban and 75% of rural areas. 85% of MSW disposal utilizes conventional sanitary landfill facilities, 10% is diverted for recycling and 5% disposed by open dumping. Both collection and disposal services are operated by or contracted out under the

¹⁰ GIZ SWEEPNET Country Report 2010 - <http://www.sweep-net.org/ckfinder/userfiles/files/country-profiles/CountryreportJordan-En-mai2011.pdf>

¹¹ LDK Consultants/ Mostaqbal Consultants, Baseline Study on the Existing MSWM System in the Hashemite Kingdom of Jordan, Sept. 2014

direction of local municipal level authorities with recycling largely being undertaken by the informal sector at source and to a limited extent at landfills. Greater Amman Municipality (GAM) accounts for approximately 50 % of the MSW generation and has a well-developed collection system and is serviced by a large centralized engineered landfill at Al Ghabawi, meeting current standards including development of methane extraction and energy generation capability with World Bank¹² and EBRD support¹³. It has also recently undergone upgrading and capacity expansion as part of a US\$25 million World Bank loan project¹⁴. The remainder of the country is served by 21 local organized/controlled and regional landfills that generally meet basic sanitary standards but are generally lacking in modern environmental protection features and operating practice. As is discussed further below generation of U-POPs from open periodic burning at these sites is a priority issue of concern with 17 such sites being identified in the above referenced strategic plan as requiring closure. More generally, all land disposal facilities continue to receive unsegregated waste streams including e-waste and to a limited degree healthcare waste, albeit illegally. While a formal SWM strategy has been implemented in Greater Amman for some years, a National SWM strategy as referenced above has only been recently developed and is now in the process of adoption. This provides for near, medium and long term targeted action plans for development of engineered regional landfill facilities, closure of sub-standard landfills, diversion of priority wastes including e-waste for recycling and Refuse Derived Fuels (RDF), development of waste to energy capacity, as well as planned management of the current informal sector for waste diversion to a more formal system involving dedicated sorting and separation facilities. One developing initiative of particular interest in the context of this project is project being started by UNDP under the overall programme framework “Mitigating the impact of the Syrian refugee crisis on Jordanian vulnerable host communities” between UNDP, the Canadian Government, and the Government of Jordan. This involves a CAD\$13,500,000 investment project on the upgrading of the large Alakedir regional landfill in the northern part of the country (Irbid Governate on the Syrian border that hosts close to major refugee camps). This landfill has also undergone studies financed by US AID related to the feasibility of capture and methane extraction.

A significant linkage to issues related to POPs in relation to efforts on waste diversion and RDF exists through the potential presence of several “new” POPs in these waste streams. Based on the draft NIP Update Tier 1 inventory calculations applied to PBDEs waste streams associated with E-waste (mainly ABS plastics in product casings) and foam/textile component wastes from automotive scrap and textile waste estimates of total PBDE content in products now or likely to enter the waste stream amount to approximately 30 t (automotive/textile -17 t, E-waste -13 t). Estimates were also undertaken for potential presence of PFOSs in the textile and firefighting foam sectors while not conclusive generally concluded that in the case of textiles its use is minimal due to cost and while potentially present in military firefighting foams it would best be addressed by substitution than as a waste.

Hazardous Waste Management: Generation of regulated hazardous waste in Jordan has been estimated in international studies to be approximately 15,000 t/year¹⁵, although actual amounts officially declared by MoE are 5,000 t/year based on the amounts received at the SWAGA site. This site which represents the main hazardous waste (HW) management infrastructure in the country was established by MoE in the 1980s as site for the reception, storage and ultimately the treatment and disposal of hazardous waste excluded from municipal facilities. The site is located at approximately 120 km south east of Amman in a remote area of desert. The original long term plan was to establish an appropriately scaled integrated hazardous waste facility consisting of an incineration unit, physical chemical treatment plant and engineered hazardous waste landfill for stabilized residues but this has not been acted upon. The site itself started operation in 1998, and utilizes a 500 ha. fenced area for reception and storage of a variety of waste streams primarily from private sector generators. Facilities include storage structures, a number of lined basic landfill cells and evaporation lagoons. However, the majority of materials arriving at the site are randomly piled in the open such that the access to actual infrastructure is limited. Wastes currently being deposited at the site are primarily pharmaceutical in origin, much of it non-hazardous new expired product. There is also barreled solvent waste of various types, expired pesticides, medical and laboratory chemical wastes, and smaller quantities of hydrocarbon sludge, miscellaneous contaminated solid industrial waste and packaging, wastes from

¹² <http://www.worldbank.org/projects/P107410/jo-amman-landfill-gas-recovery?lang=en>

¹³ <http://www.ebrd.com/news/2015/ebd-helps-jordan-transform-waste-into-energy-.html>

¹⁴ <http://www.worldbank.org/projects/P104960/jo-amman-solid-waste-management-carbon-finance?lang=en>

¹⁵ <http://www.sweep-net.org/ckfinder/userfiles/files/country-profiles/CountryreportJordan-En-mai2011.pdf>

metals and battery manufacturing, and e-waste from recently established public collection programs. No inventory or placement control of waste incoming to the site exists. The economic basis for the operation is based on collection of a fee of 300 JOD per ton set in the mid-2000 period which is collected by MoE who in turn operate the facility. The operating budget is quoted at US\$500,000/year although in fact is substantially less with the remainder nominally being accumulated in the National Environment Fund for further development and/or offsite disposal of accumulated wastes, although barriers to accessing it are said to exist. Overall, the site is in poor condition, lacks utilities and adequate site infrastructure, and has a relatively low utilization level, being physically manned operationally only one day per week although full time security is provided for.

The other area of active hazardous waste management activity has related to POPs stockpiles and waste. Estimated POPs inventories were first identified in the original NIP. POPs pesticide inventories of banned material held by the Ministry of Agriculture (MoA) and Ministry of Health (MoH) were exported and destroyed in 2013 under a regional GEF project involving UNEP, WHO and FAO¹⁶. In total 22 t of DDT and a small quantity of other POPs pesticides were eliminated. MoA informs that no further stockpiles exist, although small quantities of expired pesticides are accumulated annually and stored in an accumulating stockpile at the SWAGA site. Additionally, they note an ongoing issue regarding used pesticide containers that are currently disposed of in landfill facilities. A need to develop an effective take back program for both these waste streams was identified as a current priority which would be pursued in association with FAO. With respect to PCBs, MoE is currently completing a GEF MSP¹⁷ with UNDP's support intended to address stockpiled and in-service PCB based and PCB contaminated electrical equipment from the utility sector. To-date 65 t of PCB based equipment has been packaged and exported for destruction and currently 50 t of PCB contaminated mineral oil and drained PCB equipment will be similarly exported as a completing activity for this project. MoE reports that this largely eliminates the utility inventory of PCBs in the electrical system. Survey work has not identified any POPs contaminated sites generally and a PCB management plan is in place to undertake the identification and elimination of an anticipated small quantity of like equipment that may be held by the private sector. In summary, with GEF assistance, Jordan is effectively completing substantive major POPs stockpiles and waste elimination.

Healthcare Waste (HCW): Jordan is known for its advanced and comprehensive medical system and facilities which are considered the best in the region. The system consists of 105 hospitals with 12,545 beds. 31 hospitals (39% of beds) are operated by the Ministry of Health (MoH). 12 hospitals are military (19% of beds). 2 hospitals (8% of beds) are associated with universities. 60 hospitals (34% of beds) are private hospitals. Additionally there are an estimated 1,100 medical clinics and 313 dental clinics. Theoretical HCW generation is estimated based on a rate of 0.6 kg/month/bed to be 7-7.5 t/day, 226 t/day or 2,745 t/year noting that it does not include all generation from outpatient clinics and dental facilities, nor does it include generation from emergency medical facilities being established in refugee camps by international donors. Based on data supplied by MoH Tables 1 and 2 below summarizes the current profile of medical facilities summarized above in greater detail

Table 1: Number of Hospitals and Beds

Sector	No of Hospitals	No of Beds
Public / Ministry of Health ¹⁸	31	4,866
Military/Royal Medical Services	12	2,439
University Hospitals	2	1,035
Private	60	4,205
Total	105	12,545

¹⁶ https://www.thegef.org/gef/project_detail?projID=2546

¹⁷ https://www.thegef.org/gef/project_detail?projID=4124

¹⁸ Several expansion projects are underway, which will increase the number of beds, as well as a new hospital in Mafraq Governorate/ Badia Shamaliyah (Northern Region)

Table 2: Geographic Distribution of Hospitals and (Theoretical) Healthcare Waste Generation

	Northern Region	Central Region	Southern Region	Total
No of Hospitals	24	69	12	105
No of Beds	2,470	9,107	968	12,545
Theoretical Daily HCW Generation ¹⁹ (t)	1.48	5.46	0.58	7.5
Theoretical Monthly HCW Generation ²⁰ (t)	44.4	163.8	17.4	226
Theoretical Annual HCW Generation (t) ²¹	540.2	1,992.9	211.7	2,745

All the hospitals in the national hospital system profiled above have active HCM capacity and access to disposal facilities either on-site or as coordinated across the system although there is variability in data applicable to collection on actual amounts treated versus that generated. Initially most facilities or clusters were equipped with small basic incinerators which provided a fairly comprehensive physical capacity for on-site treatment and disposal of HCW. However as in most countries the incineration technology used was recognized as being of relatively low quality in terms of currently accepted environmental performance standards, particularly air emissions. Additionally, the ability to maintain and operate these facilities reliably is an issue, as is resistance to their operation in hospitals themselves and in urban areas. While no systematic emission testing has been undertaken, application of the UNEP Tool Kit emission factors as part of the current NIP update work on U-POPs inventory suggests that healthcare waste incineration is a significant source of PCCD/F emissions (10 g TEQ/year), particularly noting this is typically occurring on hospital sites in urban areas, and there is also some question about the emission factors actually applied that suggest this quantity is underestimated.

MoH and the other hospital operators have recognized the limitations of conventional incineration technology and over the past several years have initiated a strategy of both replacing small on-site incinerators with non-combustion alternatives, principally autoclave units equipped with shredding and sterilization capacity, and alternatively centralizing capacity in larger, better equipped, incineration units more appropriately located. The current profile of operating capacity is provided in Table 3 below. Overall, Jordan has 21 operational/operable HCW incineration units and 20 non-combustion HCW treatment units, primarily autoclaves, most of which are equipped with current technology shredding and sterilization capability. Table 4 provides the actual quantities treated in 2014 by treatment unit compared to the theoretical estimates of overall HCW generation. This data suggests that the overall coverage of HCW generation is estimated at 86% although this is qualified by only estimated data being available at this time from some private and the military hospitals.

