Annex 3: Report of the Project Meeting on Feasibility Study on Plastic Recycling Towards a Circular Future in Cambodia and Pakistan (Osaka, February 2025)

Wednesday 19th – Friday 21st February
Venue: UNEP-IETC Office, etc

Overall Introduction

The Project Meeting on the Feasibility Study on Plastic Recycling Towards a Circular Future in Cambodia and Pakistan took place from 19 to 21 February 2025 at the UNEP-IETC Office in Osaka, Japan. The meeting provided a platform to assess the progress of the feasibility study, examine challenges and opportunities for advancing sustainable plastic recycling, and develop strategic recommendations for integrating small and medium enterprises (SMEs) into circular economy models in both countries. Participants included representatives from (LCA) for plastic waste recycling technologies. The meeting concluded with a site visit to the Suminoe Incineration Plant and the Osaka Museum of Housing and Living, offering practical insights into modern and historical circular economy approaches.

This feasibility study, supported by the Japan Supplemental Fund, aims to evaluate the economic, environmental, and technical feasibility of plastic recycling technologies and business models in Cambodia and Pakistan. It focuses on identifying scalable and sustainable solutions for SMEs, leveraging policy frameworks, and exploring financial mechanisms such as impact investment and green finance to promote sustainable plastic waste management. The Government of Japan's support has been instrumental in facilitating research, stakeholder engagement, and the development of policy recommendations and financial strategies to strengthen the recycling sector in both countries. Participants expressed deep appreciation to the Government of Japan for its leadership and commitment to international environmental cooperation, reinforcing a shared vision for reducing plastic pollution and promoting a circular economy in the Asia-Pacific region.

Key outcomes of the meeting included refining LCA methodologies to address local data limitations, developing tailored business models for SMEs, strengthening policy recommendations for integrating informal waste collectors, and formulating a financial strategy to attract investments in sustainable plastic recycling initiatives. The session concluded with a structured timeline for finalizing the feasibility study, and the finalization of all study components by the end of March 2025. These efforts will ensure the delivery of practical, evidence-based recommendations for enhancing plastic waste recycling and circular economy strategies in Cambodia and Pakistan.

Opening Session

The meeting commenced with an opening session led by UNEP, welcoming participants and introducing the objectives of the three-day discussions. Representatives from UNEP, Cambodia, Pakistan, and IGES-CCET were introduced, setting the stage for collaborative engagement. Each participant provided a brief self-introduction, fostering a sense of engagement and cooperation among stakeholders.

Following the introductions, UNEP delivered an overall introduction to the project, outlining the broader context of plastic pollution and the significance of this feasibility study. The presentation highlighted global challenges related to plastic waste and emphasized the role of SMEs in driving sustainable recycling initiatives within a circular economy. UNEP further elaborated on the key objectives of the feasibility study, which include assessing the viability of plastic recycling solutions in Cambodia and Pakistan, identifying sustainable business models for SMEs, exploring financing mechanisms such as impact investment and ESG

principles, strengthening national and city waste management strategies, and providing strategic recommendations for policymakers and stakeholders. The session concluded with an overview of the agenda for the three-day meeting and key expected outcomes.

Session 1: Introduction of Project and Meeting

UNEP began the session by presenting an introduction to the project, explaining the background of plastic pollution, the rationale for the feasibility study, and how the project aligns with global waste management initiatives. The discussion explored the unique challenges faced by Cambodia and Pakistan, emphasizing the importance of tailored solutions that integrate SMEs and the informal sector.

Following this, representatives from IGES-CCET shared insights into national and city waste management strategies in both Cambodia and Pakistan. Their presentation detailed the structure of national waste management policies, city-level initiatives and frameworks, the role of regulatory mechanisms in fostering circular economy practices, and the challenges faced in implementing effective plastic waste management strategies.

The representatives from Cambodia and Pakistan then provided updates on their respective project components. The Cambodian representatives discussed progress in integrating SMEs into plastic recycling, ongoing market analysis, and regulatory challenges. The Pakistani representatives highlighted initial steps toward city-level waste management integration, progress in stakeholder engagement, and the financial feasibility of recycling initiatives.

The session concluded with an open discussion where participants shared perspectives on the barriers and opportunities in scaling plastic recycling in their respective countries. The discussion also covered potential alignment with regional and global circular economy initiatives and the identification of key areas requiring further research and investment.

Session 2: LCA for Plastic Waste Recycling Technologies

The afternoon session focused on LCA of Plastic Waste Recycling Technologies and its application to the feasibility study. UNEP provided an overview of the fundamentals of LCA and its relevance in evaluating plastic waste recycling technologies. The presentation emphasized the role of LCA in quantifying environmental impacts across the plastic value chain, the importance of data collection for informed decision-making, and the integration of LCA findings into policy and investment strategies.

