

### Concept Note

## **Evidence to Action: Economic and Policy Pathways for a Safer Lead-Acid Battery Circular Economy in Bangladesh**

**Date:** 20 June, 2026 | **Time:** 11:00 AM – 01:00 PM

**Venue:** Crystal ballroom, InterContinental Dhaka

### **Context and Policy Rationale**

Lead pollution remains one of the most significant environmental health challenges globally, particularly in countries where rapid industrial growth and informal recycling activities occur without adequate environmental safeguards. In Bangladesh, lead exposure is closely linked to activities associated with the lifecycle of lead-acid batteries (LABs), including battery manufacturing, used lead-acid battery (ULAB) recycling, and smelting operations. These activities form a complex circular economy that supports critical sectors such as transportation, telecommunications, backup power systems, and energy storage.

Over the past decade, Bangladesh has experienced rapid growth in the use of electric three-wheelers, such as Easy Bikes and Mishuks, which rely predominantly on lead-acid batteries for energy storage. These vehicles have become an important mode of affordable transportation across urban and rural areas, contributing to employment, mobility, and local economic activity. However, the increasing demand for batteries has also resulted in a growing stream of used batteries entering the recycling chain each year.

In principle, lead-acid batteries operate within a circular economy, where lead recovered from used batteries can be reused in the production of new batteries. However, in practice, a substantial portion of battery recycling in Bangladesh occurs through informal or poorly regulated processes. Informal smelting operations often lack proper emission control technologies and environmental safeguards, leading to the release of lead into surrounding environments through air emissions, contaminated soil, and improper waste disposal.

These emissions pose serious environmental and public health risks. Communities living near informal smelting and recycling sites may face long-term exposure to contaminated environments, while workers involved in recycling activities often operate under unsafe conditions without adequate occupational protection. Children and pregnant women are particularly vulnerable to the adverse health effects of lead exposure, making the environmental management of lead emissions a critical public health concern. While we have cited lead-acid batteries recycling as an example of a circular economy, environmental outcomes depend on how recycling occurs. Where battery collection, smelting, and recycling take place through informal or poorly regulated systems, the recovery of materials can be accompanied by significant lead emissions and public health risks. In such contexts, the challenge is not simply to increase recycling, but to ensure that recycling occurs within systems that adequately protect workers, communities, and the environment.

Emerging evidence from the SMEP-supported research suggests that battery quality and battery lifespan are important determinants of environmental outcomes within the lead-acid battery sector. Batteries that fail prematurely require more frequent replacement, increasing the volume of used batteries entering recycling channels and creating greater demand for lead recovery. Policies and market conditions that influence battery quality, product durability, and consumer purchasing decisions therefore have implications not only for industry competitiveness but also for lead emissions and public health outcomes. Addressing these challenges requires a comprehensive understanding of how lead flows through the battery supply chain: from production and consumption to collection, recycling, and smelting. It also requires examining the economic incentives that shape industry practices and the policy instruments that influence market behavior. Government policies related to environmental regulation, taxation, product standards, trade, and industrial oversight play an important role in shaping how the battery sector operates.

Recognizing the importance of evidence-based policy dialogue on these issues, analytical work has been led by Pure Earth and funded by the Sustainable Manufacturing and Environmental Pollution (SMEP) Programme to better understand the environmental, public health, and economic dynamics of the lead-acid battery sector in Bangladesh. The findings of this analytical work form the basis of this seminar organized by the Ministry of

Environment, Forest and Climate Change (MoEFCC) in collaboration with Pure Earth Bangladesh and the United Nations Conference on Trade and Development (UNCTAD).

### About the SMEP Project

The SMEP Programme aims to address environmental pollution associated with manufacturing systems and industrial supply chains in developing countries while promoting more sustainable patterns of production and economic development. Through research, policy analysis, and stakeholder engagement, the programme seeks to generate evidence that can support governments in designing policies that reduce pollution while maintaining economic productivity.

In Bangladesh, SMEP has supported interventions in the tanneries, textiles and lead-acid battery sectors. The lead acid battery sector was prioritized given its importance to the country's transportation, energy storage, and manufacturing systems, as well as the environmental risks associated with lead emissions from battery production and recycling activities.

The project is led by Pure Earth Bangladesh who have anchored the policy and stakeholder dialogues, supported by a research team led by Georgetown and Stanford Universities, along with local partners. It has undertaken a series of field research and analytical activities aimed at understanding the structure and functioning of the lead-acid battery circular economy. This work examines how lead moves through the battery supply chain and how formal battery manufacturers, licensed recycling facilities, informal recycling operators, and downstream consumers interact. The project research team has explored the economic drivers influencing battery production, recycling practices, and the collection of used batteries alongside consumer behavior and technology adoption patterns in the electric three-wheeler sector, providing insights into market dynamics within the battery ecosystem. Attention has been given to understanding how battery quality, replacement cycles, consumer purchasing behavior, trade policies and product standards interact within the electric three-wheeler sector. By examining these relationships, the research seeks to identify opportunities to reduce lead emissions through interventions that improve battery lifespan, influence market incentives and reduce the volume of batteries entering recycling systems.

Building on these findings, the team has developed economic modelling and policy analysis, and in so doing, has identified potential economic and regulatory pathways for reducing lead emissions associated with the battery industry. The analyses consider how policy instruments, including fiscal measures, regulatory incentives, and industry standards, may influence industry behavior and support safer and more environmentally responsible recycling systems.

This concluding seminar under the SMEP project will provide an opportunity to share the project's key research findings and policy recommendations with government institutions, regulatory bodies, industry stakeholders, development partners, researchers, and the media, and to support informed policy action to reduce informal ULAB recycling and lead emissions in Bangladesh.

### Objectives of the Seminar

The primary objectives of the consultative meeting are:

- Present the key research findings and outputs generated under the SMEP project on the lead-acid battery circular economy in Bangladesh.
- Present evidence on the public health implications of battery import barriers and lead exposure, including findings related to terminated pregnancies among women living near battery-related lead-emitting sites.
- Share insights from economic modeling, mystery shopping research, and related analyses examining market-based and government policy solutions to reduce lead emissions from the battery industry.

- Facilitate dialogue among government representatives, regulatory authorities, industry stakeholders, researchers, and development partners on practical economic and policy pathways for supporting safer battery collection and recycling systems.
- Strengthen public and media understanding of lead pollution, ULAB recycling, and policy solutions for a safer lead-acid battery circular economy in Bangladesh.

## Key Research Outputs and Technical Presentations

The seminar will include technical sessions presenting the key analytical insights generated through research conducted under the SMEP-funded project. The sessions will highlight findings on the structure, environmental implications, public health consequences, and economic dynamics of the lead-acid battery circular economy in Bangladesh, as well as potential policy pathways for reducing lead emissions.

## Overview of SMEP Project Activities and Key Outputs

The Country Director of Pure Earth Bangladesh will provide an overview of the SMEP project activities implemented in Bangladesh. This presentation will summarize the project's analytical work, stakeholder engagement, policy discussion, and key outputs developed to support a safer and more environmentally responsible lead-acid battery circular economy. It will also highlight how the project has contributed to strengthening evidence generation and policy engagement around safer battery collection and recycling systems, and circular economy governance.

## Terminated Pregnancy: Barrier to Import Batteries and Lead Poisoning in Bangladesh

The seminar will include a recorded presentation by Amrita Kundu on the paper **“Barrier to Import Batteries and Lead Poisoning in Bangladesh.”** This research examines the public health implications of battery import barriers and the expansion of domestic battery manufacturing and recycling activities in Bangladesh. The paper provides empirical evidence that trade barriers on battery imports increased manufacturing and recycling activity in the domestic lead-acid battery circular economy and associated lead emissions. Using spatially detailed data on battery-related lead-emitting sites and nationally representative maternal health data, the study provides evidence on the relationship between proximity to battery-related lead-emitting sites and increased likelihood of terminated pregnancies after the implementation of battery import barriers.

An important driver of the increase in lead emissions is that the domestically-manufactured batteries have inefficiently short useful life. Amrita Kundu will also present empirical observations from mystery shopping that explain the market failure leading to inefficiently short battery life.

This presentation will add an important public health dimension to the policy discussion by demonstrating the broader consequences of unregulated or poorly regulated circular economy systems for toxic products such as lead-acid batteries. It shows the need for integrated solutions, from trade and tax policy to business model innovation that provides reliable information to customers about battery quality and useful life, in order to reduce lead emissions.

