

INDEPENDENT EVALUATION UNIT
OFFICE OF EVALUATION AND INTERNAL OVERSIGHT

INDEPENDENT TERMINAL EVALUATION

Environmentally Sound Management and Final Disposal of
PCBs in India

UNIDO SAP ID: 104044

GEF ID: 3775



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Executive Summary

The Independent Terminal Evaluation report assesses the project *Environmentally Sound Management and Final Disposal of PCBs in India*, aiming to determine the project's effectiveness, efficiency, overall quality and performance, and likelihood of sustainability.

The overall assessment for the project so far is **'moderately unsatisfactory'**.

Among the main findings:

Project design: The logical framework includes indicators, although not quantified. The planned results-chain is clear and logical and results realistic and measurable. The formulated activities, outputs and outcomes are considered to be adequate to achieve the envisaged project objective of disposal of altogether 7,700 MT of PCBs, including pure PCBs and PCB-contaminated oils, equipment and wastes.

The overall rating for project design is **'satisfactory'**.

Relevance and Coherence: PCBs exist in India and in view of the enhanced awareness of health and environmental issues related to PCBs, stakeholders consider the project to be highly relevant. No regulation regarding PCBs existed in the country and project is considered to be highly relevant also in this context, as it aimed to support the preparation of legal and regulatory framework pertinent to PCBs.

The overall rating for both relevance and coherence is considered to be **'highly satisfactory'**.

Efficiency: Project was approved by the GEF in December 2009, and commenced administratively at UNIDO in January 2010, with a planned project duration of 60 months. At the time of the terminal evaluation, the project had almost completed 13 years of implementation time, 8 years beyond the planned duration. At the same time, it needs to be mentioned that it has faced challenges which are reported and emphasized to have been outside the control of the project.

Due to the delays, some other countries, from where PCBs were expected to be treated in India in future, have already completed their own PCB project, for example, Indonesia and Nepal, thus reducing the quantity of PCBs expected to be treated in the static facility, which was planned to contribute at least some income to the PCB-plant, as it was conceptualised to be a regional plant in Asia.

The overall rating for efficiency is **'moderately unsatisfactory'**.

Effectiveness: As such, the project has successfully achieved most of the Outputs, 11 out of 13, one partially achieved, and one Output related to PCB-disposal not (yet) achieved. The MoEFCC has issued a Gazette Notification pertinent to PCBs in April 2016, which is in place and official since then, thus obliging PCB-owners to stop using PCB oils by 31st December 2025 and complete disposal by 31st December 2028. Taking the capacities of all the PCB-destruction units into account, even if operating at 100% capacities, 7 years are estimated to be necessary to achieve project objective, and additional 4 years to cover other established PCB-quantities, that is, India will not be able to meet the deadline of 31st December 2028, for elimination of existing PCBs in the country. All the equipment has been procured and installed, that is, the facility is, as such, ready, and awaiting final commissioning and PGTs.

The overall rating for effectiveness is **'unsatisfactory'**.

Likelihood of sustainability of project results:

Financial risks for the operations and continuation of operations of both mobile and static facilities, socio-political risks and institutional and governance risks are considered to be low. Both the CPRI and the BSP

would stand to benefit if a Business Plan is prepared for their continued operations, beyond the PCB-quantities foreseen by the project.

The evaluation emphasizes that to ensure sustainability of static PCB-plant operation, a one-year extension of the project would be necessary, as transition time, for a handover of actually operating the equipment, during which BSP staff would have time to observe operations, get crucial hands-on training on operating the equipment, operate the equipment under guidance, and then take over operating the equipment completely. As observed during the evaluation mission, and confirmed by interviewed stakeholders, at least a one-year transition time is considered to be necessary and crucial, for BSP to continue operations sustainably.

Sustainability of project results is considered to be **'likely'**.

Gender mainstreaming: Gender mainstreaming was not a requirement under GEF-4. Specific gender-related or gender-focused activities have not been carried out by the project, as negative impact of PCBs is considered to be negative for both genders; and gender-disaggregated data was not compiled during the PCB-awareness workshops. Nevertheless, no gender issues were reported to the evaluation. Several female persons, in different functions, are working in different arms of the project.

The overall rating for gender is **'satisfactory'**.

The following recommendations are issued:

For UNIDO:

- Extend project by one year, to provide a transition time for the handover of operations at the static facility by BSP, enabling technical assistance by UNIDO and M/s Ramky, to ensure sustainable operations during and beyond the duration of the project; in addition, ensure that BSP staff receives proper hands-on training for at least 6 months;
- Provide support to both BSP and CPRI, as necessary, to prepare a Business Plan for sustainable operations of both the mobile and static facilities, including a consideration of the fee for disposal activities;
- Ensure that BSP receives detailed as well as shorter flyer-versions of the following documents, in English, and, if possible, also in Hindi:
 - individual instructions for each equipment, as well as standard operating procedures for the facility altogether;
 - an emergency plan – in case of unforeseen accidents, etc.;
 - safety manuals for each technology;
 - details for sourcing spare parts;
- Right after final commissioning and PGTs of static facility, hold a meeting with all key stakeholder institutions, to provide information about status of project and next steps;
- Ensure centralized documentation of the transformers and PCB-inventory database at the CPRI, to enable sustainable access of the institution to the database;

- Ensure structured and complete documentation of all documents from the project, which contributes to proper knowledge and information management at UNIDO (for example, in case of handover of project to another PM, or for the evaluation).

For the MoEFCC:

- Consider informing the Stockholm Convention about the delay in PCB-disposal, which may not be completed within 31st December 2028;
- Consider to put in place mechanisms, maybe via the CPCB or CPRI, for inspection and monitoring of PCB-contaminated oils at institutions.

Acronyms and abbreviations

BAT	Best available technology
BEP	Best environmental practice
BSP	Bhilai Steel Plant
CPCB	Central Pollution Control Board
CPRI	Central Power Research Institute
FSP	Full-size project
GDP	Gross Domestic Product
GEF	Global Environment Facility
HQ	Headquarter
IA	Implementing Agency
IE	International Expert
ISID	Inclusive and Sustainable Industrial Development
M&E	Monitoring and Evaluation
MoEFCC	Ministry of Environment, Forest and Climate Change
MTE/R	Mid-term Evaluation/Review
NE	National Expert
NGO	Non-governmental Organization
NPC	National Project Coordinator
PAD	Project Allotment Document
PCB	Polychlorinated biphenyls
PIF	Project Identification Form
PIR	Project Implementation Report
PM	Project Manager
PMT	Project Management Team
POPs	Persistent Organic Pollutants
PSC	Project Steering Committee
SAIL	Steel Authority of India Limited
TOC	Theory of Change
TOR	Terms of Reference
UNIDO	United Nations Industrial Development Organization

Glossary of evaluation terms

Term	Definition
Baseline	The situation, prior to an intervention, against which progress can be assessed.
Effect	Intended or unintended change due directly or indirectly to an intervention.
Effectiveness	The extent to which the objectives of a development intervention were or are expected to be achieved.
Impact	Positive and negative, primary and secondary, intended and non-intended, directly and indirectly, long term effects produced by a development intervention.
Indicator	Quantitative or qualitative factor or variable that provides a simple and reliable means to measure achievement, to reflect the changes connected to an intervention, or to help assess the performance of a development actor. Means by which a change will be measured.
Intervention	An external action to assist a national effort to achieve specific development goals.
Lessons learned	Generalizations based on evaluation experiences that abstract from specific to broader circumstances.
Logframe (logical framework approach)	Management tool used to guide the planning, implementation and evaluation of an intervention. System based on MBO (management by objectives) also called RBM (results-based management) principles.
Outcome	The achieved or likely short-term and medium-term effects of an intervention's outputs.
Outputs	The products, capital goods and services which result from a development intervention; may also include changes resulting from the intervention which are relevant to the achievement of outcomes.
Recommendations	Proposals aimed at enhancing the effectiveness, quality, or efficiency of a development intervention; at redesigning the objectives; and/or at the reallocation of resources. Recommendations should be linked to conclusions.
Relevance	The extent to which the objectives of a development intervention are consistent with beneficiaries' requirements, country needs, global priorities and partners' and donor's policies.

	Note: Retrospectively, the question of relevance often becomes a question as to whether the objectives of an intervention or its design are still appropriate given changed circumstances.
Results-Based Management (RBM)	A management strategy focusing on performance and achievement of outputs, outcomes and impacts.
Review	An assessment of the performance of an intervention, periodically or on an ad hoc basis. Note: Frequently “evaluation” is used for a more comprehensive and/or more in-depth assessment than “review”. Reviews tend to emphasize operational aspects. Sometimes the terms “review” and “evaluation” are used as synonyms.
Risks	Factors, normally outside the scope of an intervention, which may affect the achievement of an intervention’s objectives.
Sustainability	The continuation of benefits from an intervention, after the development assistance has been completed. The probability of continued long-term benefits. The resilience to risk of the net benefit flows over time.
Target group	The specific individuals or organizations for whose benefit an intervention is undertaken.
Theory of change	Theory of change or programme theory is similar to a logic model, but includes key assumptions behind the causal relationships and sometimes the major factors (internal and external to the intervention) likely to influence the outcomes.

1. Evaluation objectives, methodology and process

1.1 Objectives

Findings of the terminal evaluation (TE) of the Republic of India-UNIDO-GEF project “Environmentally Sound Management and Final Disposal of PCBs in India”, GEF ID: 3775, UNIDO ID: 104044, are presented in this report. The terminal evaluation was conducted between 01 August and 31 December 2022, by an independent evaluation consultant, Ms. Suman Lederer, who undertook an evaluation mission to New Delhi, Bhalai and Bengaluru, in the Republic of India, from 26th October – 05th November 2022; the evaluation mission was accompanied by Dr. Nee Sun Choong Kwet Yive, team leader of the overall PCB Cluster Evaluation.

This TE was a part of a Cluster evaluation of eight UNIDO PCB projects, which was carried out by three international evaluation consultants. It was conducted in line with the GEF¹ evaluation policy, the UNIDO² evaluation policy and as mentioned in the project document. It was guided by the Terms of Reference (TOR) for the PCB Cluster Evaluation. It covers all the components as well as the full duration of the project, from 10 January 2010 till 30 November 2022, end of data collection.

According to the TOR, the purpose of the TE is to independently assess the likelihood of sustainability of project results and impact, including its contribution to capacity development and achievement of global environmental benefit goals.

The TE had the following objectives:

- Assess the project performance in terms of relevance, coherence, effectiveness, efficiency, sustainability and progress to impact;
- Develop a series of findings, lessons and recommendations for enhancing the design of new and implementation of ongoing projects by UNIDO; and
- Contribute to organizational learning by UNIDO and its counterparts while being forward-looking, thus also guiding the development of new similar projects.

The TE assessed the project based on the evaluation criteria of relevance, coherence, effectiveness, efficiency, likelihood of sustainability, project management as well as cross-cutting issues such as gender. Detailed questions are provided in the evaluation framework matrix in Annex III.

Intended users of the TE are the project manager (PM) and project management team (PMT), project partners, government of the Republic of India, other organizations/institutions in India cooperating with UNIDO, the GEF, and UNIDO management and staff at UNIDO Headquarters (HQ).

1.2 Methodology and process

The TE was carried out between 01 August and 31 December 2022 and covers the whole duration of the project from its commencement in January 2010 – 30 November 2022. It has been conducted by an independent evaluation consultant. The findings of the TE are based on document review, field visit to project sites and stakeholder organizations, and interviews with project stakeholders. The evaluation made efforts to speak with as many stakeholders as possible, inter alia, representatives of the relevant

¹ GEF. (2019) GEF Evaluation Policy (Independent Evaluation Office, June 2019).

² UNIDO. (2021). Director General’s Bulletin: Evaluation Policy (UNIDO/DGB/2021/11).

Ministry, the PMT, the partnering institutions, and national and experts. A detailed list of stakeholders consulted is provided in Annex I.

The evaluation followed the evaluation criteria mentioned in the TOR, relevance, effectiveness, efficiency, likelihood of sustainability of project results and cross-cutting issues. The evaluation parameters have been operationalized into an evaluation matrix which is provided in Annex III.

Besides speaking face-to-face with key stakeholders during the evaluation mission, as some stakeholders are located in different geographical locations of the country, and each one of them could not be personally met during the evaluation mission, some of the evaluation meetings were conducted remotely, via Zoom and via telephone. Questionnaires had been prepared, for different types of stakeholders, that is, for representatives of the Government, for PCB owners, for national experts, etc. Interviews were semi-structured; during the stakeholder meetings, depending on the response and information received, the evaluator asked additional questions to clarify further points and receive further necessary information. Information received has been validated to the maximum extent possible, via document review, stakeholder meetings and site visits. Findings, conclusions and recommendations are based on qualitative analysis of data received.

1.3 Information sources and availability of information

For assessing the project, the TE referred to the following sources:

- **Document review:** a comprehensive desk review of the documents provided to the evaluation, inter alia, inception report, Project Information Reports (PIRs), meeting reports, expert reports, other output documents. A detailed list of documents consulted is provided in Annex II. All the documents were provided by the UNIDO PM and PMT in a timely manner;
- **Interviews:** Interviews with, amongst others, the Ministry of Environment, Forest and Climate Change (MoEFCC), Bhilai Steel Plant/SAIL (BSP), Central Power Research Institute (CPRI), UNIDO PM, UNIDO Regional Office (RO) in New Delhi, national experts, representatives of other PCB owner institutions, contractor for static facilities. Annex I provides a list of persons consulted/interviewed, face-to-face, and/or via Zoom or via telephone;
- **Site visit:** An evaluation mission to the Republic of India of the evaluator, accompanied by the overall team leader for the PCB Cluster Evaluation, to visit the project sites, BSP and CPRI, and key stakeholder organizations took place from 26 October – 05 November 2022, including travel days, for direct observation of the technologies procured and installed, as well as the procured transportation, for the mobile facility.

1.4 Limitations of the evaluation

At the time of the terminal evaluation, project was delayed, amongst other reasons also due to COVID-19. The static technologies had been installed; commissioning including process guarantee tests (PGT), however, were yet to be finalized, and decontamination operations were yet to commence; PMT reported to the evaluation that the static facilities were expected to commence operations in 2023 (after final commissioning and uptake of equipment from the contractor). Therefore, at the time of the terminal evaluation, nothing can be said of the functioning of the equipment at the static units or the challenges actually faced during operations of the static units, or about the PCB-quantities disposed, except 417.089 MT by the mobile unit, operated by the CPRI.

Official documentation of expenditure of co-finance was requested, co-finance explained during the evaluation mission, template provided, reminders sent, but not received by the evaluation.

The evaluator prepared a short e-survey for participants of the PCB awareness workshops, with close-ended questions, which would have taken between 3-5 minutes to complete. However, from sixty-six delivered e-mails with the e-survey link, only three responses were received, thus not enabling any analysis of the perception of workshop participants about the PCB workshops.

E-folders with documents provided to the evaluation were incomplete, and the evaluator had to compare documents in folders to find complete information/documents, for example, PSC minutes of the meetings were distributed over three different e-folders. This was, per se, not a limitation to the evaluation, but made the work of the evaluator with regard to document review more tedious.

The evaluation made all possible efforts to conduct as many interviews as possible, including web-based, and reviewed all the available documents to ensure the validity of the findings of the TE to the maximum extent possible.

2. Country and project background

2.1 Fact sheet

Project Title	Environmentally Sound Management and Final Disposal of PCBs in India
UNIDO SAP ID / GEF ID	104044 / 3775
Region / Country	Southeast Asia / Republic of India
Project approved for implementation by GEF	28 December 2009
Project implementation start date (First PAD issuance date)	10 January 2010
Expected implementation end date (as per CEO endorsement document)	31 January 2015
Revised expected implementation end date (if applicable)	31 December 2022 (6 extensions)
Donor(s)	GEF
EA/MSP/FSP	Full-size project (FSP)
GEF project grant (excluding PPG, in USD)	14,100,000

GEF PPG (if applicable, in USD)	350,000
UNIDO co-financing (in USD)	150,000 in-kind
Total co-financing at CEO endorsement (in USD)	29,000,000 cash + in-kind
Total project cost (excluding PPG and agency support cost, in USD; i.e., GEF project grant + total co-financing at CEO endorsement)	43,100,000 cash + in-kind
Mid-term evaluation	October – November 2014
Terminal evaluation	01 August – 31 December 2022

Source: project document, TOR.

2.2 Country and Project Background

Country Background

The Republic of India is in Southern Asia, bordering with Bangladesh, Bhutan, China, Myanmar, Nepal and Pakistan. It has a population of almost 1.4 billion, and a GDP of USD 2.835 trillion (official exchange rate, 2019 est.). The highest contribution to the GDP is by Services, 61.5%, followed by Industry, 23% and then agriculture, 15.4%. United States, United Arab Emirates and China are the main export partners, for refined petroleum, diamonds, packaged medicines, jewelry and cars as main export commodities. Crude petroleum, gold, coal, diamonds, natural gas are the main import commodities from the main importing partners – China, United States, United Arab Emirates, Saudi Arabia.

Project Background

The Republic of India signed the Stockholm Convention on 14 May 2002, ratified it in January 2006 and it entered into force in April 2006. In line with the requirements of the Convention, India submitted its National Implementation Plan (NIP) in April 2011, which identifies Polychlorinated Biphenyls (PCB) as an identified Persistent Organic Pollutant (POPs), existing in India, especially in the power sector. India has never produced PCBs on its own, and its usage began in the 1950's. One of the main issues relevant to PCBs identified during the preparation of the NIP was that the PCB-contaminated oil and equipment were not managed in an environmentally sound manner and phased-out transformers were recycled and reused. According to the NIP, during the inventory, 1548 transformers were identified to be containing pure and contaminated PCB oils. Further 400 drums were identified to be containing pure PCBs; these were stocked across the whole country. A total of **9,837.662 tons** of PCB-containing oils (1,971.15 MT pure PCB oils; 7,866.512 MT PCB-contaminated oils) were identified across 5 regions in India; from that 7,016.034 tons in the power sector, and 1,772.428 tons in the steel sector. Cross-contamination was expected to have taken place on a large scale.

