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Greening of Scrap Metal Value Chain through the Promotion of BAT/BEP to Reduce U-POPs Releases from Recycling Facilities

Office of Evaluation and Internal Oversight

OFFICE OF EVALUATION AND INTERNAL OVERSIGHT
INDEPENDENT EVALUATION UNIT

Independent Evaluation of Greening of Scrap Metal Value Chain through the Promotion of BAT/BEP to Reduce U-POPs Releases from Recycling Facilities

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Abstract

This evaluation report focuses on the project “Greening of Scrap Metal Value Chain through the Promotion of BAT/BEP to Reduce U-POPs Releases from Recycling Facilities”, funded by the Global Environment Facility (GEF) with $4.725 million and implemented by UNIDO from June 2018 to November 2024. The project aimed to reduce emissions of unintentionally produced Persistent Organic Pollutants (U-POPs) by promoting Best Available Technologies (BAT) and Best Environmental Practices (BEP) in Thailand's scrap metal recycling sector.

The evaluation used a mixed-methods approach, including desk reviews, field visits, and interviews with stakeholders such as government bodies, recycling facility operators, and project partners. Key findings reveal the project's alignment with Thailand's Stockholm Convention obligations and national development strategies. The project demonstrated high relevance, coherence, and effectiveness, exceeding its targets with a 24.34 g WHO-TEQ/year reduction in U-POPs against a goal of 23.0 g WHO-TEQ/year. Over 2,200 personnel were trained, and six recycling facilities adopted BAT/BEP measures, significantly reducing emissions of U-POPs, CO_2, and particulate matter.

The project's cost-effectiveness and timely outputs, despite delays caused by the COVID-19 pandemic, highlight its efficiency. Co-financing contributions further enhanced results. Sustainability appears likely, with ongoing stakeholder engagement and the incorporation of project outcomes into Thailand's policy framework.
The project achieved its stated objectives, providing a replicable model for the wider recycling sector. Recommendations include revising regulations to enforce BAT/BEP adoption, ensuring incentives are accessible to all facility sizes, and enhancing technical support and training through mechanisms like the DPIM Academy Platform. Additionally, maintaining and updating the project’s website is advised to ensure sustained dissemination of results.

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Abbreviations and Acronyms

Abbreviation	Meaning
BAT/BEP	Best Available Technology and Best Environmental Practice
CEO	Chief Executing Officer
DCCE	Department of Climate Change and Environment
DEQP	Departmental of Environmental Quality Promotion
DIW	Department of Industrial Works
DPIM	Department of Primary Industries and Mines
GEF	Global Environment Facility
ISIT	Iron and Steel Institute of Thailand
LFA	Logical Framework Approach
M&E	Monitoring and evaluation
MTE	Midterm Evaluation
NEA	National Executing Agency
NGO	Non-governmental Organization
NIP	National Implementation Plan
NPC	National Project Coordinator
NPD	National Project Director
NPM	National Project Manager
OIE	Office of Industrial Economics
PCD	Pollution Control Department
PCDD	Polychlorinated dibenzo- para-dioxins
PCDF	Polychlorinated dibenzo furans
PIR	Project Implementation Review
POP	Polychlorinated Biphenyls
PM	Project Manager
PMC	Project Management Cost
PMU	Project Management Unit
POPs	Persistent Organic Pollutants
PRF	Project Results Framework
PSC	Project Steering Committee
RBM	Results-based Management
TE	Terminal Evaluation
TOC	Theory of Change
TWG	Technical Working Group
UNIDO	United Nations Industrial Development Organization

Glossary of Evaluation Related Terms

Term	Definition
Assumptions	The conditions that need to be in place to achieve the results as will or may affect progress or success at different levels of an intervention's causal pathway. The assumptions can be internal or external to UNIDO or the particular programme or project and usually connect outputs to outcomes, and outcomes to impact.
Baseline	The situation, prior to an intervention, against which progress can be assessed or comparisons made.
Coherence	The compatibility of the intervention with other interventions in a country, sector or institution. The extent to which other interventions (particularly policies) support or undermine the intervention, and vice versa.
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.
Efficiency	A measure of how economically resources/inputs (funds, expertise, time, etc.) are converted to results.
Environmental and social safeguards (ESS)	The extent to which environmental, climate change and social risks and impacts of a UNIDO product, service or process have been assessed and addressed (in line with respective administrative issuances).
Evaluand	The object of an evaluation, typically an intervention, organizational programme of work, or system.
Gender mainstreaming	The extent to which an adequate gender analysis has been conducted for a UNIDO product, service or process, its findings have been included in its design and monitoring and reporting data is sex-disaggregated where feasible.
Impact	Positive and negative, primary and secondary, intended and non-intended, directly and indirectly, long term effects produced by a development intervention.
Independent evaluation	Independent evaluations provide an independent, credible and evidence-based assessment on a given entity under evaluation, such as a project, programme, or an entire strand of activities under a thematic, geographical or institutional heading. Independent evaluations are conducted and/or managed by staff members of the UNIDO Independent Evaluation Unit and conducted by external independent evaluation consultants.
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. Frequently, lessons highlight strengths or weaknesses in

	preparation, design, and implementation that affect performance, outcome, and impact.
Logframe (logical framework approach)	Management tool used most often at the project level. It involves identifying strategic elements (activities, outputs, outcomes, impact) and their causal relationships, indicators, and the assumptions or risks that may influence success and failure. It thus facilitates designing, planning, execution, monitoring and evaluation of a development cooperation intervention. System based on MBO (management by objectives) also called RBM (results-based management) principles.
Mainstreaming/sustaining	Initiatives are reproduced/adopted in other geographical areas or regions.
Market change	Initiatives catalyze market transformation by influencing the supply and demand for goods and services contributing to global environmental, economic and social benefits.
Means of verification	Data sources for indicators; reliable and cost-effective.
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.
Policy	A set of ideas or a plan of what to do in particular situations that has been agreed to officially by a group of people, an organization, a business organization, a government, or a political party.
Programme	A collection of organizational resources that is geared to accomplish a certain major result or a set of results in a coordinated manner. Therefore, it is used in the context of development cooperation interventions as well as the organizational programme of work: a) A programme contributing to the organizational programme of work: An official plan of action within the Organization, which is aimed at accomplishing a clear organizational objective, and includes details on what work is to be done, by whom, when, and what means or resources will be used. b) Development cooperation programme: A group of complementary projects or activities designed and managed in a coordinated and coherent way, simultaneously or sequentially, to obtain broader benefits and long-term results (impact) not directly attainable from managing the projects individually. A programme is further typically characterized as a systematic and complex intervention to address a development problem or need to attain specific sectoral, national, regional or global development objectives.
Progress to impact	Positive and negative, primary and secondary long-term effects produced by a development intervention, directly or indirectly, intended or unintended, including redirecting trajectories of transformational process and the extent to which conditions for trajectory change are being put into place.
Project/programme design	Formulation of the intervention, the plan to achieve a specific purpose.

Project/programme performance	Functioning of a development intervention
Quality	Products, services and processes being free of deficiencies or, in other words, satisfactory in terms of meeting established requirements (i.e. principles, standards and criteria).
Recommendations	Proposals aimed at enhancing the effectiveness, quality, or objectives; and/or at the reallocation of resources.
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.
Replication	Initiatives are reproduced/adopted in other geographical areas or regions.
Result	Specific and measurable change (output, outcome and impact) that is derived from a cause-and-effect relationship. The causality relationship between the changes is as important as the results themselves as it reflects the theory of change (see below) and the roles of UNIDO and its partners.
Results-Based Management (RBM)	A management strategy – at project and programme, portfolio, organizational, country, and global levels – based on managing for the achievement of intended results within a given context by integrating a results philosophy and principles into all aspects of management and by integrating good practices and lessons learned from past performance into management decision-making.
Review	A systematic and evidence-based self-assessment of the performance of a programme or project, aiming at determining performance against established criteria. The vehicle for steering corrective action by line management, and therefore a management responsibility (under 1st and 2nd Line of the UNIDO Three Lines Model of Defence (3LM)). It can be conducted internally, i.e. by personnel directly involved in a programme or project, or externally, i.e. by personnel hired specifically for the purpose of conducting the review (good practice), whereby the overall responsibility for the review rests with the programme or project management. Reviews can be carried out at different stages of the programme or project life cycle, i.e. for programmes and projects with start and end dates as mid-term reviews (MTRs) and terminal self-evaluations, and for open-ended programmes periodically.
Risks	Factors, normally outside the scope of an intervention, which may affect the achievement of an intervention's objectives.
Scale-up	Scale-up is defined as the multiplication of an achieved result from an intervention, in which a greater number of beneficiaries (people or institutions) benefit more lastingly from the results. The scaling-up process may be: a) horizontal, expanding geographical reach to cover more people through replication and adaptation; and/or b) vertical, expanding institutional reach to guide principles of practice through mainstreaming. Scaling-up of results may

	require an integrated approach of horizontal and vertical scaling-up
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.
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.

Executive Summary

The full-size project "*Greening of Scrap Metal Value Chain through the Promotion of BAT/BEP to Reduce U-POPs Releases from Recycling Facilities*", funded for an amount of $ 4.725 M by the Global Environment Facility, was implemented from June 2018 to 30 November 2024 by the United Nations Industrial Development Organization. The national executing agency was the Department of Primary Industries and Mining (DPIM), Ministry of Industry of Thailand.

The main objective of the project was to promote and introduce Best Available Technologies (BAT) and Best Environmental Practices (BEP) in scrap metal recycling facilities to reduce or eliminate the release of unintentionally produced Persistent Organic Pollutants (U-POPs).

The purpose of the terminal evaluation is to promote accountability; support results-based management; and drive learning and innovation. The evaluation aims to provide UNIDO management and stakeholders with valuable information, and contribute to improved policymaking based on evidence-based decision-making. The evaluation covered the whole duration of the project.

The in-depth evaluation included: a review of project documents; country visit; and, using a participatory approach, interviews with project personnel, intended beneficiaries, project partners, and other stakeholders involved in the project. The evaluation also remotely interviewed some key project partners using available apps.

Key Findings

Based on information available and the findings of the discussions held, the evaluation made the following conclusions

Relevance: The project is highly relevant as it is assisting Thailand to fulfill its obligations to towards the Stockholm Convention, which it ratified on 31 January 2005. In particular, it is fully consistent with the country's development strategies and with the environmental policies regarding the control and reduction of pollution and of hazardous chemicals. The project is aligned with GEF strategic priorities in chemical and wastes focal area and with UNIDO's priorities and mandates.

Effectiveness: The project succeeded in achieving most of the stated project objectives. It succeeded in building capacity on BAT/BEP in the scrap metal recycling value chain. National guidelines, technical manuals and training courses on BAT/BEP developed and more than 2200 staff trained. Six demonstration recycling facilities invested significantly to adopt BAT/BEP measures, which contributed to notable reductions in unintentionally produced Persistent Organic Pollutants (UPOPs), CO_2 and particulate matter emissions. Despite delays due to Covid19, implementation was very effective, the project objective was exceeded, a reduction 24.34 g WHO-TEQ/year was achieved against a target 23.0 g WHO-TEQ/year at a cost effective rate of $940,000/gTEQ against 1,470,000/gTEQ.

Efficiency: Due to the outbreak of the Covid19 pandemic, the project was granted an extension of seventeen months to allow the smooth completion of activities. Thanks to their dedication, and with the adequate guidance and support from the UNIDO project manager, the project team succeeded in delivering all outputs within the planned budget keeping the

project management costs very reasonable. The significant amount of co-financing that materialized contributed to cost-effectiveness.

Sustainability: As no risks that may jeopardize the future flow of benefits have been identified, the sustainability of project results is considered likely.

Overall assessment and project rating

	Evaluation criteria	Rating
A	**Impact (progress toward impact)**	**L**
B	**Project Design**	**HS**
1	• Overall design	S
2	• Project results framework	S
C	**Project performance**	**HS**
1	• Relevance	HS
2	• Coherence	HS
3	• Effectiveness	HS
4	• Efficiency	HS
5	• Sustainability of benefits	L
D	**Gender mainstreaming**	**S**
E	**Project implementation management**	**S**
	• Results-based management	S
	• Monitoring and evaluation, reporting	S
F	**Performance of partners**	**HS**
1	• UNIDO	HS
2	• National counterparts	HS
3	• Private partners	HS
4	• Funding Partners	S
G	**Environmental and Social Safeguards, Disability and Human Rights**	**S**
	• Environmental safeguards	S
	• Social Safeguards, Disability and Human Rights	S
H	**Overall assessment**	**HS**

Key Recommendations

Recommendation 1: Revision of existing laws and regulations, identification of gaps and development of additional regulatory measures to promote the diffusion of BAT/BEP in order to reduce emissions of UPOPs from the secondary metals producing industry has been conducted and included in a national policy framework. Once adopted, DPIM/PCD should ensure that facilities are taking actions to be in compliance with this policy. In particular, DPIM/PCD should put in place a robust enforcement mechanism for the effective monitoring and evaluation of U-POPs reduction at the facilities.

Recommendation 2: The project achieved all the stated targets. In particular, BAT/BEP measures were successfully adopted at the demonstration facilities, which improved efficiency in production, allowed energy saving, and contributed to a reduction in UPOPs and particulate matter emissions. DPIM/PCD should promote project results in reaching out and encourage the remaining facilities to adopt the demonstrated BAP/BEP measures.

Recommendation 3: Following recommendation No 2, in order to support the remaining facilities, it should be ensured by DPIM/PCD that the existing incentives are accessible to enterprises of all sizes (large, medium, and small) with close collaboration among multiple ministries and agencies.

Recommendation 4: Adopting the demonstrated BAT/BEP measures would require technical support as well. It is recommended that the authorities should consider putting in place a mechanism to provide such support. And the facilities should be encouraged to follow training on BAT/BEP at the DPIM Academy Platform.

Recommendation 5: A website has been developed to share information and promote project results. It is recommended that this website is regularly updated.

1. Introduction

1.1 Evaluation Purpose

1. The purpose of the terminal evaluation (TE) is to independently assess the project to help UNIDO improve performance and results of ongoing and future programmes and projects. The terminal evaluation will cover the whole duration of the project from its starting date on 1 June 2018 to the completion date on 30 November 2024. The evaluation has two specific objectives: (i) Assess the project 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.

1.2 Evaluation Objectives and Scope

2. The main objective of the TE was to assess the project's performance based on the criteria of relevance, effectiveness, efficiency, sustainability, and impact. The evaluator particularly looked into the following criteria mentioned in the terms of reference (TOR) of the TE:
    1) Relevance: Is the intervention doing the right things? To what extent do the project's objectives respond to beneficiaries, global, country, and partner/institution needs, policies, and priorities, and continue to do so if circumstances change?
    2) Coherence: How well does the intervention fit? How compatible is the project with other interventions in the country, sector or institution?
    3) Effectiveness: Is the project achieving its objectives?
    4) Efficiency: How well are resources being used? Has the project delivered results in an economic and timely manner?
    5) Impact: What difference does the intervention make? To what extent has the project generated significant positive or negative, intended or unintended, higher-level effects? Has the project had transformative effects?
    6) Sustainability: Will the benefits last? To what extent will the net benefits of the project/programme continue, or are likely to continue?

3. To complement the aforementioned questions, the evaluator developed a more focused set of questions as well as key indicators and data sources that cover all these aforementioned criteria, which are summarized in the evaluation matrix (Annex 2).

1.3 Theory of Change

4. The project was developed through a logical framework approach (LFA) that included well-described outcomes, the corresponding outputs and activities, verifiable indicators and their sources of verification, as well as assumptions. The LFA has the advantage of clearly describing the causal pathways from outputs through outcomes to impact. As a GEF-6 project, it was not a requirement to provide a theory of change (TOC), which is a management tool that depicts the process of change by highlighting the causal linkages in the initiative (the short-term and long-term outcomes). Based on the project document, the evaluator developed a TOC (Figure 1), which describes how the project is expected to bring about changes in the

scrap metal recycling sector in Thailand for long-term impact. One necessary precondition is that the project needs to successfully deliver the seven planned outputs that would contribute to achieving the three substantive project outcomes. It is anticipated these would trigger the occurrence of the long-term outcome, which is the uptake of the project results by the stakeholders, private sector, and facility owners of the metal recycling sector across the country (Figure 1). This entails that the stakeholders of the metal recycling value chain would have adopted the project demonstrated BAT/BET measures, which would thus lead to the impact statement: impacts of U-POPs coming from scrap metal recycling on the environment and human beings are minimized.

5. Six key assumptions[1] have been identified for the TOC to withstand (Figure 1). In particular, assumptions 4, 5, and 6 are linked to the long-term outcome. During the information gathering phase, the evaluator sought evidence whether these assumptions were proving to hold. As depicted in Figure 1, three important drivers have also been identified and they are related to the support that the project should provide to achieve the three substantive outcomes.

1.4 Methodology

1. The TE was conducted in accordance with the UNIDO Evaluation Policy,[2] the UNIDO Guidelines for the Technical Cooperation Program and Project Cycle,[3] and the UNIDO Evaluation Manual[4]. In addition, the GEF Monitoring and Evaluation Policy,[5] and the GEF Minimum Fiduciary Standards for GEF Implementing and Executing Agencies[6] was also applied.

2. The TE used a participatory approach where key stakeholders were kept informed and consulted throughout the review process. Both quantitative and qualitative evaluation methods were used as appropriate to determine project achievements against the expected outputs, outcomes, and impact.

3. The TE was based on a combination of desk review of documents and interviews (face-to-face and remote) with key stakeholders, partners, and beneficiaries involved in the project including the UNIDO Regional Office, the UNIDO Project Manager (PM), the Department of Prime Industry and Mines (DPIM), Department of Industrial Works (DIW), the Department of Climate Change and Environment (DCCE), the Pollution Control Department (PCD), the National Project Director (NPD), the National Project Coordinator (NPC), the National Project Manager (NPM), the international and national consultants, owners of recycling facilities and NGOs. Most of the interviews were undertaken during a country mission that was undertaken from 10 to 17 August 2024. During this mission, site visits were made to three recycling facilities: Thai Metal Aluminium Co. Ltd, Thai Fukoku Panaplus Foundry Co. Ltd, and Panyaraksa Co. Ltd. Before the interviews, questionnaires[7] were sent to the interviewees at least one week in advance.

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[1] Taken from the project document (page project logical framework of the project document.
[2] UNIDO (2015). Director General's Bulletin: Evaluation Policy (UNIDO/DGB/(M).98/Rev.1).
[3]UNIDO (2006). Director-General's Administrative Instruction No. 17/Rev.1: Guidelines for the Technical Cooperation Programme and Project Cycle (DGAI.17/Rev.1, 24 August 2006).
[4] https://downloads.unido.org/ot/31/37/31371641/Evaluation%20Manual.pdf
[5] GEF (2010) The GEF Monitoring and Evaluation Policy (Evaluation Office, November 2010).
[6] GEF (2011). GEF Minimum Fiduciary Standards: Separation of Implementation and Execution Functions in GEF Partner Agencies (GEF/C.41/06/Rev.01, 3 November 2011, prepared by the Trustee).
[7] See Annex 5

4. As per the terms of reference for this evaluation, the evaluation team proposed a TOC (cf. Section 1.3) that was used to identify causal and transformational pathways from the project outputs to outcomes and longer-term outcomes, drivers, and assumptions to achieve them. In particular, the evaluation assessed the extent to which the project contributed to putting in place the conditions necessary to catalyze the emergence of the long-term outcomes of the TOC for achieving impact.

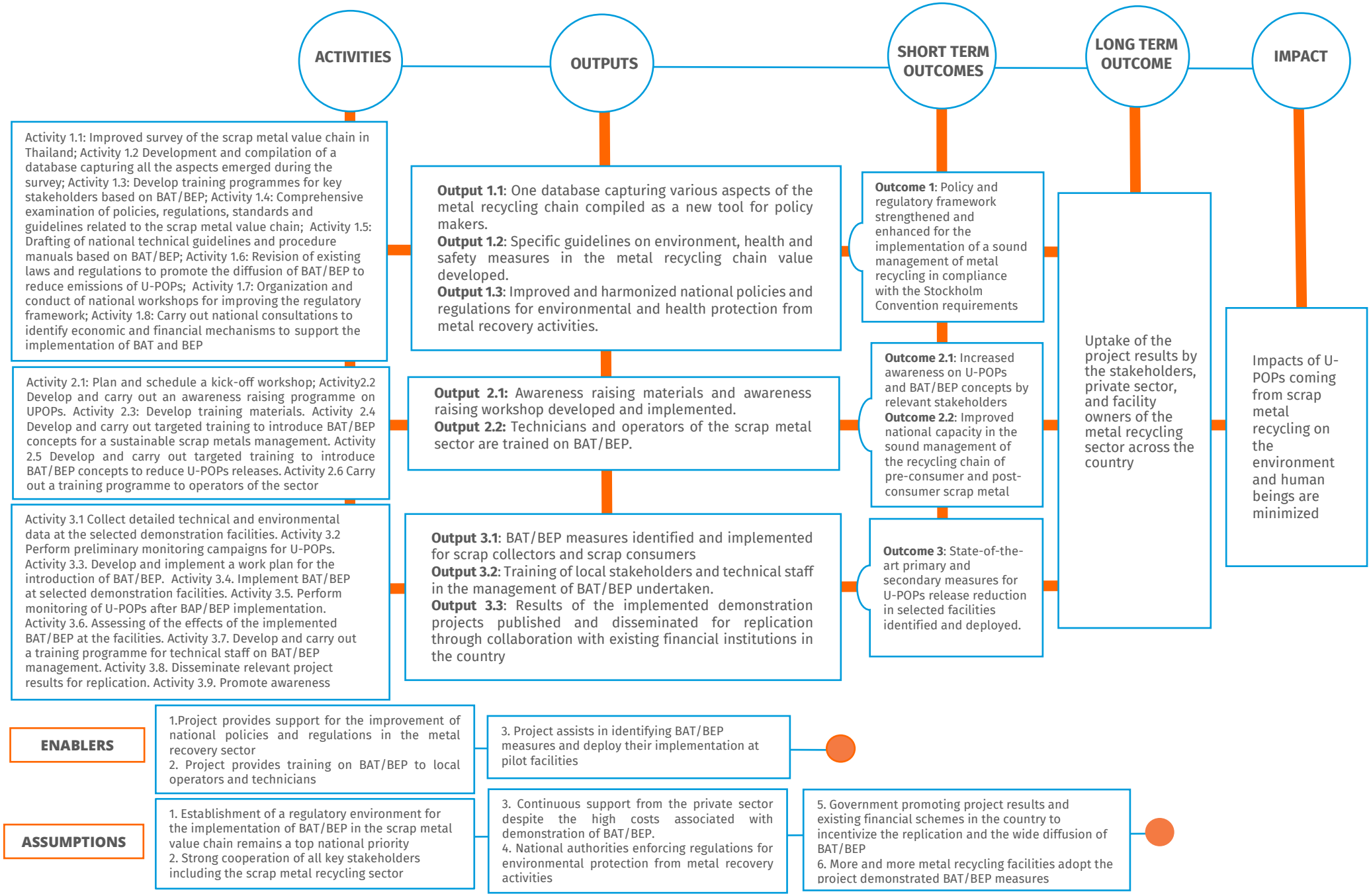
5. Data analysis, development of emerging findings, and evaluation criteria rating were undertaken. As far as possible, emerging findings were derived through triangulation of data from different sources that contributed to ensuring the robustness and validity of the assessment. Whenever a potentially important finding was identified but it was not possible to triangulate (e.g., data/finding provided by a single source), this was explicitly highlighted in the evaluation report.

1.5 Limitations

6. The evaluator did not encounter any major limitations in terms of access to information. During the inception phase, the project team shared a substantive set of documents[8]. Upon request further documents such as missing financial reports and mobilized co-financing data were provided. The evaluator could interview the key stakeholders, partners, and beneficiaries as well as consultants either during the mission or remotely.

[8] See Annex 3: list of documentation consulted

Figure 1: Theory of Change



2. Project Background and Context

7. The metallurgical sector is an important part of Thailand's economy. This sector produces ferrous and non-ferrous metals such as steel, copper alloys and aluminum, which are needed for the development of the country's infrastructure. While accounting for only 4.7% of the manufacturing industry and about 1.4% of the country's GDP, the metal industry is important to Thailand's economy as it supports many downstream industries such as the automotive, construction, electrical and electronic industry, etc.

8. The most recent polychlorinated dibenzo-para-dioxins (PCDDs)/ polychlorinated dibenzofurans (PCDFs) emission inventory for Thailand was carried out in 2005. Potential national releases of PCDDs/PCDFs emission to air, water, land, product and residue were estimated at 1075.88 g I-TEQ/year (toxic equivalent) as reported in the National Indicative Plan (NIP). The total release from the ferrous and nonferrous metal production was estimated at 119.84 g I-TEQ(toxic equivalent)/year, accounting for 11.14 % of the total national release.

9. The project "Greening the scrap metal value chain through Promotion of BAT/BEP to Reduce U-POPs Releases from Recycling Facilities" was designed in order for Thailand to meet its obligations under the Stockholm Convention (SC) and for the implementation of the identified priority action plans in its NIP that need urgent actions. The project, in general, sought to abate serious environmental threats caused by Unintentionally Produced Persistent Organic Pollutants (U-POPs) releases from the metallurgical sector. It aimed to assess in-depth the scrap metal value chain from generators, collectors and users and to provide measures that would make the processes involved in each link more environmentally-compliant and sustainable.

10. As core activity, the proposed project aimed to identify, implement and demonstrate state-of-the-art technologies for reducing U-POPs releases from scrap metal recycling in the metallurgical industry according to the obligations of the SC and to promote and introduce Best Available Technologies / Best Environmental Practices (BAT/BEP) measures to reduce U-POPs emissions in Small and Medium Enterprises (SMEs) and large enterprises involved in metallurgical processes. The guiding principles for the selection of the demonstration facilities as well as the techniques/technologies to be deployed during the demonstration project was to be the technical viability, the economic sustainability, the replicability of the demo results; cost-effectiveness in terms of reduction of U-POPs releases; and, of course, the level of support from the industry sector. Business models were to be elaborated and evaluated, including the possibility of formation of consortia between secondary metals producers and scrap dealers.

11. The main objective of the project was to promote and introduce BAT/BEP measures in scrap metal recycling facilities in order to reduce or eliminate unintentional POPs releases.

3. Findings

3.1 Project Design

12. The evaluation acknowledges several strengths in the design. In particular, a very thorough preparatory phase was undertaken whereby the necessary information was collected with the help of international and national experts and engaging the key national stakeholders including the national counter parts, in particular DPIM, and other departments of the Ministry of Industry, other ministries and the private sector (recycling facilities and waste companies). The logical framework approach, which was used to develop the project, provided a clear and rational framework for the planning of the envisaged activities and determining how to measure the project's success while taking external factors into account. The evaluation found that the design was adequate to address the problems at hand such as the obvious lack of knowledge on U-POPs and BAT/BEP measures to reduce emissions from of the national stakeholders including the scrap metal recycling value chain. Based on the situational analyses and the needs assessment done during the project preparatory phase[9], a clear thematically-focused development objective was proposed, and the causal pathways from project outputs through outcomes towards impacts have been clearly described in the project document.

13. The project document provided a detailed budget per component, per output, and per budget lines for GEF funds[10]. The socioeconomic benefits to be delivered by the project[11] as well as the gender equality and women's empowerment issues were properly considered in the design. In particular, a gender analysis was conducted during the preparatory phase, and the results were analyzed and reported[12]. Adequate institutional arrangement has been proposed for project implementation at UNIDO level, and for coordination and execution at national level[13]. Relevant key national stakeholders, such as ministries, institutions, and the private sector (recycling companies) were already identified and engaged during the design phase, and their foreseen involvement and responsibilities adequately described[14].

Project Results Framework

14. The LFA that was adopted to develop the project, led to the establishment of a Project Results Framework (PRF)[15] and the main elements of the project, i.e., the overall objective, outcomes, outputs, as well as adequate SMART[16] indicators and their means of verification, and assumptions. **Project Design and results framework** is rated **Satisfactory**.

[9] Annex C of the project document
[10] Annex F of the project document
[11] Section A.7 of the project document
[12] Section A.4 of the project document
[13] Section A.6.1
[14] Section A.3 of the project document
[15] Annex A of the project document
[16] SMART: specific, measurable, achievable, relevant and time-bound indicators

3.2 Relevance

15. This project is highly relevant with regard to national priorities. Thailand signed the Stockholm Convention (SC) in May 2002 and ratified it on 31 January 2005. The National Implementation Plan (NIP), which was transmitted to the SC Secretariat on May 2007, was developed to demonstrate how the Convention would be implemented. The NIP provided policy and strategy frameworks as well as action plans and activities to meet specific national objectives and to fulfill the country's obligations towards the SC. In particular, Thailand was determined to revise and update its legislation to include all potential source categories for PCDD/Fs and to promote BAT/BEP to reduce releases of PCDD/Fs and other UPOPs.

16. The project is fully consistent with the country's development strategies and with the environmental policies regarding the control and reduction of pollution and of hazardous chemicals set under the Enhancement and Conservation of National Environmental Quality Act B.E. 2535 (1992), the 12th National Economic and Social Development Plan 2017-2021, and the National Environmental Quality Management Plan 2017-2021. It is also in line with the vision, the mission and the four Strategic Agendas of the Ministry of Industry Strategic Plan 2017 – 2021.

17. The project is consistent with the GEF6 strategy on Chemicals and Waste 1 and 2 - CW-1: Develop the enabling conditions, tools and environment to manage harmful chemicals and wastes and CW-2: Reduce the prevalence of harmful chemicals and waste and support the implementation of clean alternative technologies. Specifically, it is consistent with CW-1 Program 1: Develop and demonstrate new tools and regulations, along with economic, approaches for managing harmful chemicals and waste in a sound manner and CW-2 Program 3: Reduction and elimination of POPs.

18. The project aligns with UNIDO priorities and mandates, and the renewed mandate on Inclusive and Sustainable Industrial Development (ISID). The project is particularly relevant to one of ISID's pillars: Safeguarding the Environment - environmentally sustainable growth, via cleaner industrial technologies and production methods, including in the fields of waste management and recycling; the promotion, adaptation, and transfer of environmentally sound technologies, under which UNIDO aims to assist countries in reaching compliance with the Stockholm Convention and aims at developing capacities in developing countries to protect their populations and their environmental resources from POPs-related pollution. Moreover, UNIDO has the comparative advantage of having implemented many projects on the environmentally sound management of POPs.

19. As the project is responding to Thailand's needs for the reduction of UPOPs emissions from the scrap metal recycling activities, and it is in line with GEF Chemicals Focal area and UNIDO mandates, the rating on **Relevance** is **Highly Satisfactory**.

3.3 Coherence

20. The project contributed to the two national plans mentioned in the previous section (Section 3.2, 2nd paragraph). In particular, it contributed to the third objective of the 12th National Economic and Social Development Plan 2017-2021: *increase efficiency of greenhouse gas reduction and enhance the capacity for climate change*

adaptation. Thanks to the introduction of BAT/BEP measures at the demonstration recycling facilities, energy efficiency was increased resulting in a decrease in electricity consumption, thereby a reduction in CO_2 emissions. For example, in one of demonstration facilities, the installation of regenerative burners (a BAT measure) that decreased the temperature of the flue gas from 600 °C to 200 °C, in order to reduce U-POP emissions, reduced energy consumption by about 30%. This resulted in a reduction of carbon emissions by 1,451 tons per year. At the same facility, a BAT improvement at the furnace to reduce U-POPs emissions allowed a 12% energy saving corresponding to a reduction in carbon emissions of 36 tons yearly.

21. One of the BAT/BEP measures adopted at the demonstration facilities was dust collector systems (bag filters) to reduce / minimize the emission of U-POPs. The use of devices also allowed a very significant reduction in the emissions particulate matters (PM10 and PM2.5)[17], thereby contributing to the improvement of the air quality, one of the goal of the National Environmental Quality Management Plan 2017-2021. Furthermore, the scrap metal recycling facilities have been informed that they have to monitor PM2.5 and report to the competent authorities[18].

22. Given the results achieved by the project in contributing to the two national development plans, rating on **Coherence** is **Highly Satisfactory**.

3.4 Effectiveness

23. Effectiveness was assessed based on the extent to which outputs and outcomes have been achieved, and whether the objectives of project have been attained. The design planned twenty three activities to deliver eight outputs that would contribute to four substantive outcomes. The outputs as well as the achievement of the outcomes, and project objectives, were assessed based on whether their corresponding indicators proposed in the PRF were available. The scale used for rating ranged from **Highly Satisfactory** (**HS**) to Highly Unsatisfactory (**HU**).

3.4.1 Delivery of Outputs

24. Despite delays due mainly due the outbreak of the Covid19 pandemic in March 2020, the project performed exceptionally well in terms of output delivery. Six of the eight substantive outputs have been rated **HS** (Table 1), and the last two **Satisfactory** (**S**) respectively. For the rating of components and achievement of outputs, the output ratings have been converted to scores. Then the average score for all the outputs has been calculated and converted to a rating again (Table 2).

25. **Component 1: Policy and regulatory framework**. The project performed very satisfactorily for this component. Targets have been exceeded for two (**Outputs 1.1 and 1.2**) of the three outputs, they have been rated **HS** (Table 1). For **Output 1.1**, four companies were fully assessed in 2018. However, as a result of Covid 19, one of the four companies pulled out of the project. However, thanks to the effort put by Iron and Steel Institute of Thailand (ISIT), hired to provide technical assistance, the project managed to identify three additional facilities, who agreed to embark as BAT/BEP demonstration facilities. A consultant was hired to develop a database, and survey data collected from much more than two companies were entered into the database. For **Output 1.2**, the staff of national authorities and facilities of the

[17] Executive summary report by Iron and Steel Institute of Thailand.

[18] Interview data

scrap metal recycling sector on measures and technologies to reduce U-POPs releases. A total of 542 persons (62.92% were women), exceeding the target of 50 at design, were trained. In the context of **Output 1.3**, the project developed national guidelines, technical manuals and policies on BAT/BEP that were adopted by the authorities. Regulatory instruments were also developed by the project, and they have been submitted to the authorities for adoption. Overall, delivery for **Component 1** is rated **HS** (Table 2).

26. **Component 2**: **Information dissemination and capacity building**. Targets for the two outputs of this component have been exceeded (Table 2). For **Output 2.1**, three videos promoting / advocating the project results have been produced and uploaded on project website[19] and project facebook. Three awareness raising campaigns/events have undertaken, and 815 people (382 men and 433 women) attended these 3 events. For **Output 2.2**, 20 training modules were developed by Chulalongkorn University in consultation with DPIM, PCD, Department of Environmental Quality Promotion (DEQP) and Department of Industry Works (DIW). In total 1721 persons (758 men and 963 women) were trained on these modules. For this output, three study tours undertaken in Italy, Korea and Japan. A total of 53 participants (27 women and 26 men) formed part of these tours. They visited several facilities in the scrap metal recycling sector. Delivery for **Component 2** is rated **HS**.

27. **Component 3**: **Pilot project for the demonstration of BAT/BEP in selected metal recycling facilities**. Both **Outputs 3.1** and **3.2** have been very satisfactorily (**HS**) delivered (Table 1). For **Output 3.1**, at the onset the facilities were informed that they would benefit from project funds at the ratio 6:1[20]. For economic reasons due to the negative impact of Covid19 one (Bangkok Iron and Steel Works Co. Ltd) of the four facilities that were identified during PPG phase pulled out of the project. It took several months to identify three additional facilities, which agreed to join the project. All were assessed, and BAT/BEP measures such as air pollution control system and pre-shredder machine were successfully implemented at the six facilities. These measures contributed to a total reduction of 24.34 g WHO-TEQ/year at the six facilities against a target of 23 g WHO-TEQ/year planed at design. These measures also contributed to significant decreases in particulate matter (PM10 and PM 2.5) emissions. Target for **Output 3.2** has been largely exceeded, a total of 1721 technical professionals (758 men, 863 women) have been trained on BAT/BEP. For Output 3.3, a national policy framework that included a replication strategy has developed and disseminated. In addition, the formulation of the updated NIP on POPs approved by Thai Cabinet on 14 March 2023. **Output 3.3** is rated **S**.

28. Based on the assessment reported in Table 2, the **delivery of outputs** is rated **Highly Satisfactory**.

[19] www.GreenScrapMetalThailand.com
[20] For every $ 6 (inkind and cash) invested, each facility would benefit 1 $ grant from the project

Table 1: Delivery of outputs

Outputs	Indicators/target at design	Target/Indicators achieved	Comments	Rating
Output 1.1: One database capturing various aspects of the metal recycling chain, as a new tool for policy makers, compiled.	• At least 4 facilities in the value chain fully assessed. • At least 2 representative companies consulted • Survey data entered and validated in the database. • A comprehensive database developed and functional.	• Four companies fully assessed in 2018. However, for various reasons, there were changes in the companies • More than 2 companies consulted • Consultant hired to successfully develop database • Survey data entered into database	Target exceeded	**HS**
Output 1.2: Specific guidelines on environment, health and safety measures in the metal recycling chain value developed.	• National guidelines and technical manuals drafted in coordination between governmental and industrial stakeholders and adopted. • 50 national authority staff trained on measures and technologies to reduce U-POPs releases from the metallurgical industry.	• National guidelines, technical manuals and training courses for national authority staff on measures and technologies to reduce U-POPs releases from the metallurgical industry produced in December 2020. • 542 representatives of relevant institutions with 62.92% women trained	Target exceeded	**HS**
Output 1.3: Improved and harmonized national policies and regulations for environmental and health protection from metal recovery activities.	• Number of regulatory instruments, national guidelines and technical manuals based on BAT/BEP submitted and/or undergoing adoption by national authorities.	• National guidelines, technical manuals and policies on BAT/BEP successful developed and adopted. Regulatory instruments developed by the project and submitted to the authorities for adopted	Target achieved	**S**
Output 2.1: Awareness raising materials and awareness raising workshop developed and implemented	• Development of at least 1 video and 2 publications • At least 2 awareness raising campaign • At least 2 participants from the relevant stakeholders participating in awareness raising campaigns. Equal access	• 3 videos produced and uploaded on project website[21] and project facebook. • Three awareness raising campaigns/events undertaken • 815 particitants attended these 3 events (382 men and 433 women)	Target exceeded	**HS**

[21] www.GreenScrapMetalThailand.com

	to training for men and women ensured			
Output 2.2: Technicians and operators of the scrap metal sector are trained on BAT/BEP	• Number of institutions involved in setting up training materials and providing training sessions. • At least 100 people (male/female) trained on BAT/BEP. • Number of participants (male/female) to the Study Tour. • Number of company visited and speeches held during the Study Tour.	• 20 modules developed by Chulalongkorn University in consultation with DPIM, PCD, DEQP and Department of Industry Works (DIW) • 1721 (758 men and 963 women) trained on the 14 modules • Three study undertaken in Italy, Korea and Japan. Total of 53 participants (27 women) • 6 facilities visited in Italy, several facilities in Korea and Japan	Target exceeded	**HS**
Output 3.1: BAT/BEP measures identified and implemented for scrap collectors and scrap consumers	• Demonstrations and assessments of the BAT/BEP measure agreed with 4 enterprises carried out and completed at the selected pilot sites. • Not less than 23 g-TEQ/year releases reduction by BAT/BEP introduction in the demonstration facilities. • Incremental investment in USD reported.	• 4 demonstration facilities identified during PPG phase, but due various reasons one left the project. Additional facilities were identified, and joined the project. All assessed, and BAT/BEP measures successfully implemented • Reduction of 24.34 g WHO-TEQ/year • $ 9,033,932 – Noting that 3 facilties have not reported yet	Target exceeded	**HS**
Output 3.2: Training of technical staff and other potentially interested local stakeholders (environmental authority, SMEs, scrap collectors, etc.) in the management of BAT/BEP undertaken	• Training of at least 50 technical professionals on BAT/BEP applicable to the industrial sector. Equal access to training for men and women ensured	• 1721 (758 men, 863 women) technical professionals trained on BAT/BEP	Target exceeded	**HS**
Output 3.3: Policy and regulatory framework	• A national action plan including estimates of costs and benefits to the adoption of BAT/BEP finalized and endorsed.	• A national policy framework developed and disseminated. In addition formulation second NIP on POPs approved by Thai Cabinet on 14 March 2023	Target achieved	**S**

Table 2: Rating of components and overall rating for achievement of outputs

Component	Outputs	Rating	Score*	Average score	Component Rating
Component 1	Output 1.1	HS	6	5.7	HS
	Output 1.2	HS	6		
	Output 1.3	S	5		
Component 2	Output 2.1	HS	6	6.0	HS
	Output 2.2	HS	6		
Component 3	Output 3.1	HS	6	5.7	HS
	Output 3.2	HS	6		
	Output 3.3	S	5		
Total and average score/Overall rating**			46	5.8	**HS**

*HS: 6; S: 5; MS: 4; MU: 3; U: 2; HU: 1; **Total score and average score for outputs and overall rating for achievement of outputs

Table 3: BAT/BEP measures implemented at the facilities

Name of facility	BAP/BEP measures
Panyaraksa Company Ltd	(1) Battery braking system; (2) APCS
Tata Steel Manufacturing Co. Ltd (Thailand)	Pre-shredder machine
Daiki Aluminium Industry Co. Ltd (Thailand)	Sorting and cleaning aluminium scrap
Thai Metal Aluminium Co. Ltd	(1) Regenerative burner; (2) billet heater
Thai Fukoku Panaplus Foundry Co. Ltd	Dust collector system
Millcon Burapa Co. Ltd	Pre-shredder machine

* Air pollution control system

3.4.2 Achievement of outcomes and attainment of project objective

29. The assessment, which was based on the availability of the indicators proposed in the PRF of the project document, is summarized in the Table 4 below. The project objective is rated **Highly Satisfactory** as the targets its four indicators have been fully achieved. In particular, the target for dioxin reduction has been surpassed, 24.34 g-WHOTEQ/year achieved against 23 g-WHOTEQ/year estimated at design. Under **Outcome 1**, rated satisfactorily, the project developed one new set of revised laws and regulations to promote the diffusion of BAT/BEP for the reduction of U-POPs releases, which have been submitted to the national authorities for approval and adoption.

30. Targets for **Outcome 2.1** and **Outcome 2.2** have been exceeded. The awareness of relevant stakeholders on U-POPs and BAT/BEP concepts has been very satisfactorily raised through numerous activities including workshops, meetings, training workshops and other events. National capacity in the sound management of the recycling chain of pre-consumer and post-consumer scrap metal having been

significantly improved through training workshops. To achieve these results, the project developed modules on BAP/BEP for awareness raising purposes and for the training the staff of the scrap metal sector value chain. A large number of staff have been trained (Section 3.4.1 under **Component 2**) and the course modules available online to the public at platforms managed by DPIM. **Outcome 3** is rated **Satisfactory** as although BAT/BEP measures have been successfully demonstrated at pilot facilities, the plan for replication, which has already been developed, has not yet been implemented.

31. Based on scores reported in Table 5, attainment of objectives and achievement of outcomes is rated **Highly Satisfactory**. Overall, **effectiveness** is rated **Highly Satisfactory**[22].

Table 4: Rating for attainment of objectives and achievement of outcomes

Objectives	Target/Indicators at design	Achievements and comments	Rating
The main objective of this five-year project is to promote and introduce Best Available Technologies (BAT) and Best Environmental Practices (BEP) in scrap metal recycling facilities to reduce or eliminate the release of unintentionally produced Persistent Organic Pollutants (U-POPs)	• Demonstration projects developed and completed in four (4) pilot facilities with reduction of U-POPs measured for pilot facilities • Emission standards for UPOPs emission for ferrous and non-ferrous secondary metal production formulated and enforced. • Estimated 23 g-TEQ/year of PCDD/F releases prevented from the four pilot demonstration sites and projected over the 15 year lifetime of equipment • BAT/BEP measures demonstrated and available.	• Six demonstration projects successfully completed with reduction of UPOPs in all of them. • These standards have been successfully developed by the project. Submitted to government for adoption • Reduction of 24.34 g-WHO TEQ/year in UPOPs releases successfully achieved at the six pilot sites • BAT/BEP measures such as dust collector system, air pollution control system or regenerative burners successfully demonstrated and available	**HS**
Outcomes	**Target/Indicators at design**	**Target/Indicators achieved and comments**	Rating

[22] Score for delivery of outputs is 5.8 and that for achievement of outcomes is 5.6. Average value is 5.7, which corresponds to **Highly Satisfactory**

Outcome 1: Policy and regulatory framework strengthened and enhanced for the implementation of a sound management of metal recycling in compliance with the Stockholm Convention	• One new set of revised laws and regulations adopted promoting the diffusion of BAT/BEP to reduce U-POPs releases from the secondary metals producing industry drafted.	• One new set of revised laws and regulations to promote the diffusion of BAT/BEP for the reduction of U-POPs releases developed and submitted to the national authorities for approval	**S**
Outcome 2.1: Increased awareness on U-POPs and BAT/BEP concepts by relevant stakeholders	• Institutionalized awareness programs within relevant ministries/institutions.	• Modules on awareness raising and training course modules on BAP/BEP available online to the public at platforms managed by DPIM	**HS**
Outcome 2.2: Improved national capacity in the sound management of the recycling chain of pre-consumer and post-consumer scrap metal	• Industry managers and technical staff are trained on the technical and environmental aspect for a sound management of the recycling of scrap metal. • Training on sound scrap metal management and BAT/BEP delivered to at least 100 trainees. Equal access to training for men and women ensured. At least 20% women.	• Substantial training on sound management of scrap metal recycling given to managers and technical staff • 1721 people (758 men and 963 women) trained on sound scrap metal management and BAT/BEP	**HS**
Outcome 3: State-of-the-art primary and secondary measures for U-POPs release reduction in selected facilities identified and deployed.	• Demonstration project interventions/results adopted by the metallurgical industry.	• BAT/BEP measures successfully demonstration at pilot facilities. Plan for replication developed but not yet implemented	**S**

Table 5: Overall rating for objective and outcomes

	Rating	Score
Objective	HS	6
Outcome 1	S	5
Outcome 2.1	HS	6
Outcome 2.2	HS	6
Outcome 3	S	5
Overall	**HS**	**5.6***

* average value of the scores

3.5 Efficiency

32. CEO endorsement was in January 2018 and planned to start the following month. The project duration was 5 years with a closure date of February 2023. The project actually started in June 2018. The main challenges that the project faced was delays

due to the outbreak of Covid19 pandemic, and the pulling out of one of the four facilities that agreed to be demonstration facilities for BAT/BEP (cf. Section 3.4.1). The project was granted an additional 17 months to allow for the smooth completion of project activities bringing the project closure to the end of November 2024.

33. UNIDO managed all the GEF funds and applied internal standard procedures for disbursements in the procurement of equipment and goods, the payments of consultants and service providers. In particular, the UNIDO PM ensured that all relevant documents and approvals were obtained before processing requests for payments and disbursements of funds[23]. Furthermore, UNIDO applied the most efficient options for the recruitment of consultants, sub-contracting service providers, and for project execution. The recruitment of consultants and the selection of service and equipment providers were done through a call for applications and bidding exercises. For consultants, the project also relied on those who had experience in the field or worked with UN agencies in the past, which was the case for the BAT/BEP international consultant who had past experience in similar projects.

34. At 31 August 2024, the total expenditures was $3,460,884 with a remaining balance of $1,039,116 (Table 6), indicative of a very cost-effective project implementation taking into account that all outputs have been successfully delivered. The significant unspent amount is due to the pulling out of Bangkok Iron and Steel Works Co. Ltd from the project, which would have invested about $ 12 M[24], and in return it would have benefited about $2 M from the project (cf. Section 3.4.1 under **Component 3**). The investment of the three additional facilities amounted to about $3.2 M (Table 7), and benefitted $800,000 as grant from the project. This explains the remaining balance, which will be returned to the GEF[25]. Upon approval by the PSC, some of the remaining funds were used to carry out UPOPs analysis of the flue gases at 30 recycling facilities in order to find out whether they were compliant or not with the new regulations. This UPOP monitoring was still on-going during the evaluation mission in Thailand. It is also worthy to note that there were no particular over expenditures for project management costs (PMC) included in items 1 and 3 (Table 6) despite the 17 months extension. The project was particularly cost effective in terms of cost per g of UPOPs (Toxicity Equivalent – TEQ) reduced: $940,000/gTEQ realized against $1,470,000/gTEQ at design[26]. The amount of co-financing that materialized was satisfactory, $18,631,276 against $23,729,838 pledged at design (Table 7). It should be noted that two additional facilities, Thai Fukoku Panaplus Foundry Co. Ltd and Millcon Burapa Co. Ltd, which invested to adopt BAT/BEP measures (Tables 3 and 7) have not yet reported on their co-financing.

35. In taking corrective actions and applying some cost-effective measures, the project successfully delivered all the planned outputs within the planned budget while keeping PMC within limits. Thus, **Efficiency** is rated **Highly Satisfactory**.

[23] Interview data
[24] Refer to Part I Section C of the project document
[25] Interview data
[26] These figures are calculated using the project cost (GEF + co-financing) at design taken from the project document, and the actual costs reported in Tables 6 and 7.

Table 6: Project expenditures as at 31 August 2024 (GEF funds only)

No	Item	Budget released ($)	Expenditures ($)	Funds available ($)
1	Staff & Inter. consultants	77,000	37,734	39,266
2	Local Travel	129,991	106,611	23,380
3	National	423,985	369,839	54,147
4	Contractual services	3,770,980	2,869,647	901,332
5	Training/Study	42,141	22,408	19,733
6	International	2,575	2,575	0
7	Premises	6,645	6,645	0
8	Equipment	6,104	6,073	31
9	Other direct costs	40,579	39,352	1,227
	Total	**4,500,000**	**3,460,884**	**1,039,116**

Table 7: Cofinancing (USD)

Source	**Co-financier**	**Type**	**Amount pledged**	**Amount materialized**
National Government	DPIM, MOI	In-kind	2,000,000	2,000,000
National Government	PCD, MONRE	In-kind	503,000	503,000
National Government	DOE, Quality Promotion	Grant	57,144	57,144
		In-kind	5,578,629	5,578,629
National Government	ISIT	In-kind	1,428,571	1,428,571
Private Sector	Bangkok Iron and Steel Works Co. Ltd	Equity	8,750,000	Company closed down, contract terminated
		In-kind	4,340,000	
Private Sector	NTS Steel Group Public Co. Ltd*	Equity	3,100,000	1,085,240
		In-kind	2,140,000	233,981
Private sector	Daiki Aluminium Industry Co. Ltd	Equity	2,000,000	2,721,466
		In-kind	610,000	19,500
Private sector	Thai Metal Aluminium Co. Ltd	Equity	2,133,887	1,921,216
		In-kind	853,555	482,559
Private Sector	Panyaraksa Co. Ltd**	Equity	2,198,906	2,470,891
		In-Kind	476,375	129,078
Private Sector		Equity	111,904	***

	Thai Fukoku Panaplus Foundry Co. Ltd**	In-kind	22,581	
Private Sector	Millcon Burapha Co. Ltd**	Equity	457,143	***
		In-kind	57,143	
GEF Agency	UNIDO	Grant	85,000	85,000
		In-kind	135,000	135,000
	Total		**33,714,786*** **	
	Total		**23,729,838*****	**18,631,276*****

*Instead of two, only one unit of the company equipped with BAT/BEP measures, no investment for 2nd unit; **Additional facilities that joined the project after Bangkok Iron Steel Co. Ltd left the project. ***These two companies invested to put in place BAT/BEP measures, but have not yet reported their co-finance.****Total amount pledged at design excluding amount from additional facilities ***** Total amount pledged and materialized excluding amount pledged from Bangkok Iron and Steel Works Co. ltd but including amount from additional facilities

3.6 Sustainability

36. Sustainability is the likelihood of continued benefits after the project ends. It can be assessed in terms of the risks confronted; the higher the risks, the lower the likelihood of sustainability of project benefits. The four dimensions of risks to sustainability: sociopolitical, financial, environmental, and institutional frameworks and governance risks) were considered and discussed below.

37. **Sociopolitical risks** – Since the ratification of the Stockholm Convention, the past and present Governments of Thailand have taken actions to implement the Convention. Over a period spanning over 20 years to date, Thailand has benefited from GEF grants amounting to $ 23 M (seven national and regional projects) to implement the Convention. Over the same period, the country has benefitted from a total GEF grant of more than $307 M for the implementation of 68 country and regional projects in the other GEF focal areas: climate change, international waters, biodiversity, and land degradation[27]. Of the 68 projects, 40 are completed, 23 are on-going, and the concepts of the last four have been approved. These initiatives clearly show that the past and current governments is showing / showed strong commitment in preserving the environment and protecting of the health of its population against hazardous substances as well as to fulfilling its obligations towards multilateral environmental agreements, which the country has ratified. The evaluation does not foresee any particular reason why this commitment would change in the future, therefore **Socio-political Sustainability** is rated **Likely**.

38. **Financial risks** – As earlier discussed (Section 4.2.1 under **Component 3** and Section 3.5), despite the difficult economic conditions during the post Covid19 period, the six demonstration facilities invested significantly to adopt BAT/BEP measures, which helped to significant reduction in UPOPs, carbon dioxide (thanks to energy saving), and particulate matter emissions. A replication strategy to cover the whole scrap metal recycling sector has been developed and adopted. However, its implementation has not started. Nevertheless, most if not all, the remaining recycling facilities of the sector, having actively participated in the project capacity

[27] https://www.thegef.org/projects-operations/database?project_search=&f%5B0%5D=project_country_national%3A149&page=0

building activities, are already aware that they will have to be compliant with the new regulations/standards pertaining to UPOP emissions, which have not yet been adopted by the authorities. A notification for compulsory implementation of the code of practice regarding BAT/BEP has already been drafted and will be issued. In support to those recycling facilities, the project carried out a monitoring of UPOPs to find out whether they were compliant with the new regulations (cf. Section 3.5). For those facilities that would need to invest to adopt the demonstrated BAT/BEP measures, three approaches to support exist: (i) Incentives from the Board of Investment of Thailand, such as tax and non-tax measures; (ii) Subsidies or low-interest loans from environmental funds or energy conservation funds; and (iii) Financial measures from commercial banks to encourage private sector to conduct green growth businesses or apply to the Bioeconomy, Circular economy and green economy (BCG) Model to the business sector. In light of the above discussion, **Financial sustainability** is rated **Likely**.

39. **Institutional framework and governance risks** – The project has successfully contributed to the development of national guidelines, technical manuals and policies on BAT/BEP, which have already been adopted. Regulatory instruments have also been developed and submitted to the authorities for adoption. A draft notification for the compulsory implementation of code of practice regarding BAT/BEP in the scrap metal recycling sector will be issued[28]. The project provided extensive capacity building on BAT/BEP. 20 modules to train the staff of the recycling sector on BAT/BEP were developed by Chulalongkorn University in consultation with DPIM, PCD, DEQP, and DIW. More than 1700 people were trained on these modules, which are available online at the DPIM Academy Platform. A Ministerial Announcement requiring recycling facilities to have their staff/workers trained on these BAT/BEP modules has been drafted, and will soon be issued[29]. Furthermore, capacity exists in the country for dioxin analysis. A dioxin laboratory was inaugurated in 2013 at Environmental Research and Training Center of DEQP. Private laboratories such UAE-IDEA Advance Analytical Company Limited (UIA) also offer services for dioxins & furans analysis[30]. In view of the above, **Institutional framework and governance sustainability** is rated **Likely**.

40. **Environmental risks** – The project is considered ecologically sustainable as it was designed to build capacity on BAT/BEP in the Thai scrap metal recycling value chain in order to reduce UPOP emissions. Thanks to the project interventions, a total reduction of 24.34 g-WHO-TEQ/year was achieved at the six demonstration facilities. In addition, the BAT/BEP measures adopted contributed to reduce CO_2 and particulate matter emissions at the facilities. As no environmental risk that can influence or affect the project's results and flow of benefits has been identified, **Environmental Sustainability** is rated **Likely**.

41. As no risks that may affect the project results have been identified, **Sustainability** is considered **Likely**.

3.7 Progress to Impact

42. The likelihood of impact was assessed on the extent to which the proposed long-term outcome in the TOC (Figure 1) was emerging in Thailand. Assessment of

[28] Interview data
[29] Interview data
[30] https://www.uia.co.th/

assumptions 4, 5 and 6, linked to the long term outcome, were also done to confirm whether they were valid. Assumptions 1 to 3 and the enablers were related to the delivery of outputs and the achievement of short term outcomes and thus they were not assessed. Table 8 summarizes the findings of this assessment.

43. Having participated in the project activities such capacity building and awareness raising workshops, the key stakeholders of the scrap metal recycling value chain are already aware that policies and regulations on BAT/BEP for the sector have been developed and submitted to the national authorities for adoption. Furthermore, as discussed in the earlier section, the relevant authorities would issue a notification for the compulsory implementation of code of practice regarding BAT/BEP in the scrap metal recycling sector. A Ministerial Announcement requiring recycling facilities to have their staff/workers trained on BAT/BEP would also be issued. The project has developed a replication plan, but its implementation has not yet started. Financial options to support facilities for adopting the demonstrated BAP/BEP measures are available (cf. Section 3.6). For these reasons, the emergence of the long-term outcome is likely.

44. Assumption 4 relates to national authorities enforcing regulations for environmental protection from metal recovery activities. This assumption is already proving to hold as the authorities would be requesting stakeholders of the value chain to have their staffed trained on BAT/BEP and to implement the code of practice for the sector. Furthermore, once the regulations/standards on UPOPs emissions for the metal recycling sector are adopted, the authorities are committed on their enforcement[31].

45. Assumption 5 is also proving to hold. Promotion of results have already started at national and regional events. Promotion was done at the Asia Pacific Forum, which was held in Bangkok, Thailand on 20-23 February under the theme: “Reinforcing the 2030 Agenda for Sustainable Development and eradicating poverty in times of multiple crises: The effective delivery of sustainable, resilient and innovative solutions in Asia and the Pacific”. At national level, the project results were promoted at the National Sustainability Exposition 2023, which was held 29 September - 08 October 2023 in Bangkok, Thailand. As already mentioned earlier (Section 3.6), three financial options exist to support the facilities. Representatives banks were invited to talk about their green funds during a national seminar - Green Scrap Metal Thailand 2023 - organized by the project under the theme “Change for the better”.

46. As the implementation of the replication plan has not started yet, it is too early to assess Assumption 6. However the staff/employees of most of the recycling facilities have already been trained on BAT/BEP. Moreover, the training courses (modules) developed by the project are available at the DPIM Academy Platform. One can learn and be examined at this platform. If successful, a certificate is issued to the participant[32]. Based on above discussions, and provided the replication plan is fully implemented, the long term impact to reduce impacts of UPOPs from the scrap metal recycling sector is considered **Likely**.

[31] Interview data
[32] Interview data

Table 8: Assessment of the long term outcome and the related assumptions

Long term outcome	Observation/findings	Rating
Uptake of the project results by the stakeholders, private sector, and facility owners of the metal recycling sector across the country	• Facilities aware of policies and regulations being drafted and submitted for adoption • Most stakeholders of the value chain participated in the capacity building activities such as the training courses on BAT/BEP • Replication plan developed, financial options to support facilities available	**S**
Assumptions	**Observations/findings**	**Rating**
4. National authorities enforcing regulations for environmental protection from metal recovery activities	Policies and regulations for the metal recycling sector not yet adopted by authorities. However, authorities committed to enforce them when adopted	**S**
5. Government promoting project results and existing financial schemes in the country to incentivize the replication and the wide diffusion of BAT/BEP	Promotion of results already started in national events. ISIT encouraging other facilities to adopt BAT/BEP and financial incentives available	**S**
6. More and more metal recycling facilities adopt the project demonstrated BAT/BEP measures	Too early to assess, however all facilities have had their staff trained by the project – Training courses available at DPIM Academy Platform	**MS**

3.8 Gender Mainstreaming

47. The project document mentioned that Gender and Development (GAD) considerations would be made an integral part of the project strategy in consideration of the Gender policies of the GEF, UNIDO and the Government of Thailand. A detailed gender analysis of the metallurgical sector in Thailand was conducted during the preparatory phase of the project to mainstream gender dimensions into the project elements. The project ensured participation of both men and women in the decision-making process and reporting of gender-sensitive indicators in its activities. Equal access to opportunities and more inclusive participation despite the metallurgical sector being a male-dominated industry was ensured. As reported in Table 1 under **Outputs 2.1, 2.2 and 3.2** the participation of women has been very satisfactory. The project also ensured around 40-60% women in the composition of the three Technical Working Groups (TWG) and also for the study tours. Rating on **Gender mainstreaming** is **Satisfactory**.

3.9 Environmental Impacts

48. The main objective of the project was to promote and introduce BAT/BEP measures in selected scrap metal recycling facilities to reduce or eliminate the release of UPOPs. The project successfully built the capacity of the key stakeholders including government officers, facility owners and other relevant institutions on BAT and BEP. It also succeeded in engaging six demonstration facilities that invested significantly to adopt BAT/measures. As a result of these interventions, a total reduction of 24.34 g WHO TEQ per year was seen at the six facilities. The adopted BAT/BEP measures

also contributed to energy savings thereby reducing CO_2 emissions, and also a notable decrease in particulate matter emissions. **Environmental impacts** is rated **Highly Satisfactory**.

3.10 Social Impacts

49. All the recycling facilities agreed that the project interventions contributed to create a better working environment for the people and the community nearby: much less smoke and particulate matter / dust observed at the working places, strict wearing of personal protective equipment, cleaner working environment, much less odour, greening of the outside environment, much less emissions and smoke to the environment. **Social Impacts** is rated **Satisfactory**.

3.11 Performance of Partners

3.11.1 UNIDO

50. UNIDO was the implementing agency, and a project manager (PM), based at UNIDO Head Quarters in Vienna and supported by a project assistant, was nominated to manage the project. At the national level, a NPM was recruited to coordinate and collaborate with national counterparts, partners, and consultants for the execution of activities. The NPM led the Project Management Unit (PMU) that was established during the early phase of implementation. In general, the UNIDO PM performed very well and showed her capacity to initiate, support, and facilitate the implementation of the project. Her very good understanding of the technical (BAT/BEP) needs in the recycling sector as well as the capacity-building needs of the country's institutions, as she previously implemented similar projects for UPOP reduction, were decisive factors in achieving results. The support and guidance provided by the UNIDO PM, and the efforts put by the NPM to coordinate activities were well appreciated by the stakeholders, who rated their performance as very satisfactory (Table 9). The quality of national and international consultants that UNIDO recruited to provide technical support was also well appreciated. UNIDO performance is rated **Highly Satisfactory**.

3.11.2 National Counterparts

51. DPIM, the executing agency of the project, fully played its role. It hosted the project PMU that was constituted by the NPM and one administrative staff. A NPD, a NPC and a project team comprising 9 DPIM staff were nominated to be directly involved in the implementation of the project. While the NPD chaired the PSC, the NPC worked closely with the PMU for the coordination of activities, and the project team was involved in the organisation of activities or were members of the TWGs. The support and guidance provided by the NPD and NPC was well appreciated by the stakeholders (Table 9). Other major stakeholders such as the national GEF focal point, PCD, DIW, DCCE, DEQP, and the Office of Industrial Economics (OIE) were either members of the PSC or the TWGs. According information gathered during the evaluation mission, it was unanimously recognized a very active participation and engagement of these stakeholders. One particular respondent indicated that the TWG meetings were quite lively and very often lasted much longer than planned. The performance of national counterparts is rated **Highly Satisfactory**.

3.11.3 Private sector

52. The scrap metal recycling facilities were fully engaged in the project. All of them had their staff followed the training on BAT/BEP. The six demonstration ones invested

significantly to adopt the BAT/BEP measures that were recommended by the international experts (Tables 3 and 7). These interventions allowed a notable reduction in UPOP, CO_2 and particulate matter emission. Rating for private sector is **Highly Satisfactory**.

3.11.4 Funding partners

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

Table 9: Rating by respondents

Entity	n*	Respondent ratings			Average score	Overall rating
		MS: 4	S: 5	HS: 6		
UNIDO	12	0	2	10	5.83	**HS**
NPM	10	0	4	6	5.60	**HS**
International Consultants	11	1	3	7	5.55	**HS**
National Consultants	11	1	3	7	5.55	**HS**
NPD	10	0	3	7	5.70	**HS**
NPC	10	1	3	6	5.50	**HS**

*n: number of respondents

3.12 Results-based Management

54. There is documented evidence that a results-based management approach was adopted to implement the project. As verified in PIR reports, the indicators proposed in the PRF of the project document were used to track progress at both output and outcome levels. Decisions taken and recommendations made at the PSC meetings were based on information provided by the PMU and the TWGs, and using a participatory approach[33]. The project team then took adaptive and corrective measures for project execution accordingly, which contributed to achieve targets. Rating for results-based management is **Satisfactory**.

3.13 Monitoring & Reporting

55. The proposed monitoring and evaluation (M&E) plan, budgeted at $250,000, included all the monitoring and evaluation activities to be carried out during project implementation. The inception workshop was held on 29 November 2018 in Bangkok. After this kick-off workshop, a total of 13 PSC meetings were carried out during which regular updates on the achievements were reported and issues were discussed. PSC was providing adequate guidance and making appropriate recommendations to adapt to situations and to respond to challenges. For instance, following the pulling out of one of the key demonstration facilities, the PSC recommended to identify additional facilities. It is clear that the PMU used the PRF as basis for monitoring, and the verifiable indicators were used to track progress at both output and outcome levels. All the recommendations of the midterm evaluation, which was conducted in July-August 2021, were adequately addressed by project management[34]. All reports required by UNIDO were completed and submitted on time. All PIR reports were timely submitted to the GEF. Any special reports or

[33] Interview data
[34] Interview data, data from PIRs and PSC meeting reports

updates required were also complied with and submitted to the relevant office. Rating on **monitoring and reporting** is **Satisfactory**.

3.14 Overarching assessment and rating table

56. Table 10 below summarizes the assessment of the project.

Table 10: Project assessment

	Evaluation criteria	Evaluator's summary comments	Rating
A	**Impact (progress toward impact)**	Conditions in place for the long term outcome proposed in the TOC to emerge, and two of the three related assumptions are proving to hold	**L**
B	**Project Design**		**HS**
1	• Overall design	Logical framework approach adopted to develop the project addressing the problems at hand. Causal pathways from project outputs through outcomes towards impacts clearly described	S
2	• Project results framework	Baseline and target values as well as well-defined SMART indicators for project objective, outputs and outcomes provided to monitor progress and track results	S
C	**Project performance**	**All stated objectives achieved**	**HS**
1	• Relevance	Project assisting Thailand to fulfill its obligations in the reduction of UPOPs emission in the srap metal recycling sector, and aligned with GEF Focal areas and UNIDO mandates	HS
2	• Coherence	Project contributing to reduce CO_2 and particulate matter emissions as well	HS
3	• Effectiveness	All the stated objectives achieved. Guidelines, policies and regulations for scrap metal recycling sector developed, target for UPOP reduction exceeded: 24.34g WHO TEQ against 23.0 g WHO TEQ/year	HS
4	• Efficiency	Despite delays, all outputs delivered within budget. Very cost effective reduction of UPOP: $940,000/gTEQ realized against 1,470,000/gTEQ at design	HS
5	• Sustainability of benefits	No socio-political, institutional framework & governance, financial and environmental risks identified, and sustainability of project benefits considered likely.	L
D	**Gender mainstreaming**	Project ensured satisfactory involvement and participation of women at all levels	S
E	**Project implementation management**		S
	• Results-based management	Results-based approach adopted, and proper monitoring of project progress done during PSC meetings involving all key stakeholders.	S
	• Monitoring and evaluation, reporting	Proper project monitoring and tracking of results done using the SMART indicators of the PRF. Thirteen PSC meetings held and relevant reports submitted timely.	S

	Evaluation criteria	Evaluator's summary comments	Rating
F	**Performance of partners**		HS
1	• UNIDO	Guidance and support UNIDO provided highly appreciated by stakeholders. Timely and critical actions taken, and technical back-stopping provided through high quality international and national experts.	HS
2	• National counterparts	DPIM fully played its role. Hosted the PMU, allocated a team of seven staff for coordination and support of project activities. Adequately led the PSC	HS
3	• Private partners	Strong commitment of the demonstration facilities, which invested significantly to adopt BAT/BEP measures and contributed to noble reduction in UPOPs, CO2 and particulate matter emissions	HS
4	• Funding Partners	GEF funds available	S
S G	**Environmental and Social Safeguards, Disability and Human Rights**		S
	• Environmental safeguards	Adequately addressed	S
	• Social Safeguards, Disability and Human Rights	Social safeguards adequately addressed. Disability and Human rights not considered in the design	S
H	**Overall assessment**		HS

4. Conclusions and Recommendations

4.1 Conclusions

57. The objective of this highly relevant project was to promote and introduce BAT/BEP in demonstration scrap metal recycling facilities to reduce or eliminate the release of UPOPs. With the strong support of the DPIM, hosting the PMU and leading the PSC, and appropriate guidance from the UNIDO PM, the committed project team able to put the project on the right track. Although Covid19 delayed implementation, all the stated objectives were successfully achieved. In particular, the introduction of the BAT/BEP measures at the demonstration facilities allowed a significant reduction in UPOPs, CO_2, and particulate matter emissions. The project interventions contributed to create better and cleaner working environments, much enhanced awareness amongst workers, and the need for systematic use protective equipment.

58. As no risks that could threaten the flow of benefits have been identified, the likelihood of sustainability of the project results is considered likely. Similarly, the impact of the project is considered likely as the conditions are already in place for the emergence of the long term outcome, and the associated assumptions are proving to be valid.

4.2 Recommendations and Management Response

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

#	Recommendations	Management Actions	Responsible Institution	Target Date
1.	Revision of existing laws and regulations, identification of gaps and development of additional regulatory measures to promote the diffusion of BAT/BEP in order to reduce emissions of UPOPs from the secondary metals producing industry has been conducted and included in a national policy framework. Once adopted, DPIM/PCD should ensure that facilities are taking actions to be in compliance with this policy. In particular, DPIM/PCD should put in place a robust enforcement mechanism for the effective monitoring and evaluation of U-POPs reduction at the facilities.	In coordination with other authorized government agencies, particularly Department of Industrial Works, DPIM and PCD are strongly supporting the enforcement mechanism for the effective monitoring and evaluation of U-POPs reduction at the facilities.	DPIM / PCD	31/12/2025
2	The project achieved all the stated targets. In particular, BAT/BEP measures were successfully adopted at the	Project results will be further shared and disseminated in relevant activities of both DPIM and PCD.	DPIM / PCD	31/12/2025

	demonstration facilities, which improved efficiency in production, allowed energy saving and, contributed to a noble reduction in UPOPs and particulate matter emissions. DPIM/PCD should promote project results in reaching out and encourage the remaining facilities to adopt the demonstrated BAP/BEP measures.			
3.	Following recommendation No 2, in order to support the remaining facilities, it should be ensured that the existing incentives are accessible to enterprises of all sizes (large, medium, and small) with close collaboration among multiple ministries and agencies.	Existing incentives will be communicated through the industrial associations.	DPIM/PCD	31/12/2025
4.	Adopting the demonstrated BAT/BEP measures would require technical support as well. It is recommended that the authorities should consider putting in place a mechanism to provide such support. And the facilities should be encouraged to follow training on BAT/BEP at the DPIM Academy Platform	Technical assistance will be made available through organic technical staff at DPIM.	DPIM	31/12/2025
5.	A website has been developed to share information and promote project results. It is recommended that this website is regularly updated.	Accepted.	DPIM	30/06/2025

5. Lessons Learned

60. The project has been successfully completed and the following lesson stemmed out.

61. Lesson 1 – A very solid preparatory phase was carried to identify the key stakeholders of the scrap metal recycling value chain as well as their needs in order to reduce the release UPOPs. A very high ownership of the project was seen among these stakeholders during implementation. Involving key project partners and stakeholders early in the process would facilitate their support and ensure their commitment.

6. Annexes

Annex 1: Evaluation Terms of Reference

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

TERMS OF REFERENCE

Independent terminal evaluation of the project:

Greening of Scrap Metal Value Chain through the Promotion of BAT/BEP to Reduce U-POPs Releases from Recycling Facilities

UNIDO ID: 150186

GEF Project ID: 9222

06/2024

Contents

I. PROJECT BACKGROUND AND CONTEXT

1. Project factsheet[35]

Project title	Greening of Scrap Metal Value Chain through the Promotion of BAT/BEP to Reduce U-POPs Releases from Recycling Facilities
UNIDO ID	150186
GEF Project ID	9222
Country(ies)	Thailand
Project donor(s)	GEF
Project approval date/GEF CEO endorsement date	22.08.2017
Planned project start date (as indicated in project document/or GEF CEO endorsement document)	01.02.2018
Actual project start date (First PAD issuance date)	01.06.2018
Planned project completion date (as indicated in project document/or GEF CEO endorsement document)	30.06.2022
Actual project completion date (as indicated in UNIDO ERP system)	30.11.2024
Project duration (year): Planned: Actual:	 5ys 7ys
GEF Focal Areas and Operational Programme	Chemicals and Wastes
Implementing agency(ies)	UNIDO
Executing Partners	Department of Primary Industries and Mines, Ministry of Industry (DPIM-MoI), Pollution Control Department (PCD) and Department of Environmental Quality Promotion (DEQP) under the Ministry of Natural Resources and Environment (MoNRE), Iron and Steel Institute of Thailand (ISIT)
Donor funding	USD 4,500,000
UNIDO input (in kind, USD)	USD 135,000

[35] Data to be validated by the Consultant

Co-financing at CEO Endorsement, as applicable	USD 33,714,786
Total project cost (USD), excluding support costs	USD 38,214,786
Planned terminal evaluation date	July-August 2024

(Source: Project document, UNIDO ERP system)

2. Project context

The metallurgical sector is an important part of Thailand's economy. This sector produces ferrous and non-ferrous metals such as steel, copper alloys and aluminum, which are needed for the development of the country's infrastructure. While accounting for only to 4.7% of the manufacturing industry and about 1.4% of the country's GDP, the metal industry is important to Thailand's economy as it supports many downstream industries such as the automotive, construction, electrical and electronic industry, etc.

The most recent polychlorinated dibenzo-para-dioxins (PCDDs)/ polychlorinated dibenzofurans (PCDFs) emission inventory for Thailand was carried out in 2005. Potential national releases of PCDDs/PCDFs emission to air, water, land, product and residue were estimated at 1075.88 g I-TEQ/year (toxic equivalent) as reported in the National Indicative Plan (NIP). The total release from the ferrous and nonferrous metal production was estimated at 119.84 g I-TEQ(toxic equivalent)/year, accounting for 11.14 % of the total national release.

The project "Greening the scrap metal value chain through Promotion of BAT/BEP to Reduce U-POPs Releases from Recycling Facilities" was designed in order for Thailand to meet its obligations under the Stockholm Convention (SC) and for the implementation of the identified priority action plans in its NIP that need urgent actions. The project, in general, seeks to abate serious environmental threats caused by Unintentionally Produced Persistent Organic Pollutants (U-POPs) releases from the metallurgical sector. It aims to assess in-depth the scrap metal value chain from generators, collectors and users and provide measures that would make the processes involved in each link more environmentally-compliant and sustainable.

As core activity, the proposed project aims to identify, implement and demonstrate state-of-the-art technologies for reducing U-POPs releases from scrap metal recycling in the metallurgical industry according to the obligations of the SC and to promote and introduce Best Available Technologies / Best Environmental Practices (BAT/BEP) measures to reduce U-POPs emissions in Small and Medium Enterprises (SMEs) and large enterprises involved in metallurgical processes. The guiding principles for the selection of the demonstration facilities as well as the techniques/technologies to be deployed during the demonstration project will be the technical viability, the economic sustainability, the replicability of the demo results; cost-effectiveness in terms of reduction of U-POPs releases; and, of course, the level of support from the industry sector. Business models will be elaborated and evaluated, including the possibility of formation of consortia between secondary metals producers and scrap dealers.

3. Project objective and expected outcomes

The main objective of the proposed project is to promote and introduce BAT/BEP measures in scrap metal recycling facilities in order to reduce or eliminate unintentional POPs releases

The following project components have been developed, in addition to project management, to achieve the project objectives:

Component 1: Policy and regulatory framework - this component will focus on filling in the gaps in the policy and regulatory framework with the aim to strengthen the country capacity to achieve an effective enforcement of laws and regulations in the field of U-POPs releases from the secondary metals producing industry.

Component 2: Information dissemination and capacity building - this component will support the strengthening of the technical capacity and expertise of human resources in the management of the lifecycle of scrap metal from its collection to the transformation into secondary metals in order to promote resource conservation and resource efficiency in a manner compatible with the requirements of the Stockholm Convention. For this purpose, it will seek to identify and fill information gaps, to disseminate as widely as possible the knowledge for a sustainable management of the scrap metal value chain and to establish a technical basis within key stakeholders for identifying and implementing the most appropriate BAT/BEP measures. At the same time, this component will attempt to raise awareness of the workers and the general public on environmental and health issues related to POPs exposure.

Component 3: Pilot project for the demonstration of BAT/BEP in selected metal recycling facilities - The scope of this component is to address and demonstrate the technical feasibility of BAT/BEP implementation in order to minimize or in some cases even eliminate the potential formation and release to the environment of U-POPs and other harmful pollutants of local and global concern during thermal processes in the metallurgical industry.

Component 4: Monitoring and evaluation; knowledge management and dissemination - the purpose of this component is to generate and ensure systematic support for managing all activities related to monitoring, evaluation and reporting on progresses and results of the project in order to guarantee the achievement of project objectives, as well as to promote the internal circulation of knowledge and the external dissemination of the results of the project.

The following are, in brief, some of the expected results of the project/programme:

- Demonstration projects developed and completed in four (4) pilot facilities with reduction of UPOPs measured for each pilot facility.
- Emission standards for UPOPs emission for ferrous and non-ferrous secondary metal production formulated and enforced.
- Estimated 23 g-TEQ/year of PCDD/F releases prevented from the four pilot demonstration sites and projected over the 15 year lifetime of installed equipment |?|
  BAT/BEP measures demonstrated and available.

4. Project implementation arrangements

The institutional arrangement for project implementation is provided in Figure 10 below. UNIDO is the GEF Implementing Agency (IA) for the project. A project officer was appointed in UNIDO HQ to oversee the implementation of the project, assisted by a support staff and supervised by a senior professional staff engaged in the management and coordination of UNIDO's Stockholm Convention Programme. The UNIDO Regional Office in Thailand played a significant role in the supervision and monitoring of the project. UNIDO country-level monitoring was provided as part of the in-kind contribution of the organization to the project.

UNIDO provided both implementation and limited execution functions. It provided full oversight of the project and was responsible in the recruitment of international experts and some national experts, including the PMU. Procurement of major equipment/services was undertaken by UNIDO in accordance with its procurement rules and procedures.

The Department of Primary Industries and Mines is the lead executing agency for the project. Coexecuting institutions will include the:

- Pollution Control Division of the Ministry of Natural Resources and the Environment to work on
  NIP-POPs and emission standards in the metallurgical sector
- • Department of Environmental Quality Promotion (DEQP), to conduct dioxin monitoring and public awareness raising and capacity building on U-POPs management
- • Iron and Steel Institute of Thailand will provide coordination and technical services to the pilot facilities. It mayalso be engaged in the execution of some awareness raising and capacity building activities.

The Project Management Unit was established within the premises of the DPIM. A National Project Director (NPD) from DPIM was appointed and chaired the Project Steering Committee. A National Project Coordinator (NPC), also from the Ministry, was assigned by the NPD to oversee the activities of the project. A National Project Manager (NPM) was recruited by UNIDO to manage and execute the day-to-day tasks required by the project and a Project Assistant who was in charge of the administrative functions required. UNIDO provided execution support by recruiting international and national experts based on specific required tasks. The NPM was responsible for drafting the reportorial requirements of the project including progress reports, annual work plans, GEF project implementation report (PIRs) and country reporting requirements based on the prescribed formats. The PMU is responsible for informing UNIDO of any delays or difficulties during the implementation so that appropriate support or corrective measures can be adopted in a timely and remedial fashion.

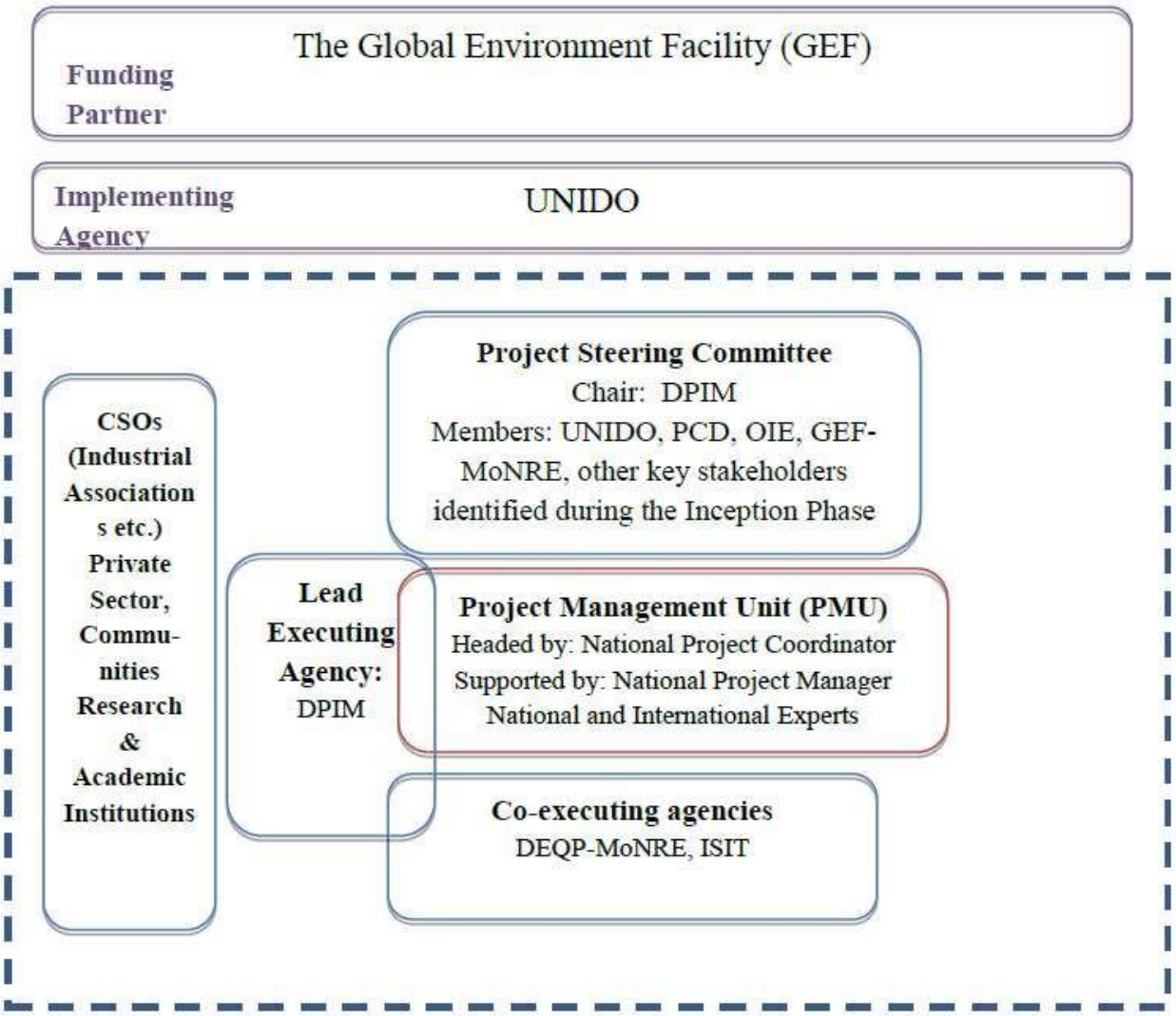


Figure 10: Project implementation structure

5. Budget information

Table 1. Financing plan summary - Outcome breakdown

Project outcomes/components	Donor (GEF/other) ($)	Co-Financing ($)	Total ($)
Component 1. Policy and regulatory framework	275,000	1,460,144	1,735,144
Component 2. Information dissemination and capacity building	625,000	5,507,200	6,132,200
Component 3. Pilot project for the demonstration of BAT/BEP in selected metal recycling facilities	3,150,000	24,247,442	27,397,442
Component 4. Monitoring and evaluation	250,000	1,500,000	1,750,000
Total ($)	4,300,000	32,714,786	37,014,786

Source: Project document

Table 2. Co-Financing source breakdown

Name of Co-financier (source)	In-kind	Cash	Total Amount ($)
Department of Primary Industries and Mines, Ministry of Industry (National Government)	2,000,000		2,000,000
Pollution Control Department (PCD), Ministry of Natural Resources and Environment (National Government)	503,000		503,000
Department of Environment Quality Promotion (National Government)	5,578,629	57,144	5,635,773
Iron and Steel Institute of Thailand (National Government)	1,428,571		1,428,571
The Bangkok Iron and Steel Works Co. Ltd (private sector)	4,340,000	8,750,000	13,090,000
NTSC Steel Group Public Co. Ltd (private sector)	2,140,000	3,100,000	5,240,000
Thai Metal Aluminum Co., Ltd	853,555	2,133,887	2,987,442
Daiki Aluminum Industry (Thailand) Co., Ltd	610,000	2,000,000	2,610,000
Total Co-financing ($)	17,453,755	15,983,887	33,494,786

Source : Project document

3. UNIDO budget allocation and expenditure by budget line

Budget line	Items by budget line	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Total expenditure (at completion)		Total allocation (at approval)	
									(USD)	%	(USD)	%
2100	Contractual Services		132,830.11	655,008.05	1,483,661.07	96,342.52	231,386.61	95,286.63	2,694,514.99	82.84%	332,000	7.38%
4500	Equipment	4,470.92	1,564.6	37.53	29.69				6,072.74	0.19%	2,644,000	58.76%
1500	Local travel	6,974.99	89,016.03		659.44	185.29		3,125.77	99,961.52	3.07%	148,000	3.29%
1700	Nat. Consult./ Staff	12,560.78	56,667.41	70,215.92	68,376.15	61,622.69	73,415.99	26,881.92	369,740.86	11.37%	746,000	16.58%
5100	Other Direct Costs	3,671.76	8,126.36	6,468.57	6,444.84	5,091.67	6,722.72	1,629.46	38,155.38	1.17%	35,000	0.78%
4300	Premises		6,645.04						6,645.04	0.20%	0	0.00%
1100	Staff & Intern Consultants				12,665.07				12,665.07	0.39%	296,000	6.58%
3000	Train/ Fellowship/ Study	14,716.55			7,247.5	2,587.34	431.7		24,983.09	0.77%	299,000	6.64%
Total		42,395.01	294,819.55	731,730.07	1,579,083.76	165,829.51	311,957.02	126,923.78	3,252,738.70	100%	100.00%	100%

Source: Project document and UNIDO Project Management ERP database as of 24/05/2024

Table 4. UNIDO budget allocation and expenditure by component

		Total allocation (at approval)		Total expenditure (at completion)	
#	Project components	USD	%	USD	%
1	Component 1. Policy and regulatory framework	275,000	6.11%	241,834.60	7.43%
2	Component 2. Information dissemination and capacity building	625,000	13.89%	603,654.04	18.56%
3	Component 3. Pilot project for the demonstration of BAT/BEP in selected metal recycling facilities	3,150,000	70.00%	2,055,344.88	63.19%
4	Component 4. Project management and Monitoring*	360,000	8.00%	335,131.49	10.30%
5	Evaluation**	90,000	2.00%	16,773.69	0.52%

	Total	4,500,000	100.00%	3,252,738.70	100.00%

Source: Project document and UNIDO Project Management ERP database as of 24/05/2024

*Project management cost is 200,000 USD, Monitoring is 160,000 USD

** Evaluation (MTE and FE) is allocated only a budget of USD 90,000.00 (p. 59-60 of project document)

II. SCOPE AND PURPOSE OF THE EVALUATION

The purpose of the evaluation is to independently assess the project to help UNIDO improve performance and results of ongoing and future programmes and projects. The terminal evaluation (TE) will cover the whole duration of the project from its starting date in February 2018 to the estimated completion date in November 2024 .