## Economic Model, Mystery Shopping Findings, and Policy Recommendations

Professor Erica Plambeck of Stanford University will deliver the technical presentation titled **“How to Reduce Lead Emissions from the Lead-Acid Battery Circular Economy.”** The presentation will share findings from the project's economic modeling and policy analysis, including how lead moves through the circular battery supply chain, how formal and informal manufacturing, recycling, and smelting processes interact, how tariffs and other policy and financing innovations affect prices for lead-acid batteries and recycled lead, imports of lead-free batteries, and lead emissions over time. Particular attention will be given to the role of import tariffs

on lead, import tariffs on lead-free batteries and other policy instruments such as smelting fees, targeted subsidies for qualified low-emissions smelters, battery traceability, collection systems and product standards. Financing innovation – long duration loans to create demand for highly durable batteries – also has a important role. Professor Plambeck will show how to starve informal and irresponsible operators of lead and demand, promote formal low-emission recycling and manufacturing of lead-acid batteries that last longer, and safely adopt lead-free batteries. and toward safer, environmentally sound recycling systems.

### Institutional Participation and Stakeholders

The seminar will bring participants from key government ministries, regulatory authorities, industry stakeholders, research institutions, development partners, civil society organizations, and media representatives whose mandates intersect with the environmental management, public health implications, and economic governance of the lead-acid battery sector in Bangladesh. Representatives from the Ministry of Environment, Forest and Climate Change (MoEFCC) and the Department of Environment (DoE) will play a central role in the discussion, as these institutions are responsible for environmental governance, pollution control, and regulatory oversight of industrial activities that may contribute to lead emissions.

The seminar will also involve representatives from other government institutions whose responsibilities intersect with the battery industry and lead pollution prevention. These include the National Board of Revenue (NBR), given its role in taxation and customs policies that influence the economics of battery production, import, and recycling; the Bangladesh Standards and Testing Institution (BSTI), given its mandate related to product standards and quality assurance; the Directorate General of Health Services (DGHS) and the Institute of Epidemiology, Disease Control and Research (IEDCR), given their relevance to public health surveillance and lead exposure prevention; and other relevant ministries, agencies, and local institutions. Given the importance of trade policy, industrial development, and market incentives to the functioning of the battery sector, participation from institutions responsible for commerce, industry, and investment promotion would also contribute valuable perspectives on opportunities to align environmental objectives with industrial competitiveness and economic development goals.

Industry stakeholders will include representatives from the lead-acid battery sector, battery recycling stakeholders, lithium and alternative battery sector actors, and relevant business associations. Participation from research institutions, development partners, and media representatives will help ensure that the findings and recommendations are discussed from technical, policy, implementation, and public communication perspectives.

### Media Engagement and Public Dissemination

In addition to the technical and policy discussions, the seminar will include a public dissemination component through engagement with a leading national daily newspaper, *The Daily Star*, as media partner. This will support wider communication of the SMEP project's research findings and policy recommendations to policymakers, industry stakeholders, civil society, and the general public. The media engagement component is expected to help raise awareness of the environmental and public health risks associated with informal ULAB recycling and lead pollution, while also highlighting practical economic and policy pathways for transitioning toward safer and more responsible recycling systems. By disseminating the research outcomes beyond the technical and policy community, the seminar will contribute to broader public understanding of the need for coordinated action on lead pollution prevention in Bangladesh.

## Expected Outcomes of the Consultation Meeting

### 1. Dissemination of research findings and policy recommendations

The seminar will provide a platform to share the research outputs generated under the SMEP project, including findings from economic modeling, mystery shopping research, and public health analysis. Participants will gain a clearer understanding of how lead moves through the battery supply chain, how formal and informal recycling systems interact, and how economic and regulatory incentives shape industry behavior.

### 2. Strengthened understanding of economic and policy pathways

The discussion will support reflection on practical economic and policy pathways for reducing informal ULAB recycling and lead emissions. Participants will be able to consider proposed measures such as fiscal instruments, targeted incentives, product standards, battery traceability, collection systems, regulatory enforcement, and formal recycling capacity.