Closure of small sub-standard incinerators is largely complete in private hospitals with conversion to on-site non-combustion treatment and disposal technology in some cases but also increasing contracting out of services to incinerators or non-combustion facilities elsewhere as an interim step to installation of non-combustion units. Current investment planning by MoH involves the addition of 5 autoclaves with shredding and sterilization and potential addition of 3 more units financed by international donors. Similarly, a number of similar units are planned for the military hospital system. Additionally there are three relatively new larger incineration units in the MoH system that is to be retained subject to technical evaluation and performance testing. Finally, a potential contracting out arrangement for HCW is under discussion between MoE and a private commercial operator (Nassar Investments/Clean City) involving activating a used rotary kiln unit (5-8,000 t/year total capacity) located at the Ghabawi landfill along with a newly purchased smaller conventional HCW batch incinerator. The proposed larger facility is a unit acquired by a predecessor company 5 years ago which was originally in Croatia and is presently inoperable having been extensively vandalized. The plan is that the original manufacturer would recondition and commission it. As such, this has yet to undergo regulatory approval including an EIA and formal licensing or performance testing.

¹⁹ Using 0.6 kg/bed.day

²⁰ Using (30) days

²¹ Using (365) days

Overall the main gaps in completing the conversion to an efficient and optimized system providing complete coverage and environmentally sound treatment and disposal are identified as follows:

1. Source based management optimization: While a sound basic system of training and organization of source based collection and operation of treatment facilities where applicable exists, its efficiency is limited by such things as staff turnover, limitations on source segregation practice, and technical qualifications of hospital staff in operating HCW facilities. Ideas considered for improving this involve expanded training, application of a certification system for personnel involved in HCW management, and selective contracting out facility operation.
2. Performance assessment of existing and planned HCW incinerators: There is an absence of any factual air emissions and solid residue monitoring data from the existing incinerators, nor qualification test results for new and planned incineration facilities (including Badia Shamaliyyah and Totunji Hospitals, and the proposed larger privately operated unit). This is important in prioritizing new investment and planning the distribution of HCW streams across the system. Of particular concern is the dependence of the system on the two older high capacity units operated by the Jordan University for Science and Technology (JUST). Overall this facility handles 44% of MoH HCW and 35% of the overall national actual generation on a contract basis (including collection) which they have provided very satisfactory service for some time. However it is generally felt that the facilities which have no air pollution control (APC) are approaching the end of their life and a replacement option or alternative capacity is required. Additionally, it is recognized that addition of new incineration facilities including the contracting out to a proposed off-site facility should require specification of BAT/BEP level performance standards and their demonstration.
3. Accelerated phase out of on-site incinerators: Recognizing that there will inevitably be deficits in environmental performance as well as location related social pressures and operational issues associated with existing small on-site facilities, there is a need for additional investment in upgraded technology, likely in the form of non-combustion options. Likewise, there is a need for capacity increase to fill the current and potential short falls relative to generation not the least of which is that created by the refugee influx and health care facilities being built to meet their needs, as well as the potential closing of older current communal incinerators.

With respect to the historical use of mercury-based equipment, in 2012 the Ministry of Health adopted decisions to move away from mercury thermometers, and procure for application electronic equipment and 50,000 pieces were purchased for use in public hospitals. Following that, hospitals reported complaints on quality of stock received in terms of reading accuracy or incomplete packaging (back covers missing). As a direct result of this initial experience in 2013 and 2014 public procurement temporarily re-oriented itself towards mercury based thermometers (170,672 pieces in 2013 and 125,000 in 2014) with the estimated overall mercury charge of 118 kg. However, lately the Ministry of Health has announced new public procurement tenders for e-thermometers to implement its original 2012 decision on the phasing out the mercury equipment from use in public hospitals, some of which are ongoing as of now, and, as an example, a recent WHO-supported procurement and distribution of 1,500 pieces of such electronic measurement equipment. As far as the other hospitals are concerned, it is estimated 90% of private hospitals and Military/Royal Medical Services switched to e-thermometers since several years ago, and some using such since 2008.

Table 3: Available HCW Treatment Facilities (Units)

Sector/Region	Incineration Units	Notes	Non-Incineration Units	Notes
Public/MoH Facilities				
Northern Region	1	New unit at the new Badia Shamaliya Hospital (not commissioned yet)	2	2 in Bashir Hospital (out of service- need maintenance) 5 new autoclaves (shredding and steam sterilization) planned
Central Region	8	• 1 unit located at the new Zarqa Hospital w/ 2 t/day capacity, currently providing services for the other MoH hospitals • 3 units out of service incinerators • 1 old unit will be installed in Prince Hussein hospital		
Southern Region	3			
Sub-Total	12		2	
Military/ Royal Medical Services Facilities				
Northern Region	1		1	Tender to supply a number of treatment units (Shredding and Steam Sterilization) is planned.
Central Region	4			
Southern Region	2	1 unit not being used due to proximity to hospital buildings		
Sub-Total	7		1	
Private Hospital Facilities				
All Regions			17	3 are in the process of installation and commissioning 2 are located in the Northern Region 5 units provide services to other healthcare establishments. Most of the units use steam sterilization (with or without shredding) 1 unit uses microwave technology, and one unit uses heat
Jordan University for Science and Technology (JUST) Facilities				
All Regions	2	Provides services to King Abdulla University Hospital and MoH hospitals in the Northern Region as well as Prince Hamza Hospital (Central Region) and private hospitals in Central and Northern Regions		
TOTAL	21		20	

Table 4: Actual Quantity of Treated Healthcare Waste by Treatment Units

Treatment Unit	Number of Healthcare Establishments Treating HCW in this Unit	Monthly Average Quantity of Treated HCW (2014) (T/m)
JUST Incinerator	(12) MOH hospitals and healthcare centers (Northern Region) + Prince Hamza Hospital (Central Region)	31.4
	Private sector (hospitals and other HC establishments) + King Abdulla University Hospital	37.8
Al Urdun Hospital Sterilization Unit	(14) private hospitals, medical laboratories, and pharmaceutical research centers	10.5
Al Takhasusi Sterilization Unit	(6) private hospitals	5.35
Al Isra'a Sterilization Unit	(23) private hospitals	13.1
King Hussein Cancer Center	-	18.8
Marka Islamic Hospital Autoclave	-	1.23
AlHayat Hospital Autoclave	-	1.44
Al Khalidi Hospital Sterilization Unit	-	2.1
Al Razi Hospital Autoclave	-	0.24
Imperial Sterilization Unit	4	1.62
Ibn Nafees Sterilization Unit	18	0.64
Takhasusi Irbed Sterilization Unit	-	1.2
Garden Hospital Sterilization Unit	-	1.3
Zarqa New Hospital Incinerator	Several MOH hospitals, blood banks, medical labs, HC centers	20
(4) MOH incinerators in Central Region	4 MOH hospitals and HC centers in the area	12
Actual Monthly Average of Treated HCW (reported)		159 (64% of total (expected) generated HCW)
Theoretical (calculated based on the number of beds) Quantity of Treated (incinerated) HCW from other hospitals (data not documented nor reported)	Royal Medical Services hospitals from all regions + MOH hospitals in the Southern Region	38
TOTAL (t/m)		197
% Treated HCW (actual + theoretical) of total (expected) generated HCW		(197/229) 86%

E-Waste: Most developing countries have and continue to see a rapid acceleration in the use of consumer electronic and electrical equipment (EEE). This is particularly true in Jordan which has an increasing standard of living and aggressive national policies exploiting information technology. One consequence of this is also the rapid growth in generation of what is considered E-waste or WEEE which can be associated with significant chemical releases if not appropriately managed. As such this has been identified by MoE in recent years as a priority waste stream requiring both dedicated regulatory control and the provision of appropriate waste management infrastructure for its environmentally sound management. The following summarizes the current level of understanding, progress in addressing this issue and gaps that exist all as a baseline for Project design in this area.

The country has only relatively recently began to address the issue in a systematic way with participation in a number of internationally funded regional initiatives undertaking the evaluating the status of E-waste management in the Arab countries generally. These include study work by Centre for Environment and Development for the Arab Region and Europe (CEDARE)²², and inputs into the United Nations University StEP Program. Currently UNDP and MoE are partnering in a country specific technical assistance program on the issue as part of the Basel Convention PACE program, the results of which are elaborated below. This involves funding of US\$99,500. Based on this work and particular, the following general characteristics forming a current baseline for addressing the issue are noted:

1. EEE Consumption: Jordan has a relatively high penetration of EEE usage, particularly electronic IT products. It is estimated that that 57% of the population own computers with an equal number in the hands of public and private sector organizations amounting to an estimated 7.3 million units. Similarly mobile telephone usage is estimated to be 9 million and ownership of TVs is approximately 3 million. Current StEP data sheet estimates²³ a per capita use of 8.8 kg/year and total annual consumption of 56,000 t of EEE.
2. E-Waste (WEEE) Generation: No actual inventories of e-waste generation have yet been done but estimates have been made both by StEP and recent UNDP/MoE study work. StEP estimates an annual E-waste generation rate of 4.5 kg per person and total generation rate of 30,000 t/year which would be relatively high for most developing countries. The UNDP study work, estimated total E-waste generation to be in the range of 20,000 t/year.
3. Current E-waste Management Practice: In the absence of any detailed studies on E-waste flows, the disposition of E-Waste from primary consumers can only be characterized qualitatively. Generally, it is felt that a significant proportion of EEE being replaced is directed to secondary users, particularly the significant populations of refugees and migrant residents. Some E-waste that is discarded directly into the MSW stream or after secondary use is captured to some degree by an informal sector for refurbishment or dismantling with unmarketable residuals being deposited in the MSW system or otherwise disposed of by random dumping and/or burning. MoE as part of the current UNDP project is currently establishing a number of collection bins at strategic points. What material that has been collected to date (6 t) is being transferred to the SWAGA facility for unorganized storage pending disposal. Greater Amman municipality also has initiated a similar but larger pilot program, involving 22 (4 bins each) collection points (one located in each section of the city) collecting TV, cell phones, fluorescent light tubes, and other consumer electronics. The municipality has expressed strong interest in financing and developing a dismantling and primary processing operation as well as partnering with the Project. One private sector operator (JoCycle) has operated in Aqaba primarily as a used EEE import/refurbishing/re-export operation but is presently moving the operation to Amman where dismantling will be introduced.
4. Current Regulatory Framework for EEE: Recognizing that virtually all EEE is imported, it is subject to the general legislative, regulatory and administrative controls governing import and export of goods. The only specific provision of note relates to the presently quite permissive regulation on the import and export of used electronic goods as administered by Ministry of Industry, Trade and Supply (MoIT). Import of used equipment ranging from 3 to 6 years old in working order and supported by spare parts is permitted under Import Instructions No.1 (2008). This has facilitated trade of nominally second hand equipment through Jordan which is essentially acting as a transit country. No estimates of the actual volumes are available but this is generally considered to be small relative to the global trade in such materials. The draft regulatory instructions being

²² <http://mideastenvironment.apps01.yorku.ca/2014/03/e-waste-jordan-and-israel/>

²³ <http://www.step-initiative.org/>

developed by MoE include a provision to ban imported e-waste and used equipment. Noting that there is an issue of import of plastics with brominated flame retardants now controlled and banned under the Stockholm Convention it is planned that actions taken for Stockholm Convention compliance will include banning these chemicals in new products as part of measures to be implemented as part of the updated NIP action plan.

5. Current Regulatory Developments applicable to E-waste. With respect to E-waste itself, this is considered a hazardous waste under the Directive on Management, Transportation and Handling of Harmful and Hazardous Substances No: 24/2005 and is banned from disposal in landfills or otherwise as it may impact the environment. Under the current MoE/UNDP initiative, the development of both a draft national E-Waste Policy and Instructions for Electrical and Electronic Waste Management under the above regulation on hazardous waste has been prepared. These documents are currently undergoing a consultation process with both government and external stakeholders, notably the private sector through the Chambers of Commerce and Industry. They provide a policy and value chain based development plan for a comprehensive control framework for E-waste that would potentially underpin an operational system of regulatory control, facilitation of required waste management infrastructure, and financing as required to address the issue. In particular the draft policy document while somewhat aspirational provides a road map defining objectives and priorities as well as key areas where development work is required. These include; i) a robust legal framework; ii) development of environmentally sound capacity and infrastructure, iii) financing and incentive mechanisms based on a variety of options involving tax incentives, “take back” schemes options, source stewardship charges and extended producer responsibility (EPR) programs; iv) life cycle approach to EEE use and E-waste management inclusive of product composition control; iv) awareness and education of consumers and service providers; and v) capacity building in support of the management system. The draft regulatory instructions include consideration of a dedicated consumption based charge on new EEE to fund e-waste collection and disposal as well as mandating Extended Producer Responsibility (EPR) funding for some items, as well as a set of charges to be imposed on generators upon disposal of the WEEE, although it not clear how practical or enforceable the latter may be.
6. Environmental and Health Impacts: The potential negative environmental and health impacts generally associated with E-waste largely result from sub-standard e-waste processing and are well documented²⁴. In general these impact are associated with U-POPs (PCBs, PCDD/F, PBDE) and volatile PTS (heavy metal emissions) releases to air and local soil emissions from crude combustion processing of E-waste (smoldering PVC insulated cables/conductors, melting (cooking) printed circuit board/batteries, and burning to dispose of residual products such as hard plastics). At this point, actual processing of E-waste appears to be limited but with its accumulating inventory and absence of environmentally sound infrastructure to manage it this would change and these impacts would develop as they have elsewhere.

Barriers

Jordan faces continuing barriers related to chemicals and waste management that GEF assistance under the GEF-6 Chemicals and Waste Focal Area can substantively assist in overcoming. These are noted and discussed in the following:

Policy Integration and Implementation Barriers. While the country has developed an effective basic legislative and regulatory framework for waste management generally, this remains somewhat fragmented, contains gaps, and is limited in practice by enforcement capacity deficits. An integrated overall waste management policy that encompasses all critical waste streams is yet to be implemented and specifically with respect to placing appropriate emphasis on waste minimization and diversion consistent with global trends, although a solid foundation for this is emerging in the form of a National SWM Strategy. With the exception of HCW and to some degree general HW, this is reflected in a lack of targeted effort on specialty waste streams that could realistically be diverted with significant economic benefits. Even in the case of HCW and HW, there remain significant capacity, quality and infrastructure deficits that limit the effectiveness of efforts in these areas. Key to having an effective overall waste management policy supporting a modern diversion strategy is the adoption and implementation of sustainable economic instruments and financial mechanisms to provide market driven incentives which will be taken up by the principle stakeholders in the public and private sector. The proposed project is designed to address this in the key

²⁴ [http://www.thelancet.com/journals/langlo/article/PIIS2214-109X\(13\)70101-3/fulltext](http://www.thelancet.com/journals/langlo/article/PIIS2214-109X(13)70101-3/fulltext)

areas of E-waste (where the inherent value chain can be exploited), HCW, and diversion of other appropriate waste streams to environmentally sound options including RDF applications offering associated GHG reduction benefits.

Regulatory Implementation Barriers

Following from the above, there are a number of regulatory barriers associated with specific target waste streams. In the case of E-waste there is a need to have appropriate regulatory direction that clearly assigns responsibility for the costs and revenues, something that generally involves participation of producers, distributors and retailers. Additionally, there is a need for practical regulatory guidance on the implementation of segregation, collection and processing of this waste stream. At present there is no operational regulation and technical guidance on the actual management activities that would both set minimum standards for these activities as well as promote the evolution from unregulated informal activities to a modern, economically scaled and environmentally sound capability serving national needs. Given the highly distributed nature of the waste generation, the scale of operations in the management chain from sources through collection, handling/transfer, processing and ultimately disposal involves a progressive scaling up of service provider activities. Being hazardous waste, all stages require some form of regulation and licensing under national regulations. The GEF project can provide support for this kind of refinement of regulatory measures based on international experience that would achieve both effective control and flexibility to allow appropriately scaled activities. In the case of hazardous waste generally, including chemical waste, the main regulatory implementation barrier is enforcement capacity at the source including its characterization and the ability to effectively track waste from waste to disposal for purposes of control. For MSW, the major regulatory barriers are specific restrictions on what is allowed in the general waste stream directed to land disposal and need for specific diversion targets for waste being directed to beneficial use.

Financial Capacity, Value Chain, and Business Model Barriers: The development of a comprehensive, economically viable waste diversion system meeting reasonable standards of ESM requires a business model capable of sustainably financing collection and processing of waste to beneficial use. This is particularly true of a waste stream like E-waste where an inherent value chain can exist in an effective system if specific gaps such as collection and ESM of residuals with high cost and low economic returns can be financed by an effective product stewardship mechanism. This means progressive elimination of the present informal system that collects e-waste, selectively extracts revenue generating parts of the waste stream as cheaply as possible with no environmental considerations and similarly disposes of low/no value residuals by dumping or burning. To accomplish this responsibility and the financial burden of financing the complete life cycle or value chain would normally be assumed by the parties profiting from the sale of these products and the costs internalized in the purchase price. This can be accomplished by some combination of an EPR system where the private sector originating product supply chain pays and/or a system that applies state mandated incremental charges at point of sale of these products that generates a fund to cover waste management costs. Both approaches require careful management and assurance that funds are accessible, something that itself may be problematic if collected as government revenue directly. The GEF project can support the development of sustainable financing capacity by assisting the creation of a viable scheme financing the services (particularly for collection), introducing initial incentives for informal collectors to integrate into the formal sector, and providing seed capital for environmentally sound processing in the formal sector. Healthcare waste on the other hand appears to have a viable financing model for delivery of services through public and private health care budgets essentially treating HCW as a public good. However, the actual operation of the system requires some optimization in terms of efficiency that may be better served by other business models involving selective contracting out of specialty services currently undertaken as an adjunct to the primary health care services delivered by the healthcare system and its staff. Finally, the overall HW management system presently operated by MoE and centered on the SWAGA facility requires reconsideration of the financing model currently applied which appears to be unsustainable.

Technical Capacity and Infrastructure Barriers: All waste management sectors have significant shortfalls in terms of technical capacity and infrastructure. At present there is very limited organized processing capability related to E-waste and what exists is primarily in the growing informal sector where chemical and specifically POPs release risks due to sub-standard processing and disposal are involved. Given the growth in generation this situation will increase in the absence of environmentally sound collection and primary processing. Associated with this is the need for

human resource technical capacity strengthening to operate new environmentally sound facilities as they become available. In the HCW sector, the current system of on-site and shared off-site facilities while coping with current demand has physical capacity and environmental performance shortfalls, of which the former is particularly critical given the influx of transient populations. In terms of human resource technical capacity, this is uneven across the system. The overall HW management system clearly has both significant capacity, quality and human resource deficits as reflected in the poor state of the SWAGA operation and the accumulating liabilities it is developing for the government. Major clean up and facilities upgrading are required for this to be operating in a satisfactory fashion. All of the above aspects would benefit from both technical assistance and potentially capital investment such as can be provided by the GEF.

Socio-Economic Barriers: An inherent characteristic of the evolution from traditional environmentally sub-standard management of E-waste to a modern environmentally sound system is the dislocation of individuals who are now productively involved in and economically dependent on the informal sector, albeit at a cost to health and living conditions. This represents a social impact that will be resisted at the local level and more broadly by society. For this reason the process of making this transition must provide for mitigation of these impacts, something that the GEF project can facilitate by supporting integration of services now in the informal sector with a formal system and transitioning of associated employment and business opportunities. In all waste management areas, the stress being placed on Jordanian society by the influx of refugees and itself represents a barrier in that it is placing significant incremental loads on the waste management system generally and particularly the HCW system.

Information and awareness barriers: Closely linked to all of the above is the relatively low level of awareness regarding modern waste management approaches which are a major barrier to effective implementation of solutions. This is particularly true for E-waste where public awareness and acceptance of the need to selectively separate and direct these wastes to a dedicated environmentally sound system is critical for its successful implementation. This applies to the general public but also across all stakeholder groups including those in the original product supply chain and service providers. In the case of HCW, a high level of awareness with the health care system appears to exist but this could certainly be reinforced particularly related to source segregation issues and certification efforts for dedicated personnel. One related sector where deficits in awareness appear to apply is the pharmaceutical production and distribution sector. In the current system this sector ships its expired product to SWAGA for a fee but also receives a sales tax rebate which is higher than that charged for disposal which in practice is underfunded and substantial quantities are accumulated without proper management. A high proportion of this is in fact non-hazardous and in many cases still potentially usable so greater awareness of what needs dedicated management is required.

