INDEPENDENT EVALUATION DIVISION
OFFICE OF EVALUATION AND INTERNAL OVERSIGHT

Independent Terminal Evaluation

Implementation of BAT and BEP for reduction of UP-POPs releases from open burning sources in Armenia

UNIDO Project No.: 150063
GEF ID: 5038

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

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List of acronyms and abbreviations

Abbreviation	Meaning
AMD	Armenian Dram
AWHHE	Armenian Women for Health and Healthy Environment
BAT	Best Available Techniques
BEP	Best Environmental Practices
EA	Executing Agency
EBRD	European Bank for Reconstruction and Development
EIA	Environment Impact Assessment
GEF	Global Environment Facility
EMIC	Environmental Monitoring and Information Center
HSWPD	Hazardous Substances and Waste Policy Division
IA	Implementing Agency
ISID	Inclusive and Sustainable Industrial Development
LFM	Logical Framework Matrix
M&E	Monitoring and Evaluation
MoNP	Ministry of Nature Protection
MRF	Material Recovery Facility
MSP	Medium-sized Project
MTE	Mid-term Evaluation
NGO	Non-Governmental Organization
NIP	National Implementation Plan
NPC	National Project Coordinator
NPM	National Project Manager
PAHs	Polycyclic Aromatic Hydrocarbons
PCDDs	Polychlorinated dibenzo-p-dioxins
PCDFs	Polychlorinated dibenzofurans
PIR	Project Implementation Review
PM	Project Manager
PMT	Project Management Team

Abbreviation	Meaning
POPs	Persistent Organic Pollutants
PSC	Project Steering Committee
RECETOX	Research Centre for Toxic Compounds in the Environment
SAICM	Strategic Approach to International Chemicals Management
SC	Stockholm Convention
SNCO	State Non-Commercial Organization
TOR	Terms of Reference
TWG	Technical Working Group
UN	United Nations
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization
UP-POPs	Unintentionally Produced POPs
VOC	Volatile Organic Compound
WRC	Waste Research Center

Glossary of evaluation-related terms

Term	Definition
Baseline	The situation, prior to an intervention, against which progress can be assessed.
Effect	Intended or unintended change directly or indirectly due to an intervention.
Effectiveness	The extent to which the development intervention's objectives were achieved or are expected to be achieved.
Efficiency	A measure of how economically resources/inputs (funds, expertise, time, etc.) are converted to results.
Impact	Positive & negative, intended & non-intended, directly & indirectly, long term effects that represent fundamental durable change in the condition of institutions, people & their environment brought about by the Project.
Indicator	Quantitative or qualitative factors that provide a means to measure the changes caused by an intervention.
Intermediate States	The transitional conditions between the Project's outcomes & impacts which must be achieved in order to deliver the intended impacts.
Lessons learned	Generalizations based on evaluation experiences that abstract from the specific circumstances to broader situations.
Logframe (logical framework approach)	Management tool drawing on results-based management principles used to facilitate the planning, implementation and evaluation of an intervention. It involves identifying strategic elements (activities, outputs, outcomes, impacts) and their causal relationships, indicators, and assumptions that may affect project success or failure.
Outcomes	The likely or achieved short- to medium-term behavioural or systemic effects to which the Project contributes, which help to achieve its impacts.
Outputs	The products, capital goods, and services that an intervention must deliver to achieve its outcomes.
Relevance	The extent to which an intervention's objectives are consistent with beneficiaries' requirements, country needs, global priorities and partners' and donor's policies.
Risks	Factors, normally outside the scope of an intervention, which may affect the achievement of an intervention's objectives.
Sustainability	The continuation of benefits from an intervention, after the development assistance has been completed.
Target groups	Specific entities for whose benefit an intervention is undertaken.

Executive summary

A. Introduction.

The medium size project "*Implementation of BAT and BEP for reduction of UP-POPs releases from open burning sources*" funded by the Global Environment Facility was implemented from June 2015 to December 2018 by the United Nations Industrial Development Organization (UNIDO). The project was nationally executed by the Environmental Monitoring and Information Center falling under the Ministry of Nature Protection of the Republic of Armenia.

The overall objective of the project was to reduce UP-POPs releases in open burning sources in Armenia through the introduction of BAT/BEP and create capacity within the government and private sector on BAT/BEP. The evaluation covered the whole duration of the project. The evaluation team consisted of Nee Sun CHOONG KWET YIVE and Artak TER-TOROSYAN

B. Evaluation findings and conclusions

The in-depth evaluation included a review of project documents and a country visit to interview project personnel, intended beneficiaries, project partners, and other stakeholders involved in the project by using a participatory approach. Field visit to the selected landfill in Ararat was also undertaken during the country mission. Based on the information available and the findings of the discussions held, the evaluation team made the following conclusions.

Relevance: The project is highly relevant as it is assisting Armenia to fulfill its obligations towards the Stockholm Convention. The project is particularly relevant with regard to the challenges facing Armenia for the management of waste. It is also in line with GEF strategic priorities in the POPs focal area.

Efficiency: The project duration was originally designed for 2 years, but due to delays encountered the actual duration was 3½ years. Thanks to the active involvement of key stakeholders, the flexibility of the contractors, and the adequate guidance and support from UNIDO, the project team was able to get the project on the right track. Despite the delays, the project performed very well and delivered quality outputs within the planned budgets.

Effectiveness: All the stated project objectives have been achieved. The project succeeded in strengthening of the national legislation as well as building capacity on BAT/BEP for waste management. Best available technologies were successfully transferred to the pilot landfill, where best environmental practices have been adopted for the sound management of wastes. These interventions have already produced tangible results. Open burning of wastes has stopped at the demonstration site resulting in the ceasing of UP-POPs emission. The workers are no longer exposed to these toxic emissions and they are now fully equipped with personal protective equipment provided by the project. The project helped to raise the awareness at all levels, and replication efforts are already on-going.

Sustainability: As no risk has been identified, chances of long term sustainability of project results are high and impact is likely.

Cross-cutting issues: The role of UNIDO was crucial for the project to meet its objectives. It has taken timely actions, and provided technical back-stopping by hiring quality international and national experts. Procurement of goods and services for the project as well as funds transfer were done in a timely manner.

Involvement of women in the project has been quite satisfactory. A total of two hundred and twenty seven persons attended the different events of the project such as inception workshop and training & awareness raising workshops; one hundred and twenty were males and ninety-eight were females.

Regarding M&E, the logical framework proposed in the project document is adequate to allow for proper monitoring and tracking of project results. SMART indicators in logical framework were used by project management to monitor project progress. All PSC as well as TWG meetings were held and relevant reports were submitted timely.

	Evaluation criteria	**Rating**
A	**Impact (progress toward impact)**	**S**
B	**Project design**	**S**
1	• Overall design	S
2	• Logframe	S
C	**Project performance**	**S**
1	• Relevance	HS
2	• Effectiveness	S
3	• Efficiency	S
4	• Sustainability of benefits	L
D	**Cross-cutting performance criteria**	
1	• Gender mainstreaming	S
2	• M&E: ✓ M&E design ✓ M&E implementation	S
3	• Results-based Management (RBM)	S
E	**Performance of partners**	
1	• UNIDO	HS
2	• National counterparts and Executing partners	HS
3	• Donor	S
F	**Overall assessment**	**S**

C. Recommendations

To UNIDO
1. For this project as well as for other projects, reporting from national counter-part on materialized co-financing is very often a challenge. It is recommended that in future projects the subcontract between the implementing agency and the national executing agency includes clauses that payments are not only linked to progress reports, but reporting of materialized co-financing as well. 2. Replication efforts in three provinces are on-going in Armenia thanks to international and bilateral support. However, for replication nationwide to cover all the provinces in the context of Armenia's strategy on waste management, substantial additional resources would be required. It is recommended that UNIDO considers to facilitate the availability of international financial as well as technical support. 3. For this project, there was some confusion regarding the actual start date. The signature of the contract between the implementing agency and the executing agency was delayed due to structural reorganization within the Ministry of Nature Protection. As a result, the date for completion of activities in the contract (March 2018) was well after the official closing date of the project (June 2017). The implementing agencies should better communicate the starting date to the national counterparts and they should ensure that the duration of the contract be in line with the project implementation timeframe.
To the national government
4. The project has contributed to the development and adoption of a number of legislation on wastes, BAT/BEP and licensing. For the sound management of wastes in the country in order to eliminate UP-POPs emission from open burning at dumpsites, the national authorities should ensure that these pieces of legislation are properly enforced. In particular, the appropriate enforcing and monitoring system should be put in place. 5. When the MRF will be operational after obtaining the appropriate license, it is important that the procedures and good practices are strictly followed while managing the wastes, this could be done through regular inspection and monitoring. 6. The project has been very successful producing very good results and valuable lessons. These should be gathered and shared with other municipalities and regions.

D. Lessons learned

Two key lessons emerged from this project:
1. A strong stakeholder commitment and high ownership that would contribute to achieve success can be secured by involving key stakeholders in all the phases of the project from the preparatory phase through implementation to project execution. 2. Simple project management structure and committed and flexible project managers at the implementing agency and the executing agency leads to efficient and effective project implementation.

1. Introduction

1.2 Evaluation objectives and scope

This terminal evaluation had two main objectives. The first was to assess the project' performance based on the criteria of relevance, effectiveness, efficiency, sustainability and impact. On the other hand, the second was to develop a series of findings, lessons and recommendations for enhancing the design of new projects and implementation of ongoing projects by UNIDO. The assessment included an analysis of the completion of project activities, delivery of outputs, occurrence of outcomes, and of risk management. The key question was whether the project has achieved or is likely to achieve the main objective "to reduce Unintentionally Produced Persistent Pollutants (UP-POPs) in open burning sources in Armenia through the introduction of Best Available Technology / Best Environmental Practices (BAT/BEP) and create capacity within the government and private sector on BAT/BEP implementation". This question was addressed by assessing the extent to which the project contributed to the conditions necessary to build the capacity of Armenia for the sound management of solid wastes through the introduction of BAT/BEP.

The purpose of this evaluation exercise was also to draw lessons and recommendations for UNIDO and the GEF that could help improve on the identification, design and implementation of future similar projects. This terminal evaluation report also includes examples of good practices for other projects. The evaluation covered the whole duration of the project, from June 2015 to December 2018.

1.2 Overview of the project context

Since its formulation in 2014, the GEF-funded project *Implementation of BAT and BEP for reduction of UP-POPs releases from open burning source* has been very relevant for the Republic of Armenia. Indeed, the situation of waste collection and transportation is outdated and insufficient, particularly in the rural areas, where almost all industrial and municipal wastes are disposed to landfills without separation and open burning of waste is common. This is because it is the cheapest and easiest means of volume reduction and disposal of combustible materials. This solution, though, is not efficient in reducing the sanitary risks due to the pathogens present in the waste. In particular, contaminated ashes from processes (incinerators, cement kilns or industrial boilers) are often dispersed in open dedicated fields and waste oils are burnt. Poor or incomplete combustion due to insufficient air (smoldering phases typical of open burning), inhomogeneous and poorly-mixed fuel materials, the presence of chlorinated precursors and catalytic metals (copper, iron) are the main factors for the formation and releases of UP-POPs in open burning processes. Releases from uncontrolled burning processes also include polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), heavy and volatile metals (Pb, Cu, Cd, Hg, Mn) and particulate matter (PM10 and PM2.5). The volatile nature of these pollutants impacts wildlife and humans far away from their point of release.

The main objective of the project was to facilitate the implementation of the Stockholm Convention – ratified by the Armenian Government in 2003 – particularly its obligations on the continuous reduction of UP-POPs from open burning sources. To achieve its goals, the project provided the opportunity for involving national stakeholders, such as some Ministries, municipalities, local authorities, research and academic institutions, NGOs and universities as

technical partners. The private sector was also tapped to participate in the project, in particular by implementing BAT/BEP, and making a shift from burning of waste to recycling or re-use. Relevant government ministries and departments, laboratories have also been involved for awareness raising activities and for the coordination of the project implementation. In particular, the *Hazardous Substances and Wastes Policy Division*, as a structural subdivision of the *Ministry of Nature Protection* of the Republic of Armenia regulates the problems dealing with chemicals and wastes. It performs the following activities:

- Develop concepts and strategy, as well as programs aimed at management of chemicals and wastes;
- Develop drafts of the legislative acts on chemicals and waste management;
- Carry out inventory of wastes generated on the territory of the Republic of Armenia;
- Analyze risks degree at enterprises, on the territory of which there is production, use of chemicals and wastes, which are potentially subject to industrial accidents, as well as inventory/accounting of a.m. enterprises;
- Coordinate activities dealing with chemicals and wastes management, as well as classification of chemicals produced and used and wastes generated on the territory of Armenia, according to degree of hazard;
- Provide expertise of Safety Passports for the hazardous industrial entities.

1.3 Overview of the project

The main objective of the project was the reduction of UP-POPs releases from open-burning sources in Armenia through the introduction of BAT and BEP; at the same time, the project also aimed at creating capacity within both the Government and private sector on BAT/BEP implementation. The expected outcomes and outputs are given below.

Project component	Expected Outcomes	Expected Outputs
1. Regulatory framework and institutional strengthening	National regulatory and enforcement infrastructures in place to assure continuous release reduction of Annex C POPs from open burning sources	1.1: Waste management regulatory framework updated 1.2: Adequate management capacity built in implementing BAT/BEP and waste management practices 1.3: Adequate capability strengthened in monitoring activities and in evaluating and reporting data of U-POPs releases
2. Promotion of BAT/BEP at selected demonstration locations	Annex C POPs releases into the environment are gradually reduced from open burning activities	2.1: Cost and benefits of the available BAT/BEP measures for reducing Annex C POPs releases from open burning assessed 2.2: Pilot demonstration activities carried out in a selected site promoting waste reduction, re-use, recycle and BAT/BEP implementation
3. Awareness and dissemination	Project activities are sustainable and replicated	3.1: Awareness raising campaigns implemented 3.2: U-POPs from open burning and chemical safety of waste management related matters incorporated into educational curricula

Project factsheet is given below:

Project title	Implementation of BAT and BEP for reduction of UP-POPs releases from open burning sources in Armenia
UNIDO ID	150063
GEF Project ID	5038
Region	Europe and Central Asia
Country(ies)	Republic of Armenia
Project donor(s)	GEF
Project implementation start date	1st September 2015
Expected duration	24 months
Expected implementation end date	31 December 2018
GEF Focal Areas and Operational Project	GEF-5: POPs CHEM-1
Implementing agency(ies)	UNIDO
Executing Partners	Ministry of Nature Protection of the Republic of Armenia
Cooperating agency:	Waste Research Center[1] - State Non-commercial Organization.
GEF project grant (excluding PPG, in USD)	853,000
Project GEF CEO endorsement / approval date	15 March 2015
UNIDO input (in kind, USD)	40,000 (cash) + 60,000 (in-kind)
Co-financing at CEO Endorsement, as applicable	3,388,420 (cash + in-kind)
Total project cost (USD), excluding support costs and PPG	4,241,420
Mid-term review date	September 2017
Terminal evaluation date	December 2018 – March 2019

1.4 Project Implementation Arrangement

The implementation arrangement proposed in the project document was the following:

UNIDO was the GEF implementing agency for the project, it was responsible for overall project implementation. A National Project Officer was appointed to undertake full coordination with the Project Management Team (PMT).

The Hazardous Substances and Waste Policy Division (HSWPD) of the Ministry of Nature Protection (MoNP) of the Republic of Armenia was the executing agency for the project as it is the national focal point for the Stockholm Convention in Armenia. It was responsible of the day-to-day management of the project.

The Environmental Monitoring and Information Center (EMIC), successor of the Waste Research Center (WRC), is a state non-commercial organization at the Ministry of Nature Protection of the Republic of Armenia. EMIC was the cooperating agency which entered into

[1] As a result of reorganization within the MoNP, WRC and three other units of MoNP were merged to form the new entity Environmental Monitoring and Information Center (EMIC)

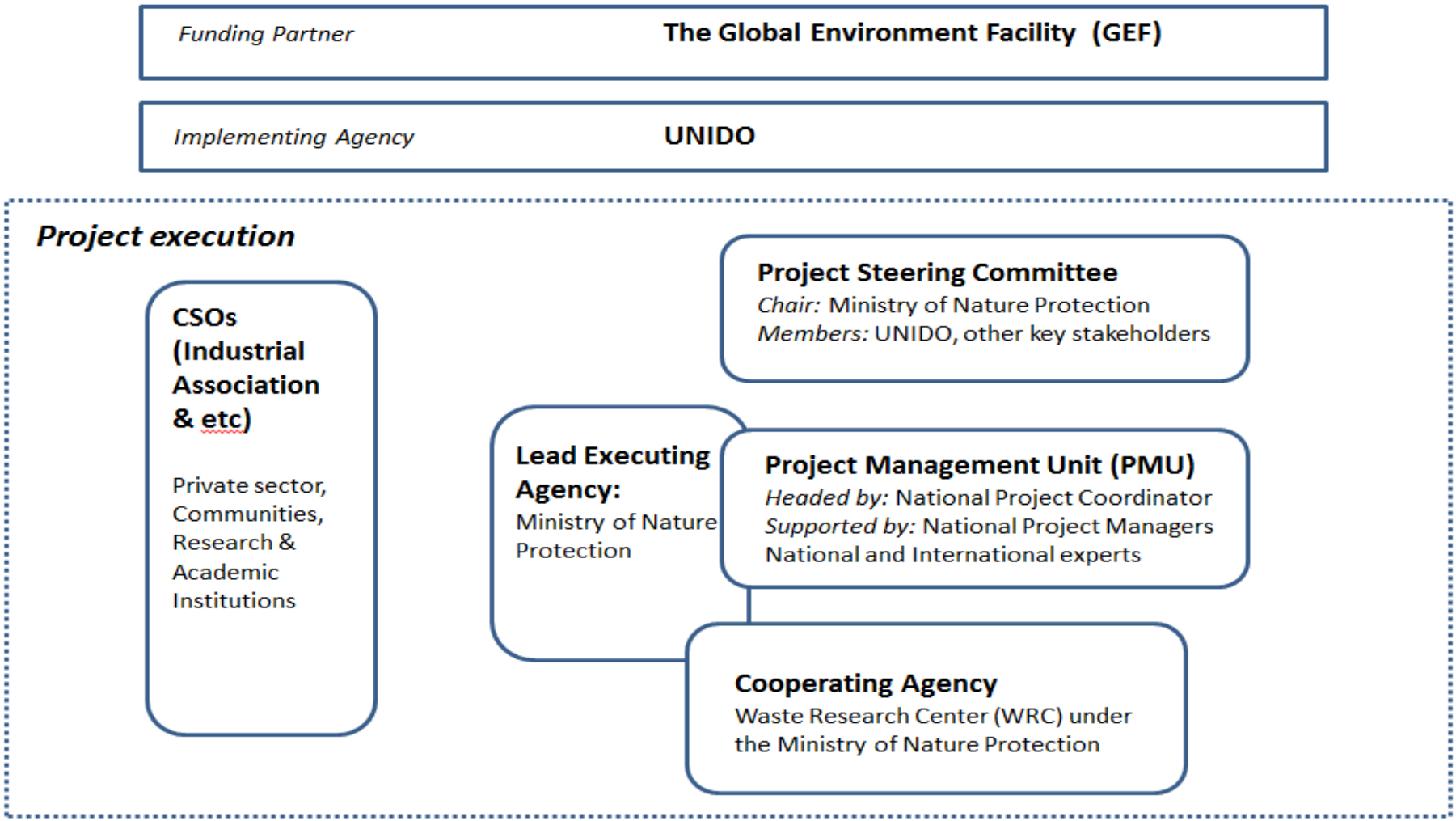
contractual arrangements with UNIDO to perform specific activities in the project. EMIC was engaged in the development of scientifically based recommendations aimed at implementing the most appropriate measures in minimizing open burning activities in dumpsites and in the adoption of the BAT/BEP at dumpsites/landfills. At the same time it was involved in the development of the manuals for landfill operation and control and in the assessment of the proposed solutions to decrease the risks for the population. Finally, EMIC was engaged in the process of taking samples of different environmental media for further analyses.