### 3. Enhanced policy uptake and institutional engagement

By bringing together government institutions, regulators, industry stakeholders, researchers, and development partners, the seminar will support further consideration of the SMEP policy recommendations within relevant government processes. Participants will be able to consider a range of regulatory, fiscal and market-based measures identified through the research.

### 4. Integration of public health evidence into policy discussion

The presentation on terminated pregnancy and lead poisoning will help integrate public health evidence into discussions on battery trade, manufacturing, recycling, and environmental regulation. This will support a more comprehensive understanding of the consequences of informal and poorly regulated circular economy systems for toxic products such as lead-acid batteries.

### 5. Wider public and media dissemination

Through engagement with The Daily Star and participation from media representatives, the seminar is expected to support wider dissemination of the project's evidence and recommendations. This will help strengthen public awareness and encourage informed discussion on lead pollution prevention, safer battery recycling, and responsible circular economy practices in Bangladesh.

### 6. Identification of priority policy actions and areas for future collaboration

The seminar is expected to support discussion on potential next steps for strengthening the governance of the battery sector, including opportunities for regulatory reform, improved inter-agency coordination, enhanced product standards, strengthened battery traceability and collection systems, and future collaboration between government, industry, researchers, and development partners.

*Disclaimer: The analytical work presented during this seminar has been funded by The Sustainable Manufacturing and Environmental Pollution (SMEP) Programme, established by the UK Foreign, Commonwealth and Development Office (FCDO) and is implemented in partnership with the United Nations Conference on Trade and Development (UNCTAD). The SMEP Programme is designed to facilitate the uptake of pollution mitigation solutions in sub-Saharan Africa and South Asia through research and piloting pollution mitigation technologies. This work extends to sharing evidence and identifying and engaging in areas where policy and regulatory adjustments may enable wider uptake of pollution mitigation solutions.*

## Seminar Schedule

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| Time              | Activity                                                                                                                                                      | Remarks                                                                                                                |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| 11:00 am-11:30 am | Registration and morning snacks                                                                                                                               |                                                                                                                        |
| 11:30 am-11:35 am | Introduction and Setting the Tone                                                                                                                             | <b>Sabrina Rahman</b><br>Senior Assistant Secretary,<br>Ministry of Environment, Forest and<br>Climate Change (MoEFCC) |
| 11:35 am-11:50 am | <b>Presentation</b><br><i>Overview of the SMEP Project<br/>Activities and Key Outputs</i>                                                                     | <b>Mitali Das</b><br>Country Director,<br>Pure Earth Bangladesh                                                        |
| 11:50 am-12:00 pm | <b>Technical Presentation</b><br><i>Terminated Pregnancy: Barrier to<br/>Import Batteries and Lead Poisoning<br/>in Bangladesh</i>                            | <b>Professor Amrita Kundu,</b><br>Georgetown University, USA                                                           |
| 12:00 pm-12:30 pm | <b>Technical Presentation</b><br><i>How to Reduce Lead Emissions from<br/>a Lead-Acid Battery Circular<br/>Economy with Formal and Informal<br/>Processes</i> | <b>Professor Erica Plambeck,</b><br>Stanford University, USA                                                           |
| 12:30 pm-12:40 pm | Open discussion and Q/A session                                                                                                                               |                                                                                                                        |
| 12:40 pm-12:45 pm | Remarks from the Special Guest                                                                                                                                | <b>Prof. Quazi Ahmed Zaki</b><br>Director<br>Institute of Epidemiology, Disease<br>Control and Research (IEDCR)        |
| 12:45 pm-12:50 pm | Remarks from the Special Guest                                                                                                                                | <b>Muhammad Mubinul Kabir</b><br>Member (Customs: Policy & ICT)<br>National Board of Revenue (NBR)                     |
| 12:50 pm-12:55 pm | Remarks from the Chief Guest                                                                                                                                  | <b>Dr. Fahmida Khanom</b><br>Additional Secretary<br>Ministry of Environment, Forest and<br>Climate Change (MoEFCC)    |
| 12:55 pm-01:00 pm | Remarks from the Chair and Closing                                                                                                                            | <b>Dr. Md. Lutfur Rahman</b><br>Director General<br>Department of Environment (DoE)                                    |
| 01:00 pm onwards  | Lunch                                                                                                                                                         |                                                                                                                        |