The evaluation has two specific objectives:

(i) Assess the project 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. EVALUATION APPROACH AND METHODOLOGY

The TE will be conducted in accordance with the UNIDO Evaluation Policy[36], the UNIDO Guidelines for the Technical Cooperation Project and Project Cycle[37], and UNIDO Evaluation Manual. In addition, the GEF Guidelines for GEF Agencies in Conducting Terminal Evaluations, the GEF Monitoring and Evaluation Policy and the GEF Minimum Fiduciary Standards for GEF Implementing and Executing Agencies will be applied.

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

The evaluation will use a theory of change approach[38] 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. Learning from this analysis will be useful for the design of future projects so that the management team can effectively use the theory of change to manage the project based on results.

1. Data collection methods

Following are the main instruments for data collection:

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

[36] UNIDO. (2021). Director General's Bulletin: Evaluation Policy (UNIDO/DGB/2021/11)

[37] 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)

[38] 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 discussions. Key stakeholders to be interviewed include:
- UNIDO Management and staff involved in the project; and
- Representatives of donors, counterparts, and other stakeholders.

(c) Field visit to project sites in Thailand.
- On-site observation of results achieved by the project, including interviews of actual and potential project beneficiaries.
- Interviews with the relevant UN Resident Coordinator and UNIDO Country offices' 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 will be used to the extent possible.

2. Key evaluation questions and criteria

The key evaluation questions (corresponding to the six OECD/DAC criteria) are the following:

1) Relevance: Is the intervention doing the right things? To what extent do the project/programme's objectives respond to beneficiaries, global, country, and partner/institution needs, policies, and priorities, and continue to do so if circumstances change?
2) Coherence: How well does the intervention fit? How compatible is the project/programme with other interventions in the country, sector or institution?
3) Effectiveness: Is the project/programme achieving its objectives?
4) Efficiency: How well are resources being used? Has the project/programme delivered results in an economic and timely manner?
5) Impact: What difference does the intervention make? To what extent has the project/programme generated significant positive or negative, intended or unintended, higher-level effects? Has the project/programme had transformative effects?
6) Sustainability: Will the benefits last? To what extent will the net benefits of the project/programme continue, or are likely to continue?

The table below provides the key evaluation criteria to be assessed by the evaluation. The detailed questions to assess each evaluation criterion are in Annex 2 of UNIDO Evaluation Manual.

Table 5. Project evaluation criteria

#	Evaluation criteria	Mandatory rating
A	Progress to Impact	Yes
B	Project design	Yes
1	Overall design	Yes
2	Project results framework/log frame	Yes
C	Project performance and progress towards results	Yes

1	Relevance	Yes
2	Coherence	Yes
3	Effectiveness	Yes
4	Efficiency	Yes
5	Sustainability of benefits	Yes
D	Gender mainstreaming	Yes
E	Project implementation management	Yes
1	Results-based management (RBM)	Yes
2	Monitoring and Evaluation, Reporting	Yes
F	Performance of partners	
1	UNIDO	Yes
2	National counterparts	Yes
3	Implementing partner (if applicable)	Yes
4	Donor	Yes
G	Environmental and Social Safeguards (ESS), Disability and Human Rights	Yes
1	Environmental Safeguards	Yes
2	Social Safeguards, Disability and Human Rights	Yes
H	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.

Other assessments required by the GEF for GEF-funded projects, for non GEF projects these topics should be covered as applicable:

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

a. Need for follow-up: e.g. in instances of 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. At the terminal evaluation point, the Project Manager will update table 3 on co-financing and add two more columns to submit to the evaluation team: 1) Amount of co-financing materialized at midterm review (MTR); and 2) Amount of co-

financing materialized at terminal evaluation (TE). The evaluation team has the responsibility to validate and verify the co-financing amount materialized during the evaluation process. This table MUST BE included in the terminal evaluation report, as per requirement by the GEF.

c. Environmental and Social Safeguards[39]: appropriate environmental and social safeguards were addressed in the project's design and implementation, e.g. preventive or mitigation measures for any foreseeable adverse effects and/or harm to environment or to any stakeholder.

d. Updated Monitoring and Assessment tool of core-indicators: The project management team will submit to the evaluation team the up-to-date core-indicators or tracking tool (for older projects) whereby all the information on the project results and benefits promised at approval and actually achieved at completion point must be presented. The evaluation team has the responsibility to validate and verify updated core-indicators during the evaluation process. This table MUST BE included in the terminal evaluation report, as per requirement by the GEF.

e. Knowledge Management Approach: Information on the project's completed Knowledge Management Approach that was approved at CEO Endorsement/Approval.

3. Rating system

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

Table 6. Project rating criteria

Score		Definition
6	Highly satisfactory	Level of achievement presents no shortcomings (90% - 100% achievement rate of planned expectations and targets).
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).

[39] 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

3	Moderately unsatisfactory	Level of achievement presents some significant shortcomings (30% - 49% achievement rate of planned expectations and targets).
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 rate of planned expectations and targets).

IV. EVALUATION PROCESS

The evaluation will be conducted from July to August 2024. 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 review.
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 debriefing to UNIDO staff at the Headquarters; and
6) Final report issuance and distribution with management response sheet, and publication of the final evaluation report in UNIDO website.

V. TIME SCHEDULE AND DELIVERABLES

The evaluation is scheduled to take place from July to August 2024. The evaluation field mission is tentatively planned in July 2024. At the end of the field mission, the evaluation team will present the preliminary findings for key relevant stakeholders involved in this project in the country. The tentative timelines are provided in the table below.

After the evaluation field mission, the evaluation team leader will arrange a virtual debriefing and presentation of the preliminary findings of the terminal evaluation with UNIDO Headquarters. The draft TE report will be submitted 1 to 3 weeks after the end of the mission. The draft TE report is to be shared with the UNIDO Project Manager (PM), UNIDO Independent Evaluation Unit, the UNIDO GEF Coordinator and GEF OFP and other stakeholders for comments. The Evaluation team 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 EIO/IEU standards.

Table 7. Tentative timelines

Timelines	Tasks
July 2024	Desk review and writing of inception report
July 2024	Online briefing with UNIDO project manager and the project team based in Vienna.
July 2024	Field visit to Thailand
August 2024	Online ebriefing Preparation of first draft evaluation report
August 2024	Internal peer review of the report by UNIDO's Independent Evaluation Unit and other stakeholder comments to draft evaluation report
August 2024	Final evaluation report

VI. EVALUATION TEAM COMPOSITION

The evaluation team will be composed of one international evaluation consultant acting as the team leader. The evaluation team members will possess a mixed skill set and experience including evaluation, relevant technical expertise, social and environmental safeguards and gender. Consultants will be contracted by UNIDO.

The tasks of each team member are specified in the job descriptions annexed to these terms of reference. The 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 Thailand 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 Unit will provide technical backstopping to the evaluation team and ensure the quality of the evaluation. The UNIDO Project Manager and national project teams will act as resource persons and provide support to the evaluation team and the evaluation manager.

VII. REPORTING

Inception report

These Terms of Reference (TOR) provide 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 approved by the responsible UNIDO Evaluation Manager.

The Inception Report will focus on the following elements: preliminary project theory model(s); elaboration of evaluation methodology including quantitative and qualitative approaches through an evaluation framework ("evaluation matrix"); Unit 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 timetable[40].

Evaluation report format and review procedures

The draft report will be delivered to UNIDO Independent Evaluation Unit (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 Unit 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 feedback 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 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 Unit.

[40] The evaluator will be provided with a Guide on how to prepare an evaluation inception report prepared by UNIDO Independent Evaluation Unit.

VIII. QUALITY ASSURANCE

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

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 Unit 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 Unit, which will submit the final report to the GEF Evaluation Office and circulate it within UNIDO together with a management response sheet.

Annex 1: Project Logical Framework

Component 1. Policy and regulatory framework					
Outcome 1: Policy and regulatory framework strengthened and enhanced for the implementation of a sound management of metal recycling in compliance with the Stockholm Convention requirements.	Number of regulatory instruments, national guidelines and technical manuals based on BAT/BEP adopted and/or enforced national authorities.	Insufficient policy and regulatory framework to encourage the diffusion of BAT/BEP for the reduction of U-POPs emissions from the scrap metal recycling chain.	One (1) new set of revised laws and regulations adopted promoting the diffusion of BAT/BEP to reduce U-POPs releases from the secondary metals producing industry drafted.	Plan of the proposed revision of strategies and national legislation for the reduction of U-POPs releases.	The establishment of a regulatory environment for the implementation of BAT/BEP in the management of the scrap metal value chain remains a top priority for the national government.
Output 1.1: One (1) database capturing various aspects of the metal recycling chain, as a new tool for policy makers, compiled.	Number of facilities identified/surveyed. Number of main industrial stakeholders interviewed/consulted. Survey data entered and validated in the database. Availability of the database as a new tool for policy makers. Number of beneficiary institutional stakeholders.	There is no comprehensive picture of the facilities involved in the scrap metal value chain. Data are scattered among different ministries/departments and industry associations There is no comprehensive database for the scrap metal value chain available in the country at the present time.	At least 50% of the firms in the national scrap metal value chain fully assessed. At least 2 representative companies in the steel and aluminium value chain interviewed/ consulted. A comprehensive database developed and functional.	Specific report on the assessment. Specific report on database development. Project's annual reports. Project mid-term and terminal evaluation reports.	Continuous cooperation between Government entities and private sector. Strong cooperation between all interested stakeholders. Scrap producers, scrap recyclers and scrap consumers are willing to share information related to their businesses.
Output 1.2: Specific guidelines on environment, health and safety measures in the metal recycling chain value developed.	Number of available national guidelines and technical manuals on BAT/BEP. Number of training programmes developed for staff authorities	There is insufficient knowledge about U-POPs and BAT/BEP in the metal recycling chain. There is insufficient information system which provide insight to operators for the management of scrap metal.	National guidelines and technical manuals drafted in coordination between governmental and industrial stakeholders and adopted. 50 national authority staff trained on measures and technologies to reduce U-POPs releases from the metallurgical industry.	Guidelines and technical manuals finalized and available for consultations.	All stakeholders are interested to define the technical aspects to be considered for scrap metal management and to know how BAT/BEP implementation in the metal scrap value chain could be applied.

			Equal access to training for men and women ensured.		
Output 1.3: Improved and harmonized national policies and regulations for environmental and health protection from metal recovery activities.	Number of regulatory instruments, national guidelines and technical manuals based on BAT/BEP submitted and/or undergoing adoption by national authorities.	Insufficient policy and regulatory framework to encourage the diffusion of BAT/BEP for the reduction of U-POPs emissions from the scrap metal recycling chain.	New set of revised laws and regulations promoting the diffusion of BAT/BEP to reduce U-POPs releases from the secondary metals producing industry.	Plan of the proposed revision of strategies and national legislation for the reduction of U-POPs releases.	The establishment of a regulatory environment for the implementation of BAT/BEP in the management of the scrap metal value chain remains a top priority for the national government.
Component 2. Information dissemination and capacity building					
Outcome 2.1: Increased awareness on U-POPs and BAT/BEP concepts by relevant stakeholders	Institutionalized awareness programs within relevant ministries/institutions. campaigns.	Awareness programs on U-POPs and scrap metal recycling related issues (environmental impacts, sound management, etc.) not included in regular programs.	Number of institutions adopting/institutionalizing awareness programs that include U-POPs and BAT/BEP as topics.	Awareness raising materials and awareness raising report including feedback assessment.	Cooperation of training institutions in participating to the awareness raising activities.
Outcome 2.2: Improved national capacity in the sound management of the recycling chain of pre-consumer and post-consumer scrap metal	Number of people (male/female) trained on the sound management of the recycling chain of scrap metal and on BAT/BEP. Availability of training reports.	Insufficient knowledge, experience and technical capability of industry manager and technical staff on BAT/BEP for the reduction of U-POPs releases in the metal scrap recycling sector.	Industry managers and technical staff are trained on the technical and environmental aspect for a sound management of the recycling of scrap metal. Training on sound scrap metal management and BAT/BEP delivered to at least 100 trainees. Equal access to training for men and women ensured. At least 20% women.	Training material. Training reports, including post-training assessment through questionnaire surveys.	A large number of metal scrap recyclers is interested in attending trainings. Training of operators is effective so that the promotion and introduction of BAT/BEP will be sustained during and after project end.
Output 2.1: Awareness raising materials and awareness raising	Development of awareness programs and materials.	Limited environmental and health awareness on scrap metal recycling and	Development of at least 1 video material and 2 relevant publication on	Awareness raising materials.	Cooperation of training institutions in participating to the

workshop developed and implemented.	Number of awareness raising initiatives. Number of participants (male/female) in the awareness raising campaigns.	U-POPs issues in both the users and the general public.	the issue of dioxin and BAT and BEP At least 2 awareness raising campaigns conducted for the users of scrap metal and the general public. At least 2 participants from the relevant stakeholders identified in the document participating in awareness raising campaigns. Equal access to training for men and women ensured.	Awareness raising reports including feedback assessment.	awareness raising activities.
Output 2.2: Technicians and operators of the scrap metal sector are trained on BAT/BEP.	Number of institutions involved in setting up training materials and providing training sessions. Number of people (male/female) trained on BAT/BEP. Number of participants (male/female) to the Study Tour. Number of company visited and speeches held during the Study Tour. Availability of training reports.	Training materials for a sound management of scrap metal recycling is not available. Limited knowledge and limited technical capacity among collectors, recyclers and users of scrap metal on BAT/BEP applicable to the scrap metal recycling chain.	Training on sound scrap metal management and BAT/BEP delivered to at least 100 trainees. Equal access to training for men and women ensured.	Training materials. Training assessment reports delivered. Study Tour report.	Cooperation of training institutions in participating to the training activities. Training of operators is effective so that the promotion and introduction of BAT/BEP will be sustained during and after project end.
Component 3. Pilot project for the demonstration of BAT/BEP in selected metal recycling facilities.					
Outcome 3. State-of-the-art primary and secondary measures for	BAT/BEP measures adopted by the metallurgical sector	The absence of specific emission limits and/or institutional incentive	Demonstration project interventions/results adopted by the	Reports on deployment of BAT/BEP to other facilities	The technologies to be implemented are accessible to all facilities

U-POPs release reduction in selected facilities identified and deployed.		systems makes that BAT/BEP are not implemented.	metallurgical industry.		
Output 3.1. BAT/BEP measures identified and implemented for scrap collectors and scrap consumers	Number of BAT/BEP identified, implemented and demonstrated. Amount of incremental investment made. Quantity of PCDD/F and other pollutant releases avoided, reduced or eliminated. Number of documents produced for each pilot case.	BAT/BEP measures in thermal processes of the metallurgical industry have never been demonstrated in Thailand.	Demonstrations and assessments of the BAT/BEP measure agreed with 4 enterprises carried out and completed at the selected pilot sites. Not less than 23 g-TEQ/year releases reduction by BAT/BEP introduction in the demonstration facilities. Incremental investment in USD reported.	Site visits and mission reports. Reports confirming that all implemented BAT/BEP are operational. BAT/BEP assessment report for each demonstration facility. Evaluation of pilot projects undertaken. Reports on monitoring campaigns and assessment of U-POPs releases.	Continuous support from the private sector despite the high costs associated with demonstration of BAT/BEP. The managers and the technical staff have good technical capacity to handle the BAT/BEP implementation and operations. Sampling and analysis of U-POPs releases will generate reliable results.
Output 3.2. Training of local stakeholders (government staff, SMEs, scrap collectors, etc.) and technical staff in the management of BAT/BEP undertaken	Number of people (male/female) trained on BAT/BEP. Availability of training reports.	Insufficient knowledge, experience and technical capability of industry manager and technical staff on BAT/BEP for the reduction of U-POPs releases in the metal scrap recycling sector.	Training of at least 50 technical professionals on BAT/BEP applicable to the industrial sector. Equal access to training for men and women ensured.	Training materials and training attendance sheets. Report demonstrating that training was successfully delivered.	Training of operators is effective so that the promotion and introduction of BAT/BEP will be sustained during and after project end.
Output 3.3. Results of the implemented demonstration projects published and disseminated for replication through collaboration with	Number of documents drafted and disseminated. National action plan for replication developed and approved.	Currently there is no action plan for replication.	A national action plan including estimates of costs and benefits to the adoption of BAT/BEP finalized and endorsed.	The action plan document.	Continuous cooperation between Government entities and private sector. Managers of demonstration sites

existing financial institutions in the country.					committed to share experiences.
Component 4. Monitoring and evaluation; knowledge management and dissemination					
Outcome 4. Effective monitoring and evaluation of project impact and sustainability implemented.	Existence of project management structure; timely availability of reports	New staff dedicated to the project and most of the key stakeholders will require specific training on the UNIDO and GEF M&E procedures.	M&E activities implemented and project implementation monitored and evaluated to achieve project objectives	Various M&E and substantial reports, progress, annual and terminal reports, Mid-Term Review and Terminal Evaluation reports.	Efficient M&E to facilitate timely achievement of project outcomes and objectives
Output 4.1. Project M&E designed and implemented.	Timely project implementation. M&E adequately conducted according to UNIDO and GEF standard. Timely availability of inception, annual (APRs, PIRs, AWPs) and evaluation (mid-term and final) project reports. Documentary evidence of M&E activities including but not limited to drafting TORs, selection and recruitment consultants and staff, review of substantial report.	Indicative Project Results Framework with outcome and output indicators and targets. Indicative M&E plan, budget and timeframe. New staff dedicated to the project and most of the key stakeholders will require specific training on the UNIDO and GEF M&E procedures.	Inception workshop held within one month from project approval. Project management structure implemented and fully functional within 6-months from the approval of the project Training on monitoring procedures, including gender, and administrative processes held during Inception Workshop. Mid-term evaluation delivered within 3 years from project signature. Terminal evaluation report delivered within 3 months from project closure.	Project inception workshop report. Annual Project Implementation Reports (PIRs). Project Annual Work Plans (AWPs) Annual Progress Reports (APRs) Independent Mid-term Evaluation report. Independent Terminal Evaluation report Terminal report	All the relevant project stakeholders are willing to cooperate in the timely establishment of project management structures. M&E and project reporting mechanisms agreed and adopted by all the relevant project partners. Project stakeholders actively cooperating in all M&E activities. Indicators are comprehensive and designed to be properly measured. All deliverables are submitted in time.
Output 4.2 Lessons learnt disseminated	Number of communication materials and dissemination events conducted.	None	Lessons and experience documented and disseminated in at least 2 workshops/conferences.	Knowledge products disseminated (newsletters, brochures, peer-reviewed publication(s), etc.)	Government and key stakeholders are willing to share data and information.

