Lead Acid Battery Recycling in Bangladesh

Community Based Urban Solid Waste Management in Dhaka (component 3.3.2)
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Executive Summary

Lead is considered as number-one hazardous substance by the scientific community. More this information started to be known to the public, more and more government policy and actions have been put in place in the developed as well as developing countries. Switching from leaded gas to unleaded gas in many countries including Bangladesh shows that if scientific information, particularly on health hazards associated with substance like lead, get disseminated, it does not take too long for public policy and actions to follow and they to succeed.

This study was undertaken to generate and analyse essential information and data on used lead-acid battery (ULAB) recycling in order to explore potential public policy and action options. It appears that unlike the heightened concerns on leaded gas and its associated health hazards (particularly children's IQ reducing effect), the awareness and environmental impact associated with exposure to lead from working with the used lead-acid batteries (ULABs) -- so widely used for the large and still growing vehicular population -- is dangerously low.

Despite the associated health hazards, economic activities have been growing centering collection, reuse, smelting and recycling of ULABs in Bangladesh. As a labour-abundant and capital-scarce economy, this is of course a boon to the Bangladesh economy. But these gains to be sustained or potentially increased, it is important to know ULAB recycling chain more in-depth. Also, since the Basal Convention's original agreement and the subsequent amendments/decisions, no country can remain idle without developing and implementing an environmentally sound ULAB recycling management system.

In the above background, this study sought to generate adequate information and data base for conducting necessary analysis to address key issues related with ULAB recycling in Bangladesh. These issues include:

- The supply and demand conditions of lead-acid battery (LAB) production in Bangladesh
- The role of secondary lead in manufacturing of batteries in Bangladesh
- The existing process/value chain of ULAB recycling
- The problems faced by the process/value chain actors
- The market structure of (LAB) manufacturing, ULAB collection and smelting in the country
- Technology in use in ULAB recycling
- The health hazards and environmental impact associated with the ULAB collection process and smelting
- Scope and mechanism of interventions to improve the ULAB collection, smelting and recycling activities from social, economic and environmental perspectives.

The study's major findings can be noted as follows:

- Collection and smelting activities of ULABs are well dispersed throughout the country. Dhaka Division alone however accounts for 50% of smelting activities, obviously this is due to Dhaka city's dominance in the Division. Next concentration is in Khulna Division. No smelting is done in Syhlet and Barisal Division. Dhaka is the major center of ULAB collection, separation and smelting. Whereas separation activities are clustered in

Waisghat, Dholaikhal and Jaikali Mondir, smelting activities are mostly located in the outskirts of the city such as Kholamora and Kamrangirchar.

- The market structure of new lead-acid battery manufacturing is marked by monopoly characteristics (Rahimafrooz alone accounts 73% of the formal sector manufacturing of new lead-acid batteries; the share remains high -- 67%--even when the informal sector's contribution -- 9% -- is included).

- Collection activities, in which mostly the informal sector labour and enterprises are involved, take place in a very competitive market condition.

- Smelting activities operate in a monopolistic market (four firms account for about 50% of the smelting industry).

- On the buyers side of secondary lead (i.e., lead recovered from batteries), the market condition is quite monopsonistic: The smelters are to sell their recovered lead largely to two big buyers (Madina Metal and the Khorshed Metal).

- Presently two chains are working in used lead-acid battery collection: (One, User small buyer /dealer broker repairer/rebuilder vangari shop smelter lead user; two, User smelter).

- The investigation of the increase in value by change of 'actor' in the recycling chain reveals that price of used battery get increased by about 100% in each stage of a transfer from one actor to the other. Value of a used battery increases by large margin if it is sold by separating its parts.

- Approximately, 3,420 tons of lead are recovered per year from $ULAB_s$ in Bangladesh. This allows to meet 60% of the total lead requirement of the country from secondary lead.

- Market value of yearly recovered lead is estimