SELF-EVALUATION REPORT

Title of the intervention: UNIDO-GEF project "Making polychlorinated biphenyls management and elimination sustainable in Morocco."

Project ID: 170117

Evaluation Period from August 2023 through December 2025

Abstract

This self-evaluation assesses the UNIDO-GEF project "Making polychlorinated biphenyls management and elimination sustainable in Morocco" (UNIDO ID: 170117) during the post-Independent Terminal Evaluation period from August 2023 through December 2025.

Implemented by the Ministry of Energy Transition and Sustainable Development (MTEDD) with total funding of USD 7.5 million (USD 1.8 million GEF, USD 250,000 UNIDO in-kind, USD 5.450 million co-financing), the project addressed Morocco's binding Stockholm Convention obligations to eliminate PCB-contaminated equipment by 2025 and wastes by 2028.

The intervention encompassed three technical components: strengthening the regulatory framework for chemicals management with focus on PCBs and compliance incentives; promoting safe PCB management practices among small-scale private sector owners; and PCB elimination through Africa's first PCB decontamination platform.

Employing a participatory theory of change approach with desk review, stakeholder consultations, and site observations, the evaluation examined relevance, coherence, effectiveness, efficiency, sustainability, and progress to impact following OECD-DAC and UNEG standards. Key findings reveal that despite design misalignment between ambitious targets (over 1,000 tons on the basis of applied prices before Covid pandemic) and available budget, the project achieved strategic accomplishments including approximately 206 tons of decontamination, publication of two ministerial decrees, upgrade of national laboratory capacity (LNESP) with specialized PCB analysis equipment, and successful testing of kiln incineration as cost-effective national disposal solution.

However, effectiveness was constrained by failure to secure anticipated SME co-financing, particularly replacement oils that never materialized, limiting project reach and leaving approximately 3,000 ‘moderately contaminated” transformers in small detentors, SMEs, and public institutions unaddressed. Though, these

transformers could be treated at the MME platform level. While the MME decontamination platform remains operational with ISO certifications (9001, 14001, 45001), its financial sustainability remains uncertain absent authorization for cement kiln co-incineration and formal government support mechanisms. The incomplete regulatory framework limits enforcement mechanisms and enables continued operation of contaminated transformers beyond international deadlines. The undifferentiated beneficiary approach that allowed contractors to focus on larger, easier-to-serve entities rather than smaller beneficiaries requiring intensive support, and most significantly, the absence of a planned exit strategy represents challenge for the durability of all achievements.

Overall project performance is rated Satisfactory given resource constraints, with Relevance rated Highly Satisfactory, while Sustainability receives Moderately Satisfactory reflecting unresolved financial mechanisms despite strong technical capacity.

The evaluation concludes that ultimate impact realization depends on government decisions regarding Phase 3 continuation, establishment of sustainable financing mechanisms for remaining transformers, completion of regulatory frameworks, formalization of cement kiln authorization, and development of fee-for-service models for laboratory analytical services.

Primary recommendations emphasize securing formal government commitment for MME platform support through sustainable business models incorporating metal recovery revenue and regional services, creating differentiated support strategies with cost-sharing for SMEs and subsidies for public institutions, developing LNESP business plans to optimize equipment utilization, and incorporating lessons learned including built-in exit strategies, differentiated beneficiary approaches, and enforceable cash co-financing mechanisms into future project designs addressing Morocco's remaining PCB elimination obligations and broader chemicals management challenges.

Table of Contents

Abstract 2
Table of Contents 4
Acknowledgements 6
Abbreviations and acronyms 7
Glossary of Evaluation Related Terms 9
Executive summary **12**
Evaluation purpose and methodology 12
Key findings 14
Conclusions and recommendations 16
Project ratings 18
Tabular overview of key findings – conclusions – recommendations 19
1 Project Background and Context 21
1.1 Project Factsheet 21
1.2 Evaluation Purpose 22
1.3 Evaluation Objectives and Scope 23
2 Theory of Change 25
2.1 Output Level 25
2.2 Outcome and Impact Level 27
3 Evaluation Methodology 28
3.1 Methodological Framework 28
3.2 Evaluation Questions 31
3.3 Limitations 32
4 Findings 34
4.1 Project Design 34
4.2 Relevance 37
4.3 Coherence 39
4.4 Effectiveness 40
4.5 Efficiency 43
4.6 Sustainability 46
4.7 Progress to Impact 50
4.8 Gender Mainstreaming 53

4.9 Environmental Impacts 54
4.10 Human Rights and Social Impact 56
4.11 Performance of Partners 57
4.11.1 UNIDO Performance 57
4.11.2 Project Management Unit (PMU) 57
4.11.3 Ministry of Energy Transition and Sustainable Development 58
4.11.4 National Counterparts and Other Ministries 58
4.11.5 Beneficiary Performance 59
4.12 Results-based Management 60
4.13 Theory of Change Analysis 62
4.13.1 Output 1 - Regulatory Framework 62
4.13.2 Output 2 - Safe Management Practices 62
4.13.3 Output 3 - Platform 62
4.13.4 Outcome Level 62
4.13.5 Impact Pathway 62
4.14 Monitoring & Reporting 63
4.14.1 Monitoring and Evaluation Framework 63
4.14.2 M&E System Implementation and Operations 63
4.14.3 M&E System Strengths 64
4.14.4 Monitoring Limitations and Gaps 64
4.15 Project Ratings 65
5 Conclusions and Recommendations 66
5.1 Conclusions 66
5.2 Recommendations and Management Response 67
5.3 Lessons Learned 68

Acknowledgements

The evaluation consultant would like to acknowledge and thank all individuals who volunteered their time and knowledge to contribute to this self-evaluation. Their perspectives and inputs were essential for the successful implementation of this assessment, and it would not have been possible to undertake this evaluation without their contribution.

The evaluation consultant would like to particularly thank the United Nations Industrial Development Organization for facilitating access to project documents and enabling interviews and meetings with project stakeholders. Special appreciation is extended to the project management team, particularly Mr. Vladimir Anastasov and the Project Management Unit led by Mr. Jamal Aboud, for their openness and collaboration throughout the evaluation process.

Abbreviations and acronyms

- **ADR** : Agreement concerning the International Carriage of Dangerous Goods by Road
- **BAT/BEP** - Best Available Techniques/Best Environmental Practices
- **COP** - Conference of the Parties
- **COVID-19** : Coronavirus Disease 2019
- **DSD** : Direction du Développement Durable (Directorate of Sustainable Development)
- **EBRD** : European Bank for Reconstruction and Development
- **ESM** : Environmentally Sound Management
- **EU** : European Union
- **FAO** : Food and Agriculture Organization
- **FEM** : Fonds pour l'Environnement Mondial (Global Environment Facility)
- **GEF** : Global Environment Facility
- **ISID** : Inclusive and Sustainable Industrial Development
- **ISO** : International Organization for Standardization
- **ITE** : Independent Terminal Evaluation
- **kg** : Kilogram
- **LNESP** : Laboratoire National des Etudes et de Surveillance de la Pollution (National Laboratory for Studies and Pollution Monitoring)
- **M&E** : Monitoring and Evaluation
- **MENA** : Middle East and North Africa
- **MME** : Maroc Maintenance Environnement
- **MSP** : Medium-Size Project
- **NIP** : National Implementation Plan
- **ONCF** : Office National des Chemins de Fer (National Railway Office)
- **ONDA** : Office National Des Aéroports (National Airports Office)
- **ONEE** : Office National de l'Electricité et de l'Eau potable (National Office of Electricity and Drinking Water)
- **ONSA** : Office National de Sécurité Sanitaire des produits Alimentaires (National Office of Food Safety)
- **ONUDI** : Organisation des Nations Unies pour le Développement Industriel (United Nations Industrial Development Organization)
- **PCB** : Polychlorinated Biphenyls
- **PIR** : Project Implementation Report

- **PMU** : Project Management Unit
- **POPs** : Persistent Organic Pollutants
- **PPE** : Personal Protective Equipment
- **PPM** : Parts Per Million
- **PRF** : Project Results Framework
- **PSC** : Project Steering Committee
- **PV** : Procès-Verbal (Official Report/Minutes)
- **RBM** : Results-based Management
- **SMART** : Specific, Measurable, Achievable, Relevant, Time-bound
- **SMEs** : Small and Medium Enterprises
- **UNDP** : United Nations Development Programme
- **UNEP** : United Nations Environment Programme
- **UNIDO** : United Nations Industrial Development Organization

Glossary of Evaluation Related Terms

- **Baseline**: The situation prior to a project intervention, against which progress can be assessed or comparisons made. It provides a reference point for measuring change.
- **Beneficiaries**: Individuals, groups, or organizations that directly or indirectly benefit from the project intervention, whether targeted or not.
- **Co-financing**: Resources (financial or in-kind) provided by partners, stakeholders, or the recipient government that complement GEF/UNIDO project funding to achieve project objectives.
- **Coherence**: The extent to which the project is compatible with other interventions in a country, sector, or institution. It examines both internal coherence (synergy between project components) and external coherence (consistency with other interventions).
- **Effectiveness**: The extent to which the project achieved, or is expected to achieve, its objectives and planned results, including any differential results across groups.
- **Efficiency**: The extent to which the project delivered results in an economic and timely manner, examining the relationship between inputs (funds, time, expertise) and outputs/outcomes.
- **Gender Mainstreaming**: The process of assessing the implications for women and men of any planned action, including legislation, policies, or programs, ensuring gender perspectives are incorporated into all stages of project design, implementation, and evaluation.
- **Impact**: The higher-level effects of the project, including long-term and indirect consequences (positive and negative, intended and unintended) on environmental, social, economic, and institutional dimensions.

- **Indicators**: Quantitative or qualitative measures used to demonstrate changes or progress toward achieving outputs, outcomes, and impacts. SMART indicators are Specific, Measurable, Achievable, Relevant, and Time-bound.
- **Lessons Learned**: Generalizations based on evaluation experiences and findings that are applicable to broader circumstances, providing insights for future project design and implementation.
- **Logical Framework (Logframe)**: A management tool that presents the project's intervention logic through a matrix showing the hierarchical relationships between inputs, activities, outputs, outcomes, and impacts.
- **Medium-Size Project (MSP)**: A GEF project category with a funding threshold typically between $1-2 million, requiring streamlined approval processes compared to full-size projects.
- **Monitoring**: The continuous and systematic collection, analysis, and use of information to track progress against planned objectives and guide management decisions during project implementation.
- **Outcomes**: The intended or achieved medium-term effects of project outputs, representing changes in institutional performance, capacity, or behavior that contribute to achieving impacts.
- **Outputs**: The tangible products, goods, and services that result directly from project activities and are largely within the control of project management.
- **Project Design**: The conceptual framework and operational plan that defines the project's objectives, strategies, activities, resource requirements, implementation arrangements, and expected results.
- **Project Results Framework (PRF)**: A logical presentation of the causal relationships between project inputs, activities, outputs, outcomes, and impacts, including indicators and targets for measuring progress.