Baseline Scenario

The basis for the baseline scenario and associated gaps is generally defined by the background above outlining the current situation respecting E-waste, HCW and various aspects of general hazardous and municipal waste management in Jordan including issues involving chemical waste stockpiles and waste related U-POPs emissions. The following describes the likely development of actions and activities that would occur in the absence of the GEF intervention with further elaboration and costing provided in the section below on incremental cost reasoning and co-financing.

It is apparent that Jordan has made positive progress related to waste management generally including the elimination of major stockpiles of PCBs and POPs pesticides. It has developed relatively comprehensive basic SW management and HCW management systems and has initiated development of dedicated systems to manage E-waste and hazardous waste. However, with respect to SW and HCW there remain operational gaps in environmental performance that continue to release significant emissions, particularly U-POPs in the form of PCDD/F and heavy metals. With respect to E-waste, the country is essentially just embarking on its effective management with an emerging policy commitment to a dedicated system for its management but as yet there is the absence of the required detailed regulatory measures, financial/economic mechanisms and physical infrastructure to provide a sustainable operational system to manage this growing waste stream. In the case of general hazardous waste inclusive of chemical waste management the initial positive development of infrastructure has effectively stalled and needs to be

re-assessed and placed on a sustainable footing, otherwise the prospects of major long term impacts grows substantially.

In a baseline scenario, it is reasonable to assume that there will be some continued development of the SW and HCW systems. For SW, the incremental implementation of a National SWM Strategy now in the process of adoption would occur noting the long implementation horizon envisioned for this and the likely slow adoption of waste diversion for productive use that is important in filling out development of a truly integrated waste management system. For HCW, the continued implementation of a strategy of replacing sub-standard on-site incineration and utilizing upgraded collective incineration facilities available or under consideration is foreseen, albeit at a slower rate. However in both cases the rate at which this would occur will be constrained by financing and is increasingly constrained by the incremental stress being put on capacity in these areas by the rapid population influx from beyond the country's borders. This would result in continuing issues related to substandard performance, particularly U-POPs emissions. In the case of E-waste, the baseline scenario would be anticipated to make some progress but in the absence of international assistance and guidance would likely be slow, fragmented and largely confined to symbolic initiatives. Given the rapid growth of this waste stream it is likely that there would be incomplete development of a sustainable fully integrated value chain, with rapid expansion of the informal sector and increased use of sub-standard processing methods to extract valuable and marketable components while leaving low value residues as an additional load on the existing waste management system as well add increased harmful releases from processing, notably POPs and heavy metals. Finally, in the absence of substantive intervention and guidance the existing HW managements system will either collapse or continue to accumulate harmful legacies indefinitely with increasing risk of its release including a catastrophic event such as a major fire.

The proposed GEF intervention described below in the Alternative Scenario will address these barriers and allow a more consistent and broadly based ESM response through strengthening a polluter pay based system, ensuring seed financing for required measures and investment, and overall add key components for a truly integrated waste management system.

Alternative (Project) Scenario

The alternative scenario that defines the proposed GEF project is based on utilizing GEF resources to address the key barriers and gaps associated with the country moving forward on areas of waste management with specific global impacts in terms of chemicals and specifically POPs release, as well as assisting in the development of an overall integrated waste management strategy and framework based on waste diversion to productive use. In the case of SW and HCW would allow sustained development of fully integrated ESM systems within this framework, even in the face of increased population and waste generation pressures. For E-waste GEF assistance in key strategic areas such as development of a sustainable financing mechanisms and economic instruments will allow the country to rapidly move forward to create a modern ESM system avoiding the entrenchment of unofficial poor quality processing of E-waste that has occurred in other developing countries. Likewise, the Project scenario proposed will facilitate the upgrading of current hazardous waste infrastructure and the current business and operating practices associated with it to provide effective primary chemical and other hazardous waste management while facilitating the elimination of the present environmental risks that the accumulated waste legacy from current practice is creating. It would involve three (3) basic Components/Outcomes as outlined in Section B above and described below in terms of corresponding Outputs and activities that include a mixture of advisory institutional/regulatory development, technical capacity strengthening, and investment. The first Component/Outcome addresses E-waste including the institutional and regulatory advisory support necessary to create a sustainable system as well as technical capacity and pilot infrastructure development required for environmentally sound processing. The second Component/Outcome addresses filling critical technical and physical capacity gaps in the current HCW management system. The third Component/Outcome provides direct support for the advancement of waste diversion within the SW management system and reduction of U-POPs releases from open burning, developing hazardous waste system in terms of eliminating the current chemical waste liabilities and facilitating upgrading and qualification of national capacity including national source based emission monitoring as well as an associated GHG release reduction benefit from introduction of RDF use.

Component 1/Outcome 1.1- Development of ESM E-waste management system/Environmentally sound E-waste collection, processing and residuals management capability developed (GEF Grant US\$1,000,000, Indicative Cofinancing US\$6,200,000) - This Component's overall purpose as reflected in the associated Outcome 1.1 is to develop a sustainable E-waste management system operating on a value chain basis and inclusive of operational environmentally sound collection, primary processing and residuals management capability. In terms of outputs and activities this would cover institutional support for the finalization, adoption and initial implementation of the proposed national E-waste policy and the refinement and implementation of a supporting regulatory framework, development and adoption of economic instruments and financial mechanisms required to ensure a sustainable market driven system, support the creation of operation partnerships to build and operate the basic collection and primary processing infrastructure required for the system, foster the linkage of this system with ESM of components suitable for sale within the international market, and underpin all of the above with effective public consultation and awareness activities. The following elaborates on the Component and its Outcome in terms of anticipated outputs and activities:

Output 1.1.1 - Effective policy implementation and regulatory control for ESM of E-waste in place: MoE is completing an initial process of developing a E-waste management policy and the basic supporting regulatory framework in the form of an instruction on e-waste management. This Output will involve follow up implementation activities to operationalize this policy and instruction as follows: i) development of detailed inventories based on regulatory registration and reporting requirements covering the generation and disposition of E-waste supported by an operational data management capability to allow analysis and trending; ii) an assessment of current E-waste capacity inclusive of a gap analysis identifying upgrading and development needs; iii) preparation and promulgation of operational regulatory standards and technical guidance documents for application in licensing and enforcement at the regional and local level covering the E-waste management chain (collection, transportation, storage, dismantling, processing and residuals disposal); and iv) strengthened cooperation and coordination within the region and internationally on import/export and Basel Convention compliance issues, both related to e-waste but also including application of appropriate controls and bans on such POPs as PBDEs in imported products. GEF support will primarily be associated with providing international practice and experience in these areas with a grant of US\$200,000. Indicative cofinancing in an amount of US\$500,000 is estimated largely from MoE in the form of both cash from the e-waste financing mechanism and in-kind contribution.

Output 1.1.2 - Sustainable financial and business mechanism supporting E-waste management established and implemented: This Output is intended to finalize the financial mechanism that will underpin the economic viability and sustainability of the E-waste management system and its operation. The purpose of the financing mechanism is to support administration of the E-waste management system and fill the gap between what it costs to capitalize and operate the collection of a widely distributed specialty waste stream followed by its processing inclusive of environmentally sound disposal of residuals and the revenues that those activities can generate in the international, and where appropriate local, market for its various valuable components. In the case of E-waste, that revenue generation can be substantial when reasonable economies of scale are achieved. Recognizing that in a relatively small generation country with limited market for recovered resources, sustaining revenue for service providers is only likely achievable for primary processing with the components of value being exported to an international market for final processing. There will be a shortfall typically involving the collection and first transport components of the operational value chain. That gap needs to be filled by an external source of revenue that ultimately ends up being reflected in the cost of sale of the originating product (i.e. waste management costs are internalized consistent with a life cycle approach). Alternatively, it could be done simply by public subsidy (government budget or external grants) but this is not generally considered an option except early in a program to demonstrate it. The common mechanism available, individually or in some combination, are: i) an incremental charge collected remitted at the retail level on sales of EEE or a similar charge applied to producers/importers/distributor/retailer. Current MoE thinking favors the former approach. This output is intended to support the process of selecting and implementing the approach finally selected at the detailed level. This would cover activities such as i) testing the feasibility of the options including issues of practicality and collectability; ii) fine tuning the level of charge to be applied and at what point; iii) developing the administrative mechanism of receiving such revenues and disbursing it to the service providers on a competitive and transparent basis; and iii) establishing the operational mechanisms of independent supervision by stakeholders and operation supported by reporting and audit. For purposes of this PIF a GEF grant of US\$200,000 is

envisioned entirely directed to technical assistance and transfer of international experience supporting the above. Co-financing of US\$400,000 sourced from financial mechanism and MoE (primarily in-kind) is assumed likely based on a charge on EEE sales to be implemented in advance.

Output 1.1.3 - E-waste collection and primary processing capability established: This Output covers the initial development of required capacity to provide environmentally sound management of domestic E-waste generation recognizing that what currently exists is largely an informal system with a few demonstration public collect points and only two identifiable formal E-waste service providers (City of Amman and JoCycle). To this end, the approach used is to focus project support primarily on support for a voluntary collection system and one or more strategically located pilot commercial E-waste dismantling and primary processing facilities in cooperation with one or more external service providers. The collection capability would have three aspects. One would involve expansion of the current limited voluntary collection system available to the general public, largely based on the placement of accessible collection containers at secure but accessible locations. The second aspect would focus primarily on the institutional sector but also on large private sector organizations that potentially generate significant quantities. In this case collection infrastructure would be based within large institutions such as government offices, university and military facilities, utilizing the IT equipment supply and facility management services in those organizations. The third aspect would be the landfill based diversion system described in Component 3 below where E-waste segregation would be part of the system being piloted and promoted at landfills utilizing the existing and more formal system of waste separation at the disposal point being developed generally. In parallel, the Output would support competitively selected proposals from private sector or municipal service providers to develop basic primary processing facilities, including those already entering the business. Typically this would involve dismantling facilities inclusive of input segregation and separation into dismantling lines and accumulation of marketable materials having optimum value in onward processing. This would include equipment for steps such as mechanical wire stripping, size reduction and packaging of plastic residuals in a form suitable for recycling and classification of printed circuit boards as a marketable commodity. In the context of POPs release reduction the creation of this primary processing infrastructure avoids the alternative of crude low temperature based processing that would otherwise develop and results in U-POPs release. Additionally, the management of waste residuals will be a key component of the value chain, particularly in relation to any residuals such as ABS based plastics that have potential to contain PBDEs. In doing so, the management of these waste streams will be linked to overall developments under the National Solid Waste Management Strategy including the initiative within the project related to the development of RDF supply and more generally to generation of marketable recyclable commodity materials, both involving ESM practices. Finally investment in general infrastructure supporting sound occupational health and safety standards, particularly ventilation and PPE would be included. The transportation link would be provided on a competitively contracted basis or concession based PPP arrangement, as an integrated service or involving separately licensed service providers. GEF support of US\$500,000 will be a combination of technical assistance to plan and provide technical design inputs for the proposed infrastructure and seed capital investment in the collection and pilot processing capability. Co-financing would be from both private sector service providers (US\$3,100,000) and funding generated by the financial mechanism, disbursed on a transparent competitive basis for capital assets and incentives in an amount of US\$2,000,000.