Mr. Matthew Armstrong Burke, an LCA Consultant, conducted a training session based on his LCA presentation materials. During this session, he explained LCA principles and methodologies based on ISO 14040:2006 and ISO 14044:2006, LCA model development including goal and scope definition, system boundaries, and data requirements, and current LCA results from Cambodia and Pakistan. He focused on baseline assessments, impact categories such as carbon footprint, water scarcity, and ecosystem health, as well as primary data collection methodologies. Additionally, he provided a comparison of mechanical, chemical, and biological recycling technologies in terms of energy consumption, emissions, and waste recovery efficiency.

Following the training, participants engaged in a consultation session aimed at refining the application of LCA methodologies for Cambodia and Pakistan. The discussions centered on adapting LCA methodologies to local data limitations, incorporating informal sector contributions into LCA models, establishing data collection mechanisms to improve the accuracy of LCA findings, and identifying areas where capacity-building efforts are needed to enhance LCA adoption among SMEs and policymakers.

The session concluded with reflections from participants on the LCA training, where they provided input on how to integrate LCA into the feasibility study findings. Several key takeaways emerged, including the need for simplified LCA approaches tailored for SMEs with limited technical capacity, collaboration opportunities

between UNEP, IGES-CCET, and local governments to standardize LCA methodologies, and the potential for LCA-driven policy recommendations, particularly in areas like Extended Producer Responsibility (EPR).

Session 3: Plastic Waste Market Analysis and Stakeholder Engagement

The session focused on analysing the plastic waste market landscape in Cambodia and Pakistan, highlighting the roles of key stakeholders such as SMEs, informal recyclers, policymakers, and the private sector. In Cambodia, the recycling market remains largely informal, with SMEs playing a crucial role in collection and processing but facing significant financial and infrastructure constraints. Similarly, in Pakistan, the regulatory landscape varies by province, with Punjab demonstrating more structured waste management systems while cities like Karachi and Peshawar struggle with waste collection inefficiencies and weak enforcement of plastic waste regulations.

Stakeholder mapping revealed that SMEs and informal recyclers form the backbone of plastic waste recycling in both countries but often lack recognition and access to financial support. Government bodies have introduced policies to regulate plastic waste, but enforcement gaps remain a significant challenge. Private sector involvement is increasing, but market fragmentation and fluctuating demand for recycled plastics hinder long-term investments. NGOs and international organizations play a vital role in bridging these gaps through policy advocacy, capacity building, and fostering partnerships.

Key challenges identified include limited access to financing for SMEs, outdated recycling technologies, and unstable market demand for recycled plastics. Regulatory inconsistencies further complicate efforts to formalize the recycling sector, making it difficult to integrate informal recyclers into structured waste management systems. To address these issues, participants discussed potential strategies such as developing public-private partnerships (PPPs), introducing financial incentives for SMEs, and enhancing capacity-building initiatives to improve recycling efficiency.

The session concluded with recommendations to strengthen collaboration among stakeholders, create policy frameworks that promote circular economy principles, and integrate informal recyclers into formal systems. Establishing stable market linkages and investment opportunities was highlighted as a critical step toward scaling up plastic recycling efforts in both countries. By addressing these market and policy challenges, the feasibility study aims to support the development of a sustainable and inclusive plastic recycling sector in Cambodia and Pakistan.

Session 4: Development of a Local SME's Sustainable Model

This session focused on exploring sustainable business models for SMEs in the plastic recycling sector in Cambodia and Pakistan, addressing their challenges, and identifying opportunities to integrate them into a circular economy framework. SMEs play a critical role in plastic waste management, particularly in collection, sorting, and initial processing. However, they face multiple barriers, including limited access to financing, regulatory constraints, and technical expertise gaps. The session emphasized the need for tailored business models that support SMEs in adopting resource-efficient and innovative recycling practices while promoting socio-economic growth.

Discussions highlighted the importance of stakeholder collaboration in strengthening the SME ecosystem. Government support through policy incentives, financial backing, and regulatory frameworks can significantly enhance the sustainability of SME-led recycling initiatives. The private sector, including larger corporations and investors, has a crucial role in providing market access, technological support, and financing solutions such as impact investment and ESG-driven funding. Integrating informal recyclers into formal waste management systems was also discussed as a key strategy to improve efficiency and social inclusion

Key challenges facing SMEs include fluctuating market demand for recycled plastics, lack of infrastructure for efficient waste collection and processing, and difficulties in accessing capital. Participants discussed potential solutions such as tax incentives for SMEs, low-interest loans, and capacity-building programs that focus on improving technical and operational skills. Promoting knowledge-sharing platforms and industry

collaborations was identified as a way to enhance SME resilience and create a more structured recycling market.