- **Relevance**: The extent to which the project's objectives and design are appropriate to stakeholders' needs, country priorities, global environmental challenges, and partner policies.
- **Results-based Management (RBM)**: A management approach that focuses on achieving defined results through planning, monitoring, evaluation, and reporting based on expected outcomes and impacts rather than activities alone.
- **Risk**: The probability of undesirable outcomes or events that may affect project implementation or achievement of objectives, requiring mitigation strategies.
- **Stakeholders**: groups, organizations, or institutions that have an interest in or are affected by the project, including implementing agencies, beneficiaries, government entities, private sector, and civil society.
- **Sustainability**: The probability that project benefits and results will continue after external funding ends, encompassing financial, institutional, social-political, and environmental dimensions.
- **Terminal Evaluation**: An independent assessment conducted at or near the end of project implementation to evaluate achievement of results, draw lessons learned, and provide recommendations for future interventions.
- **Theory of Change**: An explicit articulation of how and why project interventions are expected to lead to desired outcomes and impacts, including assumptions about causal relationships and contextual factors.
- **Triangulation**: The use of multiple data sources, methods, or perspectives to cross-verify findings and enhance the credibility and validity of evaluation conclusions.

Executive summary

Evaluation purpose and methodology

The UNIDO-GEF project "Making polychlorinated biphenyls management and elimination sustainable in Morocco" (UNIDO ID: 170117) is implemented by the Ministry of Energy Transition and Sustainable Development (MTEDD) with total funding of USD 7.5 million, comprising USD 1.8 million in GEF donor funding, USD 250,000 UNIDO in-kind contribution, and USD 5.5 million in co-financing. This self-evaluation covers the implementation period from August 2023 through December 2025, following the Independent Terminal Evaluation conducted in August 2023. The evaluation serves two primary objectives: (1) to assess project performance during the post-ITE period across all key evaluation criteria, and (2) to generate actionable findings, lessons learned, and recommendations.

The evaluation covers three technical components: strengthening the regulatory framework for chemicals management with focus on PCBs and compliance incentive measures; promoting safe PCB management practices among small-scale private sector owners; and PCB elimination through Africa's first PCB decontamination platform.

The evaluation employs a participatory, theory of change approach using multiple data collection methods including desk review of project documentation, semi-structured stakeholder consultations. The assessment follows OECD-DAC and UNEG standards, examining six evaluation criteria while addressing key questions about drivers and barriers, project performance, achieved results, sustainability prospects, and lessons learned.

Key evaluation limitations included: temporal constraints affecting long-term sustainability assessment; stakeholder availability due to operational schedules and geographic dispersion; incomplete documentation of co-financing contributions;

attribution challenges in isolating project-specific impacts; and resource limitations restricting geographic field visit coverage and verification of the platform's regional reach.

Key findings

- The project suffered from misalignment between targets (over 1,000 tons of PCB waste) and available budget, with actual decontamination costs exceeding initial estimates ($1,500/ton), making targets unachievable from the outset.
- The co-financing structure did not work as anticipated contributions, particularly from SMEs for replacement oils, never materialized, limiting project reach and effectiveness.
- The project remained highly relevant to Morocco's binding international obligations and national environmental priorities.
- Despite ambitious targets, the project achieved approximately 206 tons of decontamination, established operational capacity, published two regulatory decrees, upgraded laboratory facilities, and successfully tested kiln incineration technology as a cost-effective national solution.
- The project did not engage approximately 3,000 moderately contaminated transformers held by small operators, SMEs, and public institutions, with the decontamination contractor focusing on larger entities with highly contaminated equipment requiring immediate disposal. These remaining transformers, while not addressed during the project period, can be treated at the strengthened MME platform level, which now has the necessary retrofilling and in-situ decontamination capacity.
- While two ministerial decrees were published, the chemicals management law remains pending since 2017, and frameworks for in-service equipment, waste declassification, and cement kiln authorization remain incomplete, limiting enforcement mechanisms.
- The project exceeded gender targets, achieving 43% female participation and 55% in regional workshops, compared to the 30% minimum target.
- The project generated positive environmental impacts through elimination of approximately 206 tons of PCB materials, adoption of environmentally sound management practices, worker safety improvements through PPE

provision, and prevention of secondary contamination through proper handling procedures.

- UNIDO and the MTEDD demonstrated adequate partnership with strong engagement.
- While operational monitoring functioned adequately with systematic tracking, the results framework set ambitious targets without enforceable co-financing mechanisms, lacked differentiation by beneficiary type.
- Ultimate impact realization depends on government decisions regarding Phase 3 continuation, establishment of financial mechanisms, completion of regulatory frameworks, and development of an exit strategy, the absence of which represents a critical shortage acknowledged by stakeholders.

Conclusions and recommendations

The project established technical infrastructure and tested cost-effective national disposal solutions within severe resource constraints. However, misalignment between ambitious targets (1,000 tons) and available budget ($1.8M), plus failure to secure SME co-financing created unrealistic expectations and constrained effectiveness from inception.

National laboratory capacity (LNESP) was upgraded, and the MME decontamination platform remains operational with ISO certifications. Kiln incineration was tested as cost-effective. However, equipment underutilization and absent business models limit return on investment.

The undifferentiated beneficiary approach allowed the contractor to serve larger entities, leaving 3,000 moderately contaminated transformers in SMEs and public institutions unaddressed. These stakeholders lack financial capacity but face identical risks. Failure to engage the Ministry of Interior represents a significant gap.

The project's fundamental difficulty is lack of a planned exit strategy, threatening the durability of all achievements despite existing technical capacity and demonstrated political commitment.

<u>Recommendation</u>

- Secure formal government commitment for MME platform support or develop sustainable business model (metal recovery revenue, regional services, utility contracts)
- Formalize cement kiln co-incineration authorization.
- Develop fee-for-service model for analytical services for the LNESP.
- Create differentiated support: cost-sharing for SMEs, subsidies for public institutions and explore green financing or national budget integration.

- Focus on remaining transformers in SMEs/public institutions and use realistic cost parameters with enforceable cash co-financing.
- Incorporate lessons: differentiated strategies, SME-focused contractor incentives, built-in exit strategy.
- Encourage formal MTEDD-MME platform contracts and engage Ministry of Interior for public institution equipment.
- Create separate pathways for large utilities (self-financing) vs. SMEs/public institutions (support required)
- Position platform as regional center of excellence (contingent on legal authorization)
- Empower environmental inspectorate with enforcement authority.

Project ratings

Evaluation Criterion	Rating	Key Justification
Relevance	Highly Satisfactory	Directly addresses Morocco's Stockholm Convention obligations with appropriate institutional positioning; SME relevance weaker
Coherence	Highly Satisfactory	Built logically on Phase 1 achievements; demonstrated strategic continuity and resource optimization; aligned with international best practices and complementary national/international initiatives
Effectiveness	Satisfactory	Strategic outputs achieved (laboratory upgrade, kiln testing, legislation) creating foundations for continued progress
Efficiency	Moderately Satisfactory	Cost parameters align with international benchmarks; limited by co-financing failure and undifferentiated beneficiary approach
Sustainability	Moderately Satisfactory	Strong institutional capacity established; financial sustainability mechanisms unresolved with significant work remaining to meet Stockholm Convention deadline
Progress to Impact	Moderately Satisfactory	Clear pathway to impact demonstrated; ultimate realization depends on actions beyond project control

Tabular overview of key findings – conclusions – recommendations

KEY FINDINGS	CONCLUSIONS	RECOMMENDATIONS
DESIGN and TARGETS		
Project targeted more than 1,000 tons but achieved 206 tons decontamination Co-financing from SMEs never materialized 3,000 transformers; moderately contaminated, in small detentors/SMEs/public institutions not engaged	budget inadequate for ambitious elimination targets from inception Co-financing structure lacked enforcement mechanisms Beneficiary approach undifferentiated between large companies and SMEs No exit strategy developed	Align targets with realistic cost parameters and available budget Establish enforceable co-financing mechanisms with cash requirements Differentiate beneficiary strategies (large vs. SME) Build exit strategies into project design from inception
TECHNICAL ACHIEVEMENTS		
LNESP upgraded with specialized PCB analysis equipment MME platform operational with ISO certifications (9001, 14001, 45001) Kiln incineration successfully tested as cost-effective national solution	National technical infrastructure in place Domestic disposal alternative tested Platform demonstrates regional potential Asset utilization requires optimization	Develop business plan for LNESP analytical services to maximize laboratory equipment utilization Formalize platform as regional center of excellence Pursue mobile decontamination unit deployment
EFFECTIVENESS and EFFICIENCY		
Leveraged existing Phase 1 infrastructure effectively Cost-effective: $2.05/kg vs. $3-5/kg internationally	Reasonable effectiveness given severe resource limitations	Set realistic, budget-aligned targets Establish beneficiary-differentiated monitoring

Coordination mechanisms functioned adequately Contractor focused on large, easy-to-serve clients	Strategic outputs achieved (legislation, testing, capacity) Operational efficiency adequate Equity objectives compromised by contractor incentives	Create contractor incentives for SME service delivery Build adaptive management flexibility Track disaggregated data (beneficiary type, gender)

1 Project Background and Context

1.1 Project Factsheet

The main information of the project is structured in the following table.

Project title	Making polychlorinated biphenyls management and elimination sustainable in Morocco
Status	Operationally closed
UNIDO ID	170117
Region	ARB (Arab States)
Country(ies)	Morocco
Project donor(s)	GEF
Project implementation	Period covered by the self-evaluation mandate: August 2023 – December 2025
Implementing agency(ies)	UNIDO
Government coordinating agency	Ministry of Energy Transition and Sustainable Development
Executing Partners	MTEDD
Donor funding (GEF)	1,826,484
UNIDO input (in kind)	250,000
Co-financing at CEO Endorsement	5,450,500
Total project cost (excluding support costs and PPG)	7,526,984
Mid-term review date	NA

Planned terminal evaluation date	December 31, 2025

1.2 Evaluation Purpose

The purpose of this self-evaluation is to independently assess the UNIDO-GEF project "Safe Management and Disposal of PCBs in Morocco" to help UNIDO improve performance and results of ongoing and future programmes and projects. The self-evaluation will cover the project period from the Independent Terminal Evaluation (ITE) conducted in August 2023 through to the project's conclusion in December 2025, systematically following up on the findings and recommendations identified in the ITE.