Output 1.1.4 - Awareness and human resource strengthening for E-waste management delivered: A critical supporting element required to establish an effective E-waste management system is delivery of a comprehensive consultation awareness and training program in support of the system beginning at the stage of its proposal and introduction. This Output addresses this in recognition of the importance of stimulating the required fundamental cultural change over a wide range of stakeholders, through undertaking awareness and capacity strengthening activities. More specifically it would provide for continuing the current national consultation program on the system's development as it is finalized for implementation, followed up by awareness and training over this spectrum of key stakeholders, including targeted awareness/training for the consumer and retail sectors, regulatory officials at the national, regional and local level, and for service providers in both formal and informal sectors. In terms of public awareness additional activities through MoE, municipalities and service providers will be developed and delivered in the form of conventional media and dissemination factual documents but will also utilize web based and social media tools. Once established it can be assumed that the programs will primarily be funded by the selected financial mechanism, with GEF support being provided for the design and initial implementation of the program

inclusive of international experience as required. For purposes of estimating co-financing this is assumed to be operated for a period of five years but effectively continues indefinitely with GEF support of US\$100,000 and overall co-financing of US\$200,000.

Component 2/Outcome 2.1 - Achieving environmentally sound healthcare waste management/ BAT/BEP healthcare waste management practice and technology implemented nationally (GEF Grant US\$1,500,000, Indicative Cofinancing US\$10,800,000): The purpose of this Component/Outcome is to complete the modernization of the country's HCW system, specifically in relation to addressing environmental performance deficits associated with existing sub-standard on-site incineration. This would be done both by accelerating replacement of in-hospital incineration units with BAT/BEP non-combustion options and qualifying/upgrading newer larger incineration facilities to act as collective disposal facilities. Additionally, the component would seek to improve and optimize the efficiency and operating performance of the overall HCW system through introduction of source based training and certification of HCW operations and investigate other business models for operation involving further contracting out of HCW services from source through to environmentally sound disposal as appropriate.

Output 2.1.1 Program of replacement of small sub-standard incineration facilities in 10 hospitals with non-combustion shredding/sterilization/autoclave units fully implemented: As noted above there has been significant closure of small sub-standard incinerators in the system generally with the strategic healthcare sector priority being the adoption of non-combustion source based technology, something that is seen as a best practice and consistent with current overall waste management thinking globally, with the currently visible emphasis in the private sector and much more slower pace developments in the state-funded hospitals. Replacement programs involving introduction of autoclaves with shredding and sterilization are being pursued in public, private and military sectors along with optimization of service coverage with commercial cooperation between hospitals in and across these sectors have been initiated by are as yet incomplete. The project would propose to support the acceleration of this transition with direct financial support for new BAT/BEP non-combustion facilities in key hospitals, potentially in all three sectors and in each case leveraging and being integrated with investments programs by the respective sectors. In the public sector, ten hospitals potentially need new facilities (or alternatively cooperative arrangements with others), up to seven units in the Royal Hospital sector would similarly be considered for replacement or outsourcing. Within the private sector where all old incineration facilities have been replaced, there remains a projected capacity deficit notwithstanding initiatives by two larger hospitals to expand non-combustion treatment capability. Estimated financial commitments to be made by the three sectors over the next several year's totals US\$4,300,000 million in facilities replacement and associated in-kind support. Additional funding is anticipated to be available to the MoH from the Kuwait Fund in the amount of US\$500,000 to address the HCW needs created by hospital facilities being established in refugee camps. It is proposed that GEF financing in an amount of US\$1,600,000 be made in support of this overall effort with indicative cofinancing of US\$4,800,000.

Output 2.1.2 Qualification to demonstrate international performance of high capacity incineration facilities providing regional services undertaken: In parallel with the process of replacing small in-hospital incinerators with source based non-combustion technology, there is also a need to evaluate and potentially upgrade larger incineration facilities that will continue to provide key collective service capability to the system, particularly in the public sector and in areas outside major municipal centers. Four specific candidates for this have been identified: i) the replacement units being developed for the JUST facility which provides a significant portion of MoH needs in the north; ii) the newly installed Badia Hospital units requiring maintenance; iii) a new high capacity (2 t/day) unit in the Zarqa Hospital; and iv) the commercial rotary kiln facility awaiting renovation/ licensing/commissioning at Ghabawi landfill. It is proposed that the Project would finance technical capacity and performance evaluations as warranted. This would including i) source specific stack emission testing for the normal range of regulated pollutants including particulate, heavy metals and PCDD/Fs; and ii) identification of technical upgrading required for improved performance including selective investment as required. A proposed GEF grant of US\$400,000 would be co-financed by public and private sector investment of US\$5,700,000 based primarily on capital investments being made in the new facilities and upgrading requirements, along with assumed in-kind support for these investment programs. GEF funding would largely be directed at i) ensuring such facilities meet international emission standards, specifically those related to the release of U-POPs and heavy metals, something that is considered a prerequisite to

licensing and commercial commitments to such operations; and ii) technical assessments related to upgrade feasibility as required.

Output 2.1.3 Training and formal certification program for in-hospital waste management personnel developed and implemented: The above GEF investment interventions in BAT/BEP facilities would be supported in this Output by a number of technical assistance capacity strengthening activities. These include support for training of expanded and renewed personal training particularly at source but also including expanded and optimized collection arrangements made to support inter-hospital capacity optimization. A specific focus of this would be emergency healthcare facilities being established for refugees. Associated with this, a current MoH proposal designed to address the uneven quality of in-hospital waste management practices with a national voluntary certification program would be supported. Framing all of this, an allocation to an awareness and best practice replication initiative involving a partnership between sectors and the leading practitioners within each sector would be undertaken. An indicative GEF grant allocation of US\$200,000 is proposed for this area with an in-kind contribution of US\$200,000 in co-financing being committed. GEF funding would largely be directed at transferring current international experience and practice as input into this area, specifically drawing on UNDP's global experience and work in this area as well as supporting training and awareness initiatives.

Output 2.1.4 Development of optimized waste management service provider arrangements through private public partnerships pursued: This would be another parallel technical assistance element that would support the potential optimization of the business arrangements being applied to HCW through expanded use of PPP arrangements involving dedicated HCW management firms, inclusive of contracting in-hospital management operations. With the specific objectives of optimizing cost effectiveness and achieving a uniform level of health protection and environmental performance, this would provide an independent analysis for the stakeholder sector on what the best options might be for them individually. An GEF grant allocation of US\$100,000 is proposed for this area with an indicative contribution of US\$100,000 in co-financing being committed from the health sector. GEF funding would largely be directed at transferring current international experience as input into this area.

Component 3/Outcome 3.1 - Developing waste diversion/resource recovery capacity for GHG and U-POPs reduction/ Effective waste diversion/resource recovery capacity from HW and SW streams developed with associated GHG and U-POPs release reduction achieved (GEF Grant US\$1,400,000, Indicative Cofinancing US\$6,750,000): This component addresses several priority chemicals waste and U-POPs release issues associated with waste management generally along with GHG release reduction and avoidance. This is done through support for demonstration of modern SW and HW management practice improvement based on waste diversion and qualification of environmentally sound recycling, resource recovery and energy from waste options, all of which fit within the framework of the pending SWM strategy and more generally an overall integrated waste management strategy for the country. It links to the other Project components, particularly Component 1, and supports substantive national and international initiatives related to SW and HW management.

Output 3.1.1 Open burning associated with smaller landfills assessed and effective prevention measures implemented: The current U-POPs inventory based on the UNEP Tool Kit and used in the current GEF supported preparation of the NIP Update identifies open burning associated with controlled but sub-standard MSW landfills as the main PCCD/F release issue in the country. At present insufficient factual information is available to validate the theoretical Tool Kit analysis with empirical information. This component seeks to address this issue first by systematically assessing the extent and nature of open burning that is occurring, and, secondly, based on that information, initiate effective mitigation, potentially through a combination of awareness, training, landfill practice change and direct intervention. The proposed activity will be integrated specifically with the major upgrading initiative planned for the Alakedir landfill and potentially other activities undertaken as part of the National Solid Waste Management Strategy, particularly where consolidation and closure of small sub-standard landfills into larger engineered landfills is undertaken. A GEF grant allocation of US\$150,000 is proposed for this area with an indicative contribution of US\$150,000 in co-financing being committed. GEF funding would largely be directed at problem definition studies, awareness activities and training.