The session concluded with recommendations to develop targeted policy interventions, financial mechanisms, and capacity-building initiatives to support SMEs in the recycling sector. By fostering a supportive regulatory environment and strengthening partnerships between the public and private sectors, SMEs can become key drivers of sustainable plastic waste management. The discussions set the foundation for advancing scalable and inclusive business models that align with circular economy principles in Cambodia and Pakistan.

Session 5: Impact Investment and ESG Promotion in Plastic Waste Recycling

This session explored impact investment and ESG as financial mechanisms to support SMEs and businesses in the plastic recycling sector in Cambodia and Pakistan. Given the financial constraints SMEs face, experts emphasized the importance of aligning investments with sustainability goals to enhance circular economy initiatives. Various financial products, including impact investment funds, green bonds, and green loans, were discussed as key tools for enabling long-term financing for plastic recycling projects.

The expert presentation by Naoki Mori (IGES) provided insights into how impact investors view plastic recycling as an opportunity. He outlined that a successful recycling business model must generate financial returns while addressing environmental and social issues. He highlighted impact investment funds, exemplified by Circulate Capital, which collaborates with multinational corporations such as PepsiCo, Unilever, and Procter & Gamble to fund plastic recycling and waste management companies in Asia. Additionally, he discussed green bonds and green loans, which allow governments, banks, and corporations to finance sustainable projects. However, accessing these funds requires businesses to meet strict ESG criteria, including third-party sustainability verification. Challenges such as limited SME knowledge of ESG reporting, regulatory complexities, and the need for project scalability were also noted as barriers to securing green financingPlastic recycle IETC.

Participants discussed strategies to enhance SME investment readiness, including capacity-building programs on ESG reporting, financial literacy, and project proposal development. The importance of PPPs was emphasized to bridge funding gaps, improve recycling infrastructure, and integrate SMEs into global supply chains. Impact investors are looking for scalable business models with measurable sustainability impacts, including reducing single-use plastics, increasing recyclability, and lowering carbon emissionsPlastic recycle IETC.

The session concluded with recommendations to strengthen SME collaboration with investors, align green finance policies with international standards, and provide financial incentives such as tax breaks and low-interest loans to encourage sustainable recycling initiatives. By leveraging impact investment funds and green bonds, SMEs in Cambodia and Pakistan can play a crucial role in plastic waste management, contributing to a circular economy and reducing environmental pollution.

Session 6: Way Forwards

This session focused on consolidating discussions from previous sessions and outlining a clear roadmap for finalizing the Feasibility Study on Plastic Recycling Towards a Circular Future in Cambodia and Pakistan. Participants reviewed key findings, challenges, and opportunities identified during the meeting, emphasizing the importance of integrating SMEs, strengthening policy frameworks, and securing financing for sustainable plastic waste management. The session aimed to ensure that all stakeholders align on next steps, responsibilities, and timelines to successfully complete the study.

A critical part of the discussion was the structured plan for finalizing the feasibility study, particularly the timeline for data collection, analysis, and reporting. Over the next week, the focus will be on gathering and

analysing remaining data, ensuring comprehensive coverage of market trends, stakeholder insights, and environmental impact assessments. The draft comparative analysis report will be submitted to the international consultant by 9th March, who will then review and provide feedback by 14th March. Other study components, including business models, policy recommendations, and financial mechanisms, will be developed and refined throughout March, ensuring all sections are completed by the end of the month.

Participants discussed the integration of stakeholder inputs into the final study, including contributions from government representatives, SMEs, NGOs, and private sector actors. The study will also incorporate impact investment strategies, ESG principles, and policy recommendations to promote scalable and sustainable plastic recycling solutions in Cambodia and Pakistan. The importance of aligning the study with national and international circular economy goals was highlighted, ensuring that its findings support broader environmental and economic sustainability efforts.

The session concluded with a commitment from all participants to adhere to the agreed timeline and contribute to the completion of a high-quality feasibility study. The final document will serve as a strategic roadmap for advancing plastic waste recycling in both countries, supporting SMEs, enhancing policy frameworks, and attracting sustainable investments. The collaborative efforts of UNEP, IGES, and national stakeholders will be crucial in ensuring the effective implementation of study recommendations, paving the way for a circular economy-driven approach to plastic waste management.