The evaluation has two specific objectives:

- First, to assess the project's performance over the two-year period following the ITE across all key evaluation criteria: relevance, coherence, effectiveness, efficiency, sustainability, and progress toward impact. This assessment will examine how the project addressed the barriers to environmentally sound management of PCB-contaminated equipment in Morocco, including the strengthening of regulatory frameworks, promotion of safe management practices among small-scale owners, and the optimization of Africa's first PCB decontamination platform.
- Second, to develop a comprehensive series of findings, lessons learned, and actionable recommendations that will enhance the design and implementation of new and ongoing UNIDO projects. These recommendations will complement those already provided in the ITE, capturing additional insights gained during the final implementation phase and contributing to UNIDO's institutional learning on chemicals management, national capacity building, and

stakeholder engagement in the context of implementing the Stockholm Convention on Persistent Organic Pollutants.

1.3 Evaluation Objectives and Scope

This self-evaluation has two primary objectives that guide its analytical framework and assessment approach:

Objective 1: To conduct a comprehensive assessment of the project's performance during the two-year period following the Independent Terminal Evaluation (August 2023 to December 2025), examining all key evaluation criteria. This includes evaluating the project's relevance to Morocco's commitments under the Stockholm Convention on POPs, its coherence with national environmental policies and previous GEF-funded initiatives, its effectiveness in achieving the targeted outcomes of strengthening regulatory frameworks for chemicals management and eliminating PCB-contaminated equipment, its efficiency in utilizing donor and co-financing resources, the sustainability of established mechanisms including the national PCB decontamination platform, and the project's progress toward long-term impact on human health and ecosystem protection.

Objective 2: To generate actionable findings, practical lessons learned, and strategic recommendations that will inform and enhance the design of new projects and strengthen the implementation of ongoing UNIDO programmes in chemicals management and environmental protection. These outputs will complement and build upon the recommendations from the ITE, incorporating insights from the final implementation phase, stakeholder experiences with the decontamination platform, the application of best available techniques (BAT) and best environmental practices (BEP) among small-scale private sector owners, and the effectiveness of compliance incentive measures within Morocco's evolving regulatory framework.

The scope of this self-evaluation encompasses the project's implementation from August 2023, immediately following the ITE which found the project's Impact,

Project Design, and Project Performance to be Moderately Satisfactory, through to its planned completion in December 2025.

The evaluation will cover all three technical components of the project:

- strengthening the regulatory framework for chemicals management with focus on PCBs and compliance incentive measures, executed by the MTEDD;
- promoting the adoption of safe PCB management practices among small-scale owners in the private sector, executed by the national PCB Commission; and
- PCB elimination and promotion of Africa's first PCB decontamination platform as a regional model for knowledge sharing and best practice dissemination.

Geographically, the evaluation will focus on project activities implemented across Morocco, with particular attention to sites where PCB-contaminated equipment has been identified, decontaminated, or eliminated, and facilities where the national decontamination platform operates. The evaluation will assess the involvement of all key stakeholders including MTEDD as the government coordinating agency and executing partner, UNIDO as the implementing agency, small-scale private companies and electricity distributors as owners of PCB-contaminated equipment, and the platform operators responsible for decontamination services.

The evaluation will examine the utilization of GEF donor funding (USD 1,826,484) and co-financing (USD 5,450,500) across all project components, analyzing budget execution patterns and value for money achieved. It will assess the project's contribution to overcoming identified barriers including incomplete legislation, absence of tailored measures for small-scale owners, and inefficient use of the decontamination platform. The evaluation will also consider the project's role in building upon previous initiatives (GEF ID 3082 and 3883) that resulted in the export and elimination of over 1,080 metric tons of PCB-contaminated materials and the establishment of Morocco's pioneering decontamination platform that treated 1,530 tons of contaminated equipment.

2 Theory of Change

The theory of Change of the UNIDO Morocco Project: Safe Management and Elimination of PCBs with focus on the period: August 2023 - December 2025 is described as follows:

2.1 Output Level

The project "Safe Management and Elimination of Polychlorinated Biphenyls (PCBs) in Morocco" aims to "Protect the environment through safe elimination of PCB-containing oil, equipment and wastes combined with strengthening the regulatory framework applicable to PCBs" and covers 4 main outputs:

Output 1: Strengthening the regulatory framework for chemicals management focusing on PCBs and compliance incentive measures

Output 2: Promoting the adoption of PCBs safe management practices

Output 3: PCBs elimination and promotion of Africa's first PCB decontamination platform

Output 4: Effective monitoring and evaluation based on GEF and UNIDO requirements

- **Output 1 : Strengthened Regulatory Framework**

Output 1 focuses on developing an enabling regulatory framework for safe management of chemicals, with a focus on PCBs. It is assumed that if the law on management of chemicals including equipment in-use is finalized (R1-1), and if regulations for PCBs secure management and elimination are improved (R1-2), this will create a coherent legal framework. If, in addition, new incentive mechanisms are developed to facilitate compliance with the legislation (R1-3), these results will enable Morocco to accelerate safe management of PCBs and mitigation of environmental risks with a strengthened regulatory framework (output 1).

Strengthening the regulatory framework would contribute to strategic, regulatory, administrative and technical conditions that would accelerate safe elimination of PCBs (outcome).

- **Output 2 : Safe Management Practices Adopted**

Output 2 aims to promote adoption of safe PCB management practices among companies. If 20,000 PCB-contaminated transformers in participant companies are screened and analyzed (R2-1), this will enable precise identification of equipment requiring treatment. Through the establishment of environmentally sound management practices documented and disseminated among transformer owners as technical guidance (R2-2), companies should have the necessary tools to manage their equipment. If 39 companies participate in trainings on BAT (Best Available Techniques) and BEP (Best Environmental Practices) in ESM (Environmentally Sound Management) of PCBs (R2-3), this will strengthen their operational capacities.

These results should ultimately enable environmentally sound management of PCB-contaminated equipment, waste and oil (output 2), which should contribute to conditions facilitating safe elimination of PCBs (outcome).

- **Output 3 : PCBs Elimination and Operational Platform**

Output 3 focuses on effective elimination of PCBs through the decontamination platform. If 613 tons of PCB-contaminated equipment and 2.4 tons of pure PCB oils are sent abroad for safe elimination (R3-1), and if 1,740 transformers with 541 tons of dielectric oils are locally decontaminated (R3-2), this will significantly reduce the PCB stock in Morocco. If, in addition, a public outreach strategy is implemented to promote Morocco's experiences of the PCB platform (R3-3), this should favor its regional expansion.

Consequently, PCBs, whether in equipment in-use or decommissioned, will be safely eliminated through the decontamination platform (output 3), contributing directly to environmental and human health protection (outcome).

- **Output 4 : Monitoring and Evaluation**

Output 4 ensures effective and efficient project implementation. If project results are regularly monitored and reported through PIRs (Project Implementation Reports) (R4-1), and if an independent terminal evaluation is conducted (R4-2), this will enable identification of lessons learned, adjustment of implementation strategies, and documentation of results for replication (output 4).

2.2 Outcome and Impact Level

The development program objective to which the project will contribute is "The Moroccan population and environment benefit from safe management and elimination of PCBs, protecting human health and ecosystems".

Output 1 (strengthened regulatory framework), Output 2 (adoption of safe practices), Output 3 (PCBs elimination platform) and Output 4 (monitoring and evaluation) all four contribute to the project objective, improving strategic, regulatory, administrative and technical conditions for safe management and elimination of PCBs.

Improved regulations (output 1) should create a positive influence on activities of companies owning contaminated equipment and facilitate law enforcement. Strengthened company capacities (output 2) facilitate implementation of safe practices and demand for decontamination services. Effective PCBs elimination platform (output 3) directly reduces environmental and health risks.

Through these improved conditions, the following impacts should be observed:

- I1: Reduction of 2.4 metric tons of pure PCBs eliminated
- I2: Elimination of 613 tons of PCB-contaminated equipment
- I3: Decontamination of 1,740 transformers (541 tons of oil)
- I4: Reduction of risks to human health and environment
- I5: Creation of 15 direct jobs and 20 indirect jobs

The project contributes to SDG 3 (Good health and well-being), SDG 9 (Industry, innovation and infrastructure), and SDG 12 (Responsible consumption and production). It aligns with Morocco's obligations under the Stockholm Convention on POPs.

Main risks identified at project start:

- Institutional risk (Medium): Delays in finalization and adoption of chemicals legislation
- Market risk (Medium): Low level of private sector engagement, particularly SMEs
- Technical risk (Medium): Limited local expertise for effective implementation of PCB management practices
- Financial risk (Low): Slower than expected mobilization of co-financing

During implementation (2023-2025), additional risks to monitor include:

- Limited absorption capacity of companies for trainings and services
- Coordination difficulties between different institutions
- Exchange rate fluctuations affecting PCB export costs

Potential unintended negative effects with mitigation measures:

- Reinforcement of regional inequalities through geographic selection of companies with selection criteria including socio-economic factors and transparent communication
- Job losses in informal recycling sector with inclusion in the process and training in safe practices

3 Evaluation Methodology

3.1 Methodological Framework

This self-evaluation will be carried out as an independent assessment using a participatory approach whereby key parties associated with the project will be informed and consulted throughout the evaluation process, ensuring transparency, inclusiveness, and stakeholder ownership of findings and recommendations.

The evaluation will employ a theory of change approach as its primary analytical framework to identify causal and transformational pathways from project outputs to outcomes and longer-term impacts. This approach will systematically map the logical connections between project interventions, such as regulatory framework strengthening, capacity building for small-scale PCB equipment owners, and optimization of the decontamination platform, and their intended results in terms of environmentally sound management and elimination of PCBs in Morocco. The theory of change analysis will explicitly identify both drivers that facilitated progress (such as institutional capacity from previous GEF initiatives, existence of the decontamination platform, and stakeholder commitment) and barriers that impeded achievement (including legislative gaps, limited engagement of small-scale private sector owners, and financial constraints for decontamination services).

This learning will provide valuable insights to feed into the design and management of future UNIDO projects, enabling effective results-based management.