The Ararat Communal Service under Ararat municipality was responsible for the execution of the demonstration activities under Component 2 with the supervision of HSWMD and UNIDO.

A Project Management Team (PMT) was established within MoNP to ensure adequate organizational structure and to facilitate day-to-day monitoring of implementation progress based on the project's annual work plan and its indicators. The National POPs Focal Point was nominated as the National Project Coordinator (NPC) and was responsible to lead the PMT. The latter was supposed to regularly inform UNIDO of any delays or difficulties faced during implementation so that appropriate support or corrective measures could be adopted in a timely and remedial fashion.

A national Project Steering Committee (PSC), chaired by NPC was established and comprised of representatives from relevant ministries, UNIDO and other relevant stakeholders. The members of the PSC were finalized during the project inception phase. The PSC planned to hold its regular sessions twice a year throughout the project implementation, but additional meetings could be held if necessary. A Technical Working Group (TWG) may also be formed to discuss technical issues that may arise during project implementation. The TORs of both PSC and TWG would be formulated and agreed during the project inception phase. The TWG would include a representative from the MoNP and the NPC. The project management structure is given below.

Project management structure



1.5 Theory of Change

No explicit theory of change (ToC) was proposed for the project, however the project document (including the logical framework) contained enough information for the reconstruction of the ToC (Annex 4) that describes how the project was expected to contribute to put in place necessary preconditions for impact in the long term.

The ToC (Annex 4) developed by the evaluation proposes that in order to bring about behavioral changes for effective impact in Armenia, it is critical that a set of necessary preconditions are achieved. Indeed, for the protection of the health of the population and the environment of Armenia against the hazardous effects of polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs), it is necessary (1) to update and strengthen the national regulatory framework for the sound management of wastes. Abilities to bring about change would be accomplished by (2) building capacity for sound management of wastes and by (3) adapting best available technologies (BAT) and adopting best environmental practices (BEP) to eliminate the emissions of PCDD/Fs at landfill sites. Finally, it is necessary that (4) awareness is fully raised at all levels regarding risk exposure to PCCD/Fs and the corresponding health hazards.

The project has greatly assisted Armenia to put in place these preconditions. However, these preconditions are not sufficient for effective impact. The evaluation has identified three necessary intermediate states that need to occur for impact. These are (see Annex 4): (1) Capacity to implement and replicate sound waste management system in place; (2) Support and incentive to implement sound waste management system in other regions; and (3) Implementation of National waste strategy (2017 – 2036) and corresponding action plans. One of the key components of the project was to build capacity for sound management of waste; it is vital that this built capacity is adequately used to enable replication in other regions of Armenia. For this replication, it is vital that appropriate support (both technical and financial) and incentive are in place in Armenia that would contribute to convince provinces and regions to adopt these sound management technologies and practices for management of waste in the context of the 2017 – 2036 national strategy that has already been adopted, and is being implemented across the country.

Many important assumptions were made during the design of the project. High ownership and the commitment of Armenia to fulfill its obligations towards the Stockholm Convention was one of the main ones. This assumption proved to be correct as the project got strong support from the government and high ownership was seen among the national stakeholders. The other key assumption was that local authorities are willing to participate and invest to implement BAP/BEP for waste management. This also proved to be correct as initiatives for the sound management of wastes are being implemented in Yerevan and in the Gegharkunik and Kotayk provinces.

1.6 Evaluation methodology

The terminal evaluation was conducted in accordance with the UNIDO Evaluation Policy[2], the UNIDO Guidelines for the Technical Cooperation Programme and Project Cycle[3], the GEF

[2] UNIDO. (2015). Director General's Bulletin: Evaluation Policy (UNIDO/DGB/(M).98/Rev.1)
[3] UNIDO. (2006). Director-General's Administrative Instruction No. 17/Rev.1: Guidelines for the Technical Cooperation Programme and Project Cycle (DGAI.17/Rev.1, 24 August 2006)

Guidelines for GEF Agencies in Conducting Terminal Evaluations[4], the GEF Monitoring and Evaluation Policy[5] and the GEF Minimum Fiduciary Standards for GEF Implementing and Executing Agencies[6].

A participatory approach that sought to inform and consult with all key stakeholders of the project was used. The evaluation team consisted of Nee Sun Choong Kwet Yive, international consultant, and Artak Ter-Torosyan, national consultant.

The evaluation was carried out from December 2018 to April 2019. The theory of change approach was used to identify causal and transformational pathways from the project outputs to outcomes and longer-term impacts, and drivers as well as barriers to achieve them. In particular the extent to which the project contributed to conditions necessary to achieve the overall objective of the project was assessed using this approach.

A combination of methods was used to deliver evidence-based qualitative and quantitative information from various sources: desk studies, individual interviews, focus group meetings and direct observation. In preparing for interviews and visit in Armenia, the evaluation team reviewed the documentation of the project provided by the UNIDO Project Manager and the NPC. This included the project document, Project Implementation Review (PIR) reports, minutes of Project Steering Committee (PSC) and the Technical Working Group (TWG) meetings, annual and progress reports, training as well as awareness raising workshop reports. The full list of documents consulted and persons interviewed during the evaluation are given in the annexes[7]. The planning of the country mission, which took place in 11 – 15 December 2018, and the stakeholders to be interviewed were done in close consultation with the UNIDO PM, the UNIDO evaluation office, and NPC. The national consultant of the evaluation team worked closely with the NPC to schedule the interviews and the field visit at the Ararat municipality, the demonstration site.

Besides the use of the theory of change approach, face to face interviews and desk review of the project documentation, the evaluation developed tables (annex 5) to gather information during country visit that allowed to assess causality, explain why objectives were achieved or not, and to triangulate information.

1.7 Limitations of the evaluation

No major limitations in terms of access to information was encountered. All the set of documentation relative to implementation and monitoring was made available to the evaluation. During the country mission to Armenia, which took place on 11 – 15 December 2018, it was possible to interview all the key stakeholders and partners of the project, which included the NPC, EMIC, co-executor of the project, national consultants, the Armenian Women for Health and Healthy Environment (AWHHE), NGO involved in awareness raising, members of the project steering committee, and the Mayor of the Ararat municipality. A visit at Ararat, the pilot site for BAT/BEP demonstration to soundly manage solid waste, was also undertaken, and it was possible to meet and discuss with the waste workers. On 13 December

[4] GEF. (2017). Guidelines for GEF Agencies in Conducting Terminal Evaluations for Full-sized projects (Evaluation Office, Evaluation Document, 11 April 2017)
[5] GEF. (2010) The GEF Monitoring and Evaluation Policy (Evaluation Office, November 2010)
[6] GEF. (2011). GEF Minimum Fiduciary Standards: Separation of Implementation and Execution Functions in GEF Partner Agencies (GEF/C.41/06/Rev.01, 3 November 2011, prepared by the Trustee)
[7] See Annexes 2 and 3.

2018, the preliminary findings and conclusions were presented[8] to the key national counterparts, who expressed their satisfaction and high appreciation of the assistance provided by the project for the sound management of waste in Armenia. The feedback and comments made by the counterparts were considered in this report.

2. Project's contribution to Development Results - Effectiveness and Impact

2.1 Project's achieved results and overall effectiveness

Overall effectiveness is rated as **Satisfactory**. This rating is based on: i) the extent to which the outputs have been delivered and the outcomes accomplished, and ii) the extent to which outcomes have contributed to the conditions likely to lead to the desired long-term changes.

The project included 24 activities that were designed to deliver 9 outputs and to contribute to 4 outcomes. 18 of the 24 activities corresponding to 7 outputs referred to 3 components that contributed to the substantive project outcomes: (i) 3 outputs were designed to strengthen the national regulatory and enforcement infrastructures to assure continuous reduction of dioxin releases from open burning sources; (ii) 2 outputs pertained to the promotion of waste reduction, re-use, recycling and BAT/BEP implementation at a selected demonstration site to reduce dioxin emissions from open burning at dumpsites; (iii) 2 outputs were planned for awareness raising activities targeting relevant stakeholders, including vulnerable groups such as women and children, and incorporating POPs in educational curricula. The remaining 2 outputs were related to project management, and monitoring and evaluation activities. The summary of ratings for the project is reported in Table 1. Note that the ratings of the activities mentioned in Table 1 for each output are those given in Annex 6. Furthermore, as explained in Annex 6, the rating for an output is based on the average rating of all the activities for that output.

Table 1: Rating of outputs[9] for the projects

	Output	**No of activities**	**Rating* of activities**	**Rating* of Output**
Outcome 1	Output 1.1	4	2 HS; 2 S	S
	Output 1.2	2	2 S	S
	Output 1.3	2	2 S	S
Outcome 2	Output 2.1	2	2 S	S
	Output 2.2	3	2 S; 1 MS	S
Outcome 3	Output 3.1	3	3 S	S
	Output 3.2	2	2 S	S
Total	7	18	2 HS + 15 S + 1 MS = 18	7 S

*HS: highly satisfactory; S: satisfactory; MS: moderately satisfactory; MU: moderately unsatisfactory; U: unsatisfactory; HU: highly unsatisfactory

[8] The preliminary findings and recommendations were shared with the national counterparts through a PowerPoint presentation.

[9] See annex 6 for detailed rating of activities and outputs

Outcome 1: National regulatory and enforcement infrastructures in place to assure continuous reduction of annex C POPs releases from open burning sources. The focus for this component was to enhance institutional capacity and technical capability of public bodies and relevant stakeholders. It encompassed a review of the gaps in the current legislation and development of policies and incentive mechanism for the adoption of waste management practices and BAT/BEP with specific connection to open burning and landfill operation. As can be seen in Table 1, all the activities have been very satisfactorily completed and outputs delivered. The key achievement for this outcome was the strengthening of the national regulation for the sound management of wastes in Armenia. The project contributed to the development of 16 legislative and policy documents related to waste management (see Annex 6), which were subsequently approved by the Government. The key documents were those related to BAT - "*Establishing criteria set forth to the best available techniques*"; (No. 666-N dated June 15, 2017)"; licensing for recycling – "*Licensing Procedures for Recycling, Treatment, Storage, Transportation and Placement of Hazardous Wastes in the Republic of Armenia*" (1029-N dated September 27, 2018); and strategy on "*Concept for Extended Producer (Importer) Responsibility Regarding Manufactured Products" (*Annex 1, Protocol Decision of the Government of the Republic of Armenia - No. 14 dated April 12, 2018) and its Appropriate Action Plan for 2018-2020 (Annex 2, Protocol Decision of the Republic of Armenia Government - No. 14 dated April 12, 2018).

For this component, proposal for landfills proper management and operation was done by an international expert recruited by the project. In particular, based on studies made by national consultants, the international expert proposed a number of key procedures that included best practices notably (i) Procedure comprising strategic elements for reducing biodegradable waste going to landfill; (ii) Procedure to facilitate an application and permit system for waste disposal; (iii) Procedure for introducing waste acceptance practices; (iv) Procedure for introducing control and monitoring procedures for landfill operation, closure and aftercare; (v) Landfill best practices and proposed regulatory framework; and (vi) Landfill operations guidance manual.

Adequate management capacity in implementing BAT/BEP and waste management practices has also been built through a two-day training workshop that was held on 21 – 22 July 2016 in Yerevan, and targeting local authorities. 51 participants coming from ministries, territorial (regional) subdivisions of state environmental inspectorates, municipalities and regional administrations attended this workshop. Local capacity in sampling and analysis methods of UP-POPs was also adequately strengthened. In particular, the Head of Division of waste inventory, classification and technology investigation of EMIC attended a training course at the Research Center for Toxic Compounds in the Environment (RECETOX) of Masaryk University, Brno, Czech Republic. RECETOX is a research center of excellence on toxic compounds in the environment, and it is hosting the Regional Centre for Capacity Building and the Transfer of Technology in the Central and Eastern Europe for the Stockholm Convention on POPs. Since 2008, RECETOX has been actively involved in the Global Monitoring Plan (GMP) on POPs for the effectiveness evaluation of the Convention[10]. It was under the guidance of the RECETOX that the personnel of EMIC collected air and soil samples at the Ararat landfill demonstration site. The testing of these samples (requiring HRGC-HRMS[11]) for POPs was done by RECETOX, and the analysis of the results obtained was done by EMIC using an adequate modelling software.

[10] Article 16 of the Stockholm Convention concerns the effectiveness evaluation of the Convention.
[11] High Resolution Gas Chromatography High Resolution Mass Spectrometry

Outcome 2: Annex C POPs releases into the environment are reduced from open burning activities. Under this outcome also[12], all the outputs have been satisfactorily delivered (see Table 1). Preliminary evaluation of dioxin releases and risk assessment study for the current practices of open burning at the Ararat dumpsite were adequately done. Two campaigns of air and soil sampling under the guidance of RECETOX were done by EMIC. Appropriate representative samples were collected, and analyzed for PCDD/PCDFs at RECETOX.

Economic and technological study on the potential reduction of UPOPs after BAT/BEP implementation at the demonstration site was satisfactorily undertaken by a national expert. The study covered key issues and included the following: (i) Analysis of waste generation - types, morphological composition, and seasonal characteristics, (ii) Consideration of environmental damage done to the environment due to direct disposal of waste at landfills, (iii) The rationale for sorting and separating waste collection, (iv) Economic assessment of separate collection of waste with the purpose of their further processing, (v) Technical and economic feasibility of establishing a sorting line and its use at landfills of municipal solid wastes, and (vi) Reasoning for environmental benefits of applying sorting line.

The highlight of this component was the successful and effective rehabilitation of the selected dumpsite at the Ararat municipality to reduce dioxin emission from open burning. Before renovation works started at the Ararat dumpsite, geological assessment was done in 2016 to ensure that the rehabilitation of the dumpsite would be feasible and it would not cause harm to the environment such as polluting underground water (Figure 1).

Figure 1: Picture taken from geological assessment report (2016)

After obtaining the appropriate Environmental Impact Assessment certificate, the renovation works started in 2017 and the project contributed to the successful implementation of the following measures:

- The site has been properly fenced with an adequate gate at the entrance.
- About three hectares of land has been levelled off and all the soil work has been completed.

[12] See Annex 6 for detailed rating of outputs and activities

- The solid waste that was previously dumped at the site was removed. A concrete cell was designed. A large pit with concrete side-walls and concrete bottom to store the remaining waste after segregation was constructed.
- A concrete cell for storing the residual waste after waste segregation and recycling has been built.
- Construction works for hosting the BAT technology have been finished (Figure 2(a)).
- The conveyor belt (Figure 2 (b)) for waste pickers has been installed, and the waste compacter (Figure 2 (c)) as well as tractor have been purchased.
- Municipality of Ararat Town has provided a new power line (Figure 2 (d) to the facility (3-phase 380 volts including a transformer), and reconstructed the main road as part of their national in-kind contribution. The municipality has also provided a new water and drainage system.

In Armenia, water distribution utility is managed by the private sector. During the construction works the ownership of the water utility changed. Veolia, a French enterprise, took over from SAUR-Armenia, and they informed the project that the former approval for water connection for the MRF had to be renewed at higher costs. This caused a few months delay in the construction.

(a) (b) (c) (d)

Figure 2: (a) Building hosting the BAT (b) Conveyor belt (c) Waste compactor (d) New power line

After completion of the renovation works, the personnel of the waste facility received dedicated on-site training (at the Ararat pilot site) in waste disposal management on 10 – 11 October 2018. The training that the evaluation considers adequate covered the following topics:

- Guidelines and BAT/BEP measures for environmentally sound management of wastes at open waste dumpsites and to reduce unintentional POPs releases due to open burning
- Main concepts on material recovery facilities including storage and final disposal of residues
- Basic measures to manually sort types of recyclables in a material recovery facility.
- National regulations on sanitary protection of settlements at household waste collection, storage, transportation, treatment, recycling, recovery, decontamination and burial
- Control Functions of the Health and Labor Inspection Body of the Republic of Armenia on Collection, Storage, Transportation, Treatment, Processing, Recovery, Decontamination and Burying of Consumption Wastes in Settlements

All the necessary documents have been prepared and signed so that the renovated landfill (or material recovery facility – MRF) become officially the property of the Ararat Municipality. In order to operate the MRF, the municipality has already applied for a “License for Recycling, Treatment, Storage, Transportation, and Placement of Hazardous Wastes”, which it had not

obtained yet at the time of the terminal evaluation. According to information available[13], the Ararat Municipality has already established contact with recycling companies (for textile wastes, paper, plastics, glass, and metals). Once the license obtained, the price for the recyclable wastes would be negotiated with the companies, and contracts would be concluded. When the MRF would be operational, the national authorities should consider undertaking regular monitoring to ensure that the proper procedures and best practices are applied for the sound management of wastes at the MRF.

OUTCOME 3: Project activities are sustainable and replicated. For this outcome also, all the activities have been satisfactorily undertaken (Table 1 and Annex 6). Targeted awareness raising campaigns on environmental and health hazards of U-POPs for relevant stakeholders have been successfully undertaken by the NGO AWHHE in cooperation with EMIC. The seminars specifically raised the awareness of the participants on POPs and household wastes, and they were undertaken in the cities of Hrazdan (Kotayk Province), Dilijan (Tavush Province), Stepanavan (Lori Province), and Gavar (Gegharkunik Province). A total of 95 participants (majority of women)[14] attended these seminars, during which information materials (pamphlets) developed in local language were distributed. Some titles of these pamphlets included: "Do not Burn Your Trash!" and "Wise Approach to the Problem of Household Waste Management".