Annex 2: Job descriptions

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

TERMS OF REFERENCE FOR PERSONNEL UNDER INDIVIDUAL SERVICE AGREEMENT (ISA)

Title:	Senior evaluation consultant, team leader
Main Duty Station and Location:	Home-based
Missions:	Missions to Thailand
Start of Contract (EOD):	01/06/2024
End of Contract (COB):	30/08/2024
Number of Working Days:	30 working days spread over the above mentioned period

1. ORGANIZATIONAL CONTEXT

The UNIDO Independent Evaluation Unit (EIO/IEU) is responsible for the independent evaluation function of UNIDO. It supports learning, continuous improvement and accountability, and provides evidence-based analysis and assessment on result and practices that feed into the programmatic and strategic decisionmaking processes. Independent evaluations provide credible, reliable and useful assessment that enables the timely incorporation of findings, recommendations and lessons learned into the decision-making processes at organization-wide, programme and project level. EIO/IEU is guided by the UNIDO Evaluation Policy, which is aligned to the norms and standards for evaluation in the UN system.

2. PROJECT CONTEXT

Detailed background information of the project can be found the terms of reference (TOR) for the terminal evaluation.

The international evaluation consultant/team leader will evaluate the project in accordance with the evaluation-related terms of reference (TOR). S/he will perform, inter alia, the following main tasks:

MAIN DUTIES	Concrete/ Measurable Outputs to be achieved	Working Days	Location
1. Review project documentation and relevant country background information (national policies and strategies, UN strategies and general economic data). Define technical issues and questions to be addressed by the national technical evaluator prior to the field visit. Determine key data to collect in the field and adjust the key data collection instrument if needed. In coordination with the project manager, the project management team and the national technical evaluator, determine the suitable sites to be visited and stakeholders to be interviewed.	• Adjusted table of evaluation questions, depending on country specific context; • Draft list of stakeholders to interview during the field missions. • Identify issues and questions to be addressed by the local technical expert	4 days	Homebased
2. Prepare an inception report, which streamlines the specific questions to address the key issues in the TOR, specific methods that will be used and data to collect in the field visits, confirm the evaluation methodology, draft theory of change, and tentative agenda for fieldwork. Provide guidance to the national evaluator to prepare initial draft of output analysis and review technical inputs prepared by national evaluator, prior to field mission.	Draft theory of change and Evaluation framework to submit to the Evaluation Manager for clearance.	2 days	Home based
3. Briefing with the UNIDO Independent Evaluation Unit, project managers and other key stakeholders at UNIDO HQ (included in preparation of presentation).	Detailed evaluation schedule with tentative mission agenda (incl. list of stakeholders to interview and site visits); mission planning;	1 day	Through skype

4. Conduct field mission to Thailand [41].	? Conduct meetings with relevant project stakeholders, beneficiaries, the GEF	8 days	(specific project site to be identified

MAIN DUTIES	Concrete/ Measurable Outputs to be achieved	Working Days	Location
	Operational Focal Point (OFP), etc. for the collection of data and clarifications; ? Evaluation presentation of the evaluation's preliminary findings, conclusions and recommendations to stakeholders in the country, including the GEF OFP, at the end of the mission.		at inception phase)
5. Present overall findings and recommendations to the stakeholders at UNIDO HQ	? After field mission(s): Presentation slides, feedback from stakeholders obtained and discussed.	1 day	Vienna, Austria
6. Prepare the evaluation report. Share the evaluation report with UNIDO HQ and national stakeholders for feedback and comments.	? Draft evaluation report.	12 days	Homebased
7. Revise the draft project evaluation report based on comments from UNIDO Independent Evaluation Unit and stakeholders and edit the language and form of the final version according to UNIDO standards.	? Final evaluation report.	2 day	Homebased

MINIMUM ORGANIZATIONAL REQUIREMENTS

Education:

[41] The exact mission dates will be decided in agreement with the Consultant, UNIDO HQ, and the country counterparts.

Advanced degree in environment, energy, engineering, development studies or related areas.

Technical and functional experience:

- Minimum of 15-20 years' experience in evaluation of development projects and programmes
- Good working knowledge in Thailand.
- Knowledge about GEF operational programs and strategies and about relevant GEF policies such as those on project life cycle, M&E, incremental costs, and fiduciary standards
- Experience in the evaluation of GEF projects and knowledge of UNIDO activities an asset
- Knowledge about multilateral technical cooperation and the UN, international development priorities and frameworks
- Familiarity with gender analysis tools and methodologies an asset
- Working experience in developing countries Languages:

Fluency in written and spoken English is required. All reports and related documents must be in English and presented in electronic format. Absence of conflict of interest:

According to UNIDO rules, the consultant must not have been involved in the design and/or implementation, supervision and coordination of and/or have benefited from the programme/project (or theme) under evaluation. The consultant will be requested to sign a declaration that none of the above situations exists and that the consultants will not seek assignments with the manager/s in charge of the project before the completion of her/his contract with the UNIDO Independent Evaluation Unit.

REQUIRED COMPETENCIES

Core values:

WE LIVE AND ACT WITH INTEGRITY: work honestly, openly and impartially.
WE SHOW PROFESSIONALISM: work hard and competently in a committed and responsible manner.
WE RESPECT DIVERSITY: work together effectively, respectfully and inclusively, regardless of our differences in culture and perspective.

Core competencies:

WE FOCUS ON PEOPLE: cooperate to fully reach our potential –and this is true for our colleagues as well as our clients. Emotional intelligence and receptiveness are vital parts of our UNIDO identity.
WE FOCUS ON RESULTS AND RESPONSIBILITIES: focus on planning, organizing and managing our work effectively and efficiently. We are responsible and accountable for achieving our results and meeting our performance standards. This accountability does not end with our colleagues and supervisors, but we also owe it to those we serve and who have trusted us to contribute to a better, safer and healthier world.
WE COMMUNICATE AND EARN TRUST: communicate effectively with one another and build an environment of trust where we can all excel in our work.
WE THINK OUTSIDE THE BOX AND INNOVATE: To stay relevant, we continuously improve, support innovation, share our knowledge and skills, and learn from one another.

Annex 3: Outline of an in-depth project evaluation report

Abstract

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Annex 8: Statistical Data from Evaluation Survey / Questionnaire Analysis

Annex 4: Quality checklist

Quality criteria		UNIDO EIO/IEU assessment notes	Rating
1	The inception report is well-structured, logical, clear, and complete.		
2	The evaluation report is well-structured, logical, clear, concise, complete and timely.		
3	The report presents a clear and full description of the 'object' of the evaluation.		
4	The evaluation's purpose, objectives, and scope are fully explained.		
5	The report presents a transparent description of the evaluation methodology and clearly explains how the evaluation was designed and implemented.		
6	Findings are based on evidence derived from data collection and analysis, and they respond directly to the evaluation criteria and questions.		
7	Conclusions are based on findings and substantiated by evidence and provide insights pertinent to the object of the evaluation.		
8	Recommendations are relevant to the object and purpose of the evaluation, supported by evidence and conclusions, and developed with the involvement of relevant stakeholders.		
9	Lessons learned are relevant, linked to specific findings, and replicable in the organizational context.		
10	The report illustrates the extent to which the evaluation addressed issues pertaining to a) gender mainstreaming, b) human rights, and c) environmental impact.		

Rating system for quality of evaluation reports

A number rating of 1-6 is used for each criterion: Highly satisfactory = 6, Satisfactory = 5, Moderately satisfactory = 4, Moderately unsatisfactory = 3, Unsatisfactory = 2, Highly unsatisfactory = 1, and unable to assess = 0.

Annex 2: Evaluation Framework / Matrix

Evaluation criteria	Evaluation indicators	Means of verification
Project Design		
The evaluation will examine the extent to which: • 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? • Are relevant environmental and social risk considerations included at the time of project design?	• Situational analysis • Project results framework • Risk assessment and management • Adjustments made due to operational context • Environmental and social safeguards	• Project document and annexes • Interviews with UNIDO, NPM, NPD, NPC, key national partners, and other project stakeholders
Relevance and Coherence		
The evaluation will examine the extent to which the project is relevant or coherent to the: • National development and environmental priorities, national implementation plans and strategies of the national governments and their populations, as well as regional and international agreements. • Target groups: relevance of the project's objectives, outcomes, and outputs to the different target groups of the interventions (e.g., key government and ministry officers/representatives, metal recycling facility owners, NGOs, women's associations, 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 implementation of selected BAT/BEP measures at the pilot demonstration sites for the minimization of U-POPs releases. • 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?	• Level of alignment with national environmental priorities, NIP, as well as with UNIDO and GEF strategic priorities at the time of design and implementation	• Pertinent project documents and annexes • Interviews with UNIDO, GEF focal point, NPD, NPC key national stakeholders
Effectiveness and Progress to impact		
The evaluation will assess the objectives and current results (results to date): • 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?	• Target for outputs, outcomes, and objectives of Project Results Framework • Occurrence of intermediate	• Review of relevant documents such as PIRs, progress reports, meeting reports • Direct observation

Evaluation criteria	Evaluation indicators	Means of verification
• 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? • 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 in 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 improved and enforced the national policies and regulations for environmental and health protection from metal recovery activities? • What is the geographical coverage of the project? • Has the target of Reduction of not less than 23 g TEQ/year of PCDD/Fs released from demonstration facilities been achieved already? If not by when? • Does a certified laboratory for testing PCDD/Fs exist in the country? • Has the project provided information on POPs, including PCDD/Fs, to educational institutions (schools, colleges, universities, ...)?	states in the country • Stated contribution of stakeholders in achievement of outputs	and discussion during the evaluation mission • Interviews with UNIDO, NPD, NPM, NPC, key government representatives, owners of demonstration facilities, private sector, consultants, and other partners such as NGOs, academia, etc.
Efficiency at current stage of implementation		
The extent to which: • Is the project cost-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, government/ counterpart, and private sector 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.	• 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	For all questions under Efficiency: • PIRs, PSC meeting reports, annual and progress reports, national reports • Interviews with UNIDO, NPM, NPD, NPC, members of the project team and PSC, consultants and other project stakeholders

Evaluation criteria	Evaluation indicators	Means of verification
• 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?		
Assessment of risks to likelihood of sustainability of project outcomes		
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. The following four dimensions or aspects of risks to sustainability will be addressed: • ***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	UNIDO risk level indicators: Low, Moderate, High	• Review of relevant documents such as PIRs, progress reports, meeting documents, progress reports • Interviews with UNIDO, NPD, NPM, NPC, and other key national stakeholders, owners of demonstration facilities, and NGOs

Evaluation criteria	Evaluation indicators	Means of verification
project benefits continue to flow? Is there sufficient public/stakeholder awareness in support of the project's long-term objectives? • ***Institutional framework and governance risks***. Do the legal framework, 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? • ***Environmental risks***. 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		
• ***M&E design***. 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. • ***M&E plan implementation***. 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 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? • ***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.	• Availability of logframe, workplans, 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 changing situations; compliance of the countries in the submission of relevant reports in a timely manner • Compliance with reporting requirements as mentioned in TORs and/or project document	• Project document • PIRs, meeting reports, progress and annual reports, financial reports, audit and other relevant reports • Interviews with UNIDO, NPD, NPM, NPC, PSC members, other relevant stakeholders / partners
Monitoring of long-term changes		

Evaluation criteria	Evaluation indicators	Means of verification
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: a. 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? b. What were the accomplishments and shortcomings in establishment of this system? 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? d. Is the information generated by this system being used as originally intended?	• Evidence of initial efforts to establish a long-term monitoring system	• Project reports, M&E reports • Interviews with UNIDO, NPD, NPM, NPC, PSC members, and other relevant stakeholders
Project coordination and management		
The extent to which: • The national management and overall coordination mechanisms have been established and have been efficient and effective. Did each partner have assigned roles and responsibilities from the beginning? Did each partner fulfill 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.	• Level and quality of project coordination and management at national level	• PIRs, meeting reports, and project coordination and management reports • Interviews with UNIDO, NPD, NPM, NPC, PSC members, and other relevant stakeholders
Gender mainstreaming		
The evaluation will consider, but need not be limited to, the following issues that may have affected gender mainstreaming in the project: • Did the project design adequately consider the gender dimensions in its interventions? If so, how? • Was a gender analysis included in a baseline study or needs assessment (if any)? • How gender-balanced was the composition of the project management team, the Project Steering Committee, 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	Incorporation of gender-responsive approaches and indicators, such as: • Women's participation • Gender balance • Integration of gender dimensions in project delivery	• Project reports • Interviews with UNIDO, NPD, NPM, NPC, NGOs, Women's Associations involved, and other beneficiaries

Evaluation criteria	Evaluation indicators	Means of verification
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?	• Equality, benefits, and results	

Annex 3: List of Documentation Reviewed

1. Project Document and Annexes
2. PSC meeting reports
3. PIRs
4. Progress reports
5. MTE report
6. Consultant reports
7. Website report
8. Training reports
9. Copies of training materials
10. Technical guidance materials
11. Reports of Components 1, 2, and 3.
12. Financial and co-financial reports
13. Awareness raising materials including brochures, pamphlets, etc.
14. Pictures taken during project events or missions

Annex 4: List of Stakeholders Consulted

Name	Position
Ms. Carmela Centeno	UNIDO Project Manager
Ms. Sooksiri Chamsuk	UNIDO Regional Hub, Thailand
Dr. Aditad Vasinonta.	NPD, Director-General, DPIM
Mr. Teerawut Tunnukij	NPC, Director, DPIM
Ms. Warawan Chalermot	NPM
Mr. Pasquale Spezzano	International consultant, expert for BAT/BEP in metal industry
Mr. Simone Zanolini	International consultant, expert for BAT/BEP in metal industry
Prof. Dr. Siwatt Pongpiachan	NIDA, National Consultant for Component 1
Ms. Tippamars Taracheewin	GEF National Focal Point
Ms. Buthree Tiamtiabrat	OIE, PSC member
Mr. Anuwat Wangvanichakorn	Federation of Thai Industries, PSC member
Ms Tarnkamol Tarornpanich	DPIM, PSC member and secretary to TWGs
Mr. Methawaj Rungsiriworapong	DCCE, TWG member
Mr. Methawaj Rungsiriworapong	DCCE, Dioxin lab, TWG member
Ms. Piyanan Udomtang	PCD, TWG member
Ms. Orrawan Manoonwong	PCD, TWG member
Mr. Sirapat Wattanamanont	Thai Fukoku Panaplus Foundry, Recycling facility
Mr. Kittisak Latthikul	Panyaraksa Co. Ltd, Recycling facility
Mr. Supat Ratanasirivilai	Thai Metal Aluminium Co. Ltd, Recycling facility
Mr. Mahankorn Lohakarn	Owner of scrap yard

Annex 5: Survey / Questionnaire

Independent Terminal Evaluation of the Project:
Greening of Scrap Metal Value Chain through the Promotion of BAT/BEP to Reduce U-POPs Releases from Recycling Facilities **– *GEF ID: 9222***
July - August 2024

UNIDO PM

Questions	Answers / comments
1. (i) Was the development of the project a request from the country? (iii) Approach to develop project?	
2. (i) Were you involved in the development of the project (PIF and PPG)? (ii) Were the major national stakeholders of the metal recycling sector identified during that phase? (iii) What were their involvement?	
3. (i) Did UNIDO manage all funds? If no, was there a signed agreement with the National Executing Agency (NEA) (ii) For what amount was the agreement signed with NEA? What was the amount used for? (iii) Did UNIDO do all the procurement of equipment (e.g. for pilot projects) as well as recruitment of national and international consultants (NCs and ICs)? (iv) Generally procurements of goods and services take time, for this project which one took the longest time? (v) Were disbursements / payments done on a timely manner?	
4. Financial management (i) Was there a need for approval to reallocate budgets given the delays in project implementation? (ii) What amount was spent for Project Management Costs (PMC)? (iii) How much co-financing materialized for this project? (Detailed table of donors and amount of co-financing materialized, please, thanks)	
5. (i) Did UNIDO directly sub-contract the international as well as national consultants? (ii) How were these consultants identified? (iii)Procedure for their recruitment?	
6. Feedback on national consultants (NCs) and international consultants (ICs)	

(i) For which aspects of the project were they recruited? (ii) Did they perform well? (iii) Did they timely submit reports where relevant?	
7. Project Steering Committee, monitoring, challenges, delays, extension and PIRs (i) Did you attend all PSC meetings? (ii) Satisfied with the involvement and participation of national counterparts and other partners of the project? (iii) Has the Project Results Framework and all the proposed indicators therein been used as basis to monitor project progress and to track results? (iv) Has the gender dimension specifically been considered during implementation and monitoring of the project? (v) What major challenges has the project faced, and that caused significant delays to implementation? (vi) How have these challenges been overcome? (vii) How many project extensions were requested? Total duration of project extension? (viii) Who was responsible to draft the PIRs? (ix) Have the PIR reports been timely submitted? (x) Were all the recommendations of the MTE implemented? If no, which ones were not implemented, and why?	
8. Execution at national level, involvement of national stakeholders, ownership, performance of National Project Director (NPD), National Project Coordinator (NPC), National Project Manager (NPM) and Project Management Unit (PMU) (i) What was the modality of execution at national level?	