Multiple sources and informants will be engaged to enable systematic triangulation of data and information before forming assessments, which is essential to ensure an evidence-based and credible evaluation. The evaluation will pay particular attention to verifying findings through cross-referencing documentary evidence, stakeholder reports, financial data, and field observations to establish validity and reliability of conclusions.

The evaluation will employ four primary data collection methods:

- Desk and Literature Review: A review of project-related documentation will be conducted, including the original project document and CEO endorsement request, monitoring reports such as progress reports from 2023-2025, reports on regulatory framework development and decontamination activities, the Independent Terminal Evaluation report from August 2023, legislative drafts and regulatory framework documents related to chemicals management.

- Stakeholder Consultations: semi-structured interviews will be conducted with stakeholders involved in project implementation and benefiting from project activities.
- On-site observation of the national PCB decontamination platform.

The evaluation will assess project performance against six key evaluation criteria aligned with OECD-DAC and UNEG standards:

- Relevance: The extent to which project objectives remained aligned with Morocco's priorities under the Stockholm Convention, national environmental policy, and beneficiary needs throughout the implementation period.
- Coherence: The compatibility and complementarity of the project with previous GEF initiatives (ID 3082 and 3883), other UNIDO interventions, national chemicals management programmes, and international frameworks for POPs elimination.
- Effectiveness: The degree to which the project achieved its expected outcomes including regulatory framework strengthening, adoption of safe management practices, PCB elimination targets (2.4 metric tons pure PCB and 613 tons contaminated equipment), and promotion of the decontamination platform.
- Efficiency: The extent to which project resources (USD 1,826,484 GEF funding and USD 5,700,000 co-financing) were optimally utilized to deliver outputs and outcomes, examining cost-effectiveness, timeliness of implementation, and value for money achieved.
- Sustainability: The likelihood that project results, including the regulatory framework, capacity of small-scale owners, and viability of the decontamination platform business model, will continue after project completion, considering financial, socio-political, institutional, and environmental risks.

- Progress to Impact: The extent to which the project has contributed or is likely to contribute to long-term impacts on human health protection, ecosystem preservation, and Morocco's compliance with Stockholm Convention obligations for PCB elimination by 2025 in equipment and 2028 in wastes.

3.2 Evaluation Questions

The evaluation will address four overarching questions that guide the inquiry:

- What are the key drivers and barriers to achieve the long-term objectives of environmentally sound PCB management and elimination in Morocco?
- 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?
- How well has the project performed?
- Has the project done the right things in terms of strategic choices and intervention design?
- Has the project done things right, achieving good value for money through efficient implementation and resource management?
- What have been the project's key results at output, outcome, and impact levels?
- To what extent have the expected results been achieved or are likely to be achieved by December 2025?
- To what extent will the achieved results sustain after the completion of the project?
- What lessons can be drawn from successful and unsuccessful practices in designing, implementing, and managing the project?
- What recommendations can enhance future UNIDO project design and implementation in chemicals management and related technical cooperation areas?

3.3 Limitations

This self-evaluation will face limitations that may affect the comprehensiveness and depth of its findings. Temporal limitations arise from the evaluation's focus on the post-ITE period (August 2023 to December 2025), which may constrain the ability to fully assess long-term sustainability and impact of project interventions, particularly regarding the durability of regulatory frameworks, the viability of the decontamination platform's business model beyond project support, and the sustained adoption of safe PCB management practices among small-scale private sector owners. Stakeholder availability may be constrained due to the operational schedules of industry representatives, the dispersed geographic locations of small-scale companies owning PCB-contaminated equipment, and potential staff turnover within MTEDD and the national PCB Commission since the project's inception in 2018, which could limit access to institutional memory and longitudinal perspectives on project implementation challenges and achievements. This is also added to the time constraints for the implementation of the self-evaluation itself.

Data constraints may include incomplete or inconsistent documentation of co-financing contributions, particularly in-kind inputs from MTEDD (USD 538,700) and the former Ministry of Energy and Mines (USD 2,008,500), which could affect the accuracy of efficiency assessments and value-for-money analyses. The evaluation may also face limitations in verifying the precise quantities and locations of PCB-contaminated equipment decontaminated during the evaluation period, particularly among small-scale private owners who may not have maintained comprehensive records or labeling systems as envisioned by the project. Methodological limitations include the reliance on self-reported information from stakeholders regarding the adoption and application of best available techniques and best environmental practices, which may be subject to social desirability bias, and the challenges of attributing observed changes in regulatory frameworks or management practices solely to project interventions given the concurrent influence of Morocco's broader environmental policy evolution and previous GEF initiatives.

Resource and logistical constraints related to field visits may limit the geographic coverage of site observations, potentially restricting direct verification of decontamination activities to accessible locations and thereby affecting the representativeness of findings across all project beneficiaries and implementation sites. The evaluation's capacity to assess the regional dimension of the decontamination platform's promotion and potential for knowledge sharing with neighboring African countries may be limited by the availability of evidence on actual cross-border engagement and interest from regional partners

4 Findings

4.1 Project Design

The PCB Morocco Phase 2 project was designed as a Medium-Size Project with a total budget of $1.8 million, approved by GEF in 2018 following a 2017 proposal. The project was appropriately designed as a government-requested GEF-funded intervention through UNIDO to support Morocco's PCB management ecosystem, directly addressing Morocco's commitments under the Stockholm Convention (ratified 2004) to eliminate PCB-contaminated equipment by 2025 and ensure environmentally sound management of PCB waste by 2028[1]. The design strategically built upon Phase 1 infrastructure, particularly the MME decontamination platform, to continue PCB elimination efforts and address identified gaps in legislation and technical capacity from previous initiatives (Pillars I and II)[2].

The project encompasses four main components: (1) strengthening the regulatory framework for PCB management, (2) promoting good practices through training and awareness, (3) operationalizing the decontamination platform with a budget allocation of $500,000 for decontamination activities, and (4) monitoring and evaluation. The regulatory approach evolved from developing a PCB-specific law to align with the MTEDD's preference for a broader chemicals management law and focused on supporting two ministerial decisions.

The design incorporated laboratory capacity building through strategic equipment procurement, including a gas phase chromatograph, and sample preparation equipment for LNESP, supported by training programs[3]. The project leveraged contractual mechanisms with 10% bonuses to enable MME to acquire necessary equipment, fostering local capacity[4].

[1] Interview data
[2] Interview and project documents
[3] Interview data
[4] Interview data

However, design limitations undermined project effectiveness. The significant misalignment occurred between technical targets and available financial resources. The project originally targeted elimination of over 1,000 tons of PCB waste (including 613 tons of highly contaminated equipment and decontamination of 1,740 transformers with 541 tons of dielectric oils). At standard market rates of approximately $5,000-$10,000 per ton, this would require roughly $5 million for decontamination alone, significantly exceeding the total project budget. The initial budget estimate of $1,500 per ton was far below the actual market rates, which suffered a significant increase due to the pandemic 2019, creating a funding shortfall that made Component 3 targets unachievable from the outset[5].

The co-financing structure was particularly difficult. The project relied heavily on co-financing, especially in-kind contributions from beneficiary companies for replacement oils, without adequate mechanisms to secure these contributions. Component 3 required substantial cash co-financing ($3,219,000), yet only in-kind contributions were pledged from beneficiaries at design. While the project document included SMEs as target beneficiaries, it failed to differentiate between large companies with operational capacity and financial resources, and smaller entities requiring more intensive support and different engagement mechanisms[6]. The design focused primarily on large equipment holders (utilities, major industries) with limited mechanisms to engage smaller detentors including hotels and small industries, representing approximately 3,000 remaining "moderately contaminated" transformers according to inventory data[7].

Additional design challenges included reliance on inaccurate inventory data that failed to identify transformer locations, discontinuous project-based financing rather than continuous operational support, and absence of mechanisms to ensure financial sustainability beyond project completion. The 24-month procurement delays suggest limitation in timeline planning and equipment deployment strategies due to the supply chain disturbances because of the COVID-19 pandemic and the

[5] Project documents
[6] Interview data
[7] Interview data

Russian-Ukrainian War[8]. Furthermore, the design revealed gaps in regulatory frameworks and institutional coordination, particularly the absence of formal contracts between the implementing company and relevant ministries, indicating that project design could have better anticipated governance and institutional sustainability requirements from inception[9]. Furthermore, the design of the project focused more on technical assistance and neglected dialogue facilitation among all the stakeholders of the PCB ecosystem in order to prepare for the end of the project and the continuation of the decontamination and elimination post project.

[8] Interview data
[9] Interview data

4.2 Relevance

The project demonstrates high relevance to Morocco's national environmental priorities and international commitments. As a signatory to the Stockholm Convention on Persistent Organic Pollutants, Morocco has binding obligations to eliminate all PCBs in equipment by 2025 and in wastes by 2028. The project also addresses Morocco's obligations under the Basel and Rotterdam Conventions on hazardous chemicals and persistent organic pollutants, making the intervention critically aligned with national policy imperatives and the country's National Implementation Plan (NIP) on POPs, which identified sound management of PCBs as a top priority requiring immediate attention[10].

At the international level, the project aligned with the GEF-6 Chemicals and Waste Focal Area Strategy, which aims to prevent exposure of humans and ecosystems to harmful chemicals through significant reduction in production, use, and emissions of POPs controlled under the Stockholm Convention. The project was also highly relevant to UNIDO's mandate on Inclusive and Sustainable Industrial Development (ISID), particularly the pillar on "Safeguarding the Environment" through environmentally sound technologies, waste management, and supporting countries to reach compliance with the Stockholm Convention. UNIDO's comparative advantage in implementing GEF chemicals projects across various regions further enhanced the project's relevance[11].

The project's alignment with the MTEDD reflects appropriate institutional positioning, given that most PCB-containing transformers are part of the electrical grid infrastructure under this ministry's purview. The Ministry's active participation throughout implementation and expressed interest in a Phase 3 continuation indicates sustained government ownership. The project also demonstrates strong relevance to Morocco's environmental monitoring needs through support for POPs analysis capacity, pollution inventories, and alignment

[10] Interview data
[11] Project's document

with the Circular Economy Direction's roadmap on waste management and pollution control[12].