Output 3.1.2 Pilot MSW landfill operation optimized to provide for effective diversion to environmentally sound management through treatment, recycling and/or resource recovery: As previously noted national waste diversion rates associated with recycling are quite low in Jordan. At the same time, there are emerging if uncoordinated initiatives at individual landfills to divert certain waste streams by an informal system of manual separation at landfill reception points and within the landfills themselves at the dumping point. Limited collection of metals, plastics, e-waste, bulk textiles and corrugated/other paper is occurring based on opportunistic scavenging and/or locally arranged concession arrangements, all of which involve significant health and safety risks to those engaged in it. However, substantial volumes of these and potentially other materials remain available for diversion at this point, an issue that is highlighted in the National SWM Strategy. It is proposed that the Project supports more formalized waste diversion operations in association with landfill operators. More specifically, this would focus on developing a pilot organized waste diversion and collection operation at the Alakedir Landfill in the form of an actual Materials Recovery Facility (MRF) as part of the larger overall upgrading initiative. In particular it would target the various bulk utility and industrial waste streams that are currently going into various parts of this landfill including textile waste, evaporation pond residuals from sewage and olive oil waste water wastes as well as items listed above. The intention would be sorting/segregation of these, and size reduction (compaction, shredding, bulk containment) for recycling materials markets, refuse derived fuel (RDF) and potentially organic waste composting for soil supplement use. This activity links directly to Component 1 above and to Output 3.1.4 described below. An GEF grant allocation of US\$250,000 is proposed for this area with an indicative in-kind and cash budget contribution of US\$2,200,000 in co-financing being committed including contributions associated with a Canadian bilateral grant (CAD\$14,000,000) administered by UNDP for upgrading at the Alakedir Landfill. GEF funding would largely be directed to various aspects of pilot program development including modest capital contributions but with an emphasis on market development, training and implementation of appropriate health and safety practice.

Output 3.1.3 Elimination of primary stockpiles of chemical waste at the national hazardous waste storage site supported: This Output would be directed at providing support to MoE's priority task of restoring the SWAGA facility to its original purpose and to eliminating the currently accumulating environmental legacy that characterizes its current state. As generally described above, the site, while containing good and useful basic infrastructure, has essentially served as dumping place for a wide variety of industrial and institutional waste. Some of this is true HW including some with significant potential environmental impacts if not managed properly, but the majority is various non-hazardous wastes largely in the form of expired pharmaceutical product from original producers/distributors in its original packaging as well as specialty waste such as E-waste that should be directed to primary processors. Unfortunately there is no order for its placement on the site nor adequate characterization records or inventory available of what is there. This has all been undertaken for a fee collected by MoE but the revenues have not been adequately returned to the operation and continued development of the site, but rather is being accumulated in an environmental fund by MoE. The proposed Output targets the cleanup of site and placing it on a sustainable basis financially for future operation. This would involve an initial step of physically developing an inventory of what is present and segregating it as to hazard and potential disposition as well as clearing the various functional site facilities so they can be accessed and utilized. This would be followed by disposition decisions and where options are available removal to appropriate treatment, resource recovery and/or disposal facilities. Linked to this step would be activities elsewhere in the project related to E-waste management (Component 1), development of RDF capability at cement kilns (Output 3.1.4), and development of waste diversion/MSW recycling (Output 3.1.2). In parallel with this MoE would modify its current business model for operation to a sustainable arrangement, a major step being the substantive elimination of expired pharmaceutical waste except that which is hazardous and place this under a clear extended producer responsibility arrangement consistent with international and industry practice. A GEF grant allocation of US\$500,000 is proposed for this area with an indicative in-kind and cash budget contribution of US\$2,200,000 in co-financing, primarily from accumulated revenues and where applicable affected waste generators, being committed. GEF funding would largely be directed to technical assistance related to design and project management associated with the site cleanup and planning both future operations/modifications as well as business planning. Selected direct support for the packaging and disposal of priority chemical wastes would also be a potential candidate for GEF funds.

Output 3.1.4 National energy from waste management capability through utilization of waste derived fuel in commercial cement kilns developed and qualified: This Output supports the development of national capability for a partnership with the national cement industry to expand the usage of RDF. Jordan has a large and generally modern cement industry represented by both national and large international companies. At present 4 operating facilities producing approximately 8 million t/year of cement operate in the country serving domestic and export markets. The primary fuel used is relatively high cost imported fuel oil. Consistent with the current BAT/BEP practice in the industry generally a strong interest exists in exploiting RDF to reduce costs and GHG emission. In association with the Project, the cement producers have initiated discussion with MoE. With a linkage to other outcomes and outputs in the Project, this Output would be directed at developing a partnership between various stakeholders in modernization of waste management generally (municipal MSW operators, private waste management service providers, waste generators and MoE) to qualify one or more cement plants kilns for a variety of RDF. This would include a range of waste streams including things like E-waste residuals (plastics), residuals from end of life vehicles, pharmaceuticals, selected chemical wastes, textile wastes, and other non-marketable plastics. A GEF grant allocation of US\$500,000 is proposed for this area with an indicative in-kind and cash budget contribution of US\$2,200,000 in co-financing, primarily from cement industry partners, being committed. GEF funding would largely be directed to supporting the selection and technical evaluation/qualification of potential industry partners including baseline and waste specific test burns both utilizing international standards and guidance documentation. It will also support the regulatory development and permitting process undertaken by MoE. Included in the activity but also associated with the performance evaluation work on HCW incineration facilities (Output 2.1.2) would be technical assistance in developing national point source sampling and monitoring capability in association with one or more leading technical research institutions.

Incremental Cost Reasoning and Financing

The overall incremental cost reasoning and associated approach to co-financing is based on using GEF funding to accelerate what are new progressive policy initiatives, currently at embryonic stage in the case of E-waste and waste management generally, plus sustaining a sound BAT/BEP introduction initiative in HCW to levels consistent with international standards. As described above under the heading of Baseline Scenario, in the absence of GEF support, the likely results of the current policies and actions in these areas is their piece-meal development with a mixed array of ad hoc informal and formal capacity, marginal economic viability, and continued and potentially increasing negative environmental impact in some cases. In the case of E-waste and waste management, the GEF intervention proposed will serve to kick start the orderly development of action coordinated with substantial leveraging of funding from other sources and the development of market based capacity that will respond to the increasing demand. For HCW, the project's incremental impact focuses on ensuring the application of cost effective BAT/BEP based technologies and optimization of cost effective delivery of critical services now under increasing external pressure due to regional conflicts and the increasing influx of refugee and migrant populations. The following discusses the specific incremental reasoning by Project Component described above.

Component 1 - Development of ESM E-waste management system/environmentally sound E-waste collection, processing and residuals management capability developed: The baseline scenario for E-waste is that the current situation of slow, symbolic and somewhat ad hoc development of an E-waste management system will continue over an extended period with associated expansion and entrenchment of informal E-waste management inclusive of increasing negative environmental impacts associated with it. The Project will counter this with near term financial assistance to get the necessary systematic planning, regulatory action, organizational capability, awareness/human resource capacity, and basic primary formal processing infrastructure in place. It effectively serves to accelerate the process to the point where it has a critical mass for a sustaining market driven result, supported by an effective producer pay or EPR based financing mechanism, appropriate regulatory measures and the dedicated administrative capacity. This includes inputs of current international experience relative to enhanced information gathering, data management tools, and practical standards and guidance. All this is anticipated to leverage greater financial commitment within government and private sector budgets as well as prospective bi-lateral assistance but most importantly provide for sustaining financing mechanism. In financial terms the estimated baseline financial commitment of public and private sectors would likely be under US\$2.0 mln, mostly in-kind, while this is estimated at US\$6.2 million with up front GEF financial stimulus.

Component 2 - Achieving environmentally sound healthcare waste management: As noted above in the baseline scenario, Jordan has a relatively comprehensive and advanced HCW system for a developing country that is moving toward the adoption of international best practice from source through to disposal. The GEF contributions proposed to this is essentially to accelerate and sustain this process, specifically the preferential adoption of BAT/BEP non-combustion HCW disposal as close to sources as possible as well as fill in gaps in other parts of the system, namely the qualification of retained incineration capacity to international standards and technical assistance in adoption of uniform operating practices and procedures through implementation of a uniform hospital HCW certification system and optimization of cost effectiveness of such operations. In the absence of GEF support, the rapid adoption of BAT/BEP disposal would be delayed with continued use of substandard incineration and associated U-POPs and other PTS release. Where incineration is retained as is probable in some situations, the GEF contribution is effectively entirely incremental given that the kind of technical performance assessment and upgrading measures would not otherwise occur. Likewise kind of technical assistance proposed is incremental in that it is unlikely to occur in the absence of GEF support and key to placing the country at the forefront of developing countries in this area. This in itself represents a major incremental benefit as Jordan can serve as best practice for wide replication based on GEF support. In financial terms the estimated baseline financial commitment of the healthcare system would likely be no more than US\$5.0 million, while this is estimated at US\$10.8 million with up front GEF financial stimulus.

Component 3 - Developing waste diversion/resource recovery capacity for GHG and U-POPs reduction: This Component integrates the modernization and rehabilitation of the country's solid and hazardous waste management infrastructure with a number of chemicals waste management and POPs release reduction objectives as well as providing for GHG reduction opportunities. The incremental nature of the GEF contribution is generally derived from the connections that GEF support builds to capitalize on these aspects that would otherwise likely not be obtained by pursuing activities in these areas independently. In the case of Output 3.1.1 (Open Burning) this relates directly to ensuring that the current issues associated with landfill burning are addressed as part of the National Solid Waste Management Strategy implementation. In the case of Output 3.1.2 (MSW Waste Diversion) the GEF contribution focuses on maximizing the recovery of waste materials, otherwise being landfilled, for productive use including applications that reduce traditional GHG and U-POPs release that would otherwise not be exploited. Output 3.1.3 (HW legacy elimination) uses GEF resources to plan and implement the rehabilitation of national HW infrastructure to eliminate accumulated chemical waste legacies as well as ensure its future operation on a financially sustainable and environmentally sound basis, something that would otherwise not likely be achieved and involve continued legacy accumulation. Finally, Output 3.1.4 facilitates the adoption of international RDF utilization practices in the cement industry with resulting incremental benefits both in terms of displacement of a high carbon foot print fuel and an environmentally sound utilization option for solid and chemical wastes that would otherwise be landfilled or simply stored as long term legacies. In financial terms the estimated baseline financial commitment of to waste related activities is estimated to be US\$2.1 million, while this is estimated at US\$6.75 million with up front GEF financial stimulus.