The "Prevention of Wastes Open Burning" training workshop was held on August 1, 2017 in Yerevan to share information and experiences on good practices and to promote BAT/BEP for waste management. A total of 36 participants (17 males and 19 females) attended this workshop and they were from the Ministry of Nature Protection, Ministry of Health, Ministry of Emergency Situations, Ministry of Agriculture, EMIC, Center for Ecological-Noosphere studies, National Academy of Science, and NGOs.

In general, during these awareness raising activities, EMIC developed a number of awareness raising tools and materials that were distributed to the participants; these included notepads, T-shirts, pens, folders and calendars. Similarly, after each workshop and training EMIC developed press releases to create wide media coverage, which are available on the following websites: (MoNP web:) www.Mnp.am; www.econews.am; www.gyumri.info; www.slaq.am, and www.newsroyal.am. Since the start of the project 18 scientific papers have been submitted for publication in proceedings of International Conferences and/or books[15].

In terms of mainstreaming POPs in educational curricula, the project has been quite successful. It has contributed to the development of three educational materials: (1) "*Persistent Organic Pollutants: Fate in the Environment*" (in Armenian and Russian); (2) "*Dioxins as century challenge*" (in Armenian and Russian); and (3) "*Harmful Impacts of POPs to the Environment and Human Health*" (in English). Moreover, leading universities in Armenia such as the Armenian National Agrarian University, Vanadzor State University, the State Polytechnic University of Armenia, and the Yerevan State Medical University included topics on POPs and related issues in their curricula. For example, the Post-Graduate Course "Health and Environment" of the Yerevan State Medical University includes a number of topics covering POPs such organochlorine pesticides, challenges of chemical safety and harmful impacts of POPs on human health and the environment.

[13] Interview with Mayor of Ararat town
[14] Although it was not possible to get the exact numbers of males and females that attended these seminars, the evaluation was informed that the majority of them were females (more than 70%).
[15] See Annex 7 for list of publications

2.2. Progress towards impact

Assessment of impact can be associated to the extent to which project interventions have brought about changes in the human condition or in the environment. Changes, whether intended or unintended, can be positive or negative. For this project, the evaluation did not find any evidence of negative impacts on human health or on the environment. For impact, there is need for behavioral changes at the level of the project beneficiaries. Behavioral changes may happen at three levels: (i) Economically competitive - Advancing economic competitiveness; (ii) Environmentally sound – Safeguarding environment; and (iii) Socially inclusive – Creating shared prosperity, which are discussed below.

2.2.1. Behavioral change

Economically competitive – Economic competitiveness refers to the ability of an economy to compete fairly and successfully in markets for internationally traded goods and services that allows for rising standards of living over time. For the project, the issue is different as it relates to the sound management of solid wastes in Armenia. Instead of competitiveness, it would rather be the economic sustainability of the MRF once it is operational. On recommendation by the MTE, a cost and benefit assessment of the MRF was done in order to ensure that the required financing for running, maintaining, expanding, and long-term monitoring of the MRF would be available. There are good indications of the long term economic sustainability of the MRF. According to information available[16], before the project, the Ararat municipality was allocating 8% of its total budget (660 M AMD)[17] for the management of solid waste, which consisted of the collection of the wastes once daily and transporting them to the dumpsite, which has now been renovated into the MRF. After the project, the municipality increased this allocation to 20% that included the operation of the MRF. The Mayor of the Ararat Municipality indicated that they are expecting to have an increase in their income thanks to the MRF. For instance, before the project, only 85% of the Ararat population (about 20,300) were paying the waste management fee (180 AMD per person per month). After the project, 100% of population are now paying this fee[18]. This is a direct impact of the project according to the Mayor, the population have more trust in the municipality for waste management. Furthermore, the neighboring municipalities (located within 15 kilometers from Ararat), which were impressed with the renovated MRF, the first of its kind in Armenia, have already contacted the Ararat municipality to manage their wastes. The Ararat municipality is currently working to conclude business agreements with these neighboring municipalities, and which would be a very good opportunity to generate significant income. Once the MRF is operational, the Ararat municipality would also be able to generate some income by selling recyclable wastes at agreed prices to recycling companies, who have been contacted already. The municipality has already a contract with the recycling company Eco-engineering for plastic bottles collection at a selling price of about 60 AMD/kg.

Environmentally sound – The key change that occurred thanks to the project interventions is the complete stop of open burning at the selected landfill (see Figure 3(a) and (b)). According to the project document, open burning was due to fires set by some scavengers and also that happened spontaneously and unintentionally during summer, and a lot of ash is spread all over the place at the dumpsites. Only once per year that the municipality sent a truck with water to wash the waste in order to extinguish fires, and the municipality did not

[16] Interview with the Mayor of the Ararat Municipality
[17] AMD: Armenian dram; 1 USD = 485 AMD
[18] Representing an increased income of about 6.6 M AMD annually (20,300 x 0.15 x 12 x 180 = 6577200 AMD)

have any allocated budget to purchase soil and cover the waste daily to drastically reduce the open burning events. It was estimated that 30% of the wastes were burned through these open fires. Using the UNEP toolkit[19], it was calculated that about 230.75 mgTEQ[20] were being emitted annually to the environment at the selected dumpsite. With the implementation of the project, accidental burning of wastes has completely stopped, and given that the MRF would be managing all the wastes generated in Ararat, dioxins will no longer be emitted to the environment. The project also contributed to the safety and well-being of the workers. Before the renovation, the workers were not using any personal protective equipment (PPE), and they did not have any place (building) to protect themselves from the weather (sun, rain or snow) or to take a shower. The project has provided them with the adequate PPE (e.g. gloves, boots and mask) and appropriate clothes - overalls (Figure 3(c)). The construction of the MRF included a building dedicated for the workers (Figure 4). This building was not included in the design (contract), but at the request of the project the contractors agreed to include it without any additional costs.

(a) (b) (c)

Figure 3: (a) Before renovation, open burning[21] (b) After renovation, no open burning (c) Worker wearing PPE

Figure 4: Building for workers

Socially inclusive – All the workers (7 in total) recruited to work at the MRF come from the communities living in the nearby areas of the landfill. They are very satisfied with the project. Their conditions of work have very much improved; they are better equipped to do their job (appropriate PPE and clothes), and they are no longer exposed to the fumes of the burning wastes. With the construction of the building dedicated for them (Figure 4), they have a place to rest or to take their meals. Furthermore, in summer when it can get very hot (above 35 ^{0}C),

[19] Standardized toolkit for the identification and quantification of dioxins and furan releases. Edition 2.1, December 2005, UNEP Chemicals

[20] TEQ: Toxic Equivalent is a unit to express the level of dioxins and furans in the environment.

[21] Picture taken from project document

they can take a shower after work, or they can stay inside when the weather is bad (raining or snowing).

According to information available, the Ararat municipality has organized four public hearings for the citizens. The citizens were very happy that the municipal waste management problems would be resolved by the project. The people living near the demonstration site were also reached by the project, and they were also very satisfied with the project. In particular, they are no longer troubled by the fumes and bad odors coming from the landfill.

2.2.2. Broader adoption

This section addresses the catalytic effect of the project that relates to the extent to which the project' interventions have been adopted within the country, or beyond the domains and scales originally targeted. Overall, the project has performed well, and the achievement of the project objective to reduce UP-POPs releases in open burning sources at the Ararat pilot demonstration landfill site has already been achieved (Section 2.2.1). This has been done through the implementation of BAT/BEP at the landfill site. The question is whether mechanisms are in place for the continuation of process adoption to bring about behavioural changes at broader scales after the project. The three mechanisms frequently used to promote the broader adoption of project interventions and innovations are: mainstreaming, replication and scaling-up.

Mainstreaming occurs when information, lessons or specific results generated by the project are incorporated into broader institutional mandates and operations such as laws, policies, regulations and programs. The evaluation found sound evidence that mainstreaming has taken place in the country. This concerns mainly the 16 legal acts, regulations and policies - linked to chemicals, waste management issues (including re-use and recycling) and establishment of BAT/BEP criteria – which the project has contributed greatly in their elaboration, and that have already been adopted by the government for most of them (see Annex 6). The project was implemented in the context of the country's solid waste management strategy, which was adopted by the government in 2014, and which envisaged building a total of six regional landfills to cover the whole country. It is anticipated that these legal acts, regulations and policies would be adopted and enforced by the national and local authorities.

Replication occurs when the initiatives, technologies or innovations supported by the project are reproduced or adopted on a comparable scale. The evaluation has found evidence of replication efforts in the country. With the financial assistance of the German bank, KFW, (5.5 M Euro as grant and 5.5 M Euro as loan), a sanitary landfill is under construction (2016 – 2020) to manage the municipal waste of the Geghargunik and Kotayk marzs[22]. Similarly, another sanitary landfill is being constructed in Yerevan (2018 – 2021), the Capital City of Armenia. For this construction, financial assistance was secured from the European Bank for Reconstruction and Development (16 M Euro as loan and 10 M Euro as grant). Finally, feasibility studies are being carried out to build sanitary landfills and transfer stations for the Syunik, Shirak, Lori and Tavush marzs.

Scaling-up takes place when the project-supported interventions are implemented at a larger scale. These can be administrative, geopolitical, ecological or business scales. Initiatives that are scaled up are often expanded or adapted to accommodate new aspects or concerns

[22] A marz is the name given to a province in local language.

relative to the new scales. Given that the landfills under construction (see previous paragraph) would be managing waste at provincial level (Population: Lori: 225,000; Shirak: 243,000; Syunik: 139,000, Tavush: 125,000 and Yerevan: 1,073,000)[23] as compared to the pilot landfill for the Ararat municipality with a population of about 22,000, these replication initiatives can also be considered as scaling-up efforts.

The project has produced very tangible results such as dioxins are no longer emitted at the renovated landfill site, laws and regulations for the sound management of wastes drafted and adopted, and better working conditions for the waste workers. Given also that broader adoption of project results are already taking place, the overall rating on effectiveness is **Satisfactory**.

3. Project's quality and performance

3.1. Design

The development of the project was participatory. It was based on the discussion with national counterparts, and their views and recommendations were taken into consideration in the design of the project document. The project was formulated to take into consideration national and local priorities and strategies. In particular, the project was designed to address some of the priorities listed in the National Implementation Plan on POPs for Armenia. The formulation was also done taking into consideration the on-going activities, which served as baseline for the project intervention.

The project had a clear thematically focused development objective, namely, to reduce UP-POPs releases in open burning sources in Armenia through the introduction of BAT/BEP and create capacity within the government and private sector on BAT/BEP implementation. The project was designed to address the identified problems, gaps and barriers. The components and interventions included in the project were adequate and relevant to the achievement of the proposed objectives. The outcomes were also sufficiently clear to help guide project implementation. Besides the project management and M&E component, it included 3 substantive outcomes. The first outcome looked at legislation and policy framework to integrate BAT/BEP principles into the regulatory infrastructure. The second outcome encompassed technology transfer to demonstrate BAT/BEP in municipal waste management and disposal. Finally, the third outcome addressed awareness-raising activities to assure sustainability and replication of the project interventions.

The logical framework approach methodology was adopted, which led to the establishment of the Logical Framework Matrix (LFM) that included the main elements of the projects: overall objective, outcomes, and outputs. The LFM included adequate indicators and means of verification for each of the outputs that allowed for proper monitoring of progress and tracking of results. Realistic assumptions and potential risks were also mentioned in the LFM. The timeframe provided in the project document was adequate to undertake the planned activities. Similarly, a list of entities responsible for each of the activities / outputs was proposed in the project document. However, the midterm evaluation highlighted that the project document

[23] Population figures taken from: https://en.wikipedia.org/wiki/Administrative_divisions_of_Armenia

could have been more explicit regarding activities to be undertaken at the landfill pilot site. The document stated that the construction of the MRF facility was to be financed by the GEF budget, but for the fencing around the facility the project document stated: "*may be carried out and funded by the Municipality".* This created some confusion at the start of the project and it was finally agreed by all partners / stakeholders that the studies, designs, construction and the supervision of the construction of the MRF would be financed from the GEF budget, while the renovation of the road that leads to the MRF, and the development of the utilities like electricity, water and sewage would be financed by the Municipality.

Project Design is rated **Satisfactory**.

3.2. Relevance

The project is highly relevant as it is assisting Armenia to fulfill its obligations towards the Stockholm Convention. The project is particularly relevant with the challenges facing Armenia for the management of waste in general and municipal waste in particular is very important. There are more than 400 illegal dumpsites in the country where open burning happens regularly. Improving waste management system in Armenia is therefore on the top list of the national development agenda. Interview data with the national stakeholders confirmed the high relevance of the project. They stated that this would be the first landfill/MRF in Armenia that would have an official and legal operational permit. According to the Mayor of Ararat Town the project has a very strong and positive impact on the life of people of Ararat. Before the intervention often the wind blew dust from the cement facility, bad odor and ash from the dump to the city. The project would significantly improve the livelihood of the citizens, and this alone would ensure strong commitment at the local level.

Project outcomes are consistent with the operational program strategies of the GEF[24]. The GEF's goal in the POPs focal area is to protect human health and the environment by assisting countries to reduce and eliminate production, use and releases of POPs, and consequently contribute generally to capacity development for the sound management of chemicals. Under GEF-4, amongst the objectives to be achieved included: strengthening capacities for National Implementation Plan (NIP) implementation, especially assisting those countries that lag farthest behind to establish basic, foundational capacities for sound management of chemicals. GEF-5 encompassed an increase of 25% of resources for the POPs focal area compared to the GEF-4 allocation of US$300 million, to continue work in support of the objectives of this focal area. The project that aimed at reducing the releases of Annex C POPs via legislation, capacity building and technology transfer, to enable Armenia to comply with its obligations set out in the Stockholm Convention, is fully in line with these GEF objectives in the POPs Focal area. Moreover, this project would lay a sound foundation to fulfill Armenia's commitments, and would support its waste management regimes, which in turn would contribute to protect human health and environment from the threats of POPs.

The project is also in line with UNIDO priorities and the renewed mandate on Inclusive and Sustainable Industrial Development (ISID). UNIDO's Mission Statement (IDB.39/13/Rev.1) includes safeguarding the environment – "UNIDO aspires to reduce poverty through

[24] Focal Area Strategies and Strategic Programming for GEF-5, May 12, 2010. GEF Policy Paper, October 2007.

sustainable industrial development. We want every country to have the opportunity to grow a flourishing productive sector, to increase their participation in international trade and to safeguard their environment", and reiterates the flexible UNIDO approach for ISID – "Differentiate and adapt our approaches and methodologies according to the needs of countries at different stages of development".

One of the pillars of the ISID is "Safeguarding the Environment - environmentally sustainable growth, via cleaner industrial technologies and production methods, including in the fields of waste management and recycling; the promotion, adaptation and transfer of environmentally sound technologies, under which UNIDO aims to assist countries in reaching compliance with the Stockholm Convention and aims at developing capacities in developing countries to protect their populations and their environmental resources from POPs-related pollution".

Given that the project is responding to the needs Armenia regarding waste management to reduce UP-POPs emissions, and it is fully in line with GEF Chemicals Focal area and UNIDO mandates, rating on relevance is **Highly Satisfactory**.

3.3. Efficiency

The CEO endorsement date was 18 March 2015 and project implementation started officially at UNIDO in June 2015. Project was planned to have a duration of 2 years ending in June 2017. However due to delays, two extensions were granted to allow for completion of project activities, and the project closed in December 2018. A mixed mode of project execution was adopted to execute the project. While the ex-Water Research Center (now the Environmental Monitoring and Information Center) was sub-contracted to execute some components of project, in particular the renovation of the selected landfill (construction of MRF), other activities such as the recruitment of national and international consultants and the procurement of goods were directly executed by UNIDO. This modality of national procurement process for the construction of the MRF proved to be very efficient. As stated by the midterm evaluation, compared to similar projects where procurement was with the implementing agency, this project was very cost efficient. The project had used approximately 280 000 USD from the GEF grant to build the MRF, while in other projects just the planning of a landfill would cost more than 100 000 USD. The construction was also very effective. The planning, including EIA, all the geological and environmental surveys, and the construction was finished in 14 months which is considered fast and efficient.

Factors favoring efficiency included the adequate technical assistance provided by the project. As reported by the midterm evaluation, interview data evidenced that project partners were very satisfied with the inputs provided by the UNIDO HQ. No issues were reported regarding communication with the UNIDO PM; communication was regular and in case of queries, the UNIDO PM could be contacted via e-mail or telephone easily; and the queries were answered very fast. Technical assistance was also provided by international experts who undertook several field missions during the project life. As evidenced during the field mission[25], the national partners were very satisfied with the inputs of these experts. According to UNIDO internal procedures international experts have to report to the backstopping UNIDO PM. They are also required to debrief national counterparts on the findings and recommendations they

[25] Interview with key partners that included the MNP and Ararat Mayor during the evaluation mission in Armenia

concluded during their assignments. However as these debriefings are not usually recorded therefore the impact of these recommendations is low. The midterm evaluation recommended that international experts should also report to the national counterpart organizations.

The materialization of significant co-financing also contributed to the successful completion of project activities. As can be seen in Table 2, 97.9 % of the total planned co-financing materialized. In particular, the contribution of the Ararat Municipality was used for the following activities at the landfill site: (i) to renovate the access road to the waste dumpsite; (ii) to perform activities at the dumpsite such as collection of burying sharp, barbed articles, containers of chemical substances and chemicals; (iii) to level off some parts of the site; (iv) to assist in electricity supply system laying (Figure 2 (d)); (v) to assist and participate in water-supply system laying; (vi) to ensure further uninterrupted functioning of the waste-dump and its compliance to the Republic of Armenia legislation; (vii) to assist in arrangement of public hearings on design and/or financial documents for waste-dump renovation and infrastructure construction; and (viii) to assist in awareness-raising among the community population. The National Project Coordinator and the National Project Manager were from the MoNP, and their salaries, which were paid by MoNP, are included in the figures reported in Table 2.

Table 2: Co-financing

*Including contribution from EMIC/WRC **Project funded by Poland not undertaken

Source of co-financing	Co-financing at design	Co-financing materialized	% materialized
	Cash + In kind (US$)	Cash + In kind (US$)	
Ministry of Nature Protection*	500,000	712,000	142.4
Ararat Municipality	443,460	371,134	83.7
UNIDO	100,000	100,000	100
Asian Development Bank	750,000	750,000	100
RECETOX	300,000	300,000	100
Bureau for Chemical Substances Poland**	210,960	-	0
European Union Framework of the European Neighborhood and Partnership Instrument	1,084,000	1,084,000	100
Total	**3,388,420**	**3,317,134**	**97.9**

Project implementation faced significant delays mainly due to a structural reform that occurred at the level of MoNP in November 2016 and that affected its external units, WRC being one of them. The Government Decision No.1277 of December 15, 2016 merged the four legal entities namely the Waste Research Center (WRC), the Center of Environmental Monitoring, the Information Analytical Center, and the Hydrogeological Monitoring Center into a newly established organization called Environmental Monitoring and Information Center (EMIC), a State Non-Commercial Organization (SNCO). The reorganization was finalized in April 2017. During this period the WRC was not fully functional. There was no official director to lead the organization. After the registration of the new entity the company seals were developed, and their registration took a month. There was also a change in the directorship in the first month of operation which also caused some delays. These delays severely impacted on the signature of contract between UNIDO and EMIC/WRC, the national executing agency. UNIDO

published a request for offer on 18 December 2015 to subcontract project related technical tasks (landfill renovation) to WRC. WRC submitted its proposal on 25 January 2016. Based on the proposal, a terms of reference (ToR) was developed by UNIDO (dated 17 February 2016), and which provided a legal ground for UNIDO and WRC to enter into a contract on the 1 March 2016. The deadline for completion of the tasks stipulated in the contract was 1 March 2018, well after the closing date of the project, which was June 2017. Due to the reorganization within MoNP, an amendment was developed to the contract that changed WRC to EMIC SNCO, the new legal entity that took over the rights and responsibilities of WRC. This amendment was signed by UNIDO on 29 May 2017 and on 2 June 2017 by the SNCO and MoNP.

There were delays also due to technical reason. Because of a very strong and long winter, the landfill construction works could not start on time. These bad weather conditions also delayed the collection of water samples for dioxin and furan analysis. Finally, as mentioned previously (Section 2.1 under Outcome 2), water connection at the MRF caused a few months of delay due to change of ownership of the water utility. Given the delays encountered by the project, the midterm evaluation recommended a one year extension that was eventually granted.

The delays did not affect the cost effectiveness of the project. All the outputs were satisfactorily delivered. Table 3 reports the expenditures of GEF funds for the project. Moreover, the delays did not also increase the project management costs (GEF funds) as the salaries of the NPC and the NPM were paid by the MoNP. While the figures (Table 3) appear adequate in terms of expenditure per item (budget line), it is very difficult to reconcile these figures with those of the project document for which allocation of funds was per component (or output/activity).

Table 3: Total expenditures*– GEF funds only

*Figures provided by UNIDO

Budget line	Released budget (US$)	Expenditures (US$)	Available budget (US$)
Staff & International Consultants	71,698.58	62,505.33	9,193.25
Local travel	12,806	15,319.25	-2,513.25
National Consultants / Staff	286,144.92	289,705.98	-3,561.06
Contractual Services	470,629	472,445.98	-1,816.98
Training/Fellowship/Study	1,402.14	1,402.14	0
Equipment	1,120.75	1,120.75	0
Other Direct Costs	9,198.61	5,798.43	3,400.18
Total	**853,000**	**848,297.86**	**4,702.14**

Given that cost effectiveness of the project was not affected by the delays and quality outputs have been satisfactorily delivered, the rating on efficiency is **Satisfactory**.

3.4. Sustainability

Sustainability is understood as the likelihood of continued benefits after the project ends. Sustainability is assessed in terms of the risks confronting the project, the higher the risks the lower the likelihood of sustenance of project benefits. The four dimensions or aspects of risks to sustainability as mentioned in the TOR namely sociopolitical, financial, environmental, and institutional frameworks and governance risks are discussed below.

Sociopolitical risks – The project is highly relevant as emphasized by all the stakeholders during the interviews. Armenia is party to many multilateral environmental agreements and is fully committed to fulfill its obligations towards them. Moreover, solid waste management is a high priority in Armenia, and a national strategy has been adopted in 2014 (see Section 2.2.2 under Mainstreaming). The previous and current governments have demonstrated high ownership of the project; there is no particular reason why this would change in the future given the replicating activities taking place in the country. For these reasons, sociopolitical risks are considered low.

Financial risks – Financial risks are also considered low. The Communal Service of Ararat Town will be responsible for running the MRF. To ensure that the required financing for the operation of the MRF would be available, a cost and benefit study was done. As already mentioned, there are indications that financial sustainability would be likely (Section 2.2.1 under Economically Competitive). The Municipality of Ararat has increased its allocation for solid waste management (including running of the MRF) from 8% to 20% of its total budget. The Municipality of Ararat is also expecting to generate significant income from the management of household wastes of nearby municipalities, with whom it is concluding business agreements. Since a number of years, the global prices of secondary raw materials are increasing, which really supports recycling. The MRF is also expected to generate income from the sale of segregated wastes to recyclers. Simultaneously, the amount of waste to be stored would be reduced, thus the landfill can operate longer. These information already indicate that there would already be immediate returns on investment that would contribute to financial sustainability of the MRF, which would in turn ensure sustainability of project outcomes and results. As recommended by the MTE, the MRF will be open for the public as a buy-back center for segregated wastes. With this a much higher segregated waste quality could be achieved than through sorting of incoming mixed waste. This initiative would not only reduce costs for handling and sorting at the MRF, it would also prepare citizens, enterprises and other waste generators for the next level of waste management – segregation at source.

Institutional framework and governance risks – As reported in the Section 2.1 under Outcome 1, the project has significantly contributed to the strengthening of the national regulatory and enforcement infrastructures for the sound management of wastes in Armenia. In particular, 16 legislative documents pertaining to BAT, ownership of wastes and licensing have been produced and adopted by the government. The merging of four organizations into EMIC (within the MoNP) in view to re-organize resources more efficiently for the better management of environmental issues would suggest sustainability of institutional framework[26]. With training provided by RECETOX, the laboratory of EMIC has been strengthened for sampling and monitoring of POPs, which also provides for sustainability. For these reasons, institutional framework and governance risks are considered low.

Environmental risks – The project is considered ecologically sustainable as it has been designed to build the capacity of Armenia for the sound management of solid wastes and reduce the emission of UP-POPs. Furthermore, as no environmental risk that can influence or jeopardize the project outcomes and future flow of project benefits has been identified, environmental risk is considered low.

Given that all four types of risks are low, sustainability of project outcomes and results is rated **Likely**.

[26] Interview data with MoNP

3.5. Gender mainstreaming

By reducing the emissions of dioxins at the selected landfill in Ararat, the project also reduced risks that specifically affect women and the youth. Dioxins are highly toxic chemicals that pose risks to all human populations; they cause many health problems such as damage the immune system, interfere with hormones and can cause cancer. Once absorbed by the body, dioxins last a long time due to their chemical stability and their ability to get absorbed in fat tissues, where they are stored in the body. Their half-life in the body is estimated to be several years and up to decades for some congeners. Dioxins can also cause birth defects[27], and males are affected as well, as their sperm counts are reduced as a result of exposure to POPs[28].

According to data compiled by project management, involvement of women in the different project activities such as inception workshop, training courses and awareness raising workshops has been quite satisfactory. As can be seen in Table 4, a total of two hundred and twenty seven persons attended the different events, of which one hundred and twenty were males and ninety eight were females. They came from different government agencies, public and private sectors, academia, and local authorities. Except for events No2, No6 and No7 (Table 4), for which the participation of males was much higher, and which is comprehensible given the nature of the activity, participation in the other events in terms of gender was somewhat similar. Note that the NPC was a woman and the awareness raising and dissemination activities was sub-contracted to the NGO "Armenian Women for Health and Healthy Environment".

Rating on gender mainstreaming is **Satisfactory**.

Table 4: Gender participation in project activities*

Event	No of Participants	Ratio: men / women
1. Inception workshop	**35**	**15 / 20**
2. Training course on Solid Waste Management Application of BAT and BEP	**36**	**28 / 8**
3. Awareness raising workshop	**34**	**18 / 16**
4. Workshop on Strengthening the Regulatory Framework	**35**	**17 / 18**
5. Training workshop on Prevention of Open Wastes burning in Yerevan	**36**	**17 / 19**
6. Training workshop on Prevention of Open Wastes burning in Ararat town	**33**	**22 / 11**
7. Training for Staff engaged in landfill management in Ararat	**18**	**12 / 6**
Total	**227**	**129 / 98**

*Actual total number of participants was more, only number of trained persons in training events reported

[27] Toichuev, et al.. 2017b. "Organochlorine Pesticides in Placenta in Kyrgyzstan and the Effect on Pregnancy, Childbirth, and Newborn Health." *Environ Sci Pollut Res*. https://doi.org/10.1007/s11356-017-0962-6.
[28] Galimova EF, Amirova ZK, Galimov SN (2015) "Dioxins in the semen of men with infertility". Environ Sci Pollut Res Int. 22(19):14566-14569.

4. Performance of partners

4.1. UNIDO

Implementation is rated as **Highly Satisfactory**. According to information available, the project was very efficiently managed by the UNIDO PM. For example, after submission of the required report to UNIDO, funds transfer was quite fast. Generally, EMIC/WRC would receive the corresponding instalment within three working days. Similarly, no issues were reported regarding communication with the UNIDO PM. The national counterparts confirmed that the UNIDO PM could be contacted via e-mail or telephone easily; and queries were answered very fast. However, according to the midterm evaluation there was a misunderstanding between UNIDO and EMIC/WRC, the executing entity on the exact date of the start of the project. According to UNIDO the project starts when the budget is instituted in the UNIDO database system, which was in June 2015. For the national counterpart, the project started on the 2nd of September 2015, the date of the Inception Workshop, which was attended by the UNIDO PM. There is need for the implementing agency to better communicate the project start date to countries especially for projects with very short duration (less than 3 years). Nevertheless, in general all the national stakeholders interviewed during the evaluation mission greatly appreciated the support and guidance provided by the UNIDO PM. On the other hand, the role of the UNIDO Country Representative (CR) was quite limited, just participation to project activities such as inception workshop, awareness and training workshops. The Country Office could be more involved such as promoting the project during the preparatory phase to attract potential donors in order to mobilize additional funding or promote the project results for follow up initiatives.

4.2. National counterparts

National execution is also rated **Highly Satisfactory**. The project was hosted at the Ministry of Nature Protection from which a NPC was nominated. As planned the PMT was established at the start of the project and was kept simple. It was constituted by the NPC, who was the lead person, the NPM who was from EMIC, the executing agency, and supporting staff from the MoNP. According to feedback and confirmed during the evaluation mission, the NPC managed the project with strong hands. She has a strong personality, and has vast experience in project implementation and in organizing the work of experts. Furthermore, given her long experience in the government services, she is well known among the different ministries that were involved in the project, and this greatly facilitated the execution of project activities. The PMT performed very well and coordinated project activities very efficiently as evidenced by the short time required to complete the construction of the MRF. Indeed, the development of all the tender documents for the design of the MRF including a municipal landfill cell, the construction, and supervision of works, reception of all regulatory approval for the construction, conduction of an EIA, and construction of the MRF facility were finished within one year. Compared to other initiatives of this kind elsewhere, this was very fast, which highlights the good coordination, and high ownership and commitment of the national counterparts. In particular, the high involvement of the Ararat Municipality was instrumental in the rapid and successful construction of the MRF. It contributed significant co-finance and facilitated all the processes such as providing quickly all necessary data regarding the selected dumpsite and providing for connection to water supply and electricity, and construction of road to the landfill.

4.3. Donor

GEF was the main donor for the project. The funds were available and transfers were timely and adequate. Rating is **Satisfactory**.

5. Factors facilitating or limiting the achievement of results

5.1. Monitoring & evaluation

M&E Design. The project document included a detailed costed M&E plan. The plan described the necessary activities for monitoring progress as well as the responsible parties for reporting. These included the inception workshop, PSC meetings, annual reviews for progress reporting, Project Implementation Reviews (PIR) for reporting to the GEF, a terminal report and an independent terminal evaluation. Five key impact indicators and the means as well as their frequency of verification have also been proposed in the plan. For the outputs, SMART indicators have been provided in the logical framework. The M&E design did not include a midterm evaluation however, which was undertaken in September – October 2017.

M&E Implementation. The M&E plan was followed for the implementation of the project. The inception workshop, which was attended by the UNIDO PM, was held on the 2 September 2015 and the corresponding report was submitted. Up to August 2018, five progress reports and two annual reports have been prepared and timely submitted to UNIDO. Similarly, three comprehensive Project Implementation Review (PIR) reports for the years 2016, 2017 and 2018 were prepared and submitted. An independent midterm evaluation (MTE), which was not planned, was undertaken in September – October 2017. Table 5 below reports the recommendations made by MTE and actions taken by project management.

Table 5: Recommendations of MTE and actions taken

No	Recommendations made by MTE	Action taken
1	It is recommended that in future projects the subcontract between the IA and the EA includes clauses that payments are not only linked to progress reports, but reporting of materialized co-financing as well.	Not applicable to the project
2	It is recommended that international experts should also send their mission reports to the national counterpart organization.	Applicable to future projects
3	Project implementation is delayed by approximately 1 year, therefore an extension until September 2018 is recommended.	An extension of one year (September 2017 to September 2018) was granted
4	Project starting time should be better communicated to the national counterparts and the duration of the contracts needs to be in line with the project implementation timeframe.	Applicable to future projects
5.	The material flow at the MRF needs to be designed and the procurement of the equipment / tools (weight bridge, compactor, bailer, forklift, storage shelves/places for the bailed recycled wastes) shall be based on that plan in order to assure that the work at the MRF will be efficient.	Purchase of equipment was based on the material flow at MRF

No	Recommendations made by MTE	Action taken
6.	Discussion with the potential buyers of the segregated wastes shall also start prior to the procurement of the equipment used in the material flow. This will assure that the quality, weight and outside dimensions of the bailed segregated wastes will meet the expectations of the buyers.	Contacts have already been made with the potential buyers / recycling companies.
7.	It is also important to generate enough financial resources within one or two years to expand the landfill cell at the MRF. It is advised that the cost and benefit assessments of the MRF be prepared as soon as possible in order to assure that the required financing for running, maintaining, expanding, and long-term monitoring of the MRF is available.	Cost and benefit assessment was done by a national expert and the Report "*Economic assessment of separate collection of waste for further processing*" was submitted.
8.	It is also recommended to open the MRF for the public as a buy-back center for segregated wastes. With this a much higher segregated waste quality could be achieved than through sorting of incoming mixed waste. This may prepare citizens, enterprises for the next level of waste management – segregation at source.	When it will be operational, after the license needed for the handling of hazardous waste is obtained, the MRF will be opened for the public.
9.	It is recommended that new generations of experts are also trained together with the current ones to foster knowledge and knowledge transfer.	Training for younger experts is not amongst the objectives of the project. For this purpose a specific project is required to training of young specialists. However, two young staff of the EMIC laboratory benefitted training from RECETOX. Another one was also trained on soil, water and air sampling including passive sampling with PUF samplers, including filling the sampling forms, conservation and transport of samples.
10.	In the future it would be better if the progress reports included the indicators of the logical framework and the results would be compared against those indicators. Similarly it would be very informative if the materialized co-financing were also reported.	Reporting against indicators were done in annual and PIR reports but not in progress reports. No information regarding materialized co-finance was available in the reports.

The PSC was established and comprised of representatives of the following: UNIDO, MoNP, Ministry of Health, Ministry of Agriculture, Ministry of Emergency Situations, Ministry of Territorial Administration and Development, Ararat Town, academia and NGOs. As the project was delayed due to re-organization that occurred within MoNP and subsequently the contract with UNIDO was delayed, no PSC meetings were held between the Inception Workshop (September 2015) up to February 2017. Otherwise once the contract was signed in 2017, regular meetings (Table 6) were held. The monitoring of project progress was adequate, and recommendations and corrective measures were made to adapt to changing conditions or to unforeseen circumstances. For example, during the PSC meeting held on 15 August 2017 in Yerevan, as there were some delays in project implementation due to reorganization within the Ministry of Nature Protection and because of weather unfavorable conditions, a decision was taken to extend project duration until the end of June 2018.

Technical related decisions were taken by the Technical Working Group (TWG) which was a technical committee under the PSC. The membership of this group, which met regularly (Table

6), was similar to the PSC and it included national consultants as well. Project progress was also reported to the Inter-Ministerial / Inter-Agency Committee for Implementation of the Stockholm Convention on Persistent Organic Pollutants (CISC) (Table 6), that reviews national activities related to POPs.

Table 6: Dates of meetings

No	Type of Meeting	Date of meeting
1	Inception Workshop and PSC	2 September 2015
2	CISC	18 September 2015
3	CISC	12 August 2016
4	TWG	5 November 2016
5	PSC and TWG	10 February 2017
6	CISC	20 July 2017
7	PSC and TWG	15 August 2017
8	PSC	13 December 2017
9	CISC	21 December 2017
10	TWG	13 July 2018

Budgeting and Funding for M&E activities. A total amount of USD 40,000 (GEF funds) was budgeted for M&E activities covering expenses for the Inception Workshop (US$10,000) and the independent terminal evaluation (US$ 30,000). The other activities such as establishing the project management unit, holding PSC meetings, and reporting costs were covered by national co-financing (US$ 40,000). The allocated budgets were adequate, and the MTE, which was not budgeted in the project document, could be financed from the terminal evaluation budget line.

Rating on M&E is **Satisfactory**.

5.2. Results-Based Management

According to the Joint Inspection Unit of the UN, results-based management (RBM) is a broad management strategy focused on achieving results and aimed at changing the way agencies operate, with improving performance as central orientation. As a management tool, it should enhance responsibility, organizational learning and accountability in the implementation of programmes and budgets[29]. For the United Nations Development Group RBM is a management strategy by which all actors, contributing directly or indirectly to achieving a set of results, ensure that their processes, products and services contribute to the achievement of desired results (outputs, outcomes and higher-level goals or impact). The actors would then use the information and evidence on actual results to inform decision-making on the design, resourcing and delivery of programmes and activities as well as for accountability and reporting.[30] The key elements of RMB are (i) Focusing the dialogue on results at all phases of

[29] https://www.unjiu.org/content/results-based-management

[30] United Nations Development Group, results-based management Handbook: Harmonizing RBM concept and approaches for improved development results at country level" edited draft October 2011, p 2

the development process; (ii) Aligning programming, monitoring and evaluation with results; (iii) Keeping measurement and reporting simple; (iv) Managing for, not by results; and (v) Using results information for learning and decision making.

For this project, the approach adopted for its development and implementation clearly indicates a RBM one. The project document clearly gives the process of identifying the goal and objectives to be achieved – to reduce UP-POPs releases in open burning sources in Armenia through the introduction of BAT/BEP. The project also proposes a strategy as well as the means required to achieve them. The design of the project lays the basis for implementation, monitoring, reporting and evaluation processes. In particular, an adequate costed M&E plan including a comprehensive Logical Framework that would allow for proper monitoring of progress and tracking of results was proposed. The actual implementation of the project, lengthily discussed in the previous sections, followed the planned approach. The monitoring of progress and tracking of results was regularly done at PSC and TWG meetings involving all the key stakeholders. The project results are already being shared and are guiding the authorities to take informed decisions. For example, the neighboring municipalities have already taken the decision to have their solid wastes managed by the Ararat Town. Rating on Results-Based Management is **Satisfactory**.

5.3. Other factors

Factors that had a positive effect on project results – The appropriate design of the project proposing relevant, precise, and concise information to achieve the project objectives as well as a project coordination and management structure describing the role and responsibilities of key stakeholders and executing partners (see Section 1.4) was an important factor for achieving success.

The dedicated and committed project team, led by a pro-active NPC, was one of the key factors for success. This was highlighted by all stakeholders interviewed during the evaluation mission. The team very efficiently coordinated the project activities and was very successful to get the key stakeholders actively involved in the project since the beginning. Recruitment of high quality experts also contributed to success. In particular, their guidance and expertise that were appreciated by the beneficiaries greatly contributed to the successful technology transfer and adoption of best environmental practices at the pilot landfill site.

High ownership of the project at all levels was another important factor that contributed to achieve success. In particular, the project got strong support from the Ararat Municipality. The Mayor was personally involved and greatly facilitated the implementation process. He was living with the project as reported by one of the stakeholders interviewed during the evaluation mission. As the mayor stated during the mission, this MRF would be the first of its kind in Armenia and he wants it to be a complete success and a showcase for the whole of Armenia.

Finally, the flexibility of the contractors selected for the building of the MRF had a positive effect on efficiency. They accepted modification in the design of the MRF and also construction of the building for the workers, not planned originally in the contract, at no additional costs for the project.

Factors that hampered project results or sustainability – The main factor that hampered the implementation process were the delays encountered due to reorganization within the MoNP (see Section 3.3). In order to allow for completion of project activities, two extensions

were granted, and the project ended in December 2018, 18 months longer than anticipated. These delays however did not impact on cost effectiveness as quality outputs were delivered and management costs were kept within planned budget.

Rating on other factors is **Satisfactory**.

5.4. Overarching assessment and rating table

Table 7 below summarizes the assessment of the project.

Table 7: Summary of assessment

	Evaluation criteria	Evaluator's summary comments	Rating
A	**Impact (progress toward impact)**	Already visible signs of impact are seen at the pilot landfill. Waste burning has stopped since the start of the landfill renovation implying emission of dioxins and furans has stopped.	**S**
B	**Project design**		**S**
1	• Overall design	A participatory approach was adopted to develop the project. The components and interventions planned in the proposal are adequate and relevant to the achievement of project objectives.	S
2	• Logframe	The logical framework developed for this project was adequate to allow for proper monitoring and tracking of results. It contains baseline, target and well-defined indicators, some of which are SMART.	S
	Project performance	**All stated objectives achieved**	**S**
1	• Relevance	The project is highly relevant as it is assisting Armenia to fulfill its obligations towards the Stockholm Convention. The project is particularly relevant with the challenges facing Armenia for the management of waste. Improving waste management system in Armenia is in the top list of the national development agenda.	HS
2	• Effectiveness	All the stated objectives have been achieved. The construction of the MRF is completed, 16 legal documents related to BAT/BEP, waste management and licensing in waste sector have been drafted and adopted by the government.	S
3	• Efficiency	Despite delays, all activities have been completed and quality outputs delivered within planed budget.	S
4	• Sustainability of benefits	All the three aspects risks (financial, socio-political and institutional) are low. Sustainability is likely.	L

D	**Cross-cutting performance criteria**		
1	• Gender mainstreaming	Involvement of women in project activities was satisfactory.	S
2	• M&E: ✓ M&E design ✓ M&E implementation	The logical framework proposed is adequate to allow for proper monitoring and tracking of project results. The SMART indicators in logical framework were used to monitor project progress. PSC and TWG meetings were held regularly and relevant reports (e.g. PIRs) were submitted timely.	S
3	• Results-based Management (RBM)	The approach adopted clearly indicates a RBM one.	S
E	**Performance of partners**		
1	• UNIDO	The role of UNIDO was crucial for the project to meet its objectives. It has taken timely actions and provided technical back-stopping through quality international and national experts and introducing BAT/BEP to Armenia. Transfer of funds was timely and was greatly appreciated by national counterparts.	HS
2	• National counterparts and Executing partners	The dedicated and committed PMT performed very well, and coordinated activities very efficiently. Involvement of national stakeholders was very satisfactory. In particular, the contribution of the Ararat Municipality was instrumental in the fast construction of the MRF.	HS
3	• Donor	GEF funds were available and mobilization of co-funding contributed to successful delivery of outputs.	S
F	**Overall assessment**		S

RATING OF PROJECT OBJECTIVES AND RESULTS

- Highly satisfactory (HS): The project had no shortcomings in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.
- Satisfactory (S): The project had minor shortcomings in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.
- Moderately satisfactory (MS): The project had moderate shortcomings in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.
- Moderately unsatisfactory (MU): The project had significant shortcomings in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.
- Unsatisfactory (U): The project had major shortcomings in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.
- Highly unsatisfactory (HU): The project had severe shortcomings in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.
- Likely (L): There are no risks affecting this dimension of sustainability.
- Moderately likely (ML). There are moderate risks that affect this dimension of sustainability.
- Moderately unlikely (MU): There are significant risks that affect this dimension of sustainability.
- Unlikely (U): There are severe risks that affect this dimension of sustainability.

6. Conclusions, recommendations and lessons learned

6.1. Conclusions

The project has been successful in achieving all the stated objectives. In particular, it has contributed to build capacity in Armenia to stop UP-POPs emissions from open burning at the selected dumpsite through the introduction of BAT/BEP. The theory of change proposed by the evaluation mentions that four necessary preconditions should be in place for behavioral change and impact. The project greatly assisted in putting in place these four necessary conditions:

- The project contributed to enhance institutional capacity and technical capability of public bodies and relevant stakeholders. In particular, the national regulation for the sound management of wastes in Armenia was strengthened with the development of sixteen legislative and policy documents related to waste management, which were subsequently adopted by the Government.
- Thanks to the project, fifty-one officers coming from ministries, territorial (regional) subdivisions of state environmental inspectorates, municipalities and regional administrations had their management capacity built on the implementation of BAT/BEP and waste practices through a two-day training workshop.
- The project facilitated the transfer of best available technologies and adoption of best environmental practices at the selected landfill, which contributed to the total elimination of the emissions of PCDD/Fs from waste burning at the demonstration site.
- The project helped to raise at all levels regarding risk exposure to PCCD/Fs and the corresponding health hazards. In particular, targeted awareness raising campaigns on environmental and health hazards of U-POPs for relevant stakeholders have been successfully undertaken by the NGO AWHHE in cooperation with EMIC. All the key project events such as the Inception Workshop, the training workshops and the inauguration of the MRF were covered by the media (press and TV).

Due to an internal reorganization that occurred within the Ministry of Nature Protection, the implementation process was slowed down and was delayed. However, thanks to the active involvement of key stakeholders, in particular the Ararat Municipality who provided much assistance and co-financing, the flexibility of the contractors, and the adequate guidance and support from UNIDO the project team was able to get the project on the right track again. In the end, despite the delays of about 18 months, the project has performed very satisfactorily in delivering the quality outputs and achieving results.

As all risks are low, chances of continuous sustained impact of the project are likely.

6.2 Recommendations

For continued relevance, sustainability of the project results and impact, the following recommendations are addressed to various key stakeholders of the project.

To UNIDO
1. For this project as well as for other projects, reporting from national counterpart on materialized co-financing is very often a challenge. It is recommended that in future projects the subcontract between the implementing agency and the national executing agency includes clauses that payments are not only linked to progress reports, but reporting of materialized co-financing as well.

To UNIDO
2. Replication efforts in three provinces are on-going in Armenia thanks to international and bilateral support. However, for replication nationwide to cover all the provinces in the context of Armenia's strategy on waste management, substantial additional resources would be required. It is recommended that UNIDO considers to facilitate the availability of international financial as well as technical support. 3. For this project, there was some confusion regarding the actual start date. The signature of the contract between the implementing agency and the executing agency was delayed due to structural reorganization within the Ministry of Nature Protection. As a result, the date for completion of activities in the contract (March 2018) was well after the official closing date of the project (June 2017). The implementing agencies should better communicate the starting date to the national counterparts and they should ensure that the duration of the contract be in line with the project implementation timeframe.
To National Government
4. The project has contributed to the development and adoption of a number of legislations on wastes, BAT/BEP and licensing. For the sound management of wastes in the country in order to eliminate of UP-POPs emission from open burning at dumpsites, the national authorities should ensure that these pieces of legislation are properly enforced. In particular, the appropriate enforcing and monitoring system should be put in place. 5. When the MRF will be operational after obtaining the appropriate license, it is important that the procedures and good practices are strictly followed while managing the wastes, this could be done through regular inspection and monitoring. 6. The project has been very successful producing very good results and valuable lessons. These should be gathered and shared with other municipalities and regions.

6.3 Lessons learned

7. The project has been successfully completed and the following lessons stemmed out:

Two key lessons emerged from this project:
1. A strong stakeholder commitment and high ownership that would contribute to achieve success can be secured by involving key stakeholders in all the phases of the project from the preparatory phase through implementation to project execution. 2. Simple project management structure and committed and flexible project managers at the implementing agency and the executing agency leads to efficient and effective project implementation.

ANNEXES:

Annex 1: TOR of the evaluation

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

TERMS OF REFERENCE

Independent terminal evaluation of project

Implementation of BAT and BEP for reduction of UP-POPs releases from open burning sources in Armenia

UNIDO Project ID: 150063

GEF Project ID: 5038

September 2018

Contents

I. PROJECT BACKGROUND AND CONTEXT

1. Project factsheet[31]

Project title	Implementation of BAT and BEP for reduction of UP-POPs releases from open burning sources in Armenia
UNIDO ID	150063
GEF Project ID	5038
Region	Europe and Central Asia
Country(ies)	Republic of Armenia
Project donor(s)	GEF
Project implementation start date	1st September 2015
Expected duration	24 months
Expected implementation end date	31 December 2018
GEF Focal Areas and Operational Project	GEF-5: POPs CHEM-1
Implementing agency(ies)	UNIDO
Executing Partners	Ministry of Nature Protection of the Republic of Armenia
GEF project grant (excluding PPG, in USD)	853,000
Project GEF CEO endorsement / approval date	15 March 2015
UNIDO input (in kind, USD)	40,000 (cash) + 60,000 (in-kind)
Co-financing at CEO Endorsement, as applicable	3,388,420 (cash+in-kind)
Total project cost (USD), excluding support costs and PPG	4,241,420
Mid-term review date	September 2017
Planned terminal evaluation date	December 2018

(Source: Project document)

2. Project context

Since its formulation in 2015, the GEF-funded project *Implementation of BAT and BEP for reduction of UP-POPs releases from open burning source* has been very relevant for the Republic of Armenia. Indeed, the situation of waste collection and transportation is outdated and insufficient, particularly in the rural areas, where almost all industrial and municipal wastes are disposed to landfills without separation and open burning of waste is common. This is because it is the cheapest and easiest means of volume reduction and disposal of combustible materials.

This solution, though, is not efficient in reducing the sanitary risks due to the pathogens present in the waste. In particular, contaminated ashes from processes (incinerators, cement kilns or industrial boilers) are often dispersed in open dedicated fields and waste oils are burnt. Poor or incomplete combustion due to insufficient air (smoldering phases typical of open burning), inhomogeneous and poorly-mixed fuel materials, the presence of chlorinated precursors and catalytic metals (copper, iron) are the main factors for the formation and releases of Unintentionally Produced Persistent Pollutants (UP-POPs) in open burning processes. Releases from uncontrolled burning processes also include polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), heavy and volatile metals (Pb, Cu, Cd, Hg, Mn) and particulate matter (PM10 and PM2.5). The volatile nature of these pollutants impacts wildlife and humans far away from their point of release.

[31] Data to be validated by the Evaluation Team

The main objective of the project is to facilitate the implementation of the Stockholm Convention – ratified by Armenian Government in 2003 – particularly its obligations on the continuous reduction of UP-POPs from open burning sources.

To achieve its goals, the project provided the opportunity for involving national stakeholders, such as some Ministries, municipalities, local authorities, research and academic institutions, NGOs and universities as technical partners. The private sector was also tapped to participate in the project, in particular by implementing BAT/BEP, and making a shift from burning of waste to recycling or re-use. Relevant government ministries and departments, laboratories have also been involved for awareness raising activities and for the coordination of the project implementation.

In particular, the *Hazardous Substances and Wastes Policy Division*, as a structural subdivision of the *Ministry of Nature Protection* of the Republic of Armenia regulates the problems dealing with chemicals and wastes. It performs the following activities:

- Develop concepts and strategy, as well as programs aimed at management of chemicals and wastes;
- Develop drafts of the legislative acts on chemicals and waste management;
- Carry out Inventory of wastes generated on the territory of the Republic of Armenia;
- Analyze of risks degree at enterprises, on the territory of which there is production, use of chemicals and wastes, which are potentially subject to industrial accidents, as well as inventory/accounting of a.m. enterprises;
- Coordinate activities dealing with chemicals and wastes management, as well as classification of chemicals produced and used and wastes generated on the territory of Armenia, according to degree of hazard;
- Expertise of Safety Passports for the hazardous industrial entities.

3. Project objective and expected outcomes

In the Republic of Armenia, open burning of industrial and municipal wastes is very common at landfills and illegal dumps as it is considered the cheapest and easiest way to reduce the volume of the waste. The combustion of these wastes generates different types of pollutants such as PAHs, NOx, Sox and Annex C POPs. These pollutants are airborne, thus travelling large distances and impacting both wildlife and humans far away from their point of release.

The main objective of the project is the reduction of UP-POPs releases from open-burning sources in Armenia through the introduction of BAT and BEP; at the same time, the project also aims at creating capacity within both the Government and private sector on BAT/BEP implementation.

The project also addresses the priorities listed in the *National Implementation Plan* (NIP) of 2005. Among these:

- Improvement of legislative/regulatory background for regulation of POPs relevant issues; setting up institutional capacities/structures and strengthening the interaction amongst concerned Ministries and Agencies aimed at revealing main sources of POPs-related pollution, reducing their releases and eliminating the most hazardous ones, investigating environmental contamination by Pops and taking joint actions for prevention of their impact on human health;
- Carrying out detailed inventory on main sources of POPs and POPs-containing wastes;
- Inventory taking on PCB-containing oils and equipment in energy and industry sectors of the Republic of Armenia;

- Replacement of PCB-containing oils and equipment, which are currently exploited at different entities of energy sectors and industry of Armenia, by PCB-free oils and equipment;
- Providing monitoring of POPs polluted/contaminated sites, development of analytical screening methods for POPs with the purpose of initial/preliminary assessment of local contaminations;
- Establishment of the Central Analytical Laboratory on POPs to ensure analyses and control on the environment;
- Environmentally sound elimination/disposal of PCB-containing oils and PCB-containing equipment, as well as existing stockpiles of obsolete pesticides;
- Implementation of sound/safe technologies, which exclude POPs generation, releases in industrial area/zones and the environment;
- Arrangement of epidemiological and statistical studies on POPs impact to human health and risk assessment;
- Carrying-out wide information and awareness raising activities on POPs problem in order to develop and establish an information system embracing issues on prevention of POPs harmful impact, as well as their after-effects for human and environmental health;
- Ensuring implementation of actions aimed to meet the objectives of Stockholm Convention;
- Extending and strengthening international cooperation relevant to POPs management, information exchange of data obtained as a result of R&D (researches, technical design developments), monitoring studies, BAT and BEP.

Expected Outcomes:

Project component	Expected Outcomes	Expected Outputs
1.Regulatory framework and institutional strengthening	National regulatory and enforcement infrastructures in place to assure continuous release reduction of Annex C POPs from open burning sources	1.1: Waste management regulatory framework updated 1.2: Adequate management capacity built in implementing BAT/BEP and waste management practices 1.3: Adequate capability strengthened in monitoring activities and in evaluating and reporting data of U-POPs releases
2.Promotion of BAT/BEP at selected demonstration locations	Annex C POPs releases into the environment are gradually reduced from open burning activities	2.1: Cost and benefits of the available BAT/BEP measures for reducing Annex C POPs releases from open burning assessed 2.2: Pilot demonstration activities carried out in a selected site promoting waste reduction, re-use, recycle and BAT/BEP implementation
3.Awareness and dissemination	Project activities are sustainable and replicated	3.1: Awareness raising campaigns implemented 3.2: U-POPs from open burning and chemical safety of waste management related matters incorporated into educational curricula

4. Project implementation arrangements

UNIDO: GEF implementing agency for the project, it is responsible for overall project implementation. A National Project Officer was appointed to undertake full coordination with the Project Management Team (PMT).

Ministry of Nature Protection of the Republic of Armenia (MoNP): The Hazardous Substances and Waste Policy Division of the Ministry of Nature Protection of the Republic of Armenia (HSWPD) is the executing agency for the project as it is the national focal point for the Stockholm Convention in Armenia. It is responsible of the day-to-day management of the project.

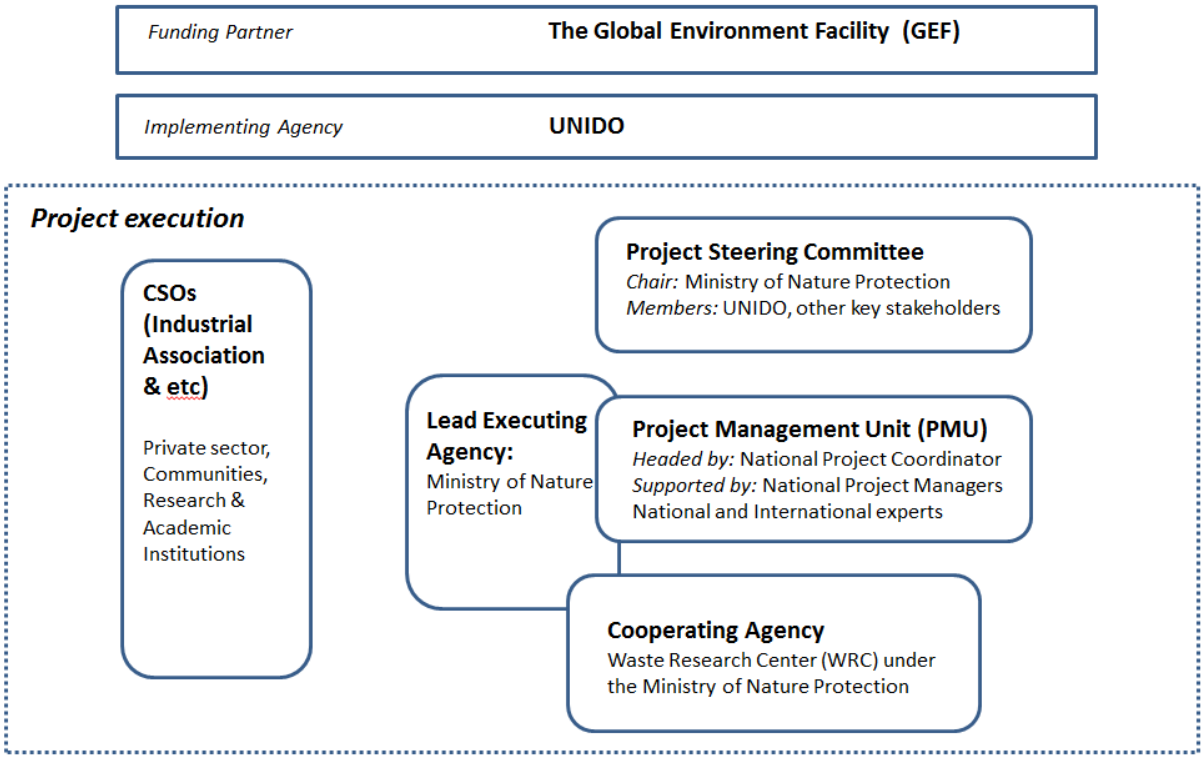
The Environmental Monitoring and Information Center (EMIC), successor of the Waste Research Center (WRC), is a state non-commercial organization at the Ministry of Nature Protection of the Republic of Armenia. EMIC is the cooperating agency which entered into contractual arrangements with UNIDO to perform specific activities in the project. EMIC is engaged in the development of scientifically based recommendations aimed at implementing the most appropriate measures in minimizing open burning activities in dumpsites and in the adoption of the BAT/BEP at dumpsites/landfills. At the same time it is involved in the development of the manuals for landfill operation and control and in the assessment of the proposed solutions to decrease the risks for the population. Finally, EMIC is engaged in the process of taking samples of different environmental media for further analyses.

The Ararat Communal Service under Ararat municipality is responsible for the execution of the demonstration activities under Component 2 with the supervision of HSWMD and UNIDO.

Project Management Unit (PMT): was established within MoNP to ensure adequate organizational structure and to facilitate day-to-day monitoring of implementation progress based on the project's annual work plan and its indicators. A National Project Coordinator (from the Ministry) heads the PMT. The PMT regularly informs UNIDO of any delays or difficulties faced during implementation so that appropriate support or corrective measures can be adopted in a timely and remedial fashion.

Project Steering Committee (PSC): the National Project Coordinator from the Ministry of Nature Protection chairs the PSC. The PSC comprises of representatives from relevant ministries, UNIDO and other relevant stakeholders. The members of the PSC were supposed to be finalized during the project inception phase. The PSC planned to hold its regular sessions twice a year throughout the project implementation, but additional meetings could be held if necessary. A Technical Working Group (TWG) may also be formed to discuss technical issues that may arise during project implementation. The TORs of both PSC and TWG would be formulated and agreed during the project inception phase.

Technical Working Group (TWG): it includes a representative from the MoNP, the operating entity and NPC.



5. Main findings of the Mid-term review

The mid-term evaluation (MTE) of the project was undertaken between September and October 2017 and has the following main **findings**:

Relevance and Design: the project takes into account and reflects national and local priorities and strategies and stakeholders consider the project highly relevant. Project design and objectives are in line with a) the GEF-5 strategies for chemicals management; b) the Inclusive and Sustainable Industrial Development (ISID) strategy of UNIDO ; c) global environmental objectives of the GEF.

Efficiency: at the stage of the MTR and despite an initial delay of one year due to institutional changes in the MoNP, the economical inputs of the project had very quickly converted into outputs, therefore the project was assessed as efficient. The planning and construction of the pilot demonstration of Material Recovery Facility (MRF) finished in 14 months at a very reasonable cost.

Effectiveness: overall the project was assessed as effective as the results achieved at that stage provided a foundation for delivering key project outcomes.

Likelihood of Sustainability: it was assessed as *high*.

Key recommendations

To UNIDO:

- It is recommended that in future projects the subcontract between the IA and the EA includes clauses that payments are not only linked to progress reports, but reporting of materialized co-financing as well.

- It is recommended that international experts should also send their mission reports to the national counterpart organization.
- Project implementation is delayed by approximately 1 year, therefore an extension until September 2018 is recommended.
- Project starting time should be better communicated to the national counterparts and the duration of the contracts need to be in line with the project implementation timeframe.

To the Government and counterpart organizations:

- The material flow at the MRF needs to be designed and the procurement of the equipment/tools (weight bridge, compactor, bailer, forklift, storage shelves/places for the bailed recycled wastes) shall be based on that plan in order to assure that the work at the MRF will be efficient.
- Discussion with the potential buyers of the segregated wastes shall also start prior to the procurement of the equipment used in the material flow at the MRF. This will assure that the quality, weight and outside dimensions of the bailed segregated wastes will meet the expectations of the buyers.
- It is also important to generate enough financial resources within one or two years to expand the landfill cell at the MRF. It is advised that the cost and benefit assessments of the MRF be prepared as soon as possible in order to assure that the required financing for running, maintaining, expanding, and long-term monitoring of the landfill cells is available.
- It is also recommended to open the MRF for the public as a buy-back center for segregated wastes. With this a much higher segregated waste quality could be achieved than through sorting of incoming mixed waste. This may prepare citizens, enterprises for the next level of waste management - segregation at source.
- It is recommended that new generations of experts are also trained together with the current ones to foster knowledge and knowledge transfer.
- In the future it would be better if the progress reports included the indicators of the logical framework and the results would be compared against those indicators. Similarly it would be very informative if the materialized co-financing were also reported.

6. Budget information

Table 1. Financing plan summary

US$	***Total (US$)***
Financing (GEF / others)	853,000
Co-financing (Cash and In-kind)	3,388,420
Total (US$)	**4,241,420**

Source: Project document / progress report

Table 2. Financing plan summary - Outcome breakdown[32]

Project component	Donor (GEF/other) (US$)	Co-Financing (US$)	Total (US$)
Regulatory Framework and institutional strengthening	183,000	1,180,000	**1,363,000**
Promotion of BAT/BEP at selected demonstration locations	490,000	1,448,420	**1,938,420**
Awareness and dissemination	100,000	560,000	**660,000**
Monitoring and Evaluation	40,000	40,000	**80,000**
Project Management costs	40,000	160,000	**200,000**
Total (US$)	**853,000**	**3,388,420**	**4,241,420**

Source: Project document / progress report

Table 3. Co-Financing source breakdown

Name of Co-financier (source)	In-kind	Cash	*% over total co-financing*
Ministry of Nature protection *(National Government)*	500,000		*14,7%*
European Union Framework of the European Neighborhood and Partnership Instrument *(Other Multilateral Agency)*	1,084,000		*32%*
Asian Development Bank *(Other Multilateral Agency)*	750,000		*22,2%*
Ararat Municipality *(Local Government)*	443,460		*13,1%*
Research Centre for Toxic Compounds in the Environment *(Others)*	300,000		*8,8%*
Bureau for Chemical Substances Poland *(Others)*	210,960		*6,2%*
UNIDO	60,000	40,000	*3%*
Total Co-financing (US$)	**3,348,420**	**40,000**	**3,388,420**

Source : Project document

Table 4. UNIDO budget execution (Grant 2000003074)

Items of expenditure	2015	2016	2017	2018	Total expenditure	*% /total*
Contractual Services		447,509	175	22,945	**470,629**	*57%*
Equipment			1,120.75		**1,120.75**	*0,1%*
Local travel	3,876.71	6,922.63	2,006.66		**12,806**	*1,5%*

[32] Source: Project document.

Items of expenditure	2015	2016	2017	2018	Total expenditure	% /total
Nat. Consult./Staff	24,766.53	94,215.94	94,415.60	72,829.62	**286,227.69**	*34,6%*
Other Direct Costs	1,044.59	2,856.31	431.63	1,015.53	**5,348.06**	*0,6%*
Staff & Intern Consultants	8,028.99	12,957.30	27,769.17	22.77	**48,778.23**	*6%*
Train/Fellowship/Study	1,402.14				**1,402.14**	*0,2%*
Grand Total	**39,118.96**	**566,477.18**	**127,935.81**	**98,830.92**	**826,311.87**	***100%***
Completion rate (current expenditure/GEF grant)						96.8%

Source: UNIDO Project Management database as of 22 August 2018

II. Scope and purpose of the evaluation

The purpose of the evaluation is to independently assess the project to help UNIDO improve performance and results of ongoing and future programmes and projects. The independent terminal evaluation (TE) will cover the whole duration of the project from its starting date in to the estimated completion date in 31/12/2018.

The evaluation has two specific objectives:

(i) Assess the project performance in terms of relevance, effectiveness, efficiency, sustainability and progress to impact; and

(ii) Develop a series of findings, lessons and recommendations for enhancing the design of new and implementation of ongoing projects by UNIDO.

III. Evaluation approach and methodology

The TE will be conducted in accordance with the UNIDO Evaluation Policy[33] and the UNIDO Guidelines for the Technical Cooperation Project and Project Cycle[34]. In addition, the GEF Guidelines for GEF Agencies in Conducting Terminal Evaluations, the GEF Monitoring and Evaluation Policy and the GEF Minimum Fiduciary Standards for GEF Implementing and Executing Agencies will be applied.

The evaluation will be carried out as an independent in-depth evaluation using a participatory approach whereby all key parties associated with the project will be informed and consulted throughout the evaluation. The evaluation team leader will liaise with the UNIDO Independent Evaluation Division (ODG/EIO/IED) on the conduct of the evaluation and methodological issues.

The evaluation will use a theory of change approach and mixed methods to collect data and information from a range of sources and informants. It will pay attention to triangulating the data and information collected before forming its assessment. This is essential to ensure an evidence-based and credible evaluation, with robust analytical underpinning.

The theory of change will identify causal and transformational pathways from the project outputs to outcomes and longer-term impacts, and drivers as well as barriers to achieve them.

[33] UNIDO. (2015). Director General's Bulletin: Evaluation Policy (UNIDO/DGB/(M).98/Rev.1)

[34] UNIDO. (2006). Director-General's Administrative Instruction No. 17/Rev.1: Guidelines for the Technical Cooperation Programme and Project Cycle (DGAI.17/Rev.1, 24 August 2006)

The learning from this analysis will be useful to feed into the design of the future projects so that the management team can effectively manage them based on results.

1. Data collection methods

Following are the main instruments for data collection:

(a) **Desk and literature review** of documents related to the project, including but not limited to:
- The original project document, monitoring reports (such as progress and financial reports, mid-term review report, output reports, back-to-office mission report(s), end-of-contract report(s) and relevant correspondence.
- Notes from the meetings of committees involved in the project.

(b) **Stakeholder consultations** will be conducted through structured and semi-structured interviews and focus group discussion. Key stakeholders to be interviewed include:
- UNIDO Management and staff involved in the project; and
- Representatives of donors, counterparts and stakeholders.

(c) **Field visit** to project sites in the Republic of Armenia.

(d) **Data and information analysis** will be taken during and after the field visits and will form the basis to prepare the evaluation report.

2. Evaluation key questions and criteria. The key evaluation questions are the following:

(b) What are the key drivers and barriers to achieve the long term objectives? To what extent has the project helped put in place the conditions likely to address the drivers, overcome barriers and contribute to the long term objectives?

(c) How well has the project performed? Has the project done the right things? Has the project done things right, with good value for money?

(d) What have been the project's key results (outputs, outcome and impact)? To what extent have the expected results been achieved or are likely to be achieved? To what extent the achieved results will sustain after the completion of the project?

(e) What lessons can be drawn from the successful and unsuccessful practices in designing, implementing and managing the project?

The evaluation will assess the likelihood of sustainability of the project results after the project completion. The assessment will identify key risks (e.g. in terms of financial, socio-political, institutional and environmental risks) and explain how these risks may affect the continuation of results after the project ends. Table 5 below provides the key evaluation criteria to be assessed by the evaluation. The details questions to assess each evaluation criterion are in annex 2 of the UNIDO Evaluation Manual.

Table 5. Project evaluation criteria

#	Evaluation criteria	Mandatory rating
A	**Impact**	**Yes**
B	**Project design**	**Yes**
1	• Overall design	Yes
2	• Logframe	Yes
C	**Project performance**	**Yes**
1	• Relevance	Yes
2	• Effectiveness	Yes
3	• Efficiency	Yes
4	• Sustainability of benefits	Yes
D	**Cross-cutting performance criteria**	
1	• Gender mainstreaming	Yes
2	• M&E:	Yes

#	Evaluation criteria	Mandatory rating
	✓ M&E design ✓ M&E implementation	
3	• Results-based Management (RBM)	Yes
E	**Performance of partners**	
1	• UNIDO	Yes
2	• National counterparts	Yes
3	• Donor	Yes
F	**Overall assessment**	Yes

Performance of partners

The assessment of performance of partners will ***include*** the quality of implementation and execution of the GEF Agencies and project executing entities (EAs) in discharging their expected roles and responsibilities. The assessment will take into account the following:

- Quality of Implementation, e.g. the extent to which the agency delivered effectively, with focus on elements that were controllable from the given GEF Agency's perspective and how well risks were identified and managed.
- Quality of Execution, e.g. the appropriate use of funds, procurement and contracting of goods and services.

Other Assessments required by the GEF for GEF-funded projects:

The terminal evaluation will assess the following topics, for which ***ratings are not required***:

a. **Need for follow-up**: e.g. in instances financial mismanagement, unintended negative impacts or risks.
b. **Materialization of co-financing**: e.g. the extent to which the expected co-financing materialized, whether co-financing was administered by the project management or by some other organization; whether and how shortfall or excess in co-financing affected project results.
c. **Environmental and Social Safeguards**[35]: appropriate environmental and social safeguards were addressed in the project's design and implementation, e.g. preventive or mitigation measures for any foreseeable adverse effects and/or harm to environment or to any stakeholder.

3. Rating system

In line with the practice adopted by many development agencies, the UNIDO Independent Evaluation Division uses a six-point rating system, where 6 is the highest score (highly satisfactory) and 1 is the lowest (highly unsatisfactory) as per Table 6.

Table 6. Project rating criteria

Score		Definition	Category
6	Highly satisfactory	Level of achievement clearly exceeds expectations and there is no shortcoming.	SATISFACTORY
5	Satisfactory	Level of achievement meets expectations (indicatively, over 80-95 per cent) and there is no or minor shortcoming.	

[35] Refer to GEF/C.41/10/Rev.1 available at: http://www.thegef.org/sites/default/files/council-meetingdocuments/ C.41.10.Rev_1.Policy_on_Environmental_and_Social_Safeguards.Final%20of%20Nov%2018.pdf

Score		Definition	Category
4	Moderately satisfactory	Level of achievement more or less meets expectations (indicatively, 60 to 80 per cent) and there are some shortcomings.	
3	Moderately unsatisfactory	Level of achievement is somewhat lower than expected (indicatively, less than 60 per cent) and there are significant shortcomings.	UNSATISFACTORY
2	Unsatisfactory	Level of achievement is substantially lower than expected and there are major shortcomings.	
1	Highly unsatisfactory	Level of achievement is negligible and there are severe shortcomings.	

IV. Evaluation process

The evaluation will be conducted from October to December 2018. The evaluation will be implemented in five phases which are not strictly sequential, but in many cases iterative, conducted in parallel and partly overlapping:

i. Inception phase: The evaluation team will reconstruct the Theory of Change of the project and an evaluation matrix with specific questions for the evaluation; the specific site visits will be determined during the inception phase, taking into consideration the findings and recommendations of the mid-term review.
ii. Desk review and data analysis;
iii. Interviews, survey and literature review;
iv. Country visits;
v. Data analysis and report writing.

V. Time schedule and deliverables

The evaluation is scheduled to take place from October to December 2018. The evaluation field mission is tentatively planned for December 2018. At the end of the field mission, there will be a presentation of the preliminary findings for all stakeholders involved in this project in . The tentative timelines are provided in Table 7.

After the evaluation field mission, the evaluation team leader will visit UNIDO HQ for debriefing and presentation of the preliminary findings of the terminal evaluation. The draft TE report will be submitted 4 to 6 weeks after the end of the mission. The draft TE report is to be shared with the UNIDO PM, UNIDO Independent Evaluation Division, the UNIDO GEF Coordinator and GEF OFP and other stakeholders for receipt of comments. The ET leader is expected to revise the draft TE report based on the comments received, edit the language and form and submit the final version of the TE report in accordance with UNIDO ODG/EIO/EID standards.

Table 7. Tentative timelines

Timelines	Tasks
October 2018	Desk review and preparation of the TOC and Evaluation Matrix
November 2018	Briefing with UNIDO project manager based in Vienna
3-10 December 2018	Field visit to Republic of Armenia
December 2018	Preparation of first draft evaluation report

Timelines	Tasks
December 2018	Debriefing in Vienna Internal peer review of the report by UNIDO's Independent Evaluation Division and other stakeholder comments to draft evaluation report
End of December 2018	Final evaluation report

VI. Evaluation team composition

The evaluation team will be composed of one international evaluation consultant acting as the team leader and one national evaluation consultant. The evaluation team members will possess relevant strong experience and skills on evaluation management and conduct together with expertise and experience in innovative clean energy technologies. Both consultants will be contracted by UNIDO.

The tasks of each team member are specified in the job descriptions annexed to these terms of reference. The ET is required to provide information relevant for follow-up studies, including terminal evaluation verification on request to the GEF partnership up to three years after completion of the terminal evaluation.

According to UNIDO Evaluation Policy, members of the evaluation team must not have been directly involved in the design and/or implementation of the project under evaluation.

The UNIDO Project Manager and the project team in the Republic of Armenia will support the evaluation team. The UNIDO GEF Coordinator and GEF OFP(s) will be briefed on the evaluation and provide support to its conduct. GEF OFP(s) will, where applicable and feasible, also be briefed and debriefed at the start and end of the evaluation mission.

An evaluation manager from UNIDO Independent Evaluation Division will provide technical backstopping to the evaluation team and ensure the quality of the evaluation. The UNIDO Project Manager and national project teams will act as resourced persons and provide support to the evaluation team and the evaluation manager.

VII. Reporting

Inception report

This Terms of Reference (ToR) provides some information on the evaluation methodology, but this should not be regarded as exhaustive. After reviewing the project documentation and initial interviews with the project manager, the Team Leader will prepare, in collaboration with the national consultant, a short inception report that will operationalize the ToR relating to the evaluation questions and provide information on what type of and how the evidence will be collected (methodology). It will be discussed with and approved by the responsible UNIDO Evaluation Manager.

The Inception Report will focus on the following elements: preliminary project theory model(s); elaboration of evaluation methodology including quantitative and qualitative approaches through an evaluation framework ("evaluation matrix"); division of work between the International Evaluation Consultant and national consultant; mission plan, including places to be visited, people to be interviewed and possible surveys to be conducted and a debriefing and reporting timetable[36].

[36] The evaluator will be provided with a Guide on how to prepare an evaluation inception report prepared by the UNIDO ODG/EVQ/IEV.

Evaluation report format and review procedures

The draft report will be delivered to UNIDO's Independent Evaluation Division (the suggested report outline is in Annex 4) and circulated to UNIDO staff and national stakeholders associated with the project for factual validation and comments. Any comments or responses, or feedback on any errors of fact to the draft report provided by the stakeholders will be sent to UNIDO's Independent Evaluation Division for collation and onward transmission to the project evaluation team who will be advised of any necessary revisions. On the basis of this feedback, and taking into consideration the comments received, the evaluation team will prepare the final version of the terminal evaluation report.

The ET will present its preliminary findings to the local stakeholders at the end of the field visit and take into account their feed-back in preparing the evaluation report. A presentation of preliminary findings will take place at UNIDO HQ after the field mission.

The TE report should be brief, to the point and easy to understand. It must explain the purpose of the evaluation, exactly what was evaluated, and the methods used. The report must highlight any methodological limitations, identify key concerns and present evidence-based findings, consequent conclusions, recommendations and lessons. The report should provide information on when the evaluation took place, the places visited, who was involved and be presented in a way that makes the information accessible and comprehensible. The report should include an executive summary that encapsulates the essence of the information contained in the report to facilitate dissemination and distillation of lessons.

Findings, conclusions and recommendations should be presented in a complete, logical and balanced manner. The evaluation report shall be written in English and follow the outline given in annex 4.

VIII. Quality assurance

All UNIDO evaluations are subject to quality assessments by UNIDO Independent Evaluation Division. Quality assurance and control is exercised in different ways throughout the evaluation process (briefing of consultants on methodology and process of UNIDO Independent Evaluation Division, providing inputs regarding findings, lessons learned and recommendations from other UNIDO evaluations, review of inception report and evaluation report by UNIDO's Independent Evaluation Division).

The quality of the evaluation report will be assessed and rated against the criteria set forth in the Checklist on evaluation report quality, attached as Annex 5. The applied evaluation quality assessment criteria are used as a tool to provide structured feedback. UNIDO Independent Evaluation Division should ensure that the evaluation report is useful for UNIDO in terms of organizational learning (recommendations and lessons learned) and is compliant with UNIDO's evaluation policy and these terms of reference. The draft and final evaluation report are reviewed by UNIDO Independent Evaluation Division, which will submit the final report to the GEF Evaluation Office and circulate it within UNIDO together with a management response sheet.

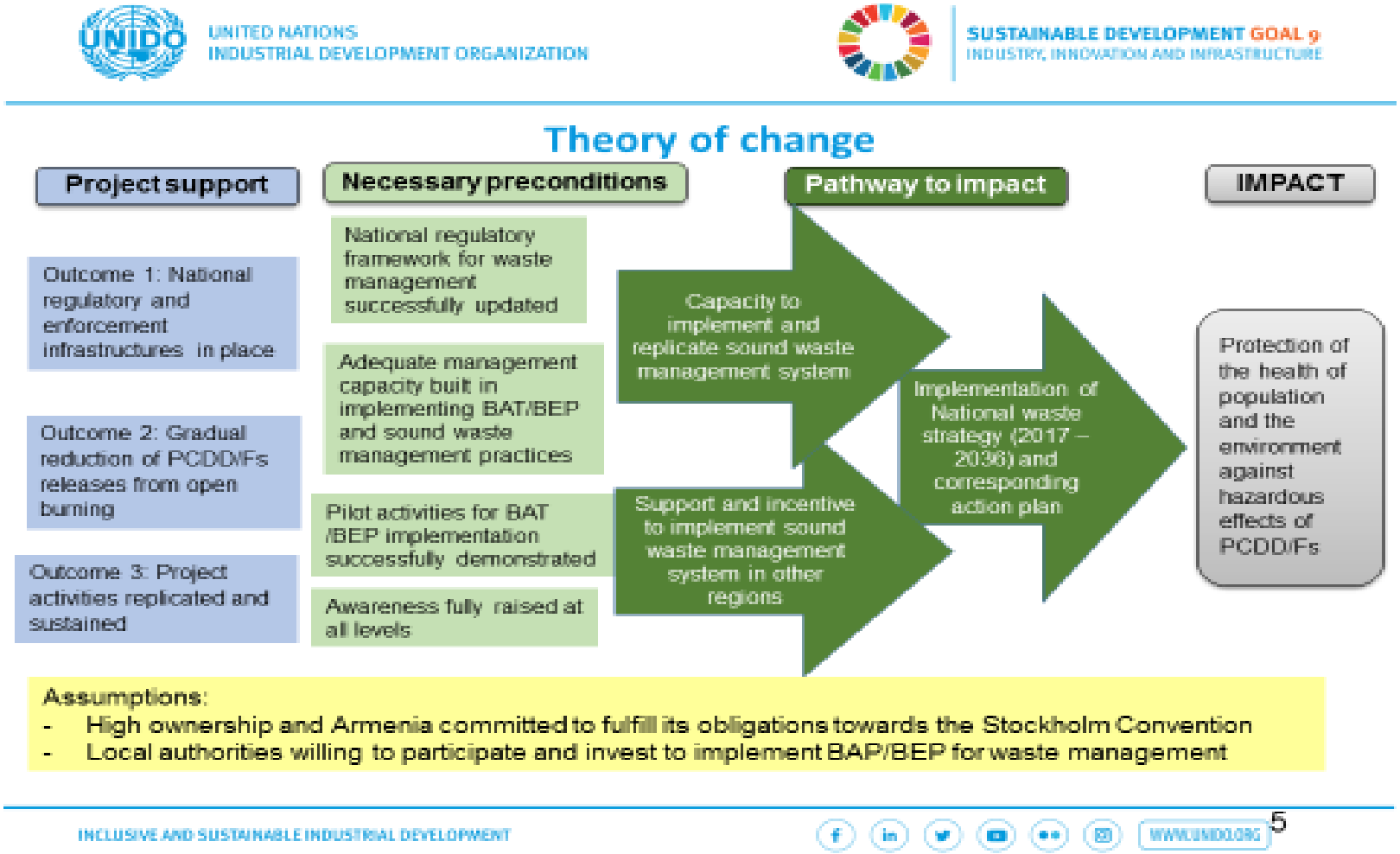
Annex 2: List of documents reviewed

1. Project document
2. Design document for Ararat town dump-site renovation and infrastructure development project (in Armenian)
3. PIR reports for FY 2016, 2017 and 2018
4. Annual reports
5. Progress reports
6. The mid-term evaluation report
7. PSC, TWG and CISC meeting reports
8. Copies of contract between EMIC and UNIDO
9. Financial report for GEF funds
10. Materialized co-financing
11. Detailed Report on Current Status of the Construction and Rehabilitation Works on the Ararat Dump Site
12. Evaluation Report of the First Monitoring Campaign
13. Ararat Site Assessment Report
14. Conclusion on engineering-geological conditions of Ararat town dump-site renovation and infrastructure development project (in Armenian)
15. Awareness-raising and dissemination of information on Project results
16. Preparation and Dissemination of Merchandizing /Awareness Raising Material
17. Technical Specifications: Purchase Schedule for Activity on preparation of design estimates for renovation and infrastructure development planned at Ararat town dump-site
18. Reports on Implementation of BAT/BEP for Reduction of UP-POPs Releases from Open Burning Sources: Inception Workshop, Prevention of Wastes Open Burning Training Workshop, Training Course on Solid Waste Management Application of BAT and BEP for Local Authorities, Strengthening the Regulatory Framework Workshop, Awareness Raising Workshop on POPs
19. Final report Implementation of BAT/BEP for Reduction of UP-POPs Releases from Open Burning Sources - Strengthening the Regulatory Framework
20. Landfill Operation Guidance
21. Ararat community reference statement
22. Educational materials:
• Persistent Organic Pollutants: Fate in the Environment (in Armenian and Russian), • Dioxins as century challenge (in Armenian and Russian), • Harmful Impacts of POPs to the Environment and Human Health (in English).

Annex 3: List of persons interviewed

No	Name	Position	Email
1	Ms. Anahit Aleksandryan	Project National Coordinator, Focal Point of Stockholm Convention	anahit.aleksandryan@yahoo.com
2	Mr. Afanasi Lazarev	Director of Environmental Monitoring and Information Center (EMIC)	a.lazarev@mnp.am
3	Mr. Artak Khachatryan	Technical Team Leader	khachart7@yahoo.com
4	Mrs. Khnarik Grigoryan	Representatives of the "Armenian Women for Health and Healthy Environment" NGO	gnarikgrigoryan@mail.ru
5	Mrs. Narine Avetyan	Head of Department of Territorial Infrastructure Development, Ministry of territorial administration and development	n.avetyan@mta.gov.am
6	Mr. Roman Chobanyan	Head of Division of Budget Programs and Procurement Process Implementation, Ministry of nature protection	r.chobanyan@mnp.am
7	Mr. Hayk Haykyan	Head of Ararat Community	(0234) 44747
8	Mr. David Androyan	National consultant	a_davidam@yahoo.com
9	Mrs. Anahit Simonyan	Head of UNIDO in Armenia	a.simonyan@**unido**.org
10	Mrs. Alla Ivchenko	UNIDO project support	imivchenko@yahoo.com
11	Mr. Dmitry Sholev	Leading specialist, Division of waste inventory, classification and technology investigation, EMIC	
12	Mr. Vladimir Mkhitaryan	Engineer, Chemist-technologist, "Nairit Plant" CJSC	
13	Ms. Hasmik Yengoyan	Lecturer, Associate professor, Department of constitutional law, Yerevan state University	
14	Mr. Vardges Frangulyan.	National Expert	
15	Carmela Centeno	UNIDO Project Manager	c.centeno@unido.org

Annex 4: Theory of Change



Annex 5: Tables to gather information during country visit

Table A: Extent and forms of adoption of changes leading to the sound management of wastes in Armenia[37]				
Preconditions	What has been mainstreamed and how	What has been replicated, by whom and to what extent?	What has been scaled and how?	Comment
National regulatory framework for waste management				
Adequate management capacity built in implementing BAT/BEP and sound waste management practices				
Pilot activities for BAT /BEP implementation successfully demonstrated				
Awareness fully raised at all levels				

T**able B: Extent to which preconditions for the sound management of wastes in Armenia have been reached[38]**				
Pre -Condition	Extent to which precondition is in place	Project contributions to preconditions and the significance of the project contributions	Other factors, projects, actors or events that contributed to the observed preconditions.	Important issues that remain to be addressed for the sound management of solid wastes
National regulatory framework for waste management				
Adequate management capacity built in implementing BAT/BEP and sound waste management practices				
Pilot activities for BAT /BEP implementation successfully demonstrated				
Awareness fully raised at all levels				

[37] To be filled in by the lead evaluator and the national evaluator/ technical expert during visit to Armenia
[38] To be filled in by the lead evaluator and the national evaluator/ technical expert during visit to Armenia

Table C: GENDER of Key project stakeholders[39]

Category	Male	Female	Total
Senior Management of Project Management Unit			
Technical staff of Project Management Unit			
Management of EMIC			
Management of Participating Firms / contractors			

[39] To be filled by national evaluator/ expert from information provided by the project management

Annex 6: Rating of activities and outputs

Rating of activities and output: HS: Highly satisfactory; S: Satisfactory; MS: Moderately Satisfactory; MU: Moderately Unsatisfactory; U: Unsatisfactory; HU: Highly Unsatisfactory

- The rating of an activity is based on whether that activity has been completed or not (Completed or Incomplete) or achievement exceeds what was expected at design (Exceeded). A rating of HS is given in case if achievement exceeds expectation at design, which is the case for Activity 3.2.1
- In the case of outputs, the rating is based on average rating obtained by all the activities of that output. Note that a score has been attributed to each rating as follows: HS = 6; S = 5; MS = 4; MU = 3; U = 2; HU = 1. If the average score for an output is not a whole number, then this figure is rounded off to the nearest whole number, and the rating corresponding that that number is the rating for the output.

Activities	Objectively verifiable indicators	Progress at project end and comments	Status	Rating
Outcome 1: **National regulatory and enforcement infrastructures in place to assure continuous reduction of annex C POPs releases from open burning sources**				
Output 1.1: Waste management regulatory framework updated	Updated regulations formulated to facilitate implementation of BAT/BEP in waste disposal practices including landfill legislation and inventory	Regulatory framework very satisfactorily updated		Score: 5.5 **S**
Activity 1.1.1: Update the regulatory framework on chemical and waste management.		List of legal acts and regulations (linked with chemicals and waste management issues) elaborated and adopted by the Government of the Republic of Armenia 1. "Decision of the Government of the Republic of Armenia "On establishing criteria set forth to the best available techniques" (No. 666-N dated June 15, 2017)"; 2. The Licensing Order was approved by Decision of the Government of the Republic of Armenia No. 1029-N dated September 27, 2018 "On Changes in Decision of the Government of the Republic of Armenia (No. 121-N of January 30, 2003) "On the Licensing Procedures for Recycling, Treatment, Storage, Transportation and Placement of Hazardous Wastes in the Republic of Armenia";	Exceeded	**HS**

Activities	Objectively verifiable indicators	Progress at project end and comments	Status	Rating
		3. 2018-2021 "Program for Implementation of Extended Responsibility of Manufacturer (Importer) for Products in the Republic of Armenia" Part. 2 states "Development of a concept paper for the introduction of single-use polyethylene packages (bags, sacks) reducing economic levers and mechanisms, and its submission to the Government"; 4. "On implementation of Strategy on Approval of Concept for Implementation of the System for Extended Producer (Importer) Responsibility Regarding Manufactured Products" (Annex 1, Protocol Decision of the Republic of Armenia Government; No. 14 dated April 12, 2018) and its Appropriate Action Plan for 2018-2020 (Annex 2, Protocol Decision of the Republic of Armenia Government; No. 14 dated April 12, 2018); 5. Concept of "Law on Chemicals" was prepared and submitted to the Government for approval; 6. The "Law on Chemicals" of the Republic of Armenia that will regulate issues and prohibition/ bans, including those related to Dioxins and Furans was drafted for submission to the Government after approval of the Concept of "Low on Chemicals"; 7. The Governmental Decision on the List of banned chemicals regulated under Stockholm Convention was prepared and submitted to stakeholders/appropriate Ministries for consideration; 8. The Manual on landfills operation, inspection, and monitoring was prepared; 9. «Decision of the Government of the Republic of Armenia "On establishing a procedure for conciliation procedure/endorsement with the Authority responsible in the area of the State Environmental Protection Administration regarding mining waste management and mining waste recycling changed plans, relating to environmental protection issues in mining sector" (No. 674-N dated 15.06.2017); 10. Decision of the Government of the Republic of Armenia "On setting forth mining waste management		

Activities	Objectively verifiable indicators	Progress at project end and comments	Status	Rating
		facilities and mining waste management and processing technical requirements and standards"; 11. «Decision of the Government of the Republic of Armenia "On establishing a procedure for mining waste recycling"; 12. «Decision of the Government of the Republic of Armenia "On establishing the procedure for mining waste and mining waste management facilities classification according to hazard" (No. 689 –N dated July 15, 2017); 13. «Decision of the Government of the Republic of Armenia Content "On defining the content of mining waste management and mining waste recycling plans, as well as mining waste management and mining waste recycling activities" (No. 675-N dated 16.06.2017); 14. «Decision of the Government of the Republic of Armenia "On establishing the exemplary forms of mining waste management plans and mining waste recycling plans" (No. 676 dated 15.06.2017); 15. Order of the Minister of Nature Protection of the Republic of Armenia "On establishing the procedure for determination of the maximum admissible concentrations / limits of hazardous chemicals required for processing of ore mineral resources" (No. 256-N dated 10.08.2017); 16. «Decision of the Government of the Republic of Armenia "On establishing the procedure for mining wastes processing" (No. 906 dated July 27, 2017).		
Activity 1.1.2: Address the gaps and barriers in the regulatory framework specifically addressing POPs and BAT/BEP		An analysis of the existing legal framework, including identification of gaps as well as implementation of legislation for strengthening the regulatory framework for POPs management, hazardous chemicals and waste management, landfills management was done by national experts	Completed	**S**
Activity 1.1.3: Formulate proposal for the regulatory framework on landfill management, specifically addressing POPs and BAT/BEP issues for the open burning sector including development of		On the basis of analysis done by national experts, proposal for landfills proper operation was done by an international expert. The study also proposes: • Procedure comprising strategic elements for reducing biodegradable waste going to landfill,	Exceeded	**HS**

Activities	Objectively verifiable indicators	Progress at project end and comments	Status	Rating
financial mechanisms that maybe implemented		• Procedure to facilitate an application and permit system for waste disposal, • Procedure for introducing waste acceptance practices, • Procedure for introducing control and monitoring procedures for landfill operation, closure and aftercare, • Landfill best practices and proposed regulatory framework, • Landfill operations guidance manual. The mentioned above studies and procedures are finalized as a report named "Implementation of BAT/BEP reduction of UP-POPs releases from open burning sources - Strengthening the regulatory framework". Additionally a study that covers: i) analysis of waste generation - types, morphological composition, seasonal characteristics, ii) consideration of environmental damage done to the environment due to direct disposal of waste at landfills, iii) the rationale for sorting and separate waste collection, iv) economic assessment of separate collection of waste with the purpose of their further processing, v) technical and economic feasibility of establishing a sorting line and its use at landfills of municipal solid wastes, and vi) reasoning for environmental benefits of applying sorting line, was conducted.		
Activity 1.1.4: Conduct workshop and training to discuss the proposed revised legal framework and circulate comments among governmental agencies, enterprises, academia and relevant stakeholders		The workshop on strengthening the regulatory framework was organized on 31 March 2017 in Yerevan. 40 persons participated in the workshop and were from Governmental bodies (ministry of nature protection, ministry of health, ministry of agriculture, ministry of emergency situations, police department, national security service), Academy of science, Universities, NGOs, enterprises.	Completed	**S**
Output 1.2: Adequate management capacity built in implementing BAT/BEP and waste management practices	Number of men / women trained Targeted trainings on BAT/BEP conducted National inventories on type and number of disposal sites updated	28 men and 8 women were trained Trainings done Inventories carried out		Score: 5 **S**

Activities	Objectively verifiable indicators	Progress at project end and comments	Status	Rating
Activity 1.2.1: Carry out targeted training for public officers and relevant stakeholders involved in waste management to introduce BAT/BEP concepts.		The training course on solid waste management application of BAT and BEP for local authorities was organized and conducted on 21-22, July 2016 in Yerevan. 51 persons participated in training course came from ministries, territorial (regional) subdivisions of state environmental inspectorates, municipalities, regional administrations,	Completed	**S**
Activity 1.2.2: Continuously update the National inventory of waste disposal sites and establish the relevant National registry.		Assessment /evaluation of solid waste disposal sites was conducted in 2017 by national experts. The assessment included types and/or assortment of wastes disposed to the landfills / dumpsites, negative impacts of the landfills / dumpsites on human health and the environment, etc. Assessment of dumpsites was conducted in different marzes/regions of the Republic of Armenia: • Syunik Marz (Kapan, Goris, Sisian, Meghri, Qajaran); • Vayots Dzor Marz (Yeghegnadzor, Vayk, Jermuk); • Tavush Marz (Ijevan, Ayrum, Berd, Dilijan, Noyemberyan); • Kotayk Marz (Hrazdan, Abovyan, Eghvard, Byureghavan, Charentsavan); • Aragatsotn Marz (Ashtarak, Talin, Aparan); • Gegharkunik Marz (Gavar, Martuni, Sevan, Vardenis, Chambarak); • Shirak Marz (Azatan, Gymri, Artik, Maralik); • Lori Marz (Vanadzor, Alaverdi, Spitak, Stepanavan, Tashir); • Ararat Marz (Artashat, Ararat, Vedi). Assessment of dumpsites was carried out by EMIC as well: sampling was done and analyses of soil samples for the content of POPs performed in 2016-2018.	Completed	**S**
Output 1.3: Adequate capability strengthened in monitoring activities and in evaluating and reporting data of U-POPs	Number of staff from governmental laboratory institutions provided with the necessary skills to carry out sampling, analysis and reporting of UP-POPs.	EMIC personnel trained to collect and analyze environmental samples for monitoring		Score: 5 **S**

Activities	Objectively verifiable indicators	Progress at project end and comments	Status	Rating
Activity 1.3.1: Strengthen laboratory capacity in sampling and analysis methods of UP-POPs.		The laboratory analysis of soil and air samples collected by EMIC from the selected Ararat landfill and evaluation of their results was conducted by the Research Center for Toxic Compounds in the Environment (RECETOX) of Masaryk University (Brno, Czech Republic). The personnel of the Environmental monitoring and information center under the Ministry of nature protection of the Republic of Armenia was engaged in air and soil sampling at the area of selected Ararat landfill, laboratory testing and evaluation of results. The Head of Division of waste inventory, classification and technology investigation of EMIC participated in training at RECETOX, Masaryk University (Brno, Czech Republic).	Completed	**S**
Activity 1.3.2: Update and evaluate the National inventory of UPOPs releases		Inventory of UP-POPs emissions from different sources was done, including: • UP-POPs emissions from dumpsites of different marzes of Armenia; • UP-POPs emissions from agricultural residues/ biomass burning and forest fires; • UP-POPs emissions from the industrial sources: - Ferrous and non-ferrous metal production, inc;uding primary and secondary copper, aluminum, iron, ferromolybdenum; - Heat and power generation; - Production of mineral products, including, cement, lime, bricks, glass, ceramics, asphalt; Production and use of chemicals and consumer products: pulp and paper, leather, tobacco smoking.	Completed	**S**
Outcome 2: Annex C POPs releases into the environment are reduced from open burning activities				
Output 2.1: Cost and benefits of available BAT/BEP measures for reducing Annex C POPs releases from open burning analyzed	UP-POPs precursors analysis carried out Risk assessment study conducted	Analyses carried out Study done		Score: 5 **S**
Activity 2.1.1: Carry out preliminary evaluation of releases and impact		Ararat town landfill was assessed; two campaigns of air and soil sampling, as well as analyses for dioxins and	Completed	**S**

Activities	Objectively verifiable indicators	Progress at project end and comments	Status	Rating
indicators and conduct risk assessment study for the current practices of open burning in the demonstration site incorporating gender and health issues.		furans were performed before renovation works. Appropriate environmental samples were taken and analyses for PCDD/PCDFs performed at RECETOX		
Activity 2.1.2: Carry out financial and technological study on the potential reduction of UPOPs after BAT/BEP implementation on the demonstration site		A study conducted by the national expert included the following: • Analysis of waste generation - types, morphological composition, seasonal characteristics, • Consideration of environmental damage done to the environment due to direct disposal of waste at landfills, • The rationale for sorting and separate waste collection, • Economic assessment of separate collection of waste with the purpose of their further processing, • Technical and economic feasibility of establishing a sorting line and its use at landfills of municipal solid wastes • Reasoning for environmental benefits of applying sorting line	Completed	**S**
Output 2.2: Demonstration activities carried out in a selected site promoting waste reduction, re-use, recycle and BAT/BEP implementation	BAT/BEP interventions carried out Amount of incremental investment from dumpsite operators/local authorities	BAT/BEP successfully transferred to renovated dumpsite at Ararat municipality for sound management wastes Ararat municipality provided significant co-financing (about US$400,000)		Score: 4.7 **S**
Activity 2.2.1: Dedicated training for staff involved in waste disposal management in the selected demonstration site		On-site training for staff engaged in waste management on 10 – 11 October 2018 at Ararat pilot site (renovated dumpsite). The following topics were covered by the international expert: : • Guidelines and BAT/BEP measures for environmentally sound management of wastes at open waste dumpsites and to reduce unintentional POPs releases due to open burning, • Material recovery facilities (MRF): Main concepts, • Material recovery facilities MRF): Storage and final disposal of residues, • Basic measures to manually sort types of recyclables in a material recovery facility.	Completed	**S**

Activities	Objectively verifiable indicators	Progress at project end and comments	Status	Rating
		National Experts made presentations as well: ➢ Head, Division of Environmental Hygiene, National Center for Disease Control and Prevention SNCO, Ministry of Health of the Republic of Armenia presented legislative basis, especially the Order of the Minister of Health of the Republic of Armenia "On sanitary protection of settlements at household waste collection, storage, transportation, treatment, recycling, recovery, decontamination and burial", ➢ Chief Specialist, Department of Hygienic and Anti-epidemic Supervision, Healthcare and Labor Inspection Body of the Republic of Armenia made a presentation "Control Functions of the Health and Labor Inspection Body of the Republic of Armenia on Collection, Storage, Transportation, Treatment, Processing, Recovery, Decontamination and Burying of Consumption Wastes in Settlements". She also provided additional information on the rules for installation/ placement of garbage containers.		
Activity 2.2.2: Introduce sustainable measures for an effective rehabilitation of the selected site to reduce U-POPs and other contaminants releases		• Geological assessment was done before renovation works at Ararat urban site. • The renovated Landfill underwent Environmental Impacts Assessment and there were public hearings. The following measures were implemented for selected Ararat landfill: • The site has been fenced around and a gate is constructed at the entrance. • About three hectares of land has been levelled off. All the earthworks have been completed. • The waste that was formally placed on the demonstration site has been removed. A concrete cell was designed. A large pit with concrete side-walls and concrete bottom to store the remaining waste after segregation was constructed. • The concrete cell for storing the residual waste from the sorting is built. • The construction works for hosting the BAT technology finished.	Completed	**S**

Activities	Objectively verifiable indicators	Progress at project end and comments	Status	Rating
		• The conveyor belt for waste pickers has been installed. • Municipality of Ararat Town has provided a new power line to the facility (3-phase 380 Volts including a transformer) and reconstructed the main road as part of their national in-kind contribution. • The municipality has also provided a new water and drainage system to the MRF. • Construction works are completed. • Engineering expertise, as well as technical control and supervision of works were done. • The compactor/ tractor purchased • All documents were prepared and approved so that the Landfill was transferred to the property of Ararat Municipality. Currently all document are ready for obtaining the "License for Recycling, Treatment, Storage, Transportation, and Placement of Hazardous Wastes"		
Activity 2.2.3: Facilitate the set up cooperation programs with local stakeholders for the promotion of recycling activities, to boost the waste management local business through incentive mechanisms		At the MRF activity will begin when wastes will be generated. Contracts will be concluded with recycling companies upon wastes generation. Cooperation program will be submitted by Ararat Municipality.	Incomplete On-going	**MS**
OUTCOME 3: Project activities are sustainable and replicated				
Output 3.1: Awareness raising campaigns implemented	Number of targeted awareness raising and dissemination workshop held Number of awareness raising materials developed in English and in local language incorporating gender dimensions	7 awareness raising events organized Numerous awareness raising material developed in English and local language and distributed during events		Score: 5 **S**

Activities	Objectively verifiable indicators	Progress at project end and comments	Status	Rating
Activity 3.1:1: Carry out targeted awareness raising campaigns on environmental and health hazard of U-POPs for relevant stakeholders, including vulnerable groups such as women and children		The NGO AWHHE in cooperation with EMIC organized seminars on raising awareness of population on POPs and household waste in the cities of Hrazdan (Kotayk Province), Dilijan (Tavush Province), Stepanavan (Lori Province), and Gavar (Gegharkunik Province) During the seminars, 95 participants were provided with the following information materials created by AWHHE: • "Beware of Obsolete and Banned Pesticides", • "Safe Handling of Pesticides", • "First Aid for Poisoning", • "Pesticides Pollution Pathways", • "Do not Burn Your Trash!", • "Wise Approach to the Problem of Household Waste Management"	Completed	**S**
Activity 3.1.2: Hold awareness workshops to share information on experiences on good practices, promote new technologies and economic feasibility of technological approaches among relevant		"Prevention of Wastes Open Burning" training workshop was arranged and held on August 1, 2017 to share information on experiences of good practices with representatives from: Ministry of nature protection, Ministry of health, Ministry of emergency situations, Ministry of agriculture, Environmental monitoring and Information center, Center for ecological-noosphere studies, National academy of science, NGOs. The presentations on: i) Basic Guidance for Environmentally Sound Management of Wastes in Open Waste Dumpsites, ii) The Stockholm Convention and Annex C provisions, iii) Options of Interventions on Waste Open Dumps and Landfills, iv) BAT/BEP for Agricultural Residues Use and Disposal, v) Municipal Waste Pre-Treatment for Landfill Disposal MBT Plants, vi) MRF Concepts and Interventions in Ararat, vii) Unintentionally Produced Persistent Organic Pollutants (POPs) Caused by Open Burning.	Completed	**S**

Activities	Objectively verifiable indicators	Progress at project end and comments	Status	Rating
		In order to raise public awareness on POPs, in particular on the unfavourable emissions of dioxins/furans at open burning of wastes at illegal dumping, their adverse effects and currently available BAT/BEP to avoid the subsequent negative impacts a series of public Lectures were arranged at Aarhus Centers of the Republic of Armenia: i) Public Lecture at the Aarhus Center of Ararat Town (Ararat Province) was arranged on August 2, 2017, ii) Public Lecture at the Aarhus Center of Aparan Town (Aragatsotn Province of Armenia) was arranged on November 3, 2017. Representatives of local self-government bodies, community leaders, Aragatsotn territorial division of the Ministry of Nature Protection and Environmental Inspectorate, as well as specialists from interested departments took part in the event.		
Activity 3.1.3: Develop awareness raising dissemination material and set up a website for information dissemination ensuring that gender dimension is observed		On the web-site of Environmental monitoring and information center under the Ministry of nature protection a new window was "opened" for international cooperation, where information about the implemented project and ongoing activities is placed.	Completed	**S**
Output 3.2: U-POPs from open burning and chemical safety of waste management related matters incorporated into educational curricula	Number of universities involved in setting up dedicated courses Number of teaching modules developed.	Four Universities proposed courses that included POPs Educational material materials and modules that covered POPs monitoring and management were developed		Score: 5 **S**
Activity 3.2.1: Design education programs for disseminating knowledge on U-POPs issues ensuring that gender dimension is observed.		The following educational materials were prepared: • "Persistent Organic Pollutants: Fate in the Environment" (in Armenian and Russian); • "Dioxins as century challenge" (in Armenian and Russian); • Harmful Impacts of POPs to the Environment and Human Health (in English).	Completed	**S**
Activity 3.2.2: Develop education curricula at university level focused on BAT/BEP, waste management and UP-POPs monitoring		Leading universities of Armenia included topics on POPs and related issues in their curricula, in particular: • **Armenian National Agrarian University**	Completed	**S**

Activities	Objectively verifiable indicators	Progress at project end and comments	Status	Rating
		Due to appropriate lectures students got information on POPs, management of chemicals, hazardous wastes, etc. • **Vanadzor State University** The Center of Biological-Ecological Studies carry out complex-type biological and ecological studies, ecological monitoring, including that of POPs. Vulnerable groups were identified for awareness-raising on harmful impacts of chemicals, including POPs. • **State Polytechnic University of Armenia** The curricula includes: "Toxicology Basics", "Theoretical backgrounds of environmental protection", "Technologies for environmental protection against emissions", "Safety Basics in Technological Activity, including POPs". • **Yerevan State Medical University** The Post-Graduate Course "Health and Environment" of the Yerevan State Medical University includes a number of issues related to POPs, as well topics on organochlorine pesticides, as well as hazards of other compounds, challenges of chemical safety, harmful impacts of POPs towards human health and the environment		

*Rating: HS: Highly Satisfactory; S: Satisfactory; MS: Moderately Satisfactory; MU: Moderately Unsatisfactory; U: Unsatisfactory; HU: Highly Unsatisfactory

Annex 7: List of publications

1. Waste dumps as a source of dioxins and furans. DIOXIN 2017 – 37th International Symposium on Halogenated Persistent Organic Pollutants (POPs). Vancouver, Canada, August 20-25, 2017. Abstract ID 099795.
2. Burial of obsolete persistent organic pollutants. DIOXIN 2017 – 37th International Symposium on Halogenated Persistent Organic Pollutants (POPs) Vancouver, Canada, August 20-25, 2017Abstract ID #009796.
3. Approaches to chemicals risk assessment with regards to human health and the environment. EMCEI – 1st Euro-Mediterranean Conference for Environmental Integration. Sousse, Tunisia, November 22-25, 2017. Abstract ID #152.
4. Risk assessment at exposure to persistent organic pollutants: human health and the environment. EMCEI – 1st Euro-Mediterranean Conference for Environmental Integration. Sousse, Tunisia, November 22-25, 2017. Abstract ID #154.
5. Chemical Risk Assessment Approaches Regarding Human Health and the Environment. In: A. Kallel et al. (eds.), Recent Advances in Environmental Science from the Euro-Mediterranean and Surrounding Regions, Proceedings of Euro- Mediterranean Conference for Environmental Integration (EMCEI-1), Tunisia 2017. Volume I and Volume 2. Part XI Environmental Health Sciences (Natural and Social Impacts on Human Health). P. 2011-2013. © Springer International Publishing AG 2018. (Advances in Science, Technology & Innovation, https:// doi.org/10.1007/978-3- 319-70548-4_585)
6. Risk assessment at exposure to persistent organic pollutants: human health and the environment. In: A. Kallel et al. (eds.), Recent Advances in Environmental Science from the Euro-Mediterranean and Surrounding Regions, Proceedings of Euro-Mediterranean Conference for Environmental Integration (EMCEI-1), Tunisia 2017. Volume I and Volume 2. Part XI Environmental Health Sciences (Natural and Social Impacts on Human Health). P. 2015-2017. © Springer International Publishing AG 2018. (Advances in Science, Technology & Innovation, https:// doi.org/10.1007/978-3-319-70548-4_585)
7. Studies on Dioxin-Like PCBs and Risk Assessment at Waste Burning. 3rd International Conference on Integrated Environmental Management for Sustainable Development (ICEM). Sousse, Tunisia. May 2-5, 2018 (ID 162).
8. Determination of dioxin-like polychlorinated biphenyls in land near the dumps of some settlements of the Republic of Armenia. SETAC Europe 28th Annual Meeting (13–17 May 2018, Rome, Italy). (ID 42458)
9. Determination of persistent organic pollutants (POPs) in soil from sites adjacent to landfills: different provinces of the Republic of Armenia. SETAC Europe 28th Annual Meeting (13–17 May 2018, Rome, Italy) (ID 42466)
10. Waste management. ASIA FORUM 2018 "Saving Lives Sustainably: Sustainable production in the Health Sector". Manila, Philippines. June 13th -15th, 2018.
11. Dioxins/Furans Emissions from different Source Categories: Biomass Burning and Forest Fires. DIOXIN 2018, Kraków Abstracts Book: 38th International Symposium on halogenated Persistent Organic Pollutants & 10th International PCB Workshop, 26 – 31 August 2018, Kraków, Poland. Gdańsk University Press, Gdańsk, 2018. ISBN 978-83-7865-713-2. P. 29.
12. Results of Analyses for PCDDs/PCDFs Emissions at Open Burning. DIOXIN 2018, Kraków Abstracts Book: 38th International Symposium on halogenated Persistent Organic Pollutants & 10th International PCB Workshop, 26 – 31 August 2018, Kraków, Poland. Gdańsk University Press, Gdańsk, 2018. ISBN 978-83-7865-713-2. P. 30.

13. Implementation of BAT and BEP to Reduce Dioxins and Furans Emissions for Environmental Protection. 8TH International Conference on Environmental Pollution and Remediation (ICEPR'18). Madrid, Spain, August 19-21, 2018 (ID: 178). ICEPR 178-1-178-2. DOI: 10.11159/icepr18.178
14. Mining Waste Management Issues in Armenia. SETAC Europe 24th LCA Symposium, (in cooperation with BOKU University of Natural Resources and Life Sciences). Vienna, Austria, 24–26 September 2018. ID 47 691.
15. Calculation of dioxins and furans emissions and their analyses in samples of air and soil: Ararat marz (Armenia). 11th SETAC Asia-Pacific Meeting (SETAC Daegu, Korea) 16–19 September 2018. Abstract E-T01-t04-0102.
16. Dioxins and Furans Emissions: Characteristics and Strength. 16th Annual Meeting on Environmental Toxicology and Biological Systems, London, UK". Global ENVITOX 2018. October 04-05, 2018.
17. Pollution by Polychlorinated Biphenyls from the Energy Sector of Armenia". Water Energy NEXUS 2018 Conference. Salerno, Italy. November 15-17, 2018.ID is: 058bd3e1
18. Dioxins and Furans: Unintentional Emissions of Toxic Substances at Open Waste Burning. World Congress and Expo on Toxicology and Pharmacology. November 15-17, 2018. Rome, Italy.