The intervention directly addresses a documented environmental challenge, with 37,000 transformers manufactured before 2000 in Morocco. Analysis of 6,000 transformers revealed a contamination rate of approximately 40%, with approximately 12,000 – 15,000 transformers requiring decontamination, demonstrating the scale and urgency of the problem[13]. The project builds on inventories and identification work completed in Phase 1 that confirmed the presence of PCB-contaminated transformers across the country. The focus on high-contamination equipment (pyralène transformers) addresses the most critical risk areas and priority environmental and health issues[14].
The focus on developing national solutions, particularly testing kiln incineration as a cost-effective domestic alternative to expensive international disposal, demonstrates strong relevance to Morocco's context and resource constraints[15]. The project addresses a critical need for managing hazardous chemical substances (PCBs, lead, mercury) in North Africa through the creation of the first regional platform on this topic, serving African countries and filling a significant gap in hazardous waste management capacity across the continent[16].

The project also demonstrates relevance through establishment of appropriate decontamination technology (polyethylene glycol/potash treatment for liquids, thermal autoclave treatment for solids) and ISO 14001/9001/45001 certified operations aligned with Morocco's 2028 Stockholm Convention obligations[17].

The project remained highly relevant to ONEE's needs by maintaining momentum and institutional focus on PCB decontamination, even though ONEE had already

[12] Interview data
[13] Interview data
[14] Interview data
[15] Interview data
[16] Interview data
[17] Interview data

initiated transformer decontamination activities prior to the project and possessed existing expertise in managing hazardous chemicals.[18]

However, the project's relevance to SME needs was less well-articulated in design, as these entities face distinct operational and financial challenges that were not adequately addressed through differentiated strategies[19]. Furthermore, the platform's inability to continue operations post-project and the absence of legal frameworks prohibiting continued operation of PCB-contaminated transformers reduce the project's long-term relevance.

4.3 Coherence

The project showed adequate internal coherence, building logically on Phase 1 achievements while addressing identified gaps. The decision to utilize the existing MME platform established in Phase 1 demonstrated strategic continuity and resource optimization, avoiding duplication of capital investments. The project's components: decontamination operations, legislative strengthening, capacity building, kiln incineration testing, and public awareness, formed a coherent package addressing different dimensions of the PCB challenge.

Moreover, the project's recognition of linkages between different chemical waste streams (PCBs, pesticides, contaminated oils) and their common management challenges reflects systemic thinking[20].

In addition, the project showed good coherence with international best practices in PCB management, drawing lessons from other UNIDO PCB projects globally, including Serbia, Georgia, and Macedonia, though implementation timelines did not

[18] Interview data
[19] Interview data
[20] Interview data

always allow for immediate application of these lessons within the Morocco project itself[21].

The project also demonstrates appropriate coherence through its integration with multiple complementary initiatives at both national and international levels. These include the MED program on high-voltage transformers, FAO's program on expired pesticides in collaboration with ONSA, the European Commission twinning project on chemical substances management and the UNEP POPs monitoring in water, air, and sediments. The coordination between UN programs and the GEF-funded activities, particularly regarding equipment procurement and laboratory capacity building, shows effective inter-agency collaboration.

4.4 Effectiveness

The project established appropriate governance structures through coordination mechanisms at the national level. The steering committee represents a multi-stakeholder governance platform involving key institutional partners including the MTEDD, the Global Environment Facility (FEM), and the United Nations Industrial Development Organization (ONUDI/UNIDO). This governance structure provides essential functions including project monitoring, resource allocation guidance, and technical validation of activities. The formal convening of steering committee meetings demonstrates active project oversight and creates accountability mechanisms. The project also demonstrates institutional coherence through the establishment of a dedicated project management committee and the institutionalization process initiated in 2010 via two COP meetings, along with the creation of a specialized commission.

The project demonstrates appropriate internal logic across multiple dimensions. Activities are adequately structured, combining technical inventory, capacity building, awareness-raising, and interministerial coordination, with clear linkages

[21] Interview data

between identifying contaminated equipment and decontamination actions. The project integrates regulatory compliance (Law 13-05 on dangerous goods transport, Law 28-00 on waste management), technical operations, capacity building (ADR training for drivers from the MME), and legal framework development into a coordinated approach[22]. The sequential implementation strategy linking technical assessments, capacity building, and elimination processes reflects a well-structured methodology consistent with Stockholm Convention requirements for systematic POPs management.

On the other hand, the project achieved reasonable overall effectiveness given budget constraints and implementation challenges. Building on the previous phase achievements (pre-2023)... and against an overly ambitious original target of over 1,000 tons, the project delivered approximately 206 tons of PCB-contaminated equipment and oil decontamination. Stakeholder assessments indicate a "very positive" evaluation, with the establishment of the regional platform and ministerial engagement confirming achievement of expected results. ONEE expressed satisfaction with the project's effectiveness in terms of quality practical guides, local decontamination services through the MME platform, and maintaining stakeholder engagement, though recent activity levels were noted as limited toward project closure[23].

The project achieved adequate regulatory progress through publication of two ministerial decrees strengthening the regulatory framework, integration of regulatory development including draft laws and implementation texts, and adoption of a national PCB elimination plan providing an overarching framework.

The project successfully established operational decontamination capacity with the platform functioning since 2015 and treating equipment with contamination levels below 2,000 PPM within Morocco. Key technical achievements also include:

[22] Interview data
[23] Interview data

- Upgrade of national laboratory capacity with specialized equipment for PCB analysis, including analytical equipment (chromatographs), and transformer profiling equipment and procurement of mobile decontamination units for MME, despite initial procurement challenges requiring a second tender process[24].
- Successful operation of the decontamination platform at Bouskoura with ISO certifications (9001, 14001, 45001) demonstrating adherence to international quality standards.
- Completion of kiln incineration tests demonstrating viable national disposal options with satisfactory emission results
- Successful establishment of the first platform in Morocco for packaging and conditioning contaminated equipment for export.

In addition, the project implemented training and awareness campaigns across multiple stakeholder groups. Successful improvement of capacity was achieved for major equipment holders (ONEE, ONCF, distribution companies)[25].

The project achieved concrete elimination results: elimination of 206 tons of PCB waste against an original target of 250 tons. Decontamination capacity reached below 50 ppm standards[26]. The systematic analysis campaign covered 1,023 transformers analyzed and 6,000 transformers systematically assessed across two inventory phases[27]. The decontamination platform achieved 100% decontamination and 80% export targets, with 1,500 tons/year treatment capability established.

However, effectiveness was significantly constrained by several factors:

- Failure to secure anticipated co-financing, particularly from SMEs that lacked financial capacity to provide replacement oils and operational support for transformer downtime, fundamentally limited project reach.

[24] Interview data
[25] Interview data
[26] Interview data
[27] Interview data

- Failure to achieve the full 250-ton international elimination target due to export notification delays and authorization renewal issues.
- The 2-year delay in equipment utilization significantly compromised effectiveness despite successful equipment delivery[28].
- Delayed start (2019 instead of 2018) and external factors (COVID-19 pandemic, Russia-Ukraine war) prevented full achievement of original objectives despite GEF budget renegotiations.

- Limited success engaging smaller detentors representing approximately 3,000 , moderately contaminated, transformers, with limited reach to small holders and public institutions indicating incomplete achievement of coverage objectives[29].

While the platform achieved its stated objectives during implementation, it now operates at a lower capacity with claimed losses. This underscores the consequences of inadequate financial sustainability mechanisms[30]. The platform's sustainability remains uncertain due to absent regulatory authorization for cement kiln incineration of PCB oils and the lack of regulatory frameworks for waste declassification. The persistence of contaminated transformers in service across public institutions due to lack of enforcement mechanisms and the absence of formal ministry contracts further compromise long-term effectiveness.

4.5 Efficiency

Project efficiency was constrained by resource-target misalignment, though operational execution within these constraints was relatively strong. The scope of accomplishments at national and multi-country regional levels indicates good resource mobilization, with productive use of available resources evidenced by complete inventory, workshops, and decontaminations achieved[31].

[28] Interview data
[29] Interview data
[30] Interview data
[31] Interview data

The project employed several efficient practices that optimized resource utilization**.** The project effectively leveraged existing Phase 1 infrastructure and the MME decontamination platform, avoiding duplicative capital investments in decontamination facilities. This improved efficiency by establishing local decontamination capacity through the MME platform, though geographic challenges remained in serving transformers located in remote areas[32].

The large-scale analysis campaign covering 6,000 transformers indicates efficient deployment of assessment resources across the country.

Efficient coordination mechanisms included utilizing the National PCB Commission to coordinate multiple agencies, employing high-quality consultants, utilizing the existing EU twinning program for technical review, and building on previous PCB management initiatives. The coordination mechanism between UNIDO headquarters, the PMU (primarily Jamal Aboud), the Ministry, and the decontamination contractor functioned adequately. The single-step approval (MSP) streamlined administrative processes but limited budget flexibility and adaptation capacity. The phased approach leveraged international convention frameworks and technical cooperation mechanisms to optimize resource deployment, allowing for systematic capacity development and resource allocation.

Positive efficiency indicators include negotiation with the monopolistic service provider to maximize decontamination capacity within the $500,000 budget, and cost-effective equipment procurement that established long-term analytical and decontamination capabilities[33]. The exploration of cement kiln incineration as an alternative to expensive export options shows innovative cost-reduction thinking. The multi-purpose capability of the gas phase chromatograph for various analytical matrices represents efficient resource design.

[32] Interview data
[33] Interview data

The platform demonstrates resource optimization through value recovery, selling iron and copper from decontaminated transformers generates revenue that partially offsets operational costs, creating a more financially sustainable model. The strategy to maximize added value before export and the development of mobile decontamination units for on-site treatment show efficient resource utilization and optimization of operational processes.

However, efficiency was impacted by several factors stemming from poor project management decisions and structural design issues.

Originally planned for 36 months (January 2018-January 2021), the project required extensions. While some delays resulted from external factors including late project launch (2019), lengthy procurement processes (3-8 months), COVID-19 pandemic, and increased equipment and transport costs caused by COVID-19 and the Russia-Ukraine war creating severe budget pressure that limited progress, inefficiencies stemmed from internal project management. Project efficiency was also undermined by the 24-month delay between equipment procurement and operational use at the LNESP, resulting in underutilized assets despite completion of 60 analyses for the MED program[34].

Co-financing mobilization was mixed: recipient government contributions exceeded pledges ($538,700 versus $165,000 pledged), but beneficiary contributions could not be verified (ITE report). The co-financing model proved inefficient in practice, as in-kind contributions (particularly replacement oils) were not reliably provided, especially by smaller beneficiaries. The undifferentiated beneficiary list mixed large and small companies without strategic prioritization, allowing the decontamination contractor to pursue the path of least resistance toward larger, easier-to-serve entities. This operational reality, while understandable from a contractor performance perspective (paid to deliver quantity of decontaminated PCB), resulted in inefficient allocation relative to equity objectives. The project could have achieved

[34] Interview data

greater efficiency through clearer beneficiary segmentation, requiring the contractor to maintain separate lists for large companies and SMEs with differentiated approaches. Better upfront planning around co-financing enforcement could have enhanced efficiency.

Delays in export operations requiring notification renewals and multi-country transit approvals created cost overruns and prevented full target achievement.
The lack of regulatory frameworks necessitating rework and additional phases represents suboptimal resource utilization. The absence of formal institutional agreements has likely created delays and administrative inefficiencies that could have been avoided with better upfront institutional design. The need for Phase 3 interventions indicates that initial phases did not fully achieve intended coverage.

These delays resulted in significant budget reallocations and over expenditures: Component 3 budget was reduced from $1,466,484 to $1,172,779 (-$293,704), while Project Management Costs increased from $150,000 to $327,654 (+$177,654, a 118% increase).

4.6 Sustainability

Project sustainability presents a mixed outlook with significant achievements alongside ongoing challenges. While the project established durable institutional capacity and demonstrated governmental commitment, questions about financial viability and regulatory completeness threaten long-term sustainability.

First, the project created lasting institutional and technical assets that provide a foundation for sustained PCB management. The MME decontamination platform remains operational and available for future use, representing a significant infrastructure investment, with the platform functioning since 2015 and possessing operational capacity. The Ministry's laboratory (LNESP) has been upgraded with specialized PCB analysis equipment, creating lasting knowledge assets that are available to address in short term any queries from public institutions of authorities.

ISO certifications (9001, 14001, 45001) of the MME platform ensure ongoing quality standards and technical continuity.

The strengthened national legislation through published decrees on waste management and import restrictions provides a partial enforcement framework for continued PCB management, addressing PCB waste streams. Legal prohibition on importing hazardous waste ensures reliance on domestic capacity, but prohibits the MME platform to serve as a regional asset for decontamination of equipment from other countries, mainly in North and West Africa. The National PCB Commission structure (established in 2010 by Decree No. 2-08-243) provides a sustainable coordination mechanism, with representatives from relevant ministries and major electricity companies actively involved throughout previous initiatives and the current project. The strong institutional foundation, including the dedicated commission, project management committee, and formal institutionalization through COP meetings, creates appropriate governance structures for long-term sustainability.

Demonstrated kiln incineration test offers a potential cost-effective national solution for higher-concentration PCB waste. Training programs contribute to human resource sustainability. Plans for mobile decontamination units indicate operational continuity. The strengthened enforcement capacity of the environmental inspectorate, while requiring continued exercise, represents enhanced institutional capability.

Morocco demonstrates long-standing commitment to environmental protection and international obligations. As a signatory to the Stockholm Convention (ratified 2004), the country has shown consistent governmental commitment through substantial GEF engagement. The project's foundation in binding international conventions (Stockholm, Basel, Rotterdam) provides strong institutional sustainability and ongoing legal obligations. The MTEDD’s strong engagement throughout the project suggests sustained institutional commitment. The

development of national technical capacity and alignment with international frameworks suggests mechanisms for continued implementation.

Despite the above-mentioned positive indicators, financial sustainability presents the most significant risk to project outcomes. While, the five major PCB owners, primarily electricity and water distribution companies that own the vast majority of transformers, confirmed they either have dedicated budgets for PCB management or would allocate necessary resources, they are still considering to receive support from the MTEDD to continue the decontamination. However, it is clear that utilities and railways with existing means and expertise can self-finance their decontamination needs.

In addition, the financial sustainability of the MME platform is uncertain. The platform faces potential closure following project completion, as current regulatory frameworks do not authorize alternative treatment methods (cement kiln co-incineration has not yet received the formal authorization) that would ensure its continued operation[35]. The platform is facing challenges, its operator having observed that the current legislation is not complete and even the adopted decrees are not fully enforced due to the lack of inspections and control. Further to the fact that the MME platform cannot serve for the international market.

Revenue generation of the MME platform from operations suggests potential for financial self-sufficiency, but the business model requires ongoing support. It is evident that the project focused more on technical capacity development, and has not covered the enablement of a local ecosystem where all the actors work together to ensure continuity after the end the project. Specifically, the project has not planned an exit strategy for its activities.

Furthermore, small owners (SMEs) would require financial support through proposed incentive mechanisms, as the mechanism for addressing remaining PCB

[35] Interview data

waste in SMEs unable to afford decontamination costs has not been established. The strategic prioritization toward public institutions (schools, universities, hospitals, police, gendarmerie) lacking decontamination budgets highlights the need for sustained public funding, creating a mixed sustainability model requiring continued government support. Public institutions' inability to finance routine contamination monitoring and transformer replacement, along with the lack of established business models for laboratory services and dependence on external program financing, further threaten sustainability.

The project unintentionally created perverse incentives where holders refuse to pay for decontamination services while awaiting free project financing, undermining the establishment of a self-sustaining market.

The incomplete regulatory framework limits sustainability prospects. While published decrees provide partial coverage, they address PCB waste streams but not equipment currently in operation. The comprehensive chemicals law remains pending approval after several years, limiting enforcement mechanisms, particularly for in-service equipment.

Sustainability ultimately depends on government decisions regarding whether to pursue a Phase 3 with GEF funding, establish a national revolving mechanism, implement polluter-pays principles, or develop cost-sharing arrangements. The equipment and capacity are in place; the political and financial commitment for sustained action remains to be secured. Sustainability is explicitly recognized as a concern, with clear acknowledgment that "a new roadmap must be established to launch a new program to ensure platform sustainability". The intention to "mobilize new funds to request a new program" demonstrates a vision for continuity, but also raises questions about financial autonomy[36]. The proposed Phase 3 focus on public institutions and small holders, along with recommendations to update the chemical

[36] Interview data

profile (last version 2017) and finalize legislation, indicates that sustainability foundations remain incomplete.

A critical limitation is the absence of an exit strategy, explicitly mentioned as a key recommendation.

4.7 Progress to Impact

The project has made progress toward long-term environmental impact and demonstrated transformative potential extending beyond quantitative waste elimination metrics to encompass institutional capacity development, regional positioning, and establishment of Morocco's MME platform as a potential center of excellence for POPs management in Africa. The project has generated changes by creating the first North Africa-scale platform, strengthening national capacities in toxicovigilance, and establishing interministerial coordination mechanisms .

The project achieved progress eliminating high-risk PCB transformers from major industrial and utility operators, directly reducing environmental contamination risk and worker/public exposure. Immediate outcomes contributing to impact include reduction of approximately 206 tons of PCB-contaminated materials from Morocco's environment, directly decreasing persistent organic pollutant exposure risks. The concrete risk reduction through transformer decontamination represents a measurable environmental and health impact.

Enhanced national capacity for PCB detection through laboratory upgrades enables continued identification and monitoring. Capacity development impacts include trained personnel across government agencies, establishment of specialized national decontamination capacity, private sector awareness of PCB risks and management requirements, and operational expertise at the decontamination platform. The establishment of a specialized PCB cell and the planned transition to comprehensive chemical substances legislation will create lasting institutional capacity and regulatory frameworks affecting chemical safety across multiple sectors and future generations.

Strengthened legislative framework through published regulatory decrees creates adequate legal framework establishing waste management requirements, providing tools for enforcement and continued action.
The contribution to draft legislation demonstrates potential systemic environmental governance improvements, though legislative delays (chemical management law development since 2017 twinning project) suggest slow progress. Maintained operational decontamination infrastructure remains ready for deployment in future phases.

Demonstrated feasibility of kiln incineration technology for cost-effective national disposal solutions potentially transforms Morocco's approach to PCB management. The project contributed to broader systemic change by proving that Morocco can rely substantially on domestic technical solutions rather than expensive international disposal routes. Economic competitiveness is evidenced by MME's $2.05/kg decontamination rate versus $3-5/kg internationally, with potential cement kiln destruction offering further cost advantages. Positive impact indicators include reduced export dependency for lower-level contamination treatment.

The project generated regional effect, with delegations from Sub-Saharan Africa and the Middle East visiting the MME platform. Established foundations for regional cooperation with African countries demonstrate potential for scaled impact; however, this is still conditioned to the legal prohibition of import of dangerous waste.

The project strengthened Morocco's institutional capacity to manage hazardous chemicals in compliance with three major international conventions (Stockholm, Basel, Rotterdam). The systematic approach to PCB elimination in electrical equipment creates long-term environmental and health benefits while positioning Morocco as a responsible party to international environmental agreements. The project contributed to sustained impact by keeping PCB elimination on institutional agendas, reinforcing existing good practices, ensuring operational entities remain

sensitized, and establishing that new transformers no longer present PCB contamination issues.

The business revenue generated demonstrates a potential economic impact while addressing environmental obligations, could create a sustainable model for hazardous waste management.

However, several factors constrain ultimate impact realization.

- While the PCB Program successfully eliminated highly contaminated transformers containing Pyralene, with expert estimates suggesting only 185 such units may remain for disposal. However, approximately 3,000 moderately contaminated transformers remain in service with SMEs and public institutions, though these can be treated at the strengthened MME platform level.[37]
- The decontamination platform's uncertain future and impending closure threaten processing capacity and Morocco's ability to meet its 2028 international obligations[38]. Critical analytical equipment remains underutilized[39].
- Incomplete legislation leaves gaps in regulatory coverage, particularly for in-service equipment. Long-term impact is constrained by the absence of legal enforcement requiring decontamination, where transformers contaminated remain in service in public institutions. The lack of maximum storage period enforcement (despite 6-month legal limit), continued operation of PCB-contaminated transformers beyond international deadlines, and incomplete regulatory frameworks preventing waste declassification and circular economy approaches further limit impact[40].

[37] Interview data
[38] Interview data
[39] Interview data
[40] Interview data

- Potential environmental concerns through tender sales of "reformed transformers" as scrap metal without decontamination verification raise additional concerns[41].
- The financial mechanism for sustained PCB elimination through 2030 has not been established. The lack of enforcement mechanisms for mandatory decontamination requirements for holders constrains the impact pathway[42].
- Long-term impact potential centers on Morocco's ability to meet its 2028/2030 Stockholm Convention obligations for PCB elimination. The project manager's assessment that "this was a clear step forward from phase one" and that Morocco "still has capacity to deal with this" suggests positive trajectory[43].
- Ultimate impact realization depends on sustained national action beyond the project period. The critical pathway to impact, from project outputs through sustained decontamination activity to complete PCB elimination by 2028/2030, remains dependent on governmental decisions not yet made regarding financing mechanisms, enforcement priorities, and SME support strategies. Therefore, it is evident that impact potential remains dependent on follow-on interventions, with Phase 3 as needed to bridge gaps in regulatory framework, treatment capacity, and stakeholder engagement.

4.8 Gender Mainstreaming

The project demonstrated satisfactory gender mainstreaming aligned with UNIDO's policy on Gender Equality and the Empowerment of Women. The project incorporated gender-disaggregated indicators in the PRF, reporting disaggregated data, demonstrating female participation target for Component 2 capacity building activities.

[41] Interview data
[42] Interview data
[43] Interview data

The project exceeded targets in implementation with women participants exceeding 30% across awareness-raising activities, seminars, and training workshops. In addition, female participants represented diverse stakeholder groups including PCB owner companies, laboratories, and public and private sector organizations.

4.9 Environmental Impacts

The project generated positive environmental impacts through direct reduction of persistent organic pollutant (POP) contamination in Morocco, with no evidence of negative effects on human health or the environment. The project's core objective, safe elimination of PCB-containing oil, equipment, and wastes combined with strengthened regulatory frameworks, directly contributed to environmental protection[44].

The decontamination and elimination of approximately 206 tons of PCB-contaminated equipment and oil represents tangible removal of hazardous substances from the environment, reducing risks of soil contamination, water pollution, and human exposure through electrical infrastructure leakage or improper disposal. Each elimination operation is documented through procès-verbal (PV) signed by a ministerial supervision commission, indicating strong environmental safeguards.

The MME PCB decontamination platform operated according to international environmental standards with ISO 14001 certification, classified under Morocco legislation as a Class 2 dangerous/inconvenient establishment, installed in an authorized industrial zone (Bouskoura). The platform incorporated critical environmental protection.

The project appropriately required specialized handling procedures during decontamination operations, including controlled drainage sites with plastic foils,

[44] Interview data

absorbent materials, special ventilation, and drainage systems, to prevent secondary environmental contamination during the cleanup process itself.

Improved worker occupational safety through provision of appropriate personal protective equipment when handling PCB-containing equipment represented a health impact. During operations, systematic use of PPE reduced worker contamination risks. Best practices adopted for ESM of PCBs showed spillover effects promoting generally cleaner workplaces, with improved safety and cleaner work environments reducing long-term PCB exposure risks for workers.

Concrete environmental benefits included adoption of environmentally sound management (ESM) practices by major transformer owners and establishment of proper ESM systems at PCB owner facilities that reduced environmental exposure risks. The decontamination platform operations demonstrate environmentally sound management practices throughout implementation. The project supported strengthening environmental management systems including ISO 14001 certification processes within ONEE's operational units.

The project contributed to preventing future environmental damage through multiple systemic interventions:

- Strengthening Morocco's legislative framework for chemical management and enhancing enforcement capacity created systemic conditions for better environmental protection.
- Training and awareness activities enhanced environmental stewardship among equipment holders, improving storage practices and emergency response capabilities. The project promoted hazardous chemical management best practices across stakeholder groups. The upgrade of national laboratory capacity enables ongoing environmental monitoring and contamination assessment, supporting evidence-based environmental management.
- The successful kiln incineration testing demonstrated that this disposal method achieves acceptable emission standards, providing Morocco with an

environmentally sound national option for treating higher-concentration PCB waste without international transport risks.

Approximately 3,000 moderately contaminated transformers remain in service across Morocco, representing continued environmental risk until addressed before the Stockholm Convention deadline. However, these transformers can be effectively treated at the strengthened MME platform level, which now has the capacity for decontamination and retrofilling, requiring sustained attention to ensure their systematic treatment.

4.10 Human Rights and Social Impact

The project demonstrated positive social impacts aligned with the socially inclusive dimension of UNIDO's Inclusive and Sustainable Industrial Development framework, specifically through enhanced occupational health and safety protections for workers handling hazardous materials.

Project interventions contributed to measurably improved working conditions at PCB owner facilities through three interconnected mechanisms: raising awareness among workers and managers about PCB hazards and safe handling practices, ensuring systematic use of appropriate personal protective equipment (PPE) when handling contaminated equipment, and supporting the adoption of environmentally sound management (ESM) systems at major facilities that elevated overall workplace safety standards.

These improvements directly reduced workers' risk exposure to PCBs and associated health impacts, creating tangible benefits for employee wellbeing across participating organizations.

The MME decontamination platform exemplifies this commitment to worker protection through comprehensive operational safety frameworks. The platform's preparedness and accident prevention plan address occupational safety through detailed emergency response procedures covering oil spills, fires, medical

emergencies, electrocution, and natural disasters, demonstrating systematic attention to worker protection across foreseeable risk scenarios.

This commitment is formalized through the platform's compliance with Morocco's Labor Code (Law 65-99) and certification according to international standards ISO 9001 (quality management), ISO 14001 (environmental management), and ISO 45001 (occupational health and safety management), demonstrating alignment with human rights frameworks protecting workers' fundamental rights to health, safety, and dignity in the workplace. The integration of these management systems ensures that worker protection is embedded within the platform's operational procedures rather than treated as a secondary consideration, creating sustainable safeguards that extend beyond project implementation.

4.11 Performance of Partners

Partner performance varied across project stakeholders, with strong engagement from key institutional actors but limitations in certain areas.

4.11.1 UNIDO Performance

The organization provided generally adequate support and demonstrated responsiveness to reported problems, provided valued technical support and advice during PSC meetings, effectively recruited high-quality national consultants, and shows commitment through pursuit of Phase 3 continuation despite current challenges. The UNIDO Country Representative contributed through high-level engagement, organizing site visits, and participating in PSC meetings.

4.11.2 Project Management Unit (PMU)

The PMU, led by Mr. Jamal Aboud with UNIDO headquarters oversight by Mr. Vladimir Anastasov, maintained adequate coordination despite the project's complexity and multiple stakeholder landscape.

4.11.3 Ministry of Energy Transition and Sustainable Development

The MTEDD demonstrated adequate partnership, characterized by high engagement, strong coordination, and proactive involvement across multiple project dimensions. The Ministry played critical roles in facilitating kiln incineration tests, supporting laboratory cooperation and equipment procurement, leading legislative amendments, and coordinating with multiple beneficiary entities. The Ministry also shows strong ownership through active participation, designation of focal points, and integration of project activities into national programs. Their strong commitment was evidenced by recipient government co-financing that substantially exceeded pledges ($538,700 materialized versus $165,000 pledged, more than triple the original commitment).

However, the Ministry has not established a formal agreement or support for the platform despite its national importance, creating sustainability vulnerabilities. Policy shifts regarding chemicals legislation (from PCB-specific law to comprehensive chemicals legislation) created implementation challenges, and the delayed chemical products law approval suggests gaps in some institutional commitments affecting long-term project success.

4.11.4 National Counterparts and Other Ministries

National counterpart engagement was consistently satisfactory throughout implementation. Representatives from ministries fulfilled their roles effectively, demonstrating full engagement and active participation in PSC meetings and National PCB Commission meetings. Counterparts provided adequate support and timely decisions to facilitate implementation, with DSD representatives integrated into the PMU at DSD offices and actively participating in supervision of daily project activities.

The Ministry of Industry demonstrated collaboration through production of the import restriction decree. However, the Ministry of Interior remains not fully involved despite jurisdiction over public institutions with contaminated equipment, representing a significant partnership gap.

- Technical and Operational Partners

- The LNESP national laboratory showed adequate interest, working diligently with the project team to define equipment requirements, participating actively in procurement processes, and integrating new analytical capacity despite initial supplier challenges .
- MME, the decontamination contractor operating the Phase 1 platform, performed adequately in executing decontamination contracts and delivered services, though the project encountered a permit renewal issue at one point that required Ministry intervention. The contractor operated within the logical constraints of their contract, incentivized to deliver quantity of decontaminated PCB, which naturally led them toward larger, easier-to-serve beneficiaries. Export authorization challenges constrained achievement of elimination targets[45].

4.11.5 Beneficiary Performance

- Large Companies

Large beneficiary companies (ONDA, ONCF, Lafarge, ONEE, regional electricity distributors) demonstrated adequate cooperation and actively participated in equipment elimination and technology testing, providing necessary access and operational support for decontamination activities[46].

- Small and Medium Enterprises (SMEs)

SME beneficiaries showed weak performance in co-financing commitments, with anticipated contributions, particularly replacement oils, not materializing as planned. This limitation reflects capacity constraints rather than unwillingness, suggesting the need for differentiated partnership approaches.

- Coordination Mechanisms

The National PCB Commission provides a multi-stakeholder coordination platform involving key institutional partners, though effectiveness in mobilizing smaller detentors appears limited.

- Donor Performance

[45] Interview data
[46] interview data

GEF performed satisfactorily as the primary project donor, with funds consistently available and transfers executed in a timely and adequate manner throughout the implementation period, enabling project activities to proceed without funding constraints on the donor side.

- Partnership Failures

Partner performance reveals systemic failures beyond individual actor performance. The absence of formal agreements between implementing entities and government ministries, lack of sustainability mechanisms.

4.12 Results-based Management

The project maintained systematic tracking mechanisms, including detailed lists of transformers with identification numbers, station locations, PCB owner information, and decontamination progress. Regular invoicing and contract monitoring demonstrated financial discipline and accountability. The project adequately monitored technical outputs including quantities decontaminated, laboratory equipment procurement and installation, legislation amendments, and kiln incineration test results.

However, results-based management limits undermined project effectiveness: the original results framework set unrealistic targets (over 1,000 tons for decontamination) that was too ambitious to available budget, due to external factors; the project did not differentiate results targets by beneficiary category (large companies vs. SMEs), preventing target-setting and appropriate monitoring of objectives; co-financing targets were included in the results framework without enforceable mechanisms for realization.

Despite these design-level limitations, operational-level results monitoring functioned adequately, with clear documentation of actual achievements. Future interventions require more rigorous results framework development during design, including realistic target-setting based on demonstrated cost parameters,

differentiated targets reflecting stakeholder diversity, and built-in flexibility for adaptive management as implementation realities emerge.

The project successfully adopted and implemented a Results-based Management (RBM) approach throughout its execution cycle. Documentary evidence from Project Implementation Reports (PIRs) clearly demonstrated that implementation was systematically guided by the Project Results Framework (PRF), with the SMART indicators specified therein consistently used to track progress at both output and outcome levels. The RBM approach facilitated systematic monitoring of project achievements against targets, enabling timely identification of implementation challenges.

The PMU effectively utilized the PRF indicators to prepare work plans, monitor activity execution, and report progress to UNIDO headquarters, which in turn provided technical support and guidance to national counterparts based on this results-focused information.

The RBM framework enabled meaningful discussions of project progress during the formal meetings held (three PSC meetings and four national PCB commission meetings)

Progress tracking through the RBM system supported evidence-based decision-making by project management and stakeholders, contributing to adaptive management responses such as the additional study on sustainable PCB management including cement kiln co-incineration trials (not originally planned but added to address implementation realities).

Annual reports and PIRs were prepared using the RBM framework and submitted in a timely manner, providing UNIDO, GEF, and national stakeholders with consistent, results-focused information on project performance.

4.13 Theory of Change Analysis

4.13.1 Output 1 - Regulatory Framework

Partial success only. Two ministerial decrees were published (R1-2 achieved) but the comprehensive chemicals law remains pending since 2017 (R1-1 failed), leaving no regulations for in-use equipment. Most critically, no incentive mechanisms materialized (R1-3 failed); instead, the project unintentionally created perverse incentives where holders awaited free project financing rather than paying for services.

4.13.2 Output 2 - Safe Management Practices

Quantitative targets met but "elite capture" occurred. Training and screening concentrated benefits among large entities (ONEE, ONCF, ONDA) with existing capacity, while SMEs lacked financial resources for replacement oils and transformer downtime

4.13.3 Output 3 - Platform

Platform achieved 206 tons decontamination. The co-financing assumption proved entirely invalid since SMEs lacked procurement authority and financial resources; in-kind contributions cannot be enforced.

4.13.4 Outcome Level

There are strong technical conditions (laboratory, platform, trained staff) but limited enabling environment. Strategic conditions incomplete (no financing mechanism, no exit strategy), regulatory conditions partial (in-use equipment unregulated

4.13.5 Impact Pathway

The project created "constituents" for impact (capacity, tested technologies) but only limited "method" (sustainable systems) to achieve it.

4.14 Monitoring & Reporting

4.14.1 Monitoring and Evaluation Framework

The project included an adequately budgeted Monitoring and Evaluation plan with a GEF grant allocation of $50,000. The M&E plan detailed all monitoring and evaluation activities to be implemented, including measurement of GEF tracking tool indicators at project completion, monitoring of impact indicators per the PRF to feed into PIRs, regular monitoring activities under PMU and PSC responsibility, and a final external evaluation under UNIDO responsibility. The M&E framework provided clear delineation of responsibilities and appropriate resource allocation.

4.14.2 M&E System Implementation and Operations

The M&E system was operational throughout implementation as planned. The PMU maintained regular communication with project stakeholders and partners on activity execution progress according to agreed work plans, reporting systematically to the UNIDO project team in Vienna, which provided technical support and guidance when necessary. The relationship between headquarters-level project management (UNIDO) and field-level implementation (PMU with Jamal Aboud) appears to have functioned adequately for information flow, with the project manager having clear visibility into operations, challenges, and achievements[47].

Project monitoring occurred through multiple channels: formal meetings (PSC and national PCB commission meetings) from project start through June 2022 where progress was discussed and guidance provided. Notably, membership overlap between these two bodies ensured coordination and consistency in oversight. Field missions and regular communications supplemented formal meeting structures.

Regular monitoring mechanisms included tracking of individual transformer decontamination progress through detailed lists capturing technical specifications, location, ownership, and processing status. Financial monitoring through invoice

[47] Interview data

review and contract management enabled oversight of expenditures against budgets.

4.14.3 M&E System Strengths

The quality of monitoring was evidenced by useful recommendations provided to the PMU and appropriate corrective actions taken in response to identified challenges. Annual reports and PIRs were consistently prepared using the M&E framework and submitted in a timely manner, providing stakeholders with regular, systematic information on project performance, progress toward targets, and emerging issues. The M&E system successfully tracked progress against PRF indicators, enabling evidence-based assessment of output delivery, outcome achievement, and progress toward impact. Reporting to GEF and compliance with UNIDO's monitoring protocols appear to have been maintained.

The project generated an independent terminal evaluation covering the earlier implementation phase (pre-August 2023), which provided valuable findings and recommendations for the subsequent period. The current self-evaluation exercise demonstrates commitment to learning and accountability, systematically reviewing the August 2023 to December 2025 period through document analysis and stakeholder consultations.

4.14.4 Monitoring Limitations and Gaps

Several monitoring and reporting limitations emerge that constrained the system's effectiveness:

- Disaggregated data collection by beneficiary type (large companies vs. SMEs) appears insufficient, limiting ability to analyze differential participation patterns and constraints
- The monitoring framework did not capture key process indicators such as co-financing realization rates by beneficiary category, which

would have enabled earlier adaptive management when commitments failed to materialize

- Systematic documentation of stakeholder consultations and awareness-raising activities was not evident in the evaluation discussion

Enhanced monitoring would benefit from more systematic capture of process indicators, disaggregated data, and stakeholder perspectives throughout implementation rather than primarily at evaluation stage.

4.15 Project Ratings

Based on the self-evaluation findings, the following ratings are considered:

- **Overall Project Performance: Satisfactory.** Within budget constraints and design limitations, the project achieved reasonable outputs and maintained strategic assets for future action.
- **Relevance: Highly Satisfactory.** The project directly addresses Morocco's Stockholm Convention obligations with appropriate institutional positioning, though SME relevance was weaker.
- **Coherence: Satisfactory.** Built logically on Phase 1 achievements; demonstrated strategic continuity and resource optimization; aligned with international best practices and complementary national and international initiatives.
- **Effectiveness: Satisfactory.** Achieved strategic outputs (laboratory upgrade, kiln testing, legislation) that create foundations for continued progress.
- **Efficiency: Moderately Satisfactory.** Cost parameters align with international benchmarks, but co-financing failure and undifferentiated beneficiary approach limited efficiency gains.

- **Sustainability: Moderately satisfactory.** Strong institutional capacity established, but financial sustainability mechanisms unresolved and significant work remains to meet the Stockholm convention deadline.
- **Progress to Impact: Moderately Satisfactory.** Clear pathway to impact demonstrated but ultimate realization depends on actions beyond project control.
- **Gender Mainstreaming: Satisfactory.** gender integration in implementation with participants in training and workshops disaggregated based on gender.
- **Partnership Performance: Satisfactory.** Ministry partnership was appropriate; SME partnership weak due to capacity rather than commitment issues.
- **Results-Based Management: Satisfactory.** Adequate operational monitoring.

5 Conclusions and Recommendations

5.1 Conclusions

The UNIDO-GEF project established critical technical infrastructure and validated cost-effective national disposal solutions within resource constraints, representing strategic value despite design challenges. The misalignment between ambitious elimination targets and available budget, coupled with challenges to secure anticipated SME co-financing, created high and unrealistic expectations and constrained effectiveness from inception. While two ministerial decrees were published, Morocco's regulatory framework remains incomplete, with the chemicals management law pending, absent frameworks for in-service equipment and waste declassification, and limited enforcement mechanisms representing gaps that undermine sustainability and enable continued operation of contaminated transformers beyond international deadlines. National laboratory capacity (LNESP) was upgraded and the MME decontamination platform remains operational with ISO certifications, with kiln incineration tested as cost-effective; however, equipment underutilization (24-month LNESP delay) and absent business models limit return on investment.

The undifferentiated beneficiary approach allowed the contractor to serve larger entities, leaving transformers in SMEs and public institutions unaddressed, with these stakeholders lacking financial capacity but facing identical risks. The absence of a planned exit strategy questions the durability of all achievements despite existing technical capacity and demonstrated political commitment.

5.2 Recommendations and Management Response

The MME decontamination platform requires support to continue operation, such as assistance to develop of a sustainable business model incorporating metal recovery revenue streams and positioning the platform to provide regional services to neighbouring African countries (contingent on legal authorization for hazardous waste imports) or establishing formal service contracts with major utilities. This should be coupled with formalization of cement kiln co-incineration authorization to provide the platform with a cost-effective disposal pathway for higher-concentration PCB oils, reducing dependency on expensive international export options.

Establishment of a national financing mechanism is essential to address the remaining transformers while ensuring platform financial viability. The government should explore integration into national budget allocations or green financing mechanisms as sustainable alternatives to project-based funding cycles.

The LNESP requires a business plan to optimize utilization of specialized PCB analytical equipment acquired through the project, which experienced a 24-month delay between procurement and operational deployment. A fee-for-service model should be developed establishing LNESP as the authoritative national reference laboratory for PCB analysis, with transparent pricing structures for analytical services offered to industrial clients, environmental authorities, research institutions, and private sector entities requiring contamination verification.

Formal service agreements should be established with key clients including major utilities (ONEE, ONCF, ONDA), regional electricity distributors, industrial facilities potentially holding contaminated equipment, environmental inspectorates requiring analytical support for enforcement activities, and the MME decontamination platform for quality control verification.

The business plan must address current underutilization by developing marketing strategies targeting potential clients, establishing service delivery protocols and implementing quality assurance and proficiency testing programs, and creating a pricing structure balancing cost recovery with accessibility for smaller clients.

Integration with environmental monitoring programs, research initiatives, and regulatory compliance requirements will ensure sustained demand for analytical services beyond project-specific needs.

5.3 Lessons Learned

This project generated four lessons applicable to future chemicals management interventions and UNIDO project design. First, medium-size projects cannot realistically achieve large-scale elimination targets for expensive waste treatment processes; project ambition must be matched to available resources using demonstrated cost parameters, with realistic target-setting at design stage. Second, in-kind co-financing from resource-constrained beneficiaries, particularly SMEs, requires enforceable mechanisms and cash alternatives rather than assumptions of voluntary contributions; project designs relying on beneficiary inputs must include verification mechanisms, differentiated expectations by stakeholder capacity, and contingency provisions for non-materialization of anticipated resources. Third, exit strategies are essential design elements rather than optional add-ons, with sustainability mechanisms built into project architecture from inception rather than addressed as afterthoughts; projects establishing technical capacity, infrastructure, or services must simultaneously create the institutional, financial, and regulatory frameworks ensuring their continuation beyond external

funding periods. Fourth, beneficiary diversity demands differentiated implementation strategies, with contractor incentives explicitly aligned to equity objectives; when projects serve both large entities with self-financing capacity and smaller stakeholders requiring support, separate engagement pathways, monitoring frameworks, and success metrics must be established to prevent natural gravitation toward easier-to-serve beneficiaries.