2.3 Project Description

The project was approved by the GEF on 28 December 2009; implementation commenced at UNIDO in January 2010 (first Project Allotment Document (PAD) on 10 January 2010), with a planned project duration of 5 years (60 months). The GEF had provided preparatory funds amounting to USD 350,000; GEF funds for the main project amount to USD 14,100,000. Total project budget, excluding project preparatory grant (PPG), is USD 43,100,000, which includes co-financing (cash and in-kind) of USD 29,000,000.

The project objective is “to reduce or eliminate the use and releases of polychlorinated biphenyls (PCBs) to the environment through the development and implementation of pilot projects on the environmentally sound management (ESM) of PCBs through the disposal of approximately 2,700 tons of pure PCBs and 5,000 tons of PCB-contaminated equipment, including PCB-contaminated mineral oils and related waste in three pilot states in India.”

Main project technical components, expected outcomes and outputs, besides project management (including monitoring and evaluation (M&E)), are as follows:

Component 1: Strengthening of policy and regulatory framework
Expected Outcome 1: Strengthened policy and regulatory framework to comply with the obligations under the Stockholm Convention
Outputs:
1.1 Legal and regulatory framework for the ESM of PCBs reviewed and assessed
1.2 Legal and regulatory framework at the national level established or upgraded
1.3 National legal and regulatory framework implemented in targeted pilot states.
1.4 Pollution prevention and management of PCBs, PCB-containing equipment and wastes in consonance with ESM guidelines
Component 2: Institutional capacity building and awareness-raising
Expected Outcome 2: Relevant institutions in India are enabled to manage PCBs in an environmentally sound manner as well as awareness-raising on the adverse effects of PCBs
Outputs:
2.1 Institutional capacity for the ESM of PCBs, PCB-containing equipment and wastes evaluated
2.2 Training workshops for representatives of key stakeholders undertaken

2.3 A national tracking and record keeping system (PCB inventory database) established and maintained countrywide (28 states and 7 union territories)
2.4 Sampling, analysis and monitoring capacity evaluated and strengthened in 13 states
2.5 Awareness-raising carried out
Component 3: Regional implementation for ESM of PCBs
Expected Outcome 3: Targeted regional implementation for ESM of PCBs, PCB-containing equipment and wastes
Outputs:
3.1 Dedicated environmentally sound maintenance capacity for PCBs, PCB-containing equipment and wastes established
Component 4: Final treatment and disposal of PCB wastes
Expected Outcome 4: Regional capability for final treatment and disposal of PCBs, PCB-containing equipment and wastes
Outputs:
4.1 Management system for identification, tracking, collection, packaging, transport, interim storage, record keeping, and disposal of PCBs, PCB-containing equipment and waste developed and operational in 13 states
4.2 ESM and transport to interim storage sites of PCB-containing materials carried out incl. specialised transport vehicles for highly concentrated PCBs with GPS and adequate preparedness measures in case of emergency on transport routes to the stationary disposal unit
4.3 Final ESM treatment of 7,700 tons of PCBs, PCB-containing equipment, PCB-contaminated oil and wastes undertaken

Source: project document.

Project stakeholders:

Main project stakeholders, according to the project document, are:

UNIDO: is the Implementing Agency (IA) and responsible for general management of the project and monitoring and reporting.

MoEFCC: Ministry of Environment, Forest and Climate Change is the focal point for the GEF and Stockholm Convention in the country.

CPRI: Central Power Research Institute was planned to be the national executing organization, and has entered into contract with UNIDO for the same. Moreover, it is the operator of the mobile dechlorination unit.

BSP/SAIL: Bhilai Steel Plant/Steel Authority of India Limited is a key stakeholder of the project. It is a main steel producer, not only in India, but also in the world market. The BSP has identified 1,700 MT of pure PCBs, which includes 1,300 MT pure PCB-oils and around 400 MT high-concentration PCB-contaminated oils.

CPCB: The Central Pollution Control Board is assigned with powers under the Air (Prevention and Control of Pollution) Act, 1981. It provides technical services to the MoEFCC and advises the Central Government on matters regarding prevention and control of water and air pollution and improvement of the quality of air. It is a member of the NSC for the GEF projects in the country.

PMU: POPs Management Unit. The Joint Secretary of the Ministry has been assigned as the National Project Director (**NPD**), and the Director as the National Project Coordinator (**NPC**). They were planned to be assisted by two Assistant Project Coordinators (**APCs**).

PSC: Project Steering Committee was established, according to the project document, which is the National Steering Committee (**NSC**) established for all GEF projects, and included representatives of the MoEFCC, Central Electricity Authority on behalf of the Ministry of Power (**MoP**), **CPCB**, major stakeholder utilities /state electricity boards, **CPRI**, National Technical Advisor (**NTA**), Chief Technical Advisor (**CTA**) and UNIDO PM.

PET: Project Expert Team was planned to be established, consisting of the international **CTA**, **NTA**, policy experts, PCB management and disposal industry experts, chemists, M&E experts and other technical experts. A Technical Working Group (**TWG**) was established with key stakeholders of the project as members.

3. Theory of Change

As a theory of change (**TOC**) was not a requirement at the time of project formulation of all the projects which are included in the PCB Cluster Evaluation, the evaluation team for the PCB Cluster Evaluation reconstructed a generic **TOC** for UNIDO's PCB projects. Taking that and the project logical framework into consideration, the evaluator has reconstructed a **TOC** for this project which is shown below. It illustrates, in a simplified manner, how the project intends to (contribute to) achieving impact, that is, the pathway to impact, and which assumptions and drivers (need to) come to work, in order for the project results to contribute to achieving impact. The **TOC** illustrates the project support – Outputs, expected Outcomes³, Intermediate State I, Intermediate State II and the expected Impact.

The Drivers are expected to provide 'motivation' for the country to achieve the Expected Outcomes, Intermediate State I and Intermediate State II. The Drivers that are expected to influence the actors

³ Note of the evaluation: Outputs and Outcomes might be defined differently in different International Organizations. For the purpose of this evaluation, in the **TOC**, the terms – Outputs and Outcomes – are as defined in the Glossary of terms of the evaluation report.

throughout the project – the Government and the PCB-owner institutions – to continue with maintaining project results, are:

- Obligation to Stockholm Convention;
- Health and environment concerns;
- Incentives.

For the achievement of the Outcomes, it is important that the assumptions hold true, that is, stakeholders are committed to, and “own” the project; PCB-owner institutions understand, cooperate and provide resources. For the achievement of Intermediate State I and II, assumptions are that the authorities have adequate resources for enforcement and monitoring; (other) PCB-owners understand, have resources and continue (with disposal activities).

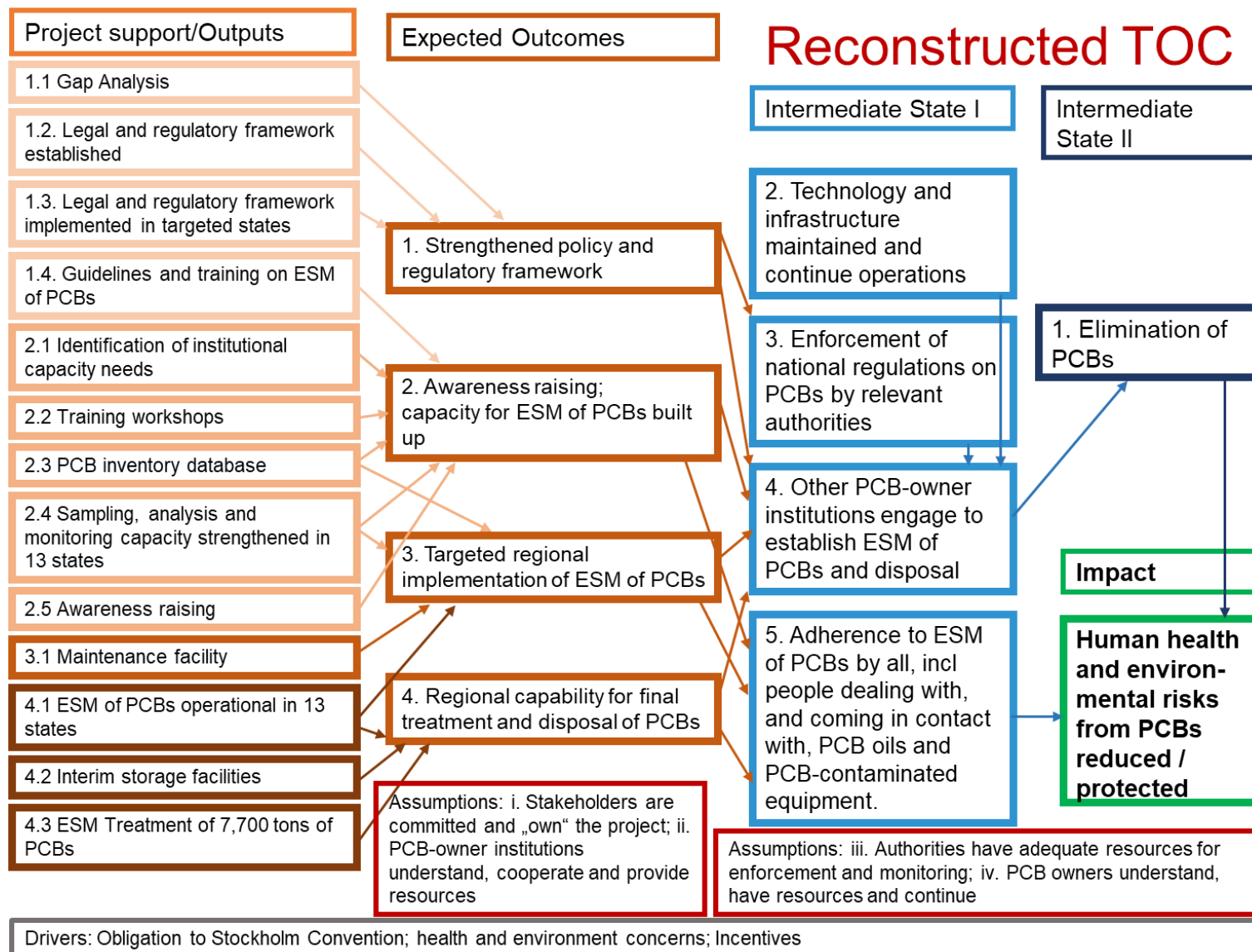
Intermediate State I is outside the control of the project. It falls under the responsibility of the country and key in-country stakeholder institutions, to maintain the technology and infrastructure and ensure that it continues its operations; to enforce national regulations on PCBs; that other PCB-owners implement ESM of PCBs at their respective institutions and come forward and treat/dispose off their PCBs; and that all adhere to ESM of PCBs, especially persons working with, and coming in contact with PCB-oils and PCB-contaminated equipment, for example, persons working in repair and maintenance workshops of institutions.

At the time of the terminal evaluation:

As described with more detailed information under sub-section 4.1, Outcome 1, the MoEFCC has issued a Gazette Notification pertinent to PCBs; guidelines have been prepared; PCB-workshops have been carried out; a database of transformers and PCBs has been prepared in EXCEL format; institutions have been provided information for their repair and maintenance facilities to adhere to ESM of PCBs; interim storage facilities have not been established; the mobile dechlorination unit has commenced operations and the static facility has been constructed and equipment installed.

With the achievement of the above Outputs, the expected Outcomes 1, 2 and 3 can be considered to be achieved; **Outcome 4 is not (yet) achieved**. Under Outcome 4, as mentioned above, the mobile unit has commenced operations and treated over 400 MT of PCB-contaminated oils; the static facility is awaiting final commissioning, and therefore, around 7,000 MT of PCBs, including pure PCBs, PCB-contaminated oils, equipment and wastes await destruction/treatment.

All the Drivers held true. Assumptions i and ii held true, at least regarding key stakeholder institutions BSP and CPRI; For the achievement of Intermediate State I, (and II), it remains to be seen if Assumptions iii and iv hold true.



4. Project's contribution to Development Results – Effectiveness and likelihood of Impact

4.1 Project's achieved results and overall effectiveness

Achievement of activities and outputs detailed below follows the order of Components, Outcomes and Outputs as presented in the project logical framework:

Achievement of Outputs:

Output 1.1: Legal and regulatory framework for ESM of PCBs reviewed and assessed

Activities under this output, which is assessment of gaps and reviewing existing national legal and regulatory framework are reported to have been carried out by the MoEFCC, with the help of a national expert. A gap analysis report was not provided to the evaluation, however, according to the mid-term evaluation report, it was presented to the mid-term evaluation and has been reviewed by it. Moreover, stakeholders reported that the review and assessment of the existing national legal and regulatory framework established that no legal and regulatory framework pertinent to PCBs existed in the country at the time the review/Gap analysis was carried out.

Based on interview data, and the MTE report, as well as the fact that a Gazette Notification has been published, this Output is considered to be **completed**.

Output 1.2: Legal and regulatory framework at the national level established or upgraded

Based on the above-mentioned finding that no legal and regulatory framework pertinent to PCBs existed in the country, the MoEFCC has issued a Gazette notification on 6th April 2016 'Regulation of Polychlorinated Biphenyls Order, 2016', which came into force with the publication of the Gazette notification. The Regulation bans manufacture and import of PCBs and import, export or trade of PCB-contaminated equipment, with the exception of scientific purposes in quantities for research and development activities. The use of PCBs in any form and equipment containing PCBs is prohibited after 31st December 2025, which in theory, and as confirmed by some of the interviews, may not motivate all enterprises/PCB-owners to take any action before 31st December 2025. Moreover, PCB-owners are obliged to declare the total number and quantity of PCBs and PCB-containing equipment to the MoEFCC within one year of the publication of the Order, which is by 06th April 2017. However, according to documents provided and the interviews, this was not really the case. Furthermore, PCBs and PCB-contaminated equipment are to be disposed by 31st December 2028, which again leaves room to initiate any actions, by the PCB-owners, towards PCB disposal only close to the said date of 31st December 2028.

Therefore, on the one hand, this output can be considered to be **completed**, as the country has indeed established PCB-related regulation, in line with Stockholm Convention requirements, which, on the other hand, leaves room for delayed implementation of the same.

Output 1.3: National legal and regulatory framework implemented in targeted states

As mentioned above, no laws or regulations, even at State level, pertinent to PCBs, existed, at the time of project commencement and when the review regarding the same was carried out. According to interview data, since a national Gazette Notification regarding PCBs is in place, all institutions/PCB owners are obliged to comply with it, and have to take necessary measures to comply with it. The CPRI commenced testing of oils at different institutions already in 2017, and has been sending the analysis reports to the concerned institutions, informing them about the status of PCBs in their respective facilities. Moreover, to support environmentally sound management (ESM) of PCBs, four extensive Guidelines have been prepared, namely:

- i. Guidelines for PCBs waste identification, tracking and record-keeping;
- ii. Guidelines for PCBs, PCB-containing equipment, packaging and transportation;
- iii. Guidelines for PCBs, PCB-containing equipment and PCB waste interim storage;
- iv. Guidelines for PCBs, PCB-containing equipment and PCBs waste disposal.

According to interview data, these guiding documents have been provided to different institutions, which also included PCB owners, in different States – Assam, Chattisgarh, Haryana, Hyderabad, Gujarat, Jammu, Jharkhand, Karnataka, Kerala, Maharashtra, Odisha, Rajasthan, Tamil Nadu, Uttarakhand, Uttar Pradesh, West Bengal (16 States), including during the PCB-awareness workshops, and are reported to be useful to the interviewed institutions. According to interview data, and documents shown to the evaluation during the evaluation mission, PCB-owners from these States have been contacted, or have themselves contacted CPRI, to enquire about disposal of their PCBs; a work plan or time plan to carry out the disposal activities was reportedly not possible to prepare, as the PCB-owners did not want to commit at present to a specific time plan due to their routine work. As the implementation aspect of this Output has not (yet) been achieved, therefore, this Output is considered to be **partially achieved**.

Output 1.4: Pollution prevention and management of PCBs, PCB-containing equipment and waste in consonance with ESM guidelines

In addition to the above four Guidelines, a comprehensive Guidance document has been prepared by the CPRI, 'Reduction and elimination of PCBs, prioritizing the power-sector in India', as well as a Manual on 'Health and safety for maintenance of polychlorinated biphenyl filled transformer, contaminated transformer oil analytical laboratories and de-chlorination process industry'. PCB-workshops carried out are reported to be considered for both Outputs 1.3 and 1.4. The guidance document, together with the aforementioned 4 guidelines is reported by the interviewed institutions to be useful. At the same time, the evaluation notes that institutions other than BSP for the static facility and CPRI for the mobile facility could not be visited during the evaluation mission, and therefore, the implementation of ESM guidelines was not really evidenced.

This output is considered to be **completed** for the project.

Output 2.1: Institutional capacity for ESM of PCBs, PCB-containing equipment and wastes evaluated

The CPRI conducted a survey between 2004 and 2008, during the preparation of the NIP of the Republic of India, based on which the preliminary inventory of PCB-containing equipment was established, and the total quantity of PCB-oils estimated. During the preparation of the NIP, the CPRI identified the larger PCB-owners, via the Steel Authority of India Limited (SAIL), amongst others, the Bhilai Steel Plant, as well as their capacity needs pertinent to environmentally sound management (ESM) of PCBs. Other PCB-owners were identified after the commencement of the project. CPRI has informed the concerned institutions about the status of PCB-oils and contaminated equipment at their facilities and reminded them of their obligation for PCB-disposal, according to existing Gazette Notification in place. Interviews were conducted with 7 PCB-owner institutions; some of them mentioned that they were not aware of PCBs⁴ before the project/CPRI contacted them regarding the testing of their transformer oils for PCBs; a few of them mentioned already having been aware of what PCBs are. All of them confirmed being aware of the Government Gazette Notification regarding PCBs and their obligation to comply with it.

This output is considered to be **completed**.

Output 2.2: Training workshops for key stakeholders undertaken

As reported to the evaluation, 68 PCB-awareness raising workshops have been conducted altogether, in different States and Union Territories (UTs), namely, Assam, Chattisgarh, Haryana, Hyderabad, Gujarat, Jammu, Jharkhand, Karnataka, Kerala, Maharashtra, Odisha, Rajasthan, Tamil Nadu, Uttarakhand, Uttar Pradesh, West

⁴ A widespread notion before the commencement of the project that PCBs are power circuit boards was reported to the evaluation.

Bengal. Participants, as reported to the evaluation, were senior level officers of relevant institutions, engineers, policy makers, researchers, PCB owners, etc. As mentioned under 'Limitations', the evaluation made efforts to receive feedback from the awareness-raising workshop participants about the workshops via an e-survey, but received only three responses out of sixty-eight delivered e-mails with the link to the e-survey. An overview report containing information about, amongst others, the awareness-raising workshops conducted, was provided to the evaluation.

Interviews with 7 PCB-owner institutions were conducted, during which they confirmed that the CPRI had conducted awareness-workshops on PCBs in their institutions which were helpful for a broader understanding of PCBs and the safe handling of transformers, transformer oils and PCB-contaminated oils and equipment. They mentioned that they were provided with the 4 Guidelines, which were prepared within the framework of the project, as well as with the safety manual also prepared within the project. Further, they reported having integrated the topic of PCBs in their formal and informal trainings at their respective institutions for existing and new staff, including persons from the transformer repair and maintenance workshops. Some of the interviewees expressed their wish and need at their institution for a "refresher" PCB-workshop.

This Output is considered to be **achieved**.

Output 2.3: A national tracking and record-keeping system (PCB inventory database) established and maintained countrywide (28 states and 7 Union Territories)

As mentioned above, Guidelines and Guidance document have been prepared and provided to the PCB-owners, as well as training workshops on ESM of PCBs. PCB-owners were identified during the preparation of the NIP and the NIP Update. Together with the identified PCB-owners, transformers with pure PCB-oils, as well as contaminated stocks have been identified. A national tracking and record-keep system (transformer and PCB-inventory database) has been established to the extent reporting was done (adequately or at all) by the PCB-owners. Ownership is with the CPRI. All the data is entered in individual EXCEL sheets, per State, and was shown to the evaluation, during the evaluation mission. However, at the time of the evaluation mission, this data was not stored in a centralized manner. Further, although several institutions have reported on their transformers and PCBs, several institutions have yet to provide information from their respective institutions.

This Output is considered to be **completed** within the framework of the project, although several institutions in the country are yet to report on this. It is upto the relevant authorities in the country to implement this throughout the country.

Output 2.4: Sampling, analysis and monitoring capacity evaluated and strengthened in 13 states

CPRI facilities include a laboratory, which is certified to carry out PCB analysis. During the preparation of the NIP, the laboratory is reported to have been upgraded, as well as within the framework of this project, with the procurement of GC-MS equipment by the project, for the CPRI. The laboratory at the CPRI was visited during the evaluation mission and the equipment seen. One GC-MS equipment is placed within the mobile decontamination unit. Around 6 persons at the CPRI are reported to have been trained on PCB analysis. In addition to these persons, initially the CPRI has reported to have recruited 3 national experts and trained them to work with the mobile unit. Due to the lockdowns during the COVID-19 pandemic, and due to reasons of wishing to move on to other work for their careers, two of these persons left. At the time of the evaluation mission, 3 national experts, 2 chemical engineers and 1 mechanical engineer, 2 of whom recruited after the previous 2 left, were working with the mobile unit. PCB-contaminated oil from 7 different institutions had already been decontaminated with the mobile unit. The evaluation interviewed representatives of all 7 institutions.

PCB-awareness-raising workshops have been carried out in different States, but there is no evidence per se of sampling, analysis and monitoring capacity being strengthened in 13 States. Capacity has been built up at the CPRI, which has also been equipped with the mobile dechlorination unit, and it is planned that CPRI will carry out the PCB-decontamination activity in different States.

All the 7 interviewed stakeholders reported all processes related to dechlorination to have functioned well. Either the CPRI arrived to the respective institution with the mobile unit, or in 2 cases, the institutions sent the PCB-contaminated oil to CPRI. CPRI arrived at the institutions with the mobile unit and all other necessary equipment and they had to provide electricity, water, space, etc. In some cases, challenges were faced, which were out of the control of the CPRI, the institution and the project, for example, breakdown of some spare-parts and/or COVID-19 related lockdowns, which causes delays and inconveniences to both, the respective institutions and to CPRI. Oil was decontaminated to values below 2 ppm, sludge and/or oil sent to recyclers authorised by State pollution control boards. The institutions received information via the PCB-awareness workshops and guidelines and pamphlets were also provided to them, in some cases, also in local language. They all confirmed enhanced awareness about PCBs at their respective institutions, and transfer of knowledge on PCBs within their institutions.

This Output is considered to be **completed** for the project.

Output 2.5: Awareness-raising carried out

Awareness-raising activities have been carried out. A detailed awareness publication has been prepared by the CPRI 'Reduction and elimination of PCBs, prioritizing the power-sector in India'; it is a comprehensive document, and covers topics pertinent to PCBs – contamination through PCBs, safety measures, national inventory and Stockholm Convention commitments, As reported to the evaluation, all the Guidelines and Guidance documents have to been provided to the stakeholders and participants of the training workshops, including policy-makers. Flyers and awareness documents were prepared in English and in local languages, such as Assamese, Bengali, English, Gujarati, Hindi, Kannada, Malayalam, Marathi, Odishi, Tamil and Telugu. These were distributed to the 7 institutions where decontamination has been carried out by the CPRI, as well as to the institutions where the PCB-awareness raising workshops (68 reported) have been conducted. Nonetheless, a few interviewed stakeholder institutions have mentioned a need for a “refresher” PCB-awareness workshop.

This Output is considered to be **achieved**.

Output 3.1: Dedicated environmentally sound maintenance capacity for PCBs, PCB-containing equipment and wastes established

A vendor workshop took place right after commencement of project, from 24-27 August 2010, with the participation of enterprises with PCB-disposal/decontamination technologies, consultancy enterprises/contractors involved in implementation of the same, and key stakeholders, inter alia, Sea Marconi, Kinetrics Inc., Fowler Westrup, Toshiba, Kobelco, Orion, Kanden Engineering, M/s Ramky Enviro Engineers Ltd., Steel Authority of India (SAIL), Bhilai Steel Plant (BSP), MoEFCC, and UNIDO – HQ, RO, Procurement, national and international experts. During this workshop, the technology vendors also presented their enterprises as well as their technologies, including process and other technical details.

Taking the data on inventory and stocks of PCBs into consideration, the technical and technological requirements at the selected site for installing the PCB-disposal facilities, Bhilai Steel Plant, were identified.

The same was done by the CPRI at the other PCB owners' sites in other parts of the country, for example, in Maharashtra, Tamil Nadu, Karnataka, Kerala, Gujarat and Assam.

Global bidding process was carried out by UNIDO's Procurement Division, to identify and select the appropriate technology for the treatment of PCB-oil, equipment and wastes. The initial bidding process was not successful, as the price quotations were too high, going even beyond the amount of the total project budget. Therefore, changes were made to the requirements, for example, the civil construction was separated from the technology to be procured, and the bidding process repeated. M/s Ramky Enviro Engineers Ltd., hereafter Ramky, was selected as contractor for static

facility Part B – dechlorination unit. Contract was signed by the contractor in May 2012.

Ramky won the next global bidding process, also carried out by UNIDO’s Procurement Division, for the static facility Part A for high-concentration PCB-destruction - plasma technology and equipment for indirect thermal desorption (ITD) for contaminated equipment, and signed the contract in October 2014.

As mentioned earlier, civil construction was not a part of the contract and was taken over by BSP, which had also committed 12,000 sqm of its own land as site for the construction of the PCB-destruction/decontamination plant.

Bringing experience in constructing and operating waste management plants and sites, complete site and plant design was prepared by Ramky, and has been provided to the evaluation. As mentioned by interviewees during the site visit at BSP, the site design was only slightly adapted by BSP according to its requirements, and the civil construction carried out by a company, which won the tender for the civil construction, in consultation with Ramky.

CPRI was selected as operator for the mobile technology. Further, M/s NPO Dekanter was selected for providing the mobile dechlorination unit, for the treatment of low-concentration PCB-contaminated oil.

This Output is considered to be **achieved**.

Output 4.1: Management system for identification, tracking, collection, packaging, transport, interim storage, record-keeping, and disposal of PCBs, PCB-containing equipment and waste developed and operational in 13 states

As mentioned under Output 1.3, 4 Guidelines, as foreseen in the project, have been prepared, namely, Guidelines for PCBs waste identification, tracking and record-keeping; Guidelines for PCBs, PCB-containing equipment, packaging and transportation; Guidelines for PCBs, PCB-containing equipment and PCB waste interim storage; and Guidelines for PCBs, PCB-containing equipment and PCBs waste disposal. These were reviewed by key stakeholders, that is, by the MoEFCC, CPCB, CPRI. After approval, they were finalized and distributed to the PCB-owners, reportedly to over 2,000 persons, and PCB-awareness workshops conducted. On its own website, the CPRI has incorporated information about and from this PCB project⁵, including a list of over 100 organizations, which might be potential PCB owners.

As such, a system for tracking, transporting, and storing at interim storage has not been established, since interim storages have not been established. Interviewed stakeholder institutions, and other interviewees reported a storage of PCB-oils and contaminated equipment at their own respective institutions separately. As reported

⁵ <https://cpri.res.in>

to the evaluation by the interviewed PCB-owner institutions, they have implemented ESM of PCBs at their respective institutions; none of the storages could be evidenced during the evaluation. Before CPRI carries out PCB-decontamination at any institution, it informs them about the requirements and preparations are carried out accordingly at a separate site at the respective institution, for which the separately stored oil is brought to the mobile unit.

This Output is considered to be **completed** for the project.

Output 4.2: ESM and transport to interim storage sites of PCB-containing materials carried out including specialized transport vehicles for highly concentrated PCBs with GPS and adequate preparedness measures in case of emergency on transport routes to the stationary disposal unit

As reported to the evaluation, interim storages were not established. In view of the established quantity, namely 1,700 tons of pure PCBs at the BSP, it was selected as the site to establish two static facilities – in one common space to be constructed – for PCB disposal, that is, sodium dechlorination unit and plasma unit, including ITD technology. For the other identified PCB-owners, with lower quantities with lower-concentration PCB-oils, a mobile unit was considered to be more appropriate and as mentioned above, a sodium dechlorination unit was selected. Therefore, it was not considered to be necessary to establish any common interim storage sites anywhere. Instead, as reported to the evaluation and confirmed by the interviewed PCB-owners, PCB-owners were trained and provided information on ESM of PCBs, to store the contaminated oils and equipment at their own sites. The interviewed PCB-owners also confirmed that they, in turn, have informed other relevant staff members and employees at their respective institutions about PCBs and ESM of PCBs, and have implemented measures related to ESM of PCBs. Therefore, specialized transport vehicles for PCB transportation were also not necessary. The mobile unit procured by the project, is fitted with a GPS system and can be tracked en route to the different PCB owners.

This Output is considered to be adapted and **completed**.

Output 4.3: Final ESM treatment of 7,700 tons of PCBs, PCB-containing equipment, and PCB-contaminated oil undertaken

As mentioned under Output 3.1, after carrying out appropriate international bidding processes, by UNIDO Procurement Division, in line with UN procurement standards and guidelines, the following technologies were selected:

At Bhilai Steel Plant,

for destruction/decontamination of PCB-oils:

- Static plasma technology from Plascon Australia;

- Static dechlorination unit from Kinetrics Canada; and
for the decontamination of PCB-contaminated equipment:
- Static indirect thermal desorption (ITD).

As mentioned under Output 3.1, BSP has provided its own land, 12,000 sqm, for the plant construction, and also took over the responsibility of the civil construction. At the time of the evaluation mission, the civil construction was completed, all the necessary equipment was procured by Ramky, had arrived, was installed, and both the technologies – dechlorination unit and plasma unit – were awaiting final commissioning respectively.

According to interview data, after successful final commissioning, the next step was to carry out destruction and decontamination of test quantities, 10 MT, with each of the 2 static units, that is the PGTs, after which ownership was to be transferred from UNIDO to the MoEFCC. It was reported that the plan was for the MoEFCC to transfer the ownership of the plant to BSP. During the evaluation mission, BSP has requested further information about the transfer and procedure for transfer, as well as highlighted the support it requires in the form of a transition period of at least one year, if not more, for familiarization and acquiring specialization and experience in operating the static units, as well as the strong need for hands-on training for its staff foreseen for operating the units, for knowledge and skills’ transfer to become competent in operating the (complex) systems and adequately handling of sodium and plasma unit.

One issue, as mentioned and indicated by a few interviewed stakeholders, also needs special attention. Contracts for the static units were signed by the contractor in 2012 and 2014. All major equipment under the static dechlorination unit was delivered in September 2019; and in January 2020 for the plasma unit. As reported to the evaluation, suppliers normally provide a guaranty for one year, which was requested to be extended to two years, since UNIDO procurement rules require a guaranty for two years. However, after the completion of the civil construction, and acquiring all official permits and approvals, and also due to the unexpected COVID-19 related lockdowns, by the time the equipment was installed, and ready (for final commissioning), the two years of guaranty have long passed. The responsibility for providing equipment in functioning stage is with the contractor, only after which UNIDO will provide the letter of acceptance to the contractor.

So, basically, due to unforeseeable circumstances, including also unexpected approvals and permits, unexpected outbreak of the pandemic, the whole responsibility of functioning equipment is with the contractor company, which is not responsible for the delays. Moreover, Ramky has insured the equipment till May 2023⁶, that is, due to these delays, it had to pay additional amounts for the insurance, until the equipment hand-over has taken place. In addition to this, it has also assigned

⁶ Requested by and provided to the evaluation.

engineers to be based and work at the static plant, till it has fulfilled its contract obligations, for whom it is also paying for, thus altogether experiencing a considerable reduction in its calculated profit margin.

At the time of the evaluation mission, key stakeholders were positively optimistic that things would work out.

Regarding the mobile unit – mobile dechlorination plant and sodium dispersion unit from M/s NPO Dekanter in Russia – to be operated by the CPRI: it is reported to be delivered between March-November 2017. Experts/Staff of NPO Dekanter are reported to have arrived in 2018 and remained with CPRI in Bengaluru for 3-4 months, during which they carried out practical hands-on training for the staff of CPRI; at the same time, final commissioning and trial runs were conducted in 2018-March 2019; after which they left. CPRI has reported having faced lingual challenges, as the NPO Dekanter experts were not proficient in English, and initial challenges while operating the mobile unit on their own, after the experts had left.

Within the framework of the project, the foreseen quantity for decontamination by the mobile unit, to be operated by the CPRI, is 750 MT. The mobile unit, after receiving all approvals and permits, started operating and carried out decontamination activities as follows:

Name of institution	Decontamination commenced on	Decontamination completed on	Venue	Initial quantity of oil which was then decontaminated (MT)
TANGEDCO ⁷ , Tamil Nadu	20.12.2018	22.01.2019	CPRI	21.431
VISL ⁸ , Karnataka	05.03.2019	19.03.2019	VISL	25.000
KSEB ⁹ , Kerala	12.11.2019	04.12.2019	CPRI	1.050
Goodyear, Haryana			CPRI	0.950

⁷ Tamil Nadu Generation and Distribution Corporation Ltd., Tamil Nadu.

⁸ Visvesvaraya Iron and Steel Plant, Karnataka.

⁹ Kerala State Electricity Board, Kerala.

Harduaganj Thermal Powre Station, Uttar Pradesh	23.01.2020	24.10.2020	Harduaganj	140.130
NPCL ¹⁰ , Maharashtra	10.12.2021	23.12.2021	NPCL	23.539
Chandrapur TPP, Maharashtra	04.01.2022	31.03.2022	Chandrapur	145.089
Sub-total				359.189
Commissioning + Trial runs				57.900
Total				417.089

Source: CPRI - seven reports on dechlorination activities.

The CPRI has reported that (remaining) quantities at the above-mentioned and/or other institutions, to be decontaminated by the mobile unit, are already known. In theory, the CPRI could prepare a roadmap with time plan, according to which it could take its mobile unit to different regions and carry out its decontamination activities, without a loss of efficiency. It has however pointed out that following the roadmap, in practice, is a herculean task, as they would be faced with several challenges, for example, once already on a specific route in a particular region, it can be expected that one or more institutions postpone their planned decontamination to a later date, as these are all operating institutions, and have their daily work to conduct. The CPRI has reported and shown to the evaluation several parts, which it has additionally procured, so as to reduce the waiting time, in case any of these parts unexpectedly have any defects. However, this does not reduce the risk of other parts of the mobile unit being defect and dysfunctional unexpectedly, thus also having an impact on planned times, which in turn, may result in some of the following institutions postponing their planned decontamination. The roads are not always in a very good condition and the risk of any parts being affected while travelling on uneven roads, possibly with potholes, is high. Nonetheless, the CPRI is convinced that the remaining quantity, less than 350 MT, from the foreseen quantity of 750 MT can be achieved within 2 years' time.

This is a crucial Output and is **not (yet) achieved**; however, the evaluation would also like to note that, the static facility was ready during the evaluation mission, and awaiting final commissioning and PGTs. All going well, in future, it is expected to

¹⁰ Nuclear Power Corporation of India Ltd., Maharashtra.

present a good option for all PCB-owners in India, and other countries in the region, to make use of it.

Achievement of Outcomes:

Outcome 1: Strengthened policy and regulatory framework to comply with the obligations under the Stockholm Convention

At the time of project formulation and also after commencement, no legal or regulatory framework for ESM of PCBs existed in the country. Therefore, in April 2016, the relevant Ministry, the MoEFCC, issued a Gazette Notification 'Regulation of Polychlorinated Biphenyls Order, 2016', which came into force with the release of the Gazette Notification. It was made known via the Gazette Notification that use of PCBs is prohibited by 31st December 2025, and that PCB-owners are obliged to declare their PCBs within one year of the publication of the Notification, that is, by April 2017.

As mentioned earlier, whereas the country has indeed established PCB-related regulation in line with Stockholm Convention requirements, which, on the other hand, leaves room for delayed implementation of the same, as the PCB-owners may not feel obliged to take action before 31st December 2025.

This Outcome can be considered to be **completed** within the framework of the project; it is up to the key in-country stakeholders, if an addendum to "motivate" PCB-owners to come forward, report the status of their PCBs and get them treated (which is however possible after the static facility starts its operations, in case of pure or high-concentration or large quantities of PCB-oils and equipment).

Outcome 2: Relevant institutions in India are enabled to manage PCBs in an environmentally sound manner as well as awareness-raising on the adverse effect of PCBs

The CPRI has reached out to several institutions in 16 different States, prepared a database of transformers, carried out testing and informed the institutions about the status of PCBs in their respective institutions, and carried out 68 PCB awareness-raising workshops in 16 different States. Altogether 6 comprehensive guidance documents have been prepared on PCBs, as well as flyers and pamphlets in regional languages. Most of the interviewed institutions mentioned during the interviews that they were not aware of PCBs before the projects, the NIP and this one – started, and that they, in turn, have transferred information about PCBs to other persons within their respective institutions. During the interviews, they emphasized high awareness about PCBs in their respective institutions, and implementation of measures for safe handling of transformers and oils during testing, repair and maintenance of these.

This Outcome can be considered to be **completed** within the framework of the project. It is up to the Government to enforce the relevant Gazette Notification, carry

out inspections, and monitoring, and ensure that institutions are implementing ESM of PCBs.

Outcome 3: Targeted regional implementation for ESM of PCBs, PCB-containing equipment and wastes

Decision was made to procure one mobile facility, to be operated by the CPRI, and two static facilities – dechlorination unit and plasma unit, together with ITD unit – to be installed at BSP, in Bhilai, located in Central India. Decision was made against any central storages for PCB-contaminated oils and transformers, as some of these – lower quantities with low-concentration PCBs – were expected to be treated by the mobile facility, and pure or high-concentration PCBs to be sent to BSP. PCB-owner institutions were made aware of PCBs and its adverse effects via the PCB-awareness raising workshops and via the testing of oils from the respective institutions.

This Outcome can be considered to be **achieved** within the framework of the project. On the whole, in the country, much may remain to be done.

Outcome 4: Regional capability for final treatment and disposal of PCBs, PCB-containing equipment and wastes

At the time of the terminal evaluation, the mobile facility was already operational for some time, and had decontaminated slightly over 400 MT of PCB-contaminated oils, from 7 different institutions. The two static facilities, including the ITD unit, had been installed; final commissioning and test runs were yet to take place. The BSP, owner of around 1,700 MT of pure PCB oils expressed its strong wish, and commitment to commence with the destruction of these pure PCB oils. At the time of the evaluation mission, it was, however, not known, if and to what extent, PCB oils from other institutions will be included in the work schedule for the PCB-plant for destruction/dechlorination, once it starts its operations.

The mobile unit has a capacity of 4 MT per batch / 2 days;

The static dechlorination unit has a capacity of 1.7 MT per batch and 5 batches / day, if operating at full capacity, that is, 8.5 MT / day, at full capacity;

The static plasma unit has a capacity of 1 MT / day.

This Outcome is **not (yet) achieved**; one part (mobile facility) has commenced; the static units are not yet operational and awaiting final commissioning, only after which they can start operations.

Overall project objective:

The overall project objective is “to reduce or eliminate the use and releases of polychlorinated biphenyls (PCBs) to the environment through the development and

implementation of a pilot projects on the environmentally sound management (ESM) of PCBs and through the disposal of approximately 2,700 tons of pure PCBs and 5,000 tons of PCB-contaminated equipment, including PCB-contaminated mineral oils and related waste in three pilot states in India.”

1. As mentioned earlier, so far, 417.089 MT of PCB-oils have been decontaminated, via the mobile dechlorination unit, operated by the CPRI. The static facilities have yet to be commissioned and then commence operations. Therefore, at the time of the terminal evaluation, as far as the quantity is concerned, around 5.3% of the foreseen quantity has been achieved.
2. Taking the daily capacities of the static and mobile units into consideration, 7 years' time is needed to complete the foreseen quantity in the project of 7,700 MT, if the units can operate at full capacity. It is to be noted that this is the quantity that the project foresees to destruct/treat. This does not include all other quantities existing in the country, that is, the country will not be able to meet the Stockholm Convention deadline of 31st December 2028, neither for achieving the project's objective, nor for the quantities existing in the country, beyond the quantity foreseen by the project.
3. That said, a commendable amount of work and effort has gone into putting into place the mobile unit and above all, the static PCB-destruction plant. All the key stakeholders are very committed to achieving not only the project objective, but altogether committed to achieving the elimination of PCBs. Therefore, albeit with a delay, should the other PCB-owners in the country also be similarly committed, and the work of elimination of PCBs could continue, the country would be on a good path to achieving the target set by the Stockholm Convention.

Overall **project objective** is, therefore, **not (yet) achieved**.

4.2 Progress towards impact

Likelihood of Impact:

Impact is defined as positive and negative, intended and non-intended, long-term effects produced by a development intervention. For the purposes of this terminal evaluation, the assessment of impact is based on likelihood of achievement of impact, as long-term impacts have not yet been achieved.

At the time of the terminal evaluation, 417.089 MT of PCB-contaminated oil was decontaminated, thus commencing the destruction of PCBs in the country. The project objective of eliminating 7,700 MT of PCB-oils and contaminated oils, equipment and wastes, contributes, per se, to the environment, in a positive way.

Moreover, should the three facilities – one mobile and two static – continue their operations beyond the quantity foreseen by the project, which is what the relevant stakeholder institutions intend to do, as confirmed and emphasized to the evaluation,

further existing PCBs in the country would be eliminated, thus contributing to health and environmental impact.

a) Behavioural change

Economic competitiveness:

Solely with the quantities of pure PCB oil, PCB-contaminated oil and PCB-contaminated equipment and wastes identified at the BSP, and the quantities identified at a few other institutions, which are being treated with the mobile unit, the project can achieve the elimination of the quantity foreseen within the project.

If BSP were to send the 1,700 MT of pure PCB oils identified at the BSP, elsewhere for destruction, it would have to pay anywhere between USD 6-12 per kg, depending on market rate at the time of signing contract, including shipping, as transport prices are reported to have risen since the onset of the Russia-Ukraine war in February 2022. This would mean, the BSP would have to pay between USD 10-20 million for the destruction of only the pure PCB oils. By investing in the construction of the PCB plant on its own premises, by spending around Rs. 370,000,000, that is around USD 4.5 million, plus operational costs, it is saving the rest of the amount.

Moreover, once the PCB plant, after commencing operations, starts accepting PCB-oils and equipment for destruction and decontamination, beyond the lifetime of the project, it can request a fee for the disposal works, thus earning or at least contributing to its operational costs.

It is a similar situation for the other enterprises, even with smaller quantities of pure PCB/contaminated oils.

The above was confirmed by interviewees during the evaluation mission.

Environmentally sound:

Project foresees the disposal of 7,700 MT of PCB-oils, equipment and wastes. Technologies, both static and mobile, conform to best available technology (BAT). Decontamination has commenced with the mobile unit, and 417.089 MT of PCB-contaminated oil has already been treated.

Interviews with 7 institutions with smaller quantities of PCB oils also confirmed their awareness on the issue of PCBs and implementation of ESM of PCB-contaminated oils in their respective institutions.

Socially inclusive:

In addition to the above-mentioned contribution to the environment, the new static PCB-plant established would require, besides the engineers already working at the BSP, further persons to be employed in various functions.

b) Broader adoption

Mainstreaming: As mentioned under Outcome 1, the Government of India, via the MoEFCC, has published a Gazette Notification/Order on ‘The Regulation of Polychlorinated Biphenyls Order, 2016’. This Order is already valid since 6th April 2016. According to this official Gazette Notification, all import, export and trade of PCB-oil and/or contaminated equipment is prohibited, all PCB-containing equipment cannot be used after 31st December 2025, PCB owners are obliged to declare their PCBs within one year of publication of the Order, and all PCBs/contaminated equipment are to be disposed off by 31st December 2028.

Interview data confirmed that institutions are aware of the above Order and expressed their commitment to comply with it.

Replication: A replication of the technologies by the same institutions, namely, BSP and CPRI, was not mentioned during any of the interviews. The CPRI did point out that one mobile unit to service small PCB-owners in the whole country is not sufficient. However, owing to the costs, of procurement and operations, at the time of the terminal evaluation, no concrete plans existed for a replication.

As far as the disposal of PCBs itself is concerned, institutions are reported to be enquiring about the disposal options, as they wish to get their oils treated as soon as realistically possible.

Scaling-up: After achieving the disposal of 1,700 MT of pure PCB-oil at the BSP (and maybe in parallel to it, which was an option being discussed at the BSP during the evaluation mission), it plans to include PCB-contaminated oil, equipment and wastes from other institutions as well.

The CPRI has already identified institutions to be serviced with the mobile unit. After achieving the foreseen quantity of 750 MT within the project, it intends to continue operating the mobile unit, against some fee (to be planned and decided at later stage).

c) Emergence of TOC intermediate states

Intermediate State	Findings	Rating
I. Technology and infrastructure maintained and continue operations	For the static facility, it is too early to have any observations to report, as it is awaiting final commissioning. Nevertheless, the BSP is highly committed to maintain and operate the facility. For the mobile facility, the CPRI has also procured some spare parts, and has reported to have staff who can repair	MS

	and maintain the unit, with the exception of the computer.	
II. Enforcement of national regulations on PCBs by relevant authorities	At the time of the terminal evaluation, it was not clear, if and how authorities, that is, the MoEFCC, via the CPCB or the CPRI, plans to inspect or monitor the implementation of the national regulation on PCBs.	MS
III. Other PCB-owner institutions engage to establish ESM of PCBs and disposal	Several interviews highlighted that other PCB-owner institutions are willing to dispose their PCBs, and in several cases, the time factor proves to be the hindrance, as the disposal activity would have to take place in addition to their normal work.	MS
IV. Adherence to ESM of PCBs by all, including people dealing with, and coming in contact with, PCB oils and PCB-contaminated equipment.	PCB-awareness workshops have been carried out, and interviewed stakeholders reported adherence to ESM of PCBs at their respective institutions, which has not been evidenced by the evaluation.	MS
Drivers	All the drivers are considered to hold true.	
Obligation to Stockholm Convention	All the interviewed stakeholders have emphasized their commitment to the disposal of PCBs; the MoEFCC has notified national regulation pertinent to PCBs; the mobile dechlorination unit has already commenced operations, however, the static facility was still awaiting commissioning, before it starts its operations.	S
Health and environment concerns	Not only have all the interviewed stakeholders emphasized their commitment to the disposal of PCBs, they have also mentioned enhanced awareness at their institutions and in	S

	wider population regarding health and environment concerns.	
Incentives	The treatment with the mobile unit is done at a subsidized cost, and in two cases, even this has been waived. PCB-owner institutions are willing to get their PCB-oils treated, and are also reported to be enquiring about the commencement of the static disposal facility.	S
Assumptions		
iii. Authorities have adequate resources for enforcement and monitoring;	At the time of the terminal evaluation, this could not be established; therefore, it remains to be seen, if this assumption will hold true in future.	MS
iv. PCB owners understand, have resources and continue	PCB-owner institutions have expressed their understanding for the issue of PCBs and willingness to dispose off; however, it remains to be seen, to what extent, other PCB-owner institutions, besides BSP, will come forward with their stocks of PCBs and participate in disposal activities.	MS

The following assessment is based on the evaluation criteria, as mentioned in the TOR for the TE.

5. Project's quality and performance

5.1 Project Design and results framework/logframe

According to the project document, the Central Power Research Institute (CPRI) had conducted a survey between 2004 and 2008, and established a preliminary inventory of PCB-containing electrical equipment, with an **estimated** quantity of 7,700 tons of PCB-contaminated oils and equipment.

Project has a clear thematically-focused development objective, namely, "To reduce or eliminate the use and releases of polychlorinated biphenyls (PCBs) to the environment through the development and implementation of a pilot projects on the

environmentally sound management (ESM) of PCBs and through the disposal of approximately 2,700 tons of pure PCBs and 5,000 tons of PCB-contaminated equipment, including PCB-contaminated mineral oils and related waste in three pilot states in India.”

In order to achieve this objective, planned components were – legal and regulatory framework for the ESM of PCBs, capacity-building, a national tracking and record-keeping system, awareness-raising, management system for identification, tracking, collection, packaging, transport, interim storage, and final treatment of 7,700 tons of PCB oils, equipment and wastes. These components are similar to those of other PCB projects, including UNIDO’s PCB projects, the main difference being that inventory was not a part of this project; the main project components are deemed to be adequate¹¹ to achieve the aforementioned project objective.

Project has been formulated in 2008 and 2009, based on the logical framework approach, in line with the then GEF and UNIDO’s requirements. Corresponding indicators for the Activities are mentioned in the logical framework; these are, however, not quantified, which is reported to not have been a requirement at that time, for example, “number of train-the-trainers programs carried out”.

Environmental and social risks (health risks) have been mentioned in the project document, under various sub-sections, for example, amongst others, “lack of awareness of PCB risks”, “lack of dedicated environmentally sound maintenance capacity for PCB-containing equipment”. Moreover, environmental risks have been taken into consideration for different scenarios in the risk assessment matrix, as well as in the logical framework matrix. Despite being a project of this scope in terms of GEF budget, and the sizeable static facility, proper risk analysis, environmental impact assessment and a proper feasibility study are not part of the project activities.

The expected result-chain – activities, outputs, outcomes – is clear and logical; outputs describe deliverables that the project will produce to achieve Outcomes. Expected results are considered to be realistic and measurable.

The terminal evaluation concurs with the mid-term evaluation on the time requirement for the processes to develop and establish the regulatory framework that it was not adequately taken into consideration in project planning.

5.2 Relevance and Coherence

As mentioned earlier, the Republic of India is party to the Stockholm Convention and as such, is expected to fulfil its obligations to under it. India prepared and submitted its NIP in 2011; and one of the Action Plans in the NIP relates to production, import and export, use, identification, labelling, removal, storage and disposal of PCBs and of

¹¹ Comparing with other PCB projects, at UNIDO and at other Organizations.

facilities containing PCBs. Project is highly relevant within the context of the obligations of the country under the Stockholm Convention to eliminate and/or reduce POPs, especially PCBs, and in line with the NIP of the Republic of India.

Further, according to the project document, and as confirmed by interviewees, no specific legal framework – laws and regulations – pertinent to PCBs existed in the country before the project. Project is deemed to be highly relevant also in this regard, as it intended to strengthen (in this case, prepare) policy and regulatory framework, under Component 1, to comply with the obligations under the Stockholm Convention.

The project is also in line with the GEF-4 POPs Focal Area Strategy. The GEF's goal in the POPs focal area is “to protect human health and the environment by assisting countries to reduce and eliminate production, use and releases of POPs, and consequently contribute generally to capacity development for the sound management of chemicals”. Under GEF-4, this goal was to be achieved by amongst others: strengthening capacities for National Implementation Plan (NIP) implementation; partnering in investments for NIP implementation; and partnering in demonstration of feasible, innovative technologies and best practices for POPs reduction and substitution, which is all being done within the framework of this project.

The project is in line with UNIDO's Inclusive and Sustainable Industrial Development (ISID). UNIDO's Mission Statement (IDB.39/13/Rev.1) includes safeguarding the environment¹² and reiterates the flexible UNIDO approach¹³ for ISID. One of the pillars of the ISID is Safeguarding the Environment - environmentally sustainable growth, via “...the promotion, adaptation and transfer of environmentally sound technologies...”, under which UNIDO aims to “...assist countries in reaching compliance with the Stockholm Convention and aims at developing capacities in developing countries to protect their populations and their environmental resources from POPs-related pollution”.

Project is collaborating with the appropriate institutions, inter alia, MoEFCC – which is the nodal agency for the planning, promotion, coordination and oversight of the implementation of India's environmental and forestry policies and programmes; CPRI – under the Ministry of Power, selected to implement PCB-related activities in the role of national executing organization; BSP, the largest PCB-owner institution; and other PCB owners. It was pointed out in the MTE that civil society was not directly involved in the project, although it was considered to be important as population is considered to be directly affected by negative consequences of PCBs. This has not changed. According to interview data, owing to the nature of the project, equipment being

¹² “UNIDO aspires to reduce poverty through sustainable industrial development. We want every country to have the opportunity to grow a flourishing productive sector, and to safeguard their environment”.

¹³ “Differentiate and adapt our approaches and methodologies according to the needs of countries at different stages of development”.

procured and PCB-plant being constructed and established, it was not considered to be realistic to involve civil society at this stage. Moreover, the awareness-raising workshops have been carried out at institutions which have identified PCBs or have the potential to possess PCBs at their respective institutions.

High relevance of the project was emphasized by all the interviewed stakeholders. Project is **coherent** with national policies and strategies. Expected results are still valid and pertinent to the target groups.

5.3 Efficiency

(Including Financial Management and Co-financing)

GEF approved the project in December 2009, and the project commenced at UNIDO (issuance of first PAD¹⁴) in January 2010. Planned duration of the project was 60 months, that is, planned project completion was in December 2014. It has received six extensions till the terminal evaluation, was planned to be completed in December 2022, and was planning for a necessary extension of 1 year to commence PCB-disposal operations at the static facility in BSP.

An Inception Workshop did not take place; instead, a Vendor Workshop took place from 24-26 August 2010, and the 1st Technical Working Group (TWG) meeting took place on 18 November 2010.

The MTE took place end of 2014, almost 5 years after project commencement, that is, at the time of initially planned project completion. Effectiveness and efficiency of project implementation were assessed to be 'moderately unsatisfactory'. According to the MTE report, issues which have negatively affected project implementation till the time of the MTE were, amongst others,

- No Inception Workshop;
- Change of NPC without adequate handover;
- Change of operating entity;
- 1st tendering process wasn't successful;
- Change in fund-flow arrangement by the Department of Economic Affairs;
- Partial success of 2nd tendering process;
- Time taken for 3rd tendering process;
- Time taken (2 years) for administrative permits (Environmental Clearance) for the construction of the disposal unit.

¹⁴ Project Allotment Document.

According to the documents provided to the evaluation, the tender for the mobile facility was released in February 2015. After completing all the procurement procedures, procuring additional necessary equipment and receiving all in-country approval and permit procedures, the mobile facility became operational in November 2019.

For the static facilities – plasma, dechlorination and Indirect Thermal Desorption (ITD), this time is longer, and reportedly with several challenges. The first tender for the static facilities was released in June 2011, which was not successful due to very high (beyond the project budget) commercial bids. Thereafter, it was split into 2 parts – one for the static dechlorination unit and one for the static plasma system, and new tenders released.

Tender for the civil construction of the static facilities was released in July 2015; civil construction work was almost completed in September 2019, after which equipment started arriving at the site. In February 2021, all construction work was completed, and all equipment installed till December 2021, after which the ‘consent to operate’ and other necessary approvals were applied for.

At the time of the terminal evaluation, in September 2022, the static facilities were awaiting final commissioning and PGTs, only after which they can start operating.

Foreseen time for implementation of the project was 5 years, and at the time of the terminal evaluation, project was already in the 13th year of implementation, that is, delayed by 8 years, and extended 6 times, and planning for another extension of 1 year, bringing the project duration altogether to 14 years (including the last foreseen extension planned to be submitted).

Summarizing the above, times taken to establish the facilities, for the static facilities, starting the first tender in February 2011, up to final commissioning and PGTs potentially at the end of 2022, it has taken almost 12 years. Several factors are reported to have contributed to this high longevity of the whole process – the tender process (although it was not the tender process per se which was faulty or inappropriate), the change of ownership of the plasma technology owner enterprise, the decision of changing the site from inside the BSP to outside its compound to enable other external enterprises to access it, the different permits and approvals to be obtained for the site, the construction, the equipment, operating the equipment, then several related permits – environmental, air, water, etc. In addition to the aforementioned, the unexpected outbreak of the COVID-19 pandemic beginning of 2020, due to which, inter alia, several works had to be halted, experts for the plasma technology, from Australia, could not enter the country, several permits and approvals have taken longer, as people could not go to the offices. Interview or secondary research could also not provide alternatives to speed up the above-mentioned factors, which impacted the time duration of the project, or to make them more cost effective. Other foreseen activities have been completed.

(If) Operating at full capacities, without any disturbances and/or waiting/preparation times:

		MT in 240 work days in a year	Quantities existing of PCBs	Time required (in years)	Quantity foreseen in project	
Mobile unit	4 MT per batch / 2 days	480 MT			750 MT (Around 330 MT remaining)	Around 2 years
Dechlorination unit	3 MT / day	720 MT	7,867 contaminated oils	10.9		7.2 years
Plasma unit	1 MT / day	240 MT	1,972 MT pure	8.2	1,700 MT	7 years
Total		1,440 MT	9,839 MT			

Source: Reports and interview data.

From the above table, it is clear that project can achieve its objective of disposal of 7,700 MT of PCB-oils, equipment and wastes, in 7 years, after commencing operations of the static units, and only if working at full capacities, without any waiting times, and without any (expected or unexpected) disturbances, which already goes beyond the deadline of the Stockholm Convention of 31st December 2028. For the disposal of the total established quantity so far, around 11 years would be necessary.

Besides the repetition of the international tenders for the static facilities, other issues have not been reported by UNIDO's Procurement Division. The contract with NPO Dekanter was fulfilled and closed; the contracts with CPRI and M/s Ramky were still ongoing.

Synergies with activities of other projects have not been reported. Nonetheless, the National Technical Advisor is also working on another UNIDO project – on DDT-Alternatives – and the officials from the MoEFCC, the NPD, NPC and GEF OFP are the same persons for both GEF-funded projects. Therefore, during yearly review meetings, both projects were discussed with the stakeholders within the same meetings. Moreover, learnings from this project are reported to have been useful for

the DDT-Alternatives project that is, about setting up a facility. Further, the static facility was planned to be a regional facility for PCBs also from other countries, for example, Indonesia and Nepal.

A website has been created, which is a sub-site of the CPRI-website. It contains information about PCBs, all the guidance documents prepared within the project, the flyers and the reports of dechlorination from 7 institutions. Other knowledge management system, also any project-internal for key stakeholders, has not been reported to exist.

Regarding the consideration of recommendations of the MTE:

1. Recommendation 1 was regarding additional time requirements for the project and to expedite implementation of project activities.
 - Actual time required for implementation is explained above.
2. Recommendation 2 was regarding strengthening the PMU, proper hand-over mechanisms, higher engagement of stakeholders and regular monitoring.
 - Project has recruited an Assistant to the National Project Coordinator (ANPC) to support coordination activities at the MoEFCC; key stakeholders are reported to be engaging well with the project, and annual review meetings have taken place.

National Experts (NEs) have been recruited, as required, amongst others, one each based at BSP and CPRI. Three international experts have also provided support to the project, one during the preparation of the project document, one for the evaluation of the tender biddings, and one for the preparation of the guidance documents prepared under the project.

As India is a relatively big country in size, being the 7th largest country in the world in terms of land mass, with the 2nd largest population, it is difficult to compare the PCB-disposal project in India to those in most other countries. The People's Republic of China received GEF funding amounting to over USD 18 million for its PCB-disposal project, which was completed in 2013. Considering the GEF funding for China, the GEF funds provided for the project in India can be considered to be comparable.

At the time of the terminal evaluation, project expenditure was USD 12,977,634 that is 92% of the GEF grant had been spent/obligated till 29 November 2022. The expenditure is shown in the following table:

UNIDO budget execution:

Items of expenditure	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total expenditure
Contractual Services	-	-	4,184,640*	555,652	1,680,219	3,864,692	752,047	131,652	12,272	329,109	- 235,087**	29	11,275,225
International Meetings	-	-	45,838*	0	272	0	0	0	0	0	0	0	46,110
Local travel	-	-	76,692*	7,236	16,885	9,167	12,890	21,727	18,140	3,573	1,268	677	168,255
Nat. Consult./Staff	-	-	182,761*	79,267	88,101	76,955	87,526	71,697	109,895	101,474	101,810	105,367	1,004,853
Other Direct Costs	-	-	28,515*	0	1,144	0	2,759	1,838	8,291	- 161,605**	4,502	6,416	- 108,140
Staff & Intern Consultants	-	-	237,467*	- 2,019	30,617	- 52,628	8,106	1,099	41,503	2,275	22	6,277	272,719
Train/Fellowship/Study	-	-	2,719*	0	509	0	0	0	0	0		1,311	4,539** *
Premises	-	-	71,600*	26,419	25,853	14,196	46,177	3,313	1,388	30,540	15,295	28,967	263,748

Items of expenditure	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total expenditure
Equipment	-	-	0*	0	4,751	0	330	44,571	665	0	0	8	50,325
Grand Total	-	-	4,830,232	666,555	1,848,351	3,912,382	909,835	275,897	192,154	305,366	-112,190	149,052	12,977,634

Source: UNIDO Project Management database as of 29.11.2022.

*The reporting figure for 2012 contains the cumulative figures for 2010-2012 due to the transition to a new budget management system

** The goods/services tax (GST) was reimbursed by the project

*** The costs for Trainings/ Study Tours were mainly covered through contractual services

An amount of USD 1,122,366 is still left within the project budget. As such, project completion is planned for December 2022. The PCB disposal activities are foreseen to continue for the next years; as per theoretical calculation of the evaluation, based on the capacities of the units reported, if running at full capacity, 7 years to complete the quantity foreseen by the project, and additional 4 years to complete the established quantity in the country.

According to the project document, expected co-finance was as follows:

Sources of Co-financing	Name of Co-financier (source)	Type of Co-financing	Committed Co-finance (\$)
National Government	MOEF	Grant and In-kind	7,500,000
Implementing Agency	UNIDO	In-kind	150,000
Other stakeholders (CPRI)	CPRI	Grand and in-kind	21,350,000
Total Co-financing			29,000,000

Source: Project document.

CPRI has spent co-finance in the form of parking and storage space for the mobile unit and its spare-parts, and its staff time. BSP has spent reportedly over Rs. 37 crores, around USD 4.5 million, for the civil construction. In addition to that, it has provided its own industrial site, 12,000 sqm for the establishment of the static PCB-disposal plant.

Official documents on **co-finance** spent by the institutions have been **requested and awaited** by the evaluation. By the time of issuance of this report, final figures could not be collected by the Evaluation Team.

Inputs from the donor GEF and UNIDO have been provided as planned and are reported to have been adequate to meet the requirements. The approved GEF funds have been received by UNIDO. Key stakeholder institutions, BSP and CPRI, have provided co-finance, as mentioned earlier, in the form of land and infrastructure, electricity, water, and human resources; official documentation on expenditure of co-finance was not provided to the evaluation, despite several reminders.

5.4 Likelihood of sustainability of project results

Project has carried out several activities, inter alia, capacity building via 68 workshops, updating the laboratory by procuring equipment, enhancing disposal capacity by procuring, amongst others, mobile dechlorination unit, static, dechlorination, plasma and ITD systems, contributed to the regulatory and legal framework of the country pertinent to PCBs, and carried out awareness-raising. Thus, it has contributed to sustainability of project results via knowledge transfer, technology transfer, regulatory framework and by creating awareness of PCBs. To what extent the enterprises would adhere to the existing regulatory framework, declare PCBs in their enterprises and participate in the disposal activities after the project remains to be seen.

According to interview data and observations during the evaluation mission, **to ensure sustainability of static PCB-plant operation, at least a one-year extension of the project would be necessary.** Since the procurement of the equipment for the static facility, the equipment is being handled by persons from M/s Ramky, in the role of the contractor procuring the equipment, and since handover has not taken place. BSP has already assigned staff to the static facility, who can not yet physically participate in any of the testing procedures, since handover has not yet taken place. BSP/staff would require at least one year's time, as **transition time**, during which, they can observe the operations, get hands-on training on operating the equipment and start operating the equipment themselves, including getting familiar with technical adjustments required in any smaller arising technical issues. BSP has also requested instructions for individual equipment, as well as for the operations altogether.

Financial risks:

Financial risks for a continuation of operation of the procured technologies, both static and mobile, are considered to be low. Both the institutions, CPRI and BSP, are well-established institutions, operating since several decades, and both have reiterated their commitment to operating the mobile and static facilities for PCB-disposal respectively.

The CPRI was established in 1960 and has several areas of work, it is called the “power house of the Indian electrical industry”, and functions as a centre for applied research in electrical power engineering. It also serves as an independent authority for testing and certification of power equipment.

The BSP was established in 1959 and is a key producer of steel rails, besides steel plates and other steel products. It has declared 1,700 MT of pure PCBs on its own, and is interested in its disposal, in full compliance with the new regulation on PCBs in the country. Its main operation is steel production. The static facilities have been installed on land provided by the BSP and it has spent USD 4.5 million on its own (non-committed co-finance, interview data). Its daily operations are independent of the

PCB-disposal facilities. Therefore, at the time of the terminal evaluation, no indications of financial risks were pointed out to the evaluation.

Notwithstanding the above, both institutions would benefit from a business plan for continued operations of the PCB-disposal facilities, including quantities from other institutions, and beyond the quantities foreseen in and duration of the project, as well as fee to be requested for the disposal.

Socio-political risks:

Socio-political risks are considered to be low. MoEFCC is the nodal agency in the country for the environmental thematic area. The MoEFCC has already published a new Gazette Notification in 2016 regarding PCBs, which is valid since its publication.

Elimination of PCBs also benefits wider population; therefore, all going well with the PCB-disposal operations, social risks are considered to be low.

Institutional framework and governance risks:

Institutional and governance risks are considered to be low, for the reasons mentioned above under 'financial risks', with regards to BSP and CPRI, and MoEFCC under 'socio-political risks'.

Environmental risks:

Environmental risks are considered to be medium. As such, a risk of oil spillage, in this case, leakage or spillage of pure PCB oils or PCB-contaminated oil, would exist anywhere; nevertheless, with enhanced awareness on ESM of PCBs, the probability of such risks happening is reduced. All going well with the PCB-disposal operations in future, both at the static and mobile facilities, environmental risks could be maintained as low. With the establishment of the static facility, as well as the procurement of the mobile facility, a transport of PCB-oils and equipment to other countries outside India is also not necessary anymore. However, a transport of contaminated oils from the owner institutions till BSP or to CPRI would still be necessary.

5.5 Gender mainstreaming

Under GEF-4, including gender consideration in the project was not a requirement. And as reported to the evaluation, owing to the technical nature of the project, and since PCBs would have a negative effect on everyone, female or male, gender aspect was not separately considered or included in the project document.

As reported to the evaluation, owing to the large number of participants at the PCB-awareness-raising workshops, gender-disaggregated data was not compiled.

Nonetheless, no gender-related issues were reported to the evaluation. Female persons are working in different aspects of the project and at key stakeholder institutions, for example, the ANPC at the MoEFCC is a female person; the CEO of BSP

is a female person; female persons were also included during interviews with 7 owner institutions of smaller quantities of PCBs; and the UNIDO PM is a female person.

6. Performance of partners

6.1 UNIDO

Project team in the field

A National Technical Advisor (NTA) has been working on the project since project formulation. It is the same person, who, amongst others, was also involved in the preparation of the NIP, thus having knowledge of the NIP and the components of this project. The NTA devotes time to day-to-day management of the project, coordinating with the partnering institutions and reporting. An Assistant National Project Coordinator has been recruited, who is based at the MoEFCC, to support coordinating activities at the MoEFCC, and one to assist and work with the NTA. A National Expert is recruited and based at the two key stakeholder institutions, BSP and CPRI respectively. Interviewed stakeholders expressed positive feedback about this set-up.

UNIDO HQ-based management

UNIDO HQ-based management is deemed to be supportive and effective. According to interview data, the project was transferred to the project manager (PM) in 2013, since then, no changes have been reported. The UNIDO PM has visited the static facility, after its completion, in August 2022, after the COVID-19 situation improved, so that travels could take place. In pre-COVID-19 times, the UNIDO PM is reported to have visited stakeholders and project site/equipment/facility as necessary, and for review meetings. The UNIDO PM provides inputs to the project and any queries in a timely manner.

A UNIDO Regional Office (RO) headed by a director, represents UNIDO in the country. The UNIDO RO is reported to not be involved in the implementation of any project activities; it is, nevertheless, highly appreciated at country level, and reported to be very supportive to the project. The director of the UNIDO RO participates in meetings and events, and represents the project at higher-level fora.

6.2 National counterparts

National counterparts

The MoEFCC has emphasized the high relevance of the project, as well as its commitment to the project objective. At the same time, it has expressed a need for closer collaboration and interaction amongst the different stakeholders, as well as for enhanced exchange of information.

Both BSP and CPRI, as well as the contractor, M/s Ramky, are very committed to the project; the same can be said about the 7 other interviewed PCB-owner institutions, which have been serviced with the mobile facility. BSP and CPRI have participated

actively in/implemented project activities and BSP has mentioned spending around USD 4.5 million co-finance.

6.3 Donor

GEF approval for the project was received in December 2009, after which GEF funds were transferred to UNIDO. UNIDO has submitted annual project implementation reports (PIRs) to the GEF starting in 2012 till 2022, covering the period up to 30 June 2022; 6 extension requests for project implementation have been approved by the GEF.

7. Factors facilitating or limiting the achievement of results

7.1 Project management and Results-based management

Overall project management is under the responsibility of UNIDO PM, who is based at UNIDO Headquarters HQ in Vienna. One change of PM is reported to have taken place at UNIDO HQ, in 2012/13, and the same PM is managing the project since then. Project reports on different activities and outputs annually to the GEF, as per GEF requirements.

Taking the work plans into consideration, planning was results-based, but implementation of activities has not been possible according to the time frames foreseen in the work plans. It is difficult to say anything about adaptive management approach, because as such no alternatives existed to the several approvals and permits which were necessary for the construction of the static facility and installation of equipment inside the static facility.

7.2 M&E, reporting

M&E and reporting

The project document entails a sub-section on M&E, with an overall budget M&E plan, including M&E activity, responsible parties, budget and time frame. As mentioned earlier, in lieu of the planned Inception Workshop, as Vendor Workshop has taken place; albeit with delay, the foreseen mid-term evaluation has taken place; review meetings have taken place; and the terminal evaluation has taken place. The total budget foreseen for the M&E activities is considered to be adequate.

The MTE has assessed the M&E system to be 'highly unsatisfactory', as the M&E plan, as outlined in the project document, was not being implemented.

As per reports provided to the evaluation, the following PSC/NSC/Review meetings have taken place:

	Date	Meeting	Venue	Institutions
1	22 March 2010	NSC	MoEFCC	MoEFCC, Ministry of Health & Social Welfare (MoH&FW), Ministry of External Affairs, Ministry of Agriculture (MoA), Department of Chemical and Petrochemicals, Indian Institute of Toxicology Research, CPRI, Department of Industrial Policy & Promotion, NTA, Regional Coordinator RENPAP, ANPCs
2	09 May 2012	Sub-committee of the NSC		MoEFCC, MoH&FW, CPRI, MoA, BSP, SAIL, RENPAP, NTA, Department of Chemical & Petrochemical
3	08 November 2013	4 th NSC (Agenda? Or MoM?)		
4	17 June 2016	PSC	MoEFCC	MoEFCC, BSP, SAIL, CPRI, CPCB, Ministry of Steel, UNIDO RO, UNIDO PM, UNIDO Procurement Adviser, RENPAP, NTA, ANPCs
5	28 March 2017	Review	MoEFCC	MoEFCC, CPRI, BSP, SAIL, HIL, NBRI, IPFT, NVBDCP, RENPAP, NTA, National Technical Project Support, ANPC
6	26 June 2018	Review	MoEFCC	MoEFCC, UNDP, UNEP, World Bank (WB), RENPAP, NTA, ANPCs
7	06 August 2019	Review	UNIDO RO	CPRI, BSP, SAIL, UNIDO RO, RENPAP, NTA
8	04 October 2019	Review	MoEFCC	MoEFCC, CPCB, UNEP, RENPAP, NTA, ANPC

9	11 September 2020	Review (no MoM)	Virtual	
10	16 March 2021	PSC	Virtual	MoEFCC, CPCP, BSP, SAIL, Ministry of Steel, CPRI, Central Electricity Authority (CEA), State Electricity Boards, UNIDO RO, UNIDO PM, RENPAP, NTA, NEs, ANPC, Project Assistant
11	25 October 2021	Review		MoEFCC, BSP, SAIL, CPRI, UNIDO RO, UNIDO PM, NTA, NEs

Source: (PSC) meeting reports.

It is contestable if PSC/Review meetings once a year can be considered to be sufficient, for a project of this scale and magnitude, and especially due to the delay in project completion; nevertheless, as can be seen in the above table, NSC/PSC/Review meetings have taken place at least once every year, as foreseen in the project document, except in 2011, 2014 and 2015. Signed minutes of the meetings (MoMs) were not provided to the evaluation for all the above meetings.

CPRI has carried out its reporting as foreseen, and several reports from 2014 – 2022 have been provided to the evaluation, including the reports on dechlorination activities via the mobile unit.

Several progress reports have also been provided to the evaluation, some of these are monthly progress reports, some yearly, and some on specific activities; some reports do not mention the date of report or the person/institution who prepared the report. Annual PIRs have been submitted to the GEF from 2012-2022.

7.3 Stakeholder engagement and communication

Stakeholder engagement:

The MoEFCC has attended all the PSC/Review meetings since the commencement of the project, with the exception of one in 2019, which was conducted to review the status of project implementation before the Review meeting with the MoEFCC later in the same year; it has however not yet visited the static PCB-plant or the mobile unit. CPRI has participated in the PSC/Review meetings since 2010 and BSP since 2012. Both the institutions are very committed to achieving the project objective. CPRI is already operating the mobile facility, has provided space/land on their campus for the mobile facility, as well as other related equipment and spare-parts, and constructed a shed to keep dry the equipment for preparing the sodium dispersion. According to interview data, BSP has spent over Rs. 37 crores, approximately USD 4.5 million, only

for the civil construction of the facility. During the evaluation mission, the evaluation could meet and speak with representatives of the MoEFCC, BSP, M/s Ramky, CPRI, NTA and NEs.

Communication:

Besides their participation in the PSC/Review, stakeholders working on the same aspects, for example, those involved in the static facility or mobile facility respectively, are reported to be in touch with each other frequently and as necessary. With the NEs engaged by UNIDO and based at each of the two facilities, static and mobile, interaction and coordination of the stakeholders with the NEs is reported to be on a daily basis. All stakeholders are also reported to interact with the NTA on an ad hoc, but frequent basis. The MoEFCC has pointed out the need for more frequent communication, interaction and information exchange amongst the different stakeholders, and especially regarding the involvement of the MoEFCC in the communication loop.

External communication:

Project and PCB-related information, including flyers in 10 regional languages, Assamese, Bengali, Gujarati, Hindi, Kannada, Malayalam, Marathi, Odishi, Tamil and Telugu, and all the guidance documents prepared under the project are provided on a sub-site of CPRI's website <https://www.cpri.res.in>

7.4 Overarching assessment and ratings table

Evaluation Criteria	Comments	Rating
A. Progress to impact	<i>PCB-disposal activity has commenced with the mobile dechlorination unit, over 400 MT of PCB-contaminated oil has been decontaminated, out of a foreseen 7,700 MT. At the same time, PCB-related legislation is in place, and awareness-raising workshops have been carried out.</i>	MS
B. Project Design		S
B.1 Overall design	<i>Project design is similar to other PCB projects and has a clear and specific development objective. Despite a</i>	S

	<i>large scope in terms of budget and facility to be constructed, Environmental Impact Assessment, Risk Analysis and Feasibility Study have not been included as project activities.</i>	
B.2 Logframe	<i>Project document was prepared in 2008/09, and entails a logical framework with indicators, which are not quantified; the results-chain is clear and logical.</i>	S
C. Project performance		
C.1 Relevance	<i>In line with priorities of the country, Stockholm Convention, GEF and UNIDO; PCBs exist in the country, and project included, amongst others, PCB-related legislation and PCB-disposal. Considered highly relevant by all interviewed stakeholders.</i>	HS
C.2 Effectiveness	<i>PCB-related legislation prepared; awareness-raising workshops conducted; mobile and static PCB-disposal equipment procured; PCB-disposal commenced, and over 400 MT of PCB-contaminated oil decontaminated with the mobile unit, from the foreseen quantity of 7,700 MT; static facility has not commenced operations yet, at the time of the TE.</i>	U
C.3 Efficiency	<i>Project commenced in January 2010 with a foreseen duration of 5 years. It has experienced delays due to various reasons, which were outside the control of the project. In the meantime, project is in its 13th year of implementation. Key stakeholder institutions have spent co-finance; official documentation is however still awaited.</i>	MU
C.4 Likelihood of Sustainability of benefits	<i>Financial risks for the operations and continuation of operations of both mobile and static facilities, socio-political risks and institutional and governance risks are considered to be low. Operating institution for the static facility would need time for capacity-building and more importantly, hands-on training, to operate the static facility (beyond project completion).</i>	L

D. Cross-cutting performance criteria		
D.1 Gender mainstreaming	<i>Gender mainstreaming was not a requirement under GEF-4. Although gender aspect has not been specifically considered in project activities, no issues were reported, and both genders are represented at all stakeholder institutions, and are participating in the project.</i>	S
D.2 M&E	<i>PSC meetings have been carried out once in most of the years of project implementation, except 2011, 2014 and 2015. Some of the progress reports submitted to the evaluation are monthly progress reports, some are yearly and some are prepared for specific activities; some of the reports do not contain the date of report and the person who wrote the report. MTE has been conducted in 2014.</i>	MU
D.3 Results-based management (RBM)	<i>Reporting to the GEF is based on project activities and outputs. Workplan was prepared, but due to the delays experienced, work has not been carried out according to the workplans. Despite the long delay altogether, as well as the delay in setting up the static facility, a full-fledged risk analysis should have been prepared as well as a feasibility study.</i>	MU
E. Performance of partners		
E.2 National counterparts	<i>All national stakeholder institutions are highly committed to the project objective, are supportive of the project, and have spent co-finance. The MoEFCC has issued legislation already in 2016, BSP has spent around USD 4.5 million co-finance, and CPRI maintains the mobile facility and operates it.</i>	S
E.1 UNIDO	<i>UNIDO HQ provides support and technical inputs; a risk analysis and feasibility study were not carried out, especially taking the delay into consideration. UNIDO RO is considered to be very supportive to the project and represents the project at high-level fora.</i>	MS

E.3 Donor	<i>The GEF has provided comments and feedback to the initial PIF. It receives annual PIRs.</i>	S
F. Overall assessment	Although project has completed a majority of Outputs, 11 out of 13, the major Output to achieve project objective, that is, the elimination of 7,700 MT of PCB-contaminated oils, equipment and wastes has not been achieved; over 400 MT has been achieved till the TE; the static facility had not commenced operations, and was awaiting final commissioning and PGTs.	MU

As mentioned in the TOR, the evaluation rating scale is as follows:

Score		Definition	Category
6	Highly Satisfactory (HS)	Level of achievement presents no shortcomings (90% - 100% achievement rate of planned expectations and targets).	Satisfactory
5	Satisfactory (S)	Level of achievement presents minor shortcomings (70% - 89% achievement rate of planned expectations and targets).	
4	Moderately Satisfactory (MS)	Level of achievement presents moderate shortcomings (50% - 69% achievement rate of planned expectations and targets).	
3	Moderately Unsatisfactory (MU)	Level of achievement presents some significant shortcomings (30% - 49% achievement rate of planned expectations and targets).	Unsatisfactory
2	Unsatisfactory (U)	Level of achievement presents major shortcomings (10% - 29% achievement rate of planned expectations and targets).	

1	Highly Unsatisfactory (HU)	Level of achievement presents severe shortcomings (0% - 9% achievement rate of planned expectations and targets).	
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Source: GEF, UNIDO.

The following table entails the UNIDO rating for sustainability (six-point rating scale) and the corresponding GEF rating for sustainability¹⁵ (four-point rating scale):

UNIDO rating	UNIDO rating for sustainability	GEF rating for sustainability
6	Highly likely (HL)	Likely (L)
5	Likely (L)	Moderately Likely (ML)
4	Moderately Likely (ML)	Moderately Likely (ML)
3	Moderately Unlikely (MU)	Moderately Unlikely (MU)
2	Unlikely (U)	Moderately Unlikely (MU)
1	Highly Unlikely (HU)	Unlikely (U)

Source: TOR for the terminal evaluation.

¹⁵ GEF uses a four-point scale for the criterion of sustainability.

8. Conclusions, recommendations, lessons learned, good practices

8.1 Conclusions

The overall assessment for the project so far is **'moderately unsatisfactory'**. The different criteria are elaborated in the report; conclusions are presented below:

Project design: Project document has been prepared in 2008/2009, entails a logical framework and a clear thematically-focused development objective. The logical framework includes indicators, although not quantified (which was not a requirement for approval at the time of project formulation). The planned results-chain is clear and logical and results realistic and measurable. The formulated activities, outputs and outcomes are considered to be adequate to achieve the envisaged project objective of disposal of altogether 7,700 MT of PCBs, including pure PCBs and PCB-contaminated oils, equipment and wastes. As already identified as a shortcoming during the MTE, the planned time requirement to develop and establish the regulatory framework was not adequate. Despite the scope of the budget, the GEF budget and the sizeable static facility, environmental impact assessment, risk analysis and feasibility study are not included as project activities.

The overall rating for project design is **'satisfactory'**.

Relevance and Coherence: PCBs exist in India and in view of the enhanced awareness of health and environmental issues related to PCBs, stakeholders consider the project to be highly relevant. No regulation regarding PCBs existed in the country and project is considered to be highly relevant also in this context, as it aimed to support the preparation of legal and regulatory framework pertinent to PCBs. The Republic of India is party to the Stockholm Convention and is aiming to achieve its obligations under it, amongst others, via this project. Project is in compliance with the GEF Focal Area Strategy for Chemicals under GEF-4, in line with UNIDO's ISID – Safeguarding the Environment – and in line with the NIP of the Republic of India.

The overall rating for relevance is considered to be **'highly satisfactory'**, for coherence **'highly satisfactory'**.

Efficiency: Project was approved by the GEF in December 2009, and commenced administratively at UNIDO in January 2010, with a planned project duration of 60 months. At the time of the terminal evaluation, in November 2022, project had almost completed 13 years of implementation time, 8 years beyond the planned duration. At the same time, it needs to be mentioned that it has faced challenges which are reported and emphasized to have been outside the control of the project, for example, initial international tenders carried out by UNIDO's Procurement Division had to be adapted and repeated, as the offers received went much beyond even the total project budget; change of owner of the plasma system, change in fund-flow arrangement by the Department of Economic Affairs in the country; change of site foreseen for the static facility from inside the BSP to outside the BSP due to strategic reasons; re-naming of site as 'green belt' by the District authorities, without the knowledge of BSP,

although the land belongs to BSP; time taken to re-name it back to 'industrial site'; longevity of procedures for procurement at BSP, for example, tendering for civil construction, all the official approvals and permits to be applied and received for basically all the buildings, equipment, installations, and operations; statutory environmental clearances from Central and State government authorities; unexpected outbreak of COVID-19, thus hindering the entry of plasma-technology experts, into the country, and halting several works.

Due to the delays, some other countries, from where PCBs were expected to be treated in India in future, have already completed their own PCB project, for example, Indonesia and Nepal, thus reducing the quantity of PCBs expected to be treated in the static facility, which was planned to contribute at least some income to the PCB-plant, as it was conceptualised to be a regional plant in Asia.

Learnings from this project are reported to have been useful in another ongoing GEF-project in India, namely, on DDT-Alternatives, for example, the setting up of a facility.

Project has received GEF funds amounting to USD 14.1 million, out of which USD 12,977,634 had been spent/obligated at the time of the terminal evaluation. An amount of USD 1,122,366 was still left.

CPRI has spent co-finance in the form of parking and storage space for the mobile unit and its spare-parts, and its staff time. BSP has spent reportedly over Rs. 37 crores, around USD 4.5 million, for the civil construction. In addition to that, it has provided its own industrial site, 12,000 sqm for the establishment of the static PCB-disposal plant.

Official documentation of co-finance spent was requested, but not received by the evaluation.

The overall rating for efficiency is '**moderately unsatisfactory**'.

Effectiveness: As such, project has successfully achieved most of the Outputs, 11 out of 13; one partially achieved, and one Output related to PCB-disposal not (yet) achieved. The MoEFCC has issued a Gazette Notification pertinent to PCBs in April 2016, which is in place and official since then, thus obliging PCB-owners to stop using PCB oils by 31st December 2025 and complete disposal by 31st December 2028. However, this is not considered to be 'motivating' the PCB-owners to initiate disposal activities before these given time periods. 68 PCB-awareness workshops have been carried out by the CPRI, guidelines and pamphlets prepared and disseminated; however, further 'refresher' workshops have been requested, owing to changes in staff at institutions. Planned mobile dechlorination and static plasma, dechlorination and indirect thermal desorption units have been procured and installed. The mobile dechlorination unit, being operated by the CPRI, has commenced treatment operations and completed 417.089 MT of PCB-contaminated oils, from the foreseen 750 MT of its contractual obligation within the project. The static units are awaiting final commissioning and PGTs (status November 2022), and therefore, are yet to

commence PCB-destruction operations. Taking the capacities of all the PCB-destruction units into account, even if operating at 100% capacities, 7 years are estimated to be necessary to achieve project objective, and additional 4 years to cover other established PCB-quantities, that is, India will not be able to meet the deadline of 31st December 2028, for elimination of existing PCBs in the country.

The overall rating for effectiveness is '**unsatisfactory**'. It is not highly unsatisfactory, although over 95% of the foreseen quantity of PCBs has not yet been treated, because all the equipment has been procured and installed, that is, the facility is, as such, ready, and awaiting final commissioning and PGTs. Delays have been explained under Efficiency.

Likelihood of sustainability of project results:

Financial risks for the operations and continuation of operations of both mobile and static facilities, socio-political risks and institutional and governance risks are considered to be low. Both the CPRI and the BSP would stand to benefit if a Business Plan is prepared for their continued operations, beyond the PCB-quantities foreseen by the project.

The evaluation emphasizes that **to ensure sustainability of static PCB-plant operation, a one-year extension of the project would be necessary**, as transition time, for a handover of actually operating the equipment, during which BSP staff would have time to observe operations, get crucial hands-on training on operating the equipment, operate the equipment under guidance, and then take over operating the equipment completely. As observed during the evaluation mission, and confirmed by interviewed stakeholders, at least a one-year transition time is considered to be necessary and crucial, for BSP to continue operations sustainably.

Sustainability of project results is considered to be '**likely**'.

Gender mainstreaming: Gender mainstreaming was not a requirement under GEF-4. Specific gender-related or gender-focused activities have not been carried out by the project, as negative impact of PCBs is considered to be negative for both genders; and gender-disaggregated data was not compiled during the PCB-awareness workshops. Nevertheless, no gender issues were reported to the evaluation. Several female persons, in different functions, are working in different arms of the project, for example, the UNIDO PM, senior management at BSP, ANPC at MoEFCC.

The overall rating for gender is '**satisfactory**'.

8.2 Recommendations

For UNIDO:

- Extend project by one year, to provide a transition time for the handover of operations at the static facility by BSP, enabling technical assistance by UNIDO

and M/s Ramky, to ensure sustainable operations during and beyond the duration of the project; in addition, ensure that BSP staff receives proper hands-on training for at least 6 months;

- Provide support to both BSP and CPRI, as necessary, to prepare a Business Plan for sustainable operations of both the mobile and static facilities, including a consideration of the fee for disposal activities;
- Ensure that BSP receives detailed as well as shorter flyer-versions of the following documents, in English, and, if possible, also in Hindi:
 - individual instructions for each equipment, as well as standard operating procedures for the facility altogether;
 - an emergency plan – in case of unforeseen accidents, etc.;
 - safety manuals for each technology;
 - details for sourcing spare parts;
- Right after final commissioning and PGTs of static facility, hold a meeting with all key stakeholder institutions, to provide information about status of project and next steps;
- Ensure centralized documentation of the transformers and PCB-inventory database at the CPRI, to enable sustainable access of the institution to the database;
- Ensure structured and complete documentation of all documents from the project, which contributes to proper knowledge and information management at UNIDO (for example, in case of handover of project to another PM, or for the evaluation).

For the MoEFCC:

- Consider informing the Stockholm Convention about the delay in PCB-disposal, which may not be completed within 31st December 2028;
- Consider to put in place mechanisms, maybe via the CPCB or CPRI, for inspection and monitoring of PCB-contaminated oils at institutions.

8.3 Lessons learned

- Despite having large and renowned institutions as partners on board, with financial capacity, and existing expertise in the country, project can still run into unforeseeable challenges, which may cause unexpected delays in project implementation.
- Although a partner institution may have technical expertise in its own field of work, its capacity-building requirements need to be taken into consideration in

the project, to ensure continuation of work and project results, after the completion of the project.

- In projects of large scope and budget, in case of delays, it may be necessary to carry out a risk analysis and feasibility study during project implementation, even if it has not been initially planned.
- In projects of large scope and budget, a full-fledged risk analysis might prove to be useful to estimate the risks involved and that can still emerge to the different involved institutions.
- Adequate time for the approval of legal and regulatory framework should be taken into consideration during project planning.

8.4 Good practices

- One NE each is based at the key stakeholder institutions, which was highlighted by all interviewed stakeholders to be very helpful for information exchange, good communication and coordination of activities.
- Continuation of knowledge about project and its activities was given at both BSP and CPRI, as UNIDO has recruited, as NEs, one at each institution, persons who were involved in the project since its commencement, and had retired after a few years.
- Project is partnering with well-established and renowned institutions, BSP, CPRI, which are not only known in the country, but also internationally. They bring with them high commitment towards project objective and willingness to achieve it, also by committing and spending their own resources.
- Knowledge has been transferred to the NEs recruited to operate the mobile facility, 2 chemical engineers and 1 mechanical engineer, and they are operating the facility on their own; since CPRI has the overall responsibility for the mobile unit, the operations are supervised by a staff of CPRI.
- Providing information on CPRI's public website is also considered to be a good practice, as it enables easy accessibility of PCB-related as well as project-related information and documents produced within the framework of the project to the wider public.

Annexes

- I List of stakeholders consulted
- II List of documents consulted/reviewed
- III Evaluation Framework Matrix
- IV PCB Cluster evaluation Terms of reference

I. List of stakeholders consulted

Name	Organization	Position	Role in Project
Mr. Neelesh Kumar Sah	MoEFCC	Joint Secretary	GEF OFP
Mr. Satyendra Kumar	MoEFCC	Director, HSM Division	NPC Executing Agency Co-financing institution PSC member
Mr. Sonamani Haobam	MoEFCC	Deputy Secretary of International Cooperation Division	
Mr. N. Subrahmanyam	MoEFCC	Jt. Director (Scientist D), HSM Division	
Mr. Subrato Paul	MoEFCC		MOEFCC GEF Consultant
Mr. Moitra	BSP		
Ms.	BSP		
Mr. Praveen	BSP		
Mr. Eshwar Reddy	M/s Ramky		
Mr. Sarma	M/s Ramky		

Mr. Thomas P	CPRI		
Mr. Sada Siva Murthy	CPRI	Joint Director, DMD Division	
Ms. Sharmila	Tamil Nadu Generation and Distribution Corporation Ltd. (TANGEDCO), Coimbatore		PCB owner institution
Mr. Mohangopal	TANGEDCO, Coimbatore		PCB owner institution
Ms. Aruna	TANGEDCO, R&D		PCB owner institution
Mr. Prakash	TANGEDCO, R&D		PCB owner institution
Ms. Kanalakshmi	TANGEDCO, R&D		PCB owner institution
Mr. Abhinanth	Kerala State Electricity Board		PCB owner institution
Mr. Govindraju	Visvesvaraya Iron & Steel Plant		PCB owner institution
Mr. Rajeev Saxena	Goodyear India Ltd.	Plant Head Engineer	PCB owner institution
Mr. Rajesh Dhoke	Chandrapur Super Thermal Power Station		PCB owner institution
Mr. Tapas Kumar	Nuclear Power Corporation of India Ltd.		PCB owner institution

Mr. Abu Zar	Harduaganj Thermal Power Station		PCB owner institution
Mr. Agrawal			National Expert
Mr. Naidu			National Expert
Mr. Thilak	UNIDO NE		Project Engineer
Mr. Tom Jose	UNIDO NE		Project Engineer
Mr. Sunny	UNIDO NE		Project Engineer
Mr. Rene van Berkel	UNIDO RO	Director	UNIDO RO
Ms. Carmela Centeno	UNIDO	Industrial Development Officer	Project Manager
Ms. Alessandra Bravin	UNIDO	Procurement Officer	
Mr. Y.P. Ramdev	UNIDO		Technical Advisor
Ms. Shradha Dhakhwa		Consultant	ANPC

II. Documents consulted/reviewed

Project document
Terms of Reference for the PCB Cluster Evaluation
Action taken report
PSC/Review/TWG meeting reports/minutes of the meetings
Vendor Workshop Minutes of the meeting
Technical Committee Constitution
CECB Extension of validity of consent to establish
Several communication/letters between stakeholders
Brochures in Telugu, Tamil, Hindi, Kannada, Marathi, English, Odishi
Contract UNIDO-NPO Dekanter
NPO Dekanter Site Requirements
NPO Dekanter Certificates for mobile dechlorination and sodium dispersion system
Technical Proposal CPRI
Contract UNIDO-CPRI and Amendment No. 1
Contract UNIDO-CPRI for treatment of PCB-oils using mobile unit
CPRI Report Awareness Program
CPRI Progress Reports
CPRI Status Reports
Action Plan for commissioning
Check-up/Repair of sodium dispersion unit
Letter regarding transportation of dispersed sodium in oil
Letter regarding registration of truck for special purpose
Technical TORs
UNIDO RfPs/Tender
PCB sticker
CPRI 7 reports on dechlorination activities
Photos of mobile unit and dechlorination activities
Manual for Sodium dispersion unit
Manual for Dechlorination unit
Guidance Document – PCB Management
Manual of Occupational Health and Safety
Guidelines for PCB interim storage

Guidelines for PCB equipment and waste disposal
Guidelines for PCB packaging and transportation
Guidelines for waste identification, tracking and record-keeping
Evaluation of current practices of management of PCBs
Evaluation Report on PCB Owners and likely PCB-Owner Organizations
Photos of static plant site and construction
MTR Report
Gazette Notification MoEFCC
PIRs 2012-2022
Progress Report static plant June 2022
Draft management plan static facility 2011
Chronological order – list of activities of PCB project – Aug 2022
Contracts and amendments Ramky-UNIDO
Contract Ramky-Kinetrics
Ramky site construction and electrical drawings
Design, Specifications and Operation Manual for Destruction System of High-Level or Pure PCB Liquid Waste & Decontamination of Porous Material Contaminated with PCBs
Ramky Interim/Progress/Status Reports 2012, 2018, 2019, 2020
Pre-Feasibility Report for static facility
Letter SAIL-Directorate of Town and Country Planning, Durg

III. Evaluation Matrix

Evaluation criteria	Evaluation indicators	Means of verification
Project Design		
<p>The evaluation will examine the extent to which:</p> <ul style="list-style-type: none"> • The project’s design is adequate to address the problems at hand. • The project has a clear thematically-focused development objective, the attainment of which can be determined by a set of verifiable indicators. • The project was formulated based on the logical framework (project results framework) approach. • Was there a need to reformulate the project design and the project results framework given changes in the countries and operational context? • Is inventory data (conducted during the preparatory phase) included in the project document based on remote inventory, physical inventory or estimates? • Are relevant environmental and social risk considerations included at the time of project design? 	<ul style="list-style-type: none"> • Situational analysis • Project results framework • Risk assessment and management • Adjustments made due to operational context • Environmental and social safeguards 	<ul style="list-style-type: none"> • Project document and annexes • Interviews with UNIDO, National Focal Points, key national partners, and other project stakeholders
Relevance and Coherence		
<p>The evaluation will examine the extent to which the project is relevant or coherent to the:</p> <ul style="list-style-type: none"> • National development and environmental priorities, national implementation plans and strategies of the national governments and their populations, as well as regional and international agreements. 	<ul style="list-style-type: none"> • Level of alignment with regional, sub-regional, and national environmental priorities, NIP, as well as 	<ul style="list-style-type: none"> • Pertinent project documents and annexes • Interviews with UNIDO, national

Evaluation criteria	Evaluation indicators	Means of verification
<ul style="list-style-type: none"> • Target groups: relevance of the project’s objectives, outcomes, and outputs to the different target groups of the interventions (e.g., national governments, municipalities, NGOs, women’s associations, waste pickers, etc.). • GEF’s focal areas/operational program strategies: In retrospect, were the project’s outcomes consistent with the GEF focal area(s)/ operational program strategies? Ascertain the likely nature and significance of the contribution of the project outcomes in the reduction or elimination of releases of uPOPs from open burning • Does the project remain relevant taking into account the changing environment? • To what extent was the project aligned with – and complementary to – other work being delivered within the participating countries? 	with UNIDO and GEF strategic priorities at the time of design and implementation	project coordinators, key national stakeholders
Effectiveness and Progress to impact		
<p>The evaluation will assess the objectives and current results (results to date):</p> <ul style="list-style-type: none"> • The evaluation will assess whether the results at various levels, including outcomes, have been achieved. In detail, the following issues will be assessed: Have the expected outputs and outcomes, been successfully achieved? What are the main reasons for the achievement/non-achievement of project objectives? • Are the project outcomes commensurate with the original or modified project objectives? If the original or modified expected results are merely outputs/inputs, were there any real outcomes of the project? If there were, are these commensurate with realistic expectations from the project? 	<ul style="list-style-type: none"> • Target for outputs, outcomes, and objectives of Project Results Framework • Occurrence of intermediate states in the participating countries • Stated contribution of stakeholders in achievement of outputs 	<ul style="list-style-type: none"> • Review of relevant documents such as PIRs, progress reports, meeting reports • Direct observation and discussion during

Evaluation criteria	Evaluation indicators	Means of verification
<ul style="list-style-type: none"> • Are the targeted beneficiary groups actually being reached? How do the stakeholders perceive the quality of outputs? • Has the project generated any results that could lead to changes of the assisted institutions? Have there been any unplanned effects? • Identify actual and/or potential longer-term impacts or at least indicate the steps taken to assess these. • Have the relevant authorities in the countries prepared and enforced the regulations on PCBs? • What is the geographical coverage of the project? • What quantity of PCBs have been identified? And disposed? • Have any spillages been observed or reported? • Does a certified laboratory for testing of PCB-oil exist in the country? • Will the participating countries continue with PCB disposal? • Has the project provided information on POPs, including PCBs, to educational institutions (schools, colleges, universities)? 		<p>evaluation mission</p> <ul style="list-style-type: none"> • Interviews with UNIDO, NPCs, National Focal Points, key government representatives, consultants and other partners such as NGOs, academia, etc.
<p>Efficiency at current stage of implementation</p>		

Evaluation criteria	Evaluation indicators	Means of verification
<p>The extent to which:</p> <ul style="list-style-type: none"> • The project cost is effective? Has the project used the most cost-efficient options? • Has the project produced results (outputs and outcomes) within the expected time frame? Has project implementation been delayed? If the project has been delayed, what were the reasons for the delay, and has it affected cost effectiveness or results? • Have the project's activities been in line with the schedule of activities as defined by the project team and annual work plans? Have the disbursements and project expenditures been in line with budgets? • Have the inputs from the donor, UNIDO, and government/ counterpart been provided as planned, and were they adequate to meet the requirements? Was the quality of UNIDO inputs and services as planned and timely? • Have the counterpart institutions spent co-finance as initially committed? • Was there coordination with other UNIDO and other donors' projects, and did possible synergy effects happen? • Give the reasons/justifications for the extension granted to the project. • Has a knowledge management system been established? • To what extent have the recommendations of the mid-term evaluation been taken into consideration? • What has been the impact of COVID-19 on project implementation? 	<ul style="list-style-type: none"> • Level of compliance with expected milestones mentioned in logical framework and with respect to financial planning and annual plans • Level of co-finance mobilized • Document the delays that occurred • List of reasons, validated by project team 	<p>For all questions under Efficiency:</p> <ul style="list-style-type: none"> • PIRs, PSC meeting reports, annual and progress reports, NPSC meeting reports, national reports • Interviews with UNIDO, NPC, National Focal Points, consultants and other project stakeholders
<p>Assessment of risks to likelihood of sustainability of project outcomes</p>		

Evaluation criteria	Evaluation indicators	Means of verification
<p>Sustainability is understood as the likelihood of continued benefits after the GEF project ends. Assessment of sustainability of outcomes will be given special attention, but also technical, financial, and organizational sustainability will be reviewed. This assessment will explain how the risks to project outcomes will affect continuation of benefits after the GEF project ends. It will include both exogenous and endogenous risks.</p> <p>The following four dimensions or aspects of risks to sustainability will be addressed:</p> <ul style="list-style-type: none"> • Financial risks. Are there any financial risks that may jeopardize sustainability of project outcomes? What is the likelihood of financial and economic resources not being available now that the GEF assistance has ended? (Such resources can be from multiple sources, such as the public and private sectors or income-generating activities; these can also include trends that indicate the likelihood that, in the future, there will be adequate financial resources for sustaining project outcomes.) Was the project successful in leveraging the co-financing pledged at design? • Socio-political risks. Are there any social or political risks that may jeopardize sustainability of project outcomes? What is the risk that the level of stakeholder ownership (including ownership by governments and other key stakeholders) will be insufficient to allow for the project outcomes/benefits to be sustained? Do the various key stakeholders see that it is in their interest that project benefits continue to flow? Is there sufficient public/stakeholder awareness in support of the project’s long-term objectives? 	<p>UNIDO risk level indicators: Low, Moderate, High</p>	<ul style="list-style-type: none"> • Review of relevant documents such as PIRs, progress reports, meeting documents, progress reports • Interviews with UNIDO, NPCs, National Focal Points, and other national stakeholders and NGOs

Evaluation criteria	Evaluation indicators	Means of verification
<ul style="list-style-type: none"> • <i>Institutional framework and governance risks.</i> Do the legal frameworks, policies, and governance structures and processes within which the project operates pose risks that may jeopardize sustainability of project benefits? Are requisite systems for accountability and transparency and required technical know-how in place? • <i>Environmental risks.</i> Are there any environmental risks that may jeopardize sustainability of project outcomes? Are there any environmental factors, positive or negative, that can influence the future flow of project benefits? Are there any project outputs or higher-level results that are likely to have adverse environmental impacts, which, in turn, might affect sustainability of project benefits? The evaluation will assess whether certain activities will pose a threat to the sustainability of the project outcomes. 		
Assessment of M&E systems		
<ul style="list-style-type: none"> • <i>M&E design.</i> Did the project have an M&E plan to monitor results and track progress towards achieving project objectives? The evaluation will assess whether the project met the minimum requirements for the application of the project M&E plan. • <i>M&E plan implementation.</i> The evaluation should verify that an M&E system was in place and facilitated timely tracking of progress towards project objectives by collecting information on chosen indicators continually throughout the project implementation period; annual project reports were complete and accurate, with well-justified ratings; the information provided by the M&E system was used during the project to improve performance and to adapt to changing needs; and the project had 	<ul style="list-style-type: none"> • Availability of LogFrame, work plans, roles of overseeing bodies, budgeted M&E plan • Level of implementation of M&E system (execution of activities); changes in implementation approach to adapt to 	<ul style="list-style-type: none"> • Project document • PIRs, meeting reports, progress and annual reports, financial and reports, audit and other relevant reports

Evaluation criteria	Evaluation indicators	Means of verification
<p>an M&E system in place with proper training for parties responsible for M&E activities to ensure that data will continue to be collected and used after project closure. Was monitoring and self-evaluation carried out effectively at regional and national levels, based on indicators for outputs, outcomes, and impacts? Are there any annual work plans? Were the steering or advisory mechanisms put in place at national and regional levels? Did reporting and performance reviews take place regularly?</p> <ul style="list-style-type: none"> • Budgeting and funding for M&E activities. In addition to incorporating information on funding for M&E while assessing M&E design, the evaluators will determine whether M&E was sufficiently budgeted for at the project planning stage and whether M&E was adequately funded and in a timely manner during implementation. 	<p>changing situations; compliance of the countries in the submission of relevant reports in a timely manner</p> <ul style="list-style-type: none"> • Compliance with reporting requirements as mentioned in TORs and/or project document 	<ul style="list-style-type: none"> • Interviews with UNIDO, NPCs, and NPSC members, and other relevant stakeholders / partners
Monitoring of long-term changes		
<p>The M&E of long-term changes is often incorporated in GEF-supported projects as a separate component and may include determination of environmental baselines; specification of indicators; and provisioning of equipment and capacity building for data gathering, analysis, and use. This section of the evaluation report will describe project actions and accomplishments towards establishing a long-term monitoring system. The evaluation will address the following questions:</p> <ol style="list-style-type: none"> Did the project contribute to the establishment of a long-term monitoring system? If it did not, should the project have included such a component? What were the accomplishments and shortcomings in establishment of this system? 	<ul style="list-style-type: none"> • Evidence of initial efforts to establish a long-term monitoring system 	<ul style="list-style-type: none"> • Project reports, M&E reports • Interviews with UNIDO, NPCs, National Focal Points, and other relevant stakeholders

Evaluation criteria	Evaluation indicators	Means of verification
<p>c. Is the system sustainable — that is, is it embedded in a proper institutional structure and does it have financing? How likely is it that this system will continue operating upon project completion?</p> <p>d. Is the information generated by this system being used as originally intended?</p>		
Project coordination and management		
<p>The extent to which:</p> <ul style="list-style-type: none"> • The national management and overall coordination mechanisms have been established and been efficient and effective. Did each partner have assigned roles and responsibilities from the beginning? Did each partner fulfil its role and responsibilities (e.g., providing strategic support, monitoring and reviewing performance, allocating funds, providing technical support, following up agreed/corrective actions)? • The UNIDO HQ-based management, coordination, monitoring, quality control, and technical inputs have been efficient, timely, and effective (e.g., problems identified timely and accurately; quality support provided timely and effectively; right staffing levels, continuity, skill mix, and frequency of field visits)? • The UNIDO CO is involved in the project. 	<ul style="list-style-type: none"> • Level and quality of project coordination and management at regional and national level 	<ul style="list-style-type: none"> • PIRs, meeting reports, and project coordination and management reports • Interviews with UNIDO, NPCs, National Focal Points, and other relevant stakeholders
Gender mainstreaming		

Evaluation criteria	Evaluation indicators	Means of verification
<p>The evaluation will consider, but need not be limited to, the following issues that may have affected gender mainstreaming in the project:</p> <ul style="list-style-type: none"> • Did the project design adequately consider the gender dimensions in its interventions? If so, how? (For GEF-4 take this point out?) • Was a gender analysis included in a baseline study or needs assessment (if any)? (For GEF-4 take this point out?) • How gender-balanced was the composition of the project management team at regional and national levels, the Regional and National Steering Committees, experts and consultants, and the beneficiaries? • Have women and men benefited equally from the project's interventions? Do the results affect women and men differently? If so, why and how? How are the results likely to affect gender relations (e.g., division of labour, decision-making authority)? • Are women/gender-focused groups, associations or gender units in partner organizations consulted/included in the project? • To what extent were socio-economic benefits delivered by the project at the regional, national, and local levels, including consideration of gender dimensions? 	<p>Incorporation of gender-responsive approaches and indicators, such as:</p> <ul style="list-style-type: none"> • Women's participation • Gender balance • Integration of gender dimensions in project delivery • Equality, benefits, and results 	<ul style="list-style-type: none"> • Project reports • Interviews with UNIDO, NPCs, National Focal Points, NGOs, Women's Associations involved, and other beneficiaries

IV. PCB Cluster evaluation Terms of reference

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

TERMS OF REFERENCE
Cluster evaluation of UNIDO projects

Polychlorinated biphenyls (PCBs)

| 2022 |

1. UNIDO PCBs portfolio background

The Stockholm Convention (SC) on persistent organic pollutants (POPs) recognizes that POPs including polychlorinated biphenyls (PCBs) “possess toxic properties, resist degradation, accumulate and are transported through air, water and migratory species, across international boundaries and deposited far from their places, where they accumulate in terrestrial and aquatic ecosystems”. Exposure to PCBs is of a major public health concern, in particular impacts upon women and, through them, upon future generations.

PCBs are industrial products or chemicals mainly used in the energy sector, widely deployed as dielectric and coolant fluids in electrical apparatus, carbonless copy paper and heat transfer fluids. Generally, PCBs are very stable, which explains their persistence in the environment.

UNIDO’s PCBs management and disposal strategy aims to create fundamental capacities within industries, governments, institutions and PCBs owners, in order to comply with the PCB-related obligations under the SC. The projects implemented by UNIDO enhance the critical regulatory and legislative framework and strengthen institutions at the national, regional and local level to manage equipment and waste that contain PCBs in an environmentally sound manner.

Compliance with legislation is ensured by building capacities in local laboratories for PCB sampling and analysis, transfer of technology know-how for local PCBs treatment and elimination and undertaking inspections at PCB-contaminated sites. Environmentally sound PCB management practices reduce PCB releases and risks to human health and the environment; best practices are then further disseminated through public awareness raising initiatives.

Furthermore, UNIDO’s PCB projects include the elimination and disposal of PCBs, often by leveraging interests of the project recipient countries in non-combustion technology, which, in many cases, offer technical and financial advantages. One is on-site PCB decontamination, which solves many technical and procedural barriers for very large transformers that cannot be transported on the road to transformer maintenance facilities. The other is the regeneration of oil. Because workers would usually need to drain and dismantle these transformers, this helps reducing the workers’ risk of exposure to PCBs.

2. Rationale and purpose of the evaluation

Given the number of PCB projects in the last phase of implementation and taken into account significant similarities at project design level, a cluster evaluation approach will be used. The cluster will be tentatively composed of eight (8) projects selected from Table 1 below and the final list of projects included will be validated at Inception phase.

One of the main reasons of the Cluster evaluation would be to overcome some of the shortcomings present in traditional project evaluation, namely the inward-looking nature of the exercise, the timing and high transactional costs and administrative burden.

The purpose of the cluster approach is to produce synergies and increase the value added in the conduct of evaluations.

The efficiency gains produced by this approach will be invested in additional learning and more strategic assessments to inform UNIDO management, Member States, donors and beneficiaries with further more relevant and useful evaluation findings, conclusions and recommendations, such as:

- a) Inter-project comparisons (e.g. differences in implementation approaches, different strategies for broader adoption)
- b) Incorporation of additional aspects normally not so well-covered (e.g. socio-economic and environmental impacts of projects, other aspects (e.g., global crisis such as the COVID 19 pandemic).
- c) Aggregated information for cross-cutting and recurrent issues, such as management, systemic challenges and root causes based on several cases and therefore less anecdotal.

Table 1. List of projects for Cluster Evaluation

Region	Country	UNIDO project N.	GEF ID	The m area	Project budget(EUR)	Year of Eval	Budget left (SAP 31.03.22 USD)
EUR	SERBIA	100313	4877	PCB	2,100,000	2022	786,423
ASP	INDIA	104044	3775	PCB	14,100,000	2022	107,230
ASP	LAO PDR	140157	4782	PCB	1,400,000	2022	271,414
LAC	BOLIVIA	140296	5646	PCB	2,000,000	2022	278,300
LAC	GUATEMALA	140298	5816	PCB	2,000,000	2022	403,866

EUR	RUSSIAN FEDERATI ON	140019	491 5	PCB	7,400,000	2022	30,000
AFR	CONGO	140160	532 5	PCB	975,000	2022	25,000
AFR	MOROCCO	170117	991 6	PCB	1,826,484	2022	621,734 (ex OpenData)
<i>tot</i>					<i><u>31,801,484</u></i>		<i><u>1,902,233</u></i>

3. Scope and focus of the evaluation

The final cluster of projects will be decided upon in the Inception Report, based on the following criteria:

- **Thematic:** projects from same or similar programme, or within interrelated technical areas
- **Timing:** project which Terminal Evaluations are due within +/- 6 months

Projects will be selected based on the planned timing for the project end or operational completion and the respective thematic focal area. The final selection will be made in coordination with the respective project managers and the GEF coordination unit to ensure smooth implementation of the evaluation.

The Cluster Evaluation, as foreseen in the Independent Evaluation Division Work Plan (WP) 2018-1916 and reiterated in WP 2020-2117, will follow the UNIDO Evaluation Policy¹⁸, the UNIDO Guidelines for the Technical Cooperation Project and Project Cycle¹⁹, and UNIDO [Evaluation Manual](#). Furthermore, the GEF Guidelines for GEF Agencies in Conducting Terminal Evaluations, the GEF Monitoring and Evaluation Policy²⁰ and the GEF Minimum Fiduciary Standards for GEF Implementing and Executing Agencies will be applied. The evaluation will also build upon the findings

¹⁶ https://www.unido.org/sites/default/files/files/2018-11/IEV_WP_2018-19_final_180228.pdf

¹⁷ https://www.unido.org/sites/default/files/files/2021-06/2021-04-21_EIO%20Evaluation%20work%20plan-budget%202020-21_Update%202021_EB%20Approved_F.pdf

¹⁸ UNIDO. (2018). Director General's Bulletin: Evaluation Policy (UNIDO/DGB/2018/08)

¹⁹ UNIDO. (2006). Director-General's Administrative Instruction No. 17/Rev.1: Guidelines for the Technical Cooperation Programme and Project Cycle (DGAI.17/Rev.1, 24 August 2006)

²⁰ https://www.thegef.org/sites/default/files/council-meeting_documents/EN_GEF.ME_C56_02_GEF_Evaluation_Policy_May_2019_0.pdf

and recommendations of the Cluster Evaluation on UNIDO POPs portfolio carried out in 2015²¹.

The evaluation has three main specific objectives:

- i. Assess the projects` performance in terms of relevance, effectiveness, efficiency, sustainability, coherence, and progress to impact; and
- ii. Develop a series of findings, lessons and recommendations for enhancing the design of new and implementation of ongoing projects by UNIDO.
- iii. Contribute to organizational learning, by UNIDO and its counterparts, while being forward looking, thus also guiding the development of new similar projects.

4. Evaluation approach and methodology

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

The evaluation will use a theory of change (ToC) approach²² and mixed methods to collect data and information from a range of sources and informants. It will pay attention to triangulating the data and information collected before forming its assessment. This is essential to ensure an evidence-based and credible evaluation, with robust analytical underpinning.

The theory of change will depict the causal and transformational pathways from project outputs to outcomes and longer-term impacts. It also identifies the drivers and barriers to achieving results. The learning from this analysis will be useful for the design of the future projects so that the management team can effectively use the theory of change to manage the project based on results.

5. Data collection methods

The complete array of instruments for data collection will be finalized at Inception Report stage. Among the main methods foreseen to be used by the Evaluation Team:

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

²¹

https://www.unido.org/sites/default/files/2015-04/FINAL_report_NIPS_CLUSTER_EVAL_20150409_0.pdf#page=81&zoom=100,120,76

²² For more information on Theory of Change, please see chapter 3.4 of UNIDO [Evaluation Manual](#)

- (b) **Stakeholder consultations** will be conducted through structured and semi-structured interviews and focus group discussion. Key stakeholders to be interviewed include:
- UNIDO Management and staff involved in the projects; and
 - Representatives of donors, counterparts and stakeholders.
- (c) Whenever possible, **field visits** to project sites in the involved countries. Due to the persisting emergency caused by the virus Covid-19, it shall be noted that restrictions on international travels are still in place at the time this ToR is drafted, therefore the field visits should be carried out by the national consultants only.
- On-site observation of results achieved by the project, including interviews of actual and potential project beneficiaries.
 - Interviews with the relevant UNIDO Country Office(s) representative to the extent that he/she was involved in the project, and the project's management members and the various national [and sub-regional] authorities dealing with project activities as necessary.
- (d) **Online data collection** methods such as surveys will be used to the extent possible.

6. Evaluation key questions and criteria

The key evaluation questions, to be further refined at the level of Inception Report, are the following:

- 1) Have they done the right things in the context of PCB issues in the respective countries? How well have the projects fit with other policies and interventions that affect PCBs in the respective countries?
- 2) What are the projects' key results (outputs, outcome and impact)? To what extent have the expected results been achieved or are likely to be achieved? To what extent are the achieved results to be sustained after the completion of the projects?
- 3) What are the key drivers and barriers to achieve the long term objectives? To what extent have the projects helped put in place the conditions likely to address the drivers, overcome barriers and contribute to the long term objectives?
- 4) What are the key risks (e.g. in terms of financial, socio-political, institutional and environmental risks) and how these risks may affect the continuation of results after the projects end?
- 5) What lessons can be drawn from the successful and unsuccessful practices in designing, implementing and managing the analysed projects?
- 6) How far have the Mid-term reviews conducted on the cluster projects been used to ensure the success of the projects in the second phase of implementation?
- 7) Are there tangible differences with regard to the evaluation criteria between MSPs and FSPs?
- 8) Were lessons learned from previous projects in the countries and the POPs thematic area sufficiently taken into account while designing the cluster projects?
- 9) Was the gender dimension given sufficient attention at both project design and implementation?

The table below provides the key evaluation criteria to be assessed by the evaluation. The details questions to assess each evaluation criterion are in annex 2 of UNIDO [Evaluation Manual](#).

Table 2. Project evaluation criteria

#	Evaluation criteria	Mandatory rating
A	Progress to impact	Yes
B	Project design	Yes
1	• Overall design	Yes
2	• Logframe	Yes
C	Project performance	
1	• Relevance	Yes
2	• Effectiveness	Yes
3	• Coherence	Yes
4	• Efficiency	Yes
5	• Sustainability of benefits	Yes
D	Cross-cutting performance criteria	
1	• Gender mainstreaming	Yes
2	• M&E: ✓ M&E design ✓ M&E implementation	Yes Yes
3	• Results-based Management (RBM)	Yes
E	Performance of partners	
1	• UNIDO	Yes
2	• National counterparts	Yes
3	• Donor	Yes
F	Overall assessment	Yes

Performance of partners

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

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

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

- a. **Need for follow-up:** e.g. in instances financial mismanagement, unintended negative impacts or risks.
- b. **Materialization of co-financing:** e.g. the extent to which the expected co-financing materialized, whether co-financing was administered by the project management or by some other organization; whether and how shortfall or excess in co-financing affected project results.
- c. **Environmental and Social Safeguards**²³: appropriate environmental and social safeguards were addressed in the projects` design and implementation, e.g. preventive or mitigation measures for any foreseeable adverse effects and/or harm to environment or to any stakeholder.

7. Rating system

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

Table 3. Project rating criteria

Score		Definition	Category
6	Highly satisfactory	Level of achievement presents no shortcomings (90% - 100% achievement rate of planned expectations and targets).	SATISFACTORY
5	Satisfactory	Level of achievement presents minor shortcomings (70% - 89% achievement rate of planned expectations and targets).	
4	Moderately satisfactory	Level of achievement presents moderate shortcomings (50% - 69% achievement rate of planned expectations and targets).	
3	Moderately unsatisfactory	Level of achievement presents some significant shortcomings (30% - 49% achievement rate of planned expectations and targets).	UNSATISFACTORY
2	Unsatisfactory	Level of achievement presents major shortcomings (10% - 29% achievement rate of planned expectations and targets).	
1	Highly unsatisfactory	Level of achievement presents severe shortcomings (0% - 9% achievement	

²³ Refer to GEF/C.41/10/Rev.1 available at: <http://www.thegef.org/sites/default/files/council-meetingdocuments/>

C.41.10.Rev_1.Policy_on_Environmental_and_Social_Safeguards.Final%20of%20Nov%2018.pdf

		rate of planned expectations and targets).	
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8. Evaluation process

The cluster evaluation will be conducted from June 2022 to December 2022. The evaluation will be implemented in five phases which are not strictly sequential, but in many cases iterative, conducted in parallel and partly overlapping:

- 1) Inception phase: The evaluation team will prepare the inception report providing details on the evaluation methodology and include an evaluation matrix with specific issues for the evaluation to address; the specific site visits will be determined during the inception phase, taking into consideration the findings and recommendations of the mid-term reviews – whenever available – and the current limitations imposed by the Covid-10 pandemic.
- 2) Desk review and data analysis;
- 3) Interviews, survey and literature review;
- 4) Country visits (whenever possible) and debriefing to key relevant stakeholders in the field;
- 5) Data analysis, report writing and virtual debriefing to UNIDO staff at the Headquarters; and
- 6) Final report issuance and distribution, and publication of the final evaluation report in UNIDO website.

9. Time schedule and deliverables

The evaluation is scheduled to take place from April 2022 to August 2022. The data collection phase from the field is tentatively planned for May 2022 but will be tailored on the different stages of projects` implementation and specific requirements by the different countries. At the end of the data collection, the evaluation team will present the preliminary findings for key relevant stakeholders involved in the project in the country. The tentative timelines are provided in the table below.

After the debriefing to the national stakeholders, the evaluation team will debrief UNIDO Headquarters and the internal stakeholders involved for debriefing and presentation of the preliminary findings of the terminal evaluation. Online presentation is to be arranged in case the visit cannot take place.

After this phase and the factual validation, a synthesis aggregating the comparable findings from the different projects is expected to be produced by the team. The draft TE report will be submitted 4 to 6 weeks after the end of the mission. The draft TE report is to be shared with the UNIDO Project Managers (PMs), UNIDO Independent Evaluation Division, the UNIDO GEF Coordinator and GEF OFP and other stakeholders for comments. The ET leader is expected to revise the draft TE report based on the comments received, edit the language and submit the final version of the TE report in accordance with UNIDO ODG/EIO/EID standards.

Table 4. Tentative timelines

Timelines	Tasks
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June 2022	Desk review and writing of inception report
June 2022	Online briefing with UNIDO project manager and the project teams based in Vienna.
July-August 2022	Data collection from the Field
August 2022	Debriefing in Vienna Preparation of first draft evaluation report
September 2022	Internal peer review of the report by UNIDO's Independent Evaluation Division and other stakeholder comments to draft evaluation report
October 2022	Preparation of the synthesis of aggregated findings from the clustered evaluations
November 2022	Review of the Synthesis and the first draft
December 2022	Final evaluation report

10. Evaluation team composition

Given the number of projects included in the Evaluation and the current travel restrictions in place, the evaluation team will be composed of a mix of two international evaluation consultants - one acting as the team leader - and one national evaluation consultant per country, supported by a Cluster Evaluation coordinator from UNIDO IED. The evaluation team members will possess a mixed skill set and experience including evaluation, relevant technical expertise, social and environmental safeguards, and gender. All the consultants will be contracted by UNIDO pooling funds from the projects' evaluation budgets.

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

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

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

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

11. Reporting

Inception report

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

The Inception Report will focus on the following elements: preliminary project theory model(s); elaboration of evaluation methodology including quantitative and qualitative approaches through an evaluation framework (“evaluation matrix”); division of work between the evaluation team members; field mission plan, including places to be visited, people to be interviewed and possible surveys to be conducted and a debriefing and reporting timetable²⁴. The draft inception report will also include a suggested outline of the overall synthesis report (see below), including the specific evaluation questions for the cross-cutting analysis.

Evaluation report format and review procedures

All selected projects will be evaluated meeting GEF minimum requirements (see Annex I).

In terms of final outputs, one short evaluation report per project will be produced, including project performance ratings according to OECD-DAC criteria.

In addition, a final synthesis report of the evaluation findings of the cluster projects, inter-project comparisons and additional evaluation aspects will also be produced.

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

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

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

²⁴ The evaluator will be provided with a Guide on how to prepare an evaluation inception report prepared by UNIDO Independent Evaluation Division.

summary that encapsulates the essence of the information contained in the report to facilitate dissemination and distillation of lessons.

Findings, conclusions and recommendations should be presented in a complete, logical and balanced manner. The evaluation report shall be written in English and follow the outline given by UNIDO Independent Evaluation Division.

12. Quality assurance

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

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