(ii) Who was the NPD? What was his role? Performed as expected? (iii) Role and performance of NPC? (iv) How was the NPM identified and selected. Did she perform as expected? Frequent communication with her? Timely reporting? (v) Constitution of the PMU? Who led the PMU? Role and responsibilities of PMU ? Did they perform well? (vi) Have you seen a good involvement/engagement of national stakeholders, private sector (facility owners, scrap dealers, etc.) and other stakeholders and beneficiaries? (vii) Do you feel there was high ownership of project in the country?	
9. How do you foresee the sustainability of the project results in the long term?	
10. Your general feedback on the project and ownership by key stakeholders and partners, especially stakeholders of the scrap metal recycling value chain?	

National Project Director

Country: Thailand

Contact person information (name, email, phone):

Name of your institution and your position:

Date in filling out this questionnaire:

Please email back to: robert@uom.ac.mu

Questions	Response and comments
1. How relevant is the UNIDO project to your country's priorities regarding national plans for POPs? 2. How willing is your government to fulfill its obligations towards the Stockholm Convention?	
3. What support has your government, specifically your department, given to the implementation of the UNIDO project?	
4. Are you satisfied with the support and guidance provided by the UNIDO Project Manager (PM), the UNIDO Country Office, and the National Project Manager (NPM)?	

Questions	Response and comments
5. Please give your feedback on the assistance and support provided by national and international consultants. Please elaborate. 6. What other types of assistance do you think would have been helpful?	
7. Has your country been able to successfully deliver all the outputs of the project? 8. What were the main challenges faced to undertake the activities? 9. How were the challenges overcome? 10. How was the involvement of metal recycling facilities in the project?	
11. Please rate the guidance & support provided by UNIDO PM, the NPM, the International Consultants (ICs), and the National Consultants (NCs)(from 1 to 6). **1: Highly unsatisfactory; 2: Unsatisfactory; 3: Moderately Unsatisfactory; 4: Moderately Satisfactory; 5: Satisfactory; and, 6: Highly Satisfactory**	UNIDO PM: NPM: ICs: NCs:
12. When was the Project Steering Committee (PSC) established? 13. Were the meetings held regularly as planned? 14. Did the PSC play its role fully? 15. Were the members of the PSC fully engaged and did they participate actively in the meetings?	
16. Have the regulations and policies on recycling of metals developed in the context of the project been adopted by the Government of Indonesia? 17. Have the relevant authorities started to enforce those regulatory measures and policies on scrap metal recycling? 18. Do the enforcing agencies have the necessary resources to inspect and monitor the recycling facilities regarding compliance with the national regulations and policies on scrap metal recycling?	
19. Are there any social or political factors that may influence positively or negatively the project results? If yes, please comment.	
20. Are the capacities built for BAT/BEP implementation and management in metal recycling sector within the project robust enough to continue delivering benefits beyond the project life? Why or why not? Please elaborate.	
21. What steps has the Government of Thailand authorities taken to encourage the replication of the project results (BAT/BEP measures demonstrated at pilot sites) to other recycling facilities across the country?	

Questions	Response and comments
22. What are the existing financial mechanism that the metal recycling facilities can benefit from to implement the demonstrated BAT/BEP measures? 23. According to you, what are the main obstacles that would hinder the replication of the project results across the country? How can these obstacles be overcome	
24. Do you have any inputs / comments / suggestions / issues pertinent to the project you'd like to raise with me?	

National Project Coordinator Questionnaire

Country: Thailand
Contact person information:
Name of your institution:
Your position in the institution:
Please email back to: robert@uom.ac.mu

Questions	Response and comments
1. What was the procedure for your nomination as National Project Coordinator (NPC)? 1. Were you NPC since the beginning of the project?	
2. What were your role and main responsibilities as NPC? 3. What were the main challenges you have faced in coordinating the activities of the project? How did you overcome these challenges? 4. Who was your supervisor? Do you have to report regularly to your supervisor?	
Was a Project Management Unit (PMU) established? If yes, when? 5. Give the constitution of the PMU. 6. What were the roles and responsibilities of the PMU in the project?	
7. How many consultants were contracted for the project? Give the procedure for the recruitment and selection of consultants a. Are you satisfied with their performance/quality? b. Did they submit the reports on time or late? If late, the reasons for the delay? c. Do these reports have to be validated? If so, by whom?	
Who were the project's main/key stakeholders? Please explain their role in the project. Were they actively participating and collaborating in the project? Please reply per stakeholder. Were the collaboration and interaction between stakeholders satisfactory? How was the communication (frequency and channel) between the key stakeholders? Did the co-financing resources (agree at the beginning of the project) provided by the partners? Did the project receive support from the	

Questions	Response and comments
government/national authorities or local authorities/private sector? If yes, what type of support (human resources, capacity building, infrastructure)? Please reply per stakeholder. 8. How did stakeholders share/update the information? Did the stakeholders have any common platform for information storage? For example, sample analysis results, inventory, etc.	
9. When was the project officially launched in your country? Did the project build on the results / data produced by previous initiatives such as the inventory carried out under the NIP on POPs or other?	
10. Are you satisfied with the support and guidance provided by UNIDO, and the National Project Director (NPD)? Please rate the guidance & support provided by UNIDO and NPD separately (from 1 to 6). 1: Highly unsatisfactory; 2: Unsatisfactory; 3: Moderately unsatisfactory; 4: Moderately satisfactory; 5: Satisfactory; and, 6: Highly satisfactory What other types of assistance do you think would have been helpful?	
Has the project able to deliver all outcomes/outputs planned? Did the project had any delays, Why? Did the project reach the key indicators main targets? Why? 11. Are there any social or political factors that may influence positively or negatively the project results? If yes, please comment. 12. What were the main challenges faced to undertake the activities? How were the challenges overcome? Are there already positive visible signs as a result of the project intervention in the metal recycling sector? 13. Are you aware of job creation due to the project implementation? If yes, how many jobs were created, and what type of job? Any data disaggregated by gender?	
14. Have the relevant authorities started to enforce the regulations and policies developed in the context of the project on metal recycling? 15. Do the enforcing agencies have the necessary resources to inspect and monitor the recycling facilities regarding compliance with national regulations and policies on metal recycling?	

Questions	Response and comments
Has the project involved women? How has it integrated gender dimensions in project delivery? Any positive or emerging outcomes on gender equality?	
How COVID-19 restrictions impacted the delivery of activities and outputs? what adjustments were made because of the delays?	
Who was responsible for the Monitoring & Evaluation (M&E) of the project? Were you involved in the M&E of the project? Was a Project Steering Committee (PSC) established? If yes, when? 16. Who were the members of the PSC? 17. What were the roles and responsibilities of the PSC? 18. How often did the PSC meet? 19. Were the recommendations of the Mid Term Evaluation implemented?	
Do you have any inputs/comments/suggestions/issues pertinent to the project you'd like to raise with me?	

National Project Manager Questionnaire

Country: Thailand
Contact person information:
Name of your institution:
Your position in the institution:
Please email back to: robert@uom.ac.mu

Questions	Response and comments
20. What procedure was to select and hire you as National Project Manager (NPM)? Who made the final decision? How many candidates applied? To whom did you report? 21. For how long have you been the NPM? 22. When were you replaced, and what were the reasons for your replacement?	
23. What were your main responsibilities as NPM? 24. What were the main challenges you have faced in coordinating the activities of the project? How did you overcome these challenges? 25. How was the collaboration with the National Project Coordinator (NPC)? 26. Did you get support from DPIM to undertake your duties? Are you satisfied with the support provided? 27. What were the reports under your responsibility? Did you submit the reports on time? To whom?	
Was a Project Management Unit (PMU) established? If yes, when? Give the constitution of PMU. Were you a member of PMU? If not, how was the collaboration with PMU? Did the PMU facilitate your tasks? 28. Where is the office of the PMU?	

Questions	Response and comments
29. What were the roles and responsibilities of the PMU in the project?	
30. How many consultants were contracted for the project? Give the procedure for the recruitment and selection of consultants d. Are you satisfied with their performance/quality? e. Did they submit the reports on time or late? If late, the reasons for the delays? f. Do these reports have to be validated? If so, by whom?	
Who were the project's main/key stakeholders? Please explain their role in the project. Were they actively participating and collaborating in the project? Please reply per stakeholder. Were the collaboration and interaction between stakeholders satisfactory? How was the communication (frequency and channel) between the key stakeholders? 31. Have you seen active involvement from the stakeholders (DPIM, recycling facilities, PSC members, NGOs, etc.)?	
32. Are you satisfied with the support and guidance provided by UNIDO PM, the National Project Director (NPD), and the National Project Coordinator (NPC)? 33. Was the UNIDO Country Office involved in the project? What type of involvement? What other types of assistance do you think would have been helpful?	
Please rate the guidance & support provided by UNIDO PM, NPD, and NPC (from **1 to 6**). **1: Highly unsatisfactory; 2: Unsatisfactory; 3: Moderately unsatisfactory; 4: Moderately satisfactory; 5: Satisfactory; and, 6: Highly satisfactory** Where relevant, please rate also the performance of national and international consultants (NCs and ICs) from **1 to 6.**	UNIDO PM: NPD: NPC: NCs: ICs:
34. Has the project been able to deliver all outcomes/outputs planned? 35. What were the main reasons for the delays in project implementation? 36. Were the targets for the key project indicators reached?	
37. Are there any social or political factors that may influence positively or negatively the project results? If yes, please comment. 38. What were the main challenges faced in undertaking the activities? How were the challenges overcome? 39. Are there already visible signs of the project's impact at the pilot demonstration sites or behavioral change of the workers in the scrap metal recycling sector?	

Questions	Response and comments
Are you aware of job creation as a result of project implementation? If yes, how many jobs were created, and what type of job? Any data disaggregated by gender?	
Has the project involved women? How has it integrated gender dimensions in project delivery? Any positive or emerging outcomes on gender equality?	
How COVID-19 restrictions impacted the delivery of activities and outputs? What adjustments were made because of COVID-19?	
Who was responsible for the Monitoring & Evaluation (M&E) of the project? Were you involved in the M&E of the project? 40. Were all the recommendations of the midterm evaluation (MTE) implemented?	
Do you have any inputs/comments/suggestions/issues pertinent to the project you'd like to raise with me?	

Metal Recycling Facility

Country: Thailand

Contact person information:

Name of your company:
Your position in the company:

Please email back to: robert@uom.ac.mu and dadset@gmail.com

Questions	Response and comments
1: About your company: (i) When was your enterprise/company established? (ii) What is the main business of your company? (iii) What is the production capacity (or recycling facility) of your company? (iv) How many people does your enterprise / company employ? How many men and women?	
2: How and when was your company contacted to be involved in project? 3: Was your company involved in the preparatory phase of the project?	
4: (i) What was the role of your company in the project? (ii) What did your company and its staff benefit from project in terms of equipment, capacity building, training on BAT/BEP, and technical support? (iii) What did your company contribute (invest) during the involvement in the project?	
5: (i) Are you satisfied with the training / technical support provided by the project (consultants)?	

Questions	Response and comments
(ii) What BAT/BEP measures has your company implemented? (iii) What were the major obstacles or challenges your company faced during the implementation of the BAT/BEP measures? (iv) How were the challenges / obstacles overcome? (v) Has COVID-19 impacted on the delivery of activities and outputs? What adjustments were made because of the pandemic? (vi) Do you foresee any obstacles / challenges that your company might face to continue operating under BAT/BEP conditions? (vii) Have new jobs been created as a result of the involvement of your company in the project? (viii) What has been the impact (positive or negative) of the project on the operations of your company?	
6: (i) Are you satisfied with the guidance, support, and assistance provided by **UNIDO**, the **National Project Management Manager** (**NPM**), and the **National Project Coordinator** (**NPC**)? (ii) Are you satisfied with the support and assistance of the national and international consultants (**NCs** and **ICs**)? Please give your feedback (iii) What other types of assistance do you think would have been helpful?	
7: Where relevant, please rate individually the guidance & support provided by **UNIDO**, **NPM**, **NPC, National Consultants (NCs) and International Consultants (ICs)** from 1 to 6. **1: Highly unsatisfactory; 2: Unsatisfactory; 3: Moderately unsatisfactory; 4: Moderately satisfactory; 5: Satisfactory; and, 6: Highly satisfactory**	**UNIDO**: **NPM:** **NPC**: **NCs**: **ICs**:
8: (i) Now the project is over, what improvement can you think of? (ii) Your feedback on the project?	

GEF Focal Point Questionnaire

Country: Thailand
Contact person information:
Name of your institution:
Your position in the institution:
Please email back to: robert@uom.ac.mu

Questions	Response and comments
(i) What are the roles and duties of the GEF Office (or GEF Focal Point) of Indonesia? (ii) Since when are you the GEF Focal Point for Indonesia?	

Questions	Response and comments
(iii) How many GEF-funded projects are being currently implemented in Thailand?	
(i) How relevant is the project with respect to the priorities of Thailand? (ii) What has been your involvement or that of the GEF office of Thailand in this project? (iii) Have you participated in some activities of the project? If yes, which ones? (iv) What support or assistance did the GEF Office of Thailand provide to the project? (v) Have you been regularly kept informed about the achievements of the project?	
Your feedback on the project	

NGO

Country: Thailand
Contact person information:
Name of your institution:
Your position in the institution:
Please email back to: robert@uom.ac.mu

Questions	Response and comments
(i) When was your NGO established? (ii) What are the missions of your NGO/ (iii) Number of permanent staff of your NGO?	
(iv) When and how your NGO was contacted to participate in the project? (v) Has your NGO participated in previous similar project? (vi) What was the role of your NGO in the project? (vii) What did your NGO benefit from the project? (viii) What did your NGO contribute to the project?	
Your feedback on the project	

Project Steering Committee (PSC) Member

Country: Thailand
Contact person information:
Name of your institution:
Please email back to: robert@uom.ac.mu

Questions	Response and comments
1. What is your position at your institution? 2. Have you been a member of the Project Steering Committee (PSC) since the beginning? 3. Did you have to report to your institution on the progress and results of the project? If yes, what frequency?	
4. How relevant is the project to Thailand's priorities on environmental protection?	

Questions	Response and comments
5. Has the PSC played its role fully in monitoring project progress and providing guidance to the project team? 6. Were the engagement and involvement of all PSC members adequate and active? 7. What was the procedure to reach a consensus in cases of diverging views among members? 8. Were all recommendations made by the PSC implemented by the PMU? 9. What were the main challenges faced by the project? 10. How were they overcome?	
11. Did the Project Management Unit (PMU) perform well? 41. Did UNIDO provide adequate support and assistance to the project?	
12. Are you satisfied with the support and guidance provided by UNIDO, the National Project Director (NPD), the National Project Coordinator (NPC), the National Project Manager (NPM), and the consultants? **13.** Please rate the guidance & support provided by UNIDO, NPD, NPC, and consultants (from 1 to 6). **1: Highly unsatisfactory; 2: Unsatisfactory; 3: Moderately unsatisfactory; 4: Moderately satisfactory; 5: Satisfactory; and, 6: Highly satisfactory** 14. What other types of assistance do you think would have been helpful?	UNIDO: NPD: NPC: NPM: Consultants:
15. What did you (or your institution) benefit from the project? 16. What did you (or your institution) contribute to the project?	
17. Do you have any inputs / comments / suggestions / issues pertinent to the project you'd like to raise with me?	

Technical Working Group (TWG) Member

Country: Thailand
Contact person information:
Name of your institution:
Please email back to: robert@uom.ac.mu

Questions	Response and comments
1. What is your position at your institution? 2. How was you nominated to be a member of the technical working group (TWG)?	
3. How many members are there in this TWG? How many men and women? 4. Who was the chairperson of this TWG? 5. How often did the TWG meet? 6. Where did the TWG meet? 7. Were all the members actively involved during the TWG meetings?	

Questions	Response and comments
8. Did you get support from the stakeholders and partners of the project to carry out your mandate (duties)?	
9. What were the mandate (duties) of this TWG? 10. To whom did the TWG had to report? 11. Were the decisions, recommendations, proposals of the TWG adopted by the project / stakeholders? Can you give some concrete examples?	
12. Are you satisfied with the support and guidance provided by UNIDO, the National Project Director (NPD), the National Project Manager (NPM), the National Project Coordinator (NPC), and the consultants? 13. Please rate the guidance & support provided by UNIDO, NPD, NPM, NPC, and consultants (from 1 to 6). **1: Highly unsatisfactory; 2: Unsatisfactory; 3: Moderately unsatisfactory; 4: Moderately satisfactory; 5: Satisfactory; and, 6: Highly satisfactory**	UNIDO: NPD: NPM: NPC: Consultants:
14. What did you (or your institution) benefit from the project? 15. What did you (or your institution) contribute to the project?	
16. Do you have any inputs / comments / suggestions / issues pertinent to the project you'd like to raise with me?	

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