Session 7: Site visits

On 21st February 2025, participants conducted site visits to gain practical insights into advanced waste management technologies and historical circular economy practices. The visit began at the Suminoe Incineration Plant, where participants observed modern waste-to-energy technology, emission control systems, and sustainable waste treatment methods. This provided an understanding of how incineration with energy recovery can complement plastic recycling efforts. The second visit was to the Osaka Museum of Housing and Living, which showcased traditional Edo-era circular economy practices, such as repair, reuse, and resource efficiency. The museum highlighted how historical sustainability models—like repurposing human waste as fertilizer and repairing household items—remain relevant for today's circular economy approaches. The visit offered valuable perspectives on combining modern technological advancements with traditional waste reduction philosophies, reinforcing key themes from the feasibility study on sustainable plastic waste management in Cambodia and Pakistan.

Overall Analysis of the Meeting

The Project Meeting on the Feasibility Study on Plastic Recycling Towards a Circular Future in Cambodia and Pakistan provided a structured and multi-stakeholder platform to assess the progress of the feasibility study, exchange knowledge, and formulate actionable strategies for advancing plastic recycling initiatives. The diverse representation of government officials, private sector stakeholders, SMEs, NGOs, and international consultants enabled a holistic discussion on the key technical, financial, and policy aspects of plastic waste management. The meeting effectively combined theoretical insights with practical applications, ensuring that discussions were grounded in real-world challenges and opportunities specific to Cambodia and Pakistan.

One of the notable strengths of the meeting was its comprehensive and integrated approach to addressing plastic waste management. Sessions on LCA, plastic waste market dynamics, SME-led business models, and impact investment strategies ensured a well-rounded understanding of the economic, environmental, and technical feasibility of different recycling models. The engagement of SMEs and informal recyclers highlighted the need for financial and policy interventions to integrate them into the formal waste management sector. Additionally, the inclusion of impact investment discussions and ESG-driven financing broadened the scope of solutions beyond traditional waste management approaches, positioning plastic recycling within a larger circular economy framework.

Despite the successful discussions, the meeting also highlighted several persistent challenges that require further attention. Data limitations remain a significant issue, particularly in the application of LCA

methodologies for assessing plastic recycling technologies. The fragmented and informal nature of the plastic waste sector in both Cambodia and Pakistan poses difficulties in implementing structured policy interventions. Additionally, limited financing options for SMEs, weak enforcement of existing waste regulations, and fluctuations in market demand for recycled plastics were identified as barriers to scaling up sustainable recycling efforts. These challenges indicate a need for stronger policy coordination, enhanced investment incentives, and targeted capacity-building programs for key stakeholders.

The Japan Supplemental Fund played a critical role in enabling the research, stakeholder engagement, and strategic policy development necessary for this feasibility study. The support from the Government of Japan was widely recognized and appreciated, reinforcing the importance of international cooperation in tackling plastic waste challenges in developing economies. The meeting successfully leveraged this funding to facilitate meaningful discussions and develop an evidence-based roadmap for scaling up plastic recycling initiatives.

Overall, the meeting was well-structured, participatory, and results-oriented, effectively aligning stakeholders on concrete next steps for completing the feasibility study. The clear timeline for data collection, analysis, and final reporting, with completion set for the end of March 2025, ensures that the study will be comprehensive and actionable. The collaborative nature of the meeting, coupled with its focus on scalable and finance-driven solutions, lays a strong foundation for future investment, policy reforms, and sustainable development in plastic recycling in Cambodia and Pakistan.

List of Participants

Cambodia

- Vimeanreaksmey Dek (Deputy Director, Department of Solid Waste Management, Ministry of Environment)
- Veasna LEANG (City Governor, Local Government, Battambang Municipality)
- Sam Phalla (Director, Environmental Education and Recycle Organization (COMPOSTED))
- Uch Rithy (Deputy Director, COMOSTED)

Pakistan

- Faisal Saeed Syed (Program Development Expert, Living Indus Program)
- Zainab Naeem (Associate Research Fellow, the Sustainable Development Policy Institute (SDPI))

UNEP

- Takehiro Nakamura (Head, International Environmental Technology Centre (IETC))
- Archana Datta (Associate Programme Management Officer, Life Cycle Initiative)
- Matthew Armstrong Burke (LCA Consultant, IETC)
- Felipe Dall (Programme Management Officer, IETC)
- Shunichi Honda (Programme Management Officer, IETC)

Institute for Global Environmental Strategies (IGES)

- Premakumara Jagath Dickella Gamaralalage (Director, the IGES Centre Collaborating with UNEP on Environmental Technologies (CCET))
- Lakshitha Paranagama (Programme Coordinator, CCET)
- Naoki Mori (Programme Director, Finance Taskforce, Institute for Global Environmental Strategies (IGES))