Indicative Project Timelines and Implementation Linkages

The overall indicative project timelines, nominally starting from the GEF CEO approval noting that a 18 month PPG period dating from the PIF/ PPG funding approval and assuming a 60 month implementation period are summarized below:

Component	Activity/Output	Scheduling			Linkages
		Start	Finish	Duration (months)	
	Project Implementation Procedures/Inception Activities	Month 1	Month 6	6	Operational requirement for initial contracting
1. 0 Development of ESM E-waste management system	1.1.1 E-waste policy implementation and regulatory control	Month 3	Month 18	15	Required to support Activities 1.1.2 and 1.1.3
	1.1.2 Sustainable financial	Month 6	Month 24	12	Integrated with other

Component	Activity/Output	Scheduling			Linkages
	mechanism supporting E-waste management				Component activities throughout
	1.1.3 E-waste collection and primary processing capability	Month 18	Month 60	42	Integrated with other Component activities throughout
	1.1.4 Awareness and human resource strengthening for e-waste management	Month 3	Month 60	57	Integrated with other Component activities throughout
2. 0 Achieving environmentally sound healthcare waste management	2.1.1 Program of replacement of small sub-standard incineration facilities with non-combustion shredding/sterilization units	Month 6	Month 48	42	Linked to 2.1.2 for capacity gap definition
	2.1.2 Qualification to demonstrate international performance of high capacity incineration facilities providing regional services	Month 6	Month 36	30	Results will potentially define latter replacements in 2.1.1
	2.1.3 Training and formal certification program for in-hospital waste management personnel	Month 12	Month 24	12	Completion linked to 2.14
	2.1.4 Development of optimized waste management service provider arrangements through private public partnerships	Month 24	Month 36	12	Results of 2.1.3 input into PPP development process
3. 0 Developing waste diversion/resource recovery capacity for GHG and U-POPs reduction	3.1.1 Open burning associated with smaller landfills assessed and effective prevention measures implemented	Month 6	Month 12	6	Serves as input into national SWM plan strategy implementation
	3.1.2 Pilot MSW landfill operation optimized to provide for effective diversion to environmentally sound management through treatment, recycling and/or resource recovery	Month 12	Month 48	36	Linked to implementation schedule of UNDP MSW project at Alakedir. Serves as input to 3.1.4
	3.1.3 Elimination of primary stockpiles of chemical waste at the national hazardous waste storage site and qualification of in-country disposal options	Month 6	Month 18	12	Linkage to Activities 1.1.3 and 3.1.4
	3.1.4 National energy from waste management capability through utilization of RDF in commercial cement kilns developed and qualified	Month 6	Month 60	54	Inputs from 1.1.3 and 3.1.4

Global Environmental Benefits

The Global Environmental Benefits (GEB) attributed to this project are associated with both the the elimination and/or secure containment of POPs and other harmful chemicals that would otherwise be subject to release into the broader environment with associated environmental and human health impacts, and a parallel benefit involving reduction in GHG emissions obtained by improved waste management practice that exploits the use of waste as fuel as a replacement for fossil fuels.

In the case of Component 1 (E-waste), the POPs of concern originating from inadequate E-waste processing are: i) Polychlorinated dibenzo-pdioxins (PCDD) and dibenzofurans (PCDF) originating from smoldering of cables or plastic metal mixes to obtain copper and precious metals as well as from burning of printed circuit boards and plastics in order to reduce the volume of unrecyclable waste; and ii) the incomplete combustion products from burning of polybrominated diphenyl ethers (PBDEs) contained as flame retardants in plastics used in TVs,

computer casings, circuit boards and other IT products. Historically PCBs were used in small capacitors used in electronic products although this would be anticipated to be small except for very old products. Mercury is potentially contained in switches used in electronic products, and would be subject to release to land and water from dumping/land disposal and air where crude thermal processing is involved. Other priority pollutants of concern include a range of heavy metals including cadmium, hexavalent chrome and particularly lead, potentially released to land and air.

In the case of Component 2 (HCW), the primary environmental benefit will be derived from the substantive reduction in PCDD/F emissions from the current sub-standard incineration facilities utilized in the country which is conservatively estimated in the NIP update to be 10 g TEQ/year. Of particular importance is the replacement of smaller in-hospital units in all sectors with non-combustion technology along with upgrading of larger newer incineration units serving collective needs to meet international emission standards. An additional benefit of the conversion to non-combustion technology will be elimination of possible mercury emissions potentially associated with incineration units that are replaced. However, as noted in the baseline, the healthcare system in Jordan is quite advanced in the elimination of mercury in its primary source (thermometers) and for this reason, the project's impact in this area will not likely be significant.

In the case of Component 3 (Waste Diversion/Resource Recovery Capacity) GEB will be obtained from reduction in PCDD/F and PBDE combustion by product release associated with open burning of landfills and random disposal of informal scavenging processing residuals such as plastics, foams and textiles, the latter materials being diverted to qualified RDF applications. There would theoretically be some potential for PFOSs to also be addressed through diversion of textile wastes but as noted above preliminary inventory studies suggest this is not a major issue. As noted above the preliminary NIP update inventories suggest that approximately 17 t of PBDEs exist in the overall stock of affected automotive and textile products in the country and open burning of landfills is generating 46 g TEQ/year. Likewise a variety of chemical wastes, some of which potentially having global environmental impacts will be captured and disposed of in an environmentally sound fashion, although this is not likely quantifiable. The use of diverted waste materials likewise provides a parallel benefit of GHG reduction through the displacement of high impact fossil fuels currently in use in cement kilns. This will be determined during the PPG when RDF availability and use capacity is determined.

Estimating the actual quantities of POPs and other chemicals where release elimination and reduction is achieved as well as the net GHG reduction is difficult to estimate at this stage in the absence of solid inventory data, detailed assessment of current practice, and having actual estimates of volumes of material going to RDF and other diversion options. This would be specific focus and objective of work done at the PPG stage. However, the following provides a very approximate estimate of potential annual reductions of key critical chemical releases during the project implementation period:

- Release of approximately 500 kg of commercial PBDE and other brominated flame retardants prevented
- Release of approximately 60 g TEQ PCDD/F prevented
- Indirect effect: release of CO₂ prevented – to be determined during the PPG

Innovation, sustainability and potential for scaling up

The Project's approach capitalizes on a well advanced developing country's commitment to meeting international environmental standards generally and in relation to key waste management activities in particular, such that it can be a leader and example for others in the region. This entails innovative approaches to the specific waste management aspects being addressed notably the aggressive adoption of BAT/BEP technologies in HCW management, exploring public/private business models in all aspects of waste management, and adoption of an integrated approach to waste diversion exploiting the use of RDF for waste reduction and climate benefits. It is recognized that for E-waste and waste diversion, the process started by the project will entail stepwise scaling up over time given the key support provided by the GEF in moving to a scale that can readily be sustained by tested

policies, strong public awareness and consensus, and effective financial instruments and market based mechanisms.

2. *Stakeholders*. Will project design include the participation of relevant stakeholders from [civil society](#) and [indigenous people](#)? (yes ☒ /no ☐) If yes, identify key stakeholders and briefly describe how they will be engaged in project design/preparation.

During PIF preparation a wide range of stakeholders have been consulted, the following identifies the principle institutional, industry, academic, international and civil society stakeholders with whom initial consultations have occurred and those that will be followed up with during the PPG stage.

Stakeholder Organization	Role
Institutional Stakeholders	
Ministry of Environment (MoE)	National Executing Agency, Stockholm/Basel/Rotterdam/Minamata Convention as well as ICCM focal points, national policy and project implementation coordination, regulation development, licensing and enforcement applicable to hazardous substances and waste management as well operator of national HW facilities.
Ministry of Health (MoH)	Monitoring of impacts of chemical pollutants on public health nationally and at a local level. Regulatory responsibility for HCW facilities in cooperation with MoE Supervision, technical oversight and financing for operating HCW facilities in the public sector.
Ministry of Planning and International Cooperation	Responsible for overall policy planning in the country Policy level approvals of international projects and national co-financing obligations GEF Focal Point
Customs Department	Controlling goods movements and transportation across national borders in conformity with the current regulations in force. Front line enforcement in relation to border control of hazardous, poisonous, dangerous, and banned materials/chemicals in collaboration with MoE and MoIT. Contribution in controlling the commercial activities to prohibit illegal businesses under the current regulations in force.
Ministry of Industry, Trade and Supply (MoIT)	Organizing and control the internal and external trade. Regulatory role in managing e-waste import and export
Ministry of Municipal Affaires	Provide the municipalities and common services council with finance including MSW Regulate and monitor municipal affaires
Local Municipal Governments including Greater Amman Municipality	Operational responsibility role in the provision of delivering of MSW services including collection, waste diversion and landfill disposal, applying restrictions on the acceptance of targeted waste and hazardous processing residuals at landfills, and supporting disposal of non-hazardous waste residuals.
Aqaba Special Economic Zone Authority (ASEZA)	Monitoring and controlling, e-waste and HCW in Aqaba region. Licensing new facilities for e-waste.
Principle Industrial/Private Sector Stakeholders	
Producers/Distributors/Retailers/consumers of EEE	Financial support for E-waste management activities as mandated under national policy.

Formal sector E- waste private sector service providers	Provision of licensed facilities and technical capability for the collection, transportation, handling, storage, processing, and residuals disposal.
Informal E-waste sector service providers	Currently the principal E-waste management service providers and future human resource base for the formal sector
Private sector HW and HCW service providers	Providers of contracted out HCW collection and disposal
Amman Chamber of Industry and other Chambers	Representation of business sector related waste management issues
Jordan Association of Cement Producers	Development of use of waste as replacement fuel
Academic Institutions	
Jordan University of Science & Technology (JUST)	Active involvement in regional HCW and environmental monitoring service provision
Jordan University	Educate students and staff, develop technological methods and encourage research and post graduate studies in the field of e-waste and HCW
International Organizations	
Kuwait Fund	Bi-lateral donor on HCW and other impact mitigation measures associated with refugee issues
Gulf Fund	Potential bi-lateral donor on HCW and other impact mitigation measures associated with refugee issues as well related environmental expertise capacity.
GIZ	Potential bi-lateral donor supporting SW practice upgrading
Canadian Embassy	Bi-lateral donor supporting SW practice upgrading
US AID	Potential bilateral donor in the area of Chemicals management
European Commission	Potential bilateral donor in the area of Chemicals management
Civil Society	
Royal Scientific Society (RSS)	Research and technological studies institute Analysis of emissions and waste streams Inspection of electrical and electronic devise entered to Jordan
Jordan Environment Society (JES)	Education, awareness raising, monitoring and research.
Land and Human to Advocate Progress (LHAP)	Technical advice on the development of E-Waste planning

The role of civil society is recognized in the preparation of the project with participation of NGO leaders as national consultants. There is the intention to have active ENGOs with a direct interest in POPs and chemical waste management at the local and national level be engaged during the PPG stage in preparation and assume an active facilitation role in public and community awareness and engagement activities during implementation.

3. *Gender Considerations.* Are [gender considerations](#) taken into account? (yes ☒ /no ☐). If yes, briefly describe how gender considerations will be mainstreamed into project preparation, taken into account the differences, needs, roles and priorities of men and women.

The project contributes to reduction of health risks generally associated with POPs, chemical wastes and other PTS being distributed in the broader environment for women, specifically related to their bioaccumulation and transfer through breast milk and more broadly occurrence of such chemicals in both humans and the food supply. More directly, women are potentially disproportionately exposed to the risks of sub-standard waste management practices. In the case of E-waste, there are direct gender issues associated with the operation of informal sub-standard processing and disposal when this occurs at a household and local community level where immediate air, soil and water contamination occurs and to which women and children who live in close proximity have direct exposure. Similarly, emissions associated with HCW facilities, specifically incineration facilities in hospitals and urban areas will have similar gender specific impacts given the proportionally higher number of women working and/or living₂₈

in close proximity to such facilities. The Project's focus on developing better general waste management and specifically waste diversion approaches likewise has a gender impact given that currently the majority of such activities involve informal scavenging activities involving women both upstream and specifically at landfills where adherence to health and safety measures are minimal and in the case of landfills, where those involved often live in close proximity to such operations. During the PPG these aspects will be specifically explored and assessed to ensure that the Project design and implementation throughout takes them into consideration.

4 Risks. Indicate risks, including climate change, potential social and environmental risks that might prevent the project objectives from being achieved, and, if possible, propose measures that address these risks to be further developed during the project design (table format acceptable).

Risk	Risk rating	Risk mitigation strategy
Government policy respecting commitment to a producer pay based system to finance a viable self-financing system of environmentally sound E-waste management is not sustained for the project life either through failure to implement a suitable financial mechanism or due to the inadequate allocation of revenues from it to E-waste management.	Medium	Government has made a concrete, public commitment to implementation of an E-waste management system and established an initial legal and regulatory basis for doing so. However, at present the financial mechanism being pursued is untested and based on previous experience with a similar producer pay system applied to HW which has not effectively provided for environmentally sound management of the subject waste streams. The Project specifically targets ensuring that administrative capacity and commitment to the existence of viable revenue generation and allocation mechanism as a prerequisite to supporting this component of the Project.
Formal sector service providers do not respond to market opportunities with appropriate capacity investment.	Low	While the formal E-waste management sector remains small, investment interest is being expressed, particularly at the municipal government level. Assuming that a viable producer pay system is established, this can be assumed to grow, with facilitation by the Project investment and technology acquisition support
The informal sector business model will dominate the capture of E-waste thus limiting access to E-waste by formal sector.	Medium	The rate of transition to a formal sector based business model will be dependent on the combination of incentives provided to the informal sector to collect and present material for formal sector management and the application of reasonable but progressive regulation to the informal sector at the local level. The project facilitates this through the design of the producer pay system, direct incentives and awareness/training initiatives.
There is a general change in the current commitment within the healthcare system that reverts to more traditional incineration technology for the disposal of HCW.	Low	While the public and private system appear strongly committed to the replacement of sub-standard incineration technology with BAT/BEP non-combustion technologies and selectively upgrading more modern incineration facilities, all operating under optimized business models, a risk exists that competing proposals for centralizing capability in potentially unqualified incineration facilities will be supported within the government. The Project mitigates this by ensuring that whatever options are pursued fully qualify and are demonstrated against international standards.
Social displacement and hardship will result from the replacement of the informal sector currently involved in E-waste and waste diversion activities with a formal sector business model.	Low	The progressive nature and emphasis on integrating the informal sector into a system of formal ESM E-waste management and market driven waste diversion will serve to mitigate the social impacts with the project facilitating the transition of informal sector participants into the formal sector.
Public awareness and human resource	Low	This will be mitigated by the inclusion of robust

Risk	Risk rating	Risk mitigation strategy
capacity is inadequate to support the diversion of E-waste, and other wastes and its presentation for environmentally sound management.		awareness programs targeting the general public and operational stakeholders, as well as training provisions across all main stakeholder groups in the promotion of and creation of technical capacity for management E-waste, HCW and waste diversion activities.

The project will be monitored and evaluated on a regular basis according to applicable GEF and UNDP procedures for results-based management. An annual reporting exercise in the form of the project implementation review (PIR) will take place, where the project will be tracked for progress against the relevant performance indicators (including application of the POPs tracking tool), evaluated for progress made towards development results, and assessed with regard to its degree of adaptive management and its flexibility to respond to changing circumstances.

5. *Coordination.* Outline the coordination with other relevant GEF-financed and other initiatives.

To date, a number of linkages and points of coordination with GEF financed and other initiatives have been identified and discussions initiated. The following elaborates on these.

With respect to country specific GEF projects, this Project effectively represents a follow on initiative to the UNDP GEF-4 MSP on PCB management undertaken by MoE as noted above which provides a strong experience basis in the implementation of Stockholm Convention compliance activities. The proposed Project will also continue to coordinate with the completing UNIDO EA activities involved with the NIP update as it has done to date, particularly in relation to U-POPs release estimates and presence of materials containing brominated flame retardants in the waste stream. Likewise, the results of the UNEP and FAO activities related to DDT, vector control and obsolete pesticide management will be monitored particularly where obsolete pesticides are finding their way into the general waste stream and legacy accumulations at the SWAGA site and these agencies may choose to undertake follow up activities with the Ministry of Agriculture.

The project will also monitor and attempt to develop information and experience exchange with other GEF E-waste and HCW management in the region and globally. Two particularly relevant projects are the UNDP projects in China where a large scale E-waste project is being implemented and in Egypt where there is a combined E-waste and HCW project being implemented.

There are also several international bilateral initiatives that the project would link with. These include: i) the Canadian Embassy financed waste management project being administered by UNDP in Northern Jordan, ii) bilateral funding of HCW infrastructure, particularly that associated with incremental impacts of refugee and migrant populations from the Kuwait and potentially Gulf Funds; iii) the USEPA sponsored International E-waste Network²⁵; iv) regional and global activities/networking platform provided by EMPA²⁶; and v) the UNEP Global Partnership on Waste Management²⁷.

During project preparation and then later implementation phase, the project will also look into potential synergies with a parallel GEF/UNDP PIF entitled “A systemic approach to sustainable urbanization and resource efficiency in Greater Amman Municipality (GAM)” with a budget of US\$ 2,640,000 and with the main objective related to assist the Greater Amman Municipality achieve a climate-resilient and low-carbon future through a targeted support for improved urban planning and interventions in the municipal buildings and street lighting sub-sectors.

²⁵ <http://www2.epa.gov/international-cooperation/international-e-waste-management-network-iemn>

²⁶ <http://ewasteguide.info/>

²⁷ <http://www.unep.org/gpwm/InformationPlatform/CountryWasteManagementProfiles/tabid/104472/Default.aspx>

6. *Consistency with National Priorities.* Is the project consistent with the National strategies and plans or reports and assessments under relevant conventions? (yes ☒ /no ☐). If yes, which ones and how: NAPAs, NAPs, ASGM NAPs, MIAs, NBSAPs, NCs, TNAs, NCSAs, NIPs, PRSPs, NPFE, BURs, etc.

The Project is consistent with and constitutes an integral part of national strategies, priority plans and its current development priorities related to environmental protection as well as social and economic development. In terms of the three current primary chemicals related Conventions (Stockholm, Basel, Rotterdam), all of which Jordan is a party to and active participant in, the Project directly addresses strengthening national compliance, something that is a major priority of the country. It has a primary objective of reducing and eliminating POPs and other chemicals releases along with addressing control of trade issues associated with things like E-waste and used EEE, and generally promoting current overall solid and hazardous waste management approaches consistent with maximizing beneficial use and minimizing traditional disposal. In that regard, the Project is also well timed to support the implementation new National Solid Waste Management Strategy. It also develops a linkage to GHG reduction through the development of environmentally sound RDF applications which is in line with Jordan's overall climate change mitigation policies and strategies. With regard to national development and specifically the country's situation in the region, the Project fits well into Jordan's proactive and humanitarian policies related to accommodating refugees and economic migrants in a manner that both provides appropriate sanitation and medical services while ensuring maintenance of national and ultimately international standards in these areas.

7. *Knowledge Management.* Outline the knowledge management approach for the project, including, if any, plans for the project to learn from other relevant projects and initiatives, to assess and document in a user-friendly form, and share these experiences and expertise with relevant stakeholders.

The principle similar projects that will be mutually supportive in terms of knowledge sharing and transfer are those in Egypt and China along with the extensive network of E-waste, HCW, chemical and general waste management knowledge management initiatives operational both in the region, and globally. This will include active participation into the activities of various organizations, groups and networks that provide forum for knowledge sharing, transfer and dissemination noted above.

Part III: Approval/endorsement by GEF operational focal point(s) and GEF agency(ies)


A. RECORD OF ENDORSEMENT²⁸ OF GEF OPERATIONAL FOCAL POINT (S) ON BEHALF OF THE GOVERNMENT(S):

(Please attach the [Operational Focal Point endorsement letter](#)(s) with this template. For SGP, use this [SGP OFP endorsement letter](#)).

NAME	POSITION	MINISTRY	DATE (MM/dd/yyyy)
SALEH AL-KHARABSHEH	Secretary General GEF OFP	MINISTRY OF PLANNING AND INTERNATIONAL COOPERATION	07/08/2015

B. GEF AGENCY(IES) CERTIFICATION

This request has been prepared in accordance with GEF policies²⁹ and procedures and meets the GEF criteria for project identification and preparation under GEF-6.

Agency Coordinator, Agency name	Signature	Date (MM/dd/yyyy)	Project Contact Person	Telephone	Email
Adriana Dinu, UNDP-GEF Executive Coordinator		07/15/2015	Jacques Van Engel, Director, MPU-Chemicals	00-1-212- 906-5782	jacques.van.engel@undp.org

C. ADDITIONAL GEF PROJECT AGENCY CERTIFICATION (APPLICABLE ONLY TO NEWLY ACCREDITED GEF PROJECT AGENCIES)

For newly accredited GEF Project Agencies, please download and fill up the required [GEF Project Agency Certification of Ceiling Information Template](#) to be attached as an annex to the PIF.

²⁸ For regional and/or global projects in which participating countries are identified, OFP endorsement letters from these countries are required even though there may not be a STAR allocation associated with the project.

²⁹ GEF policies encompass all managed trust funds, namely: GEFTF, LDCF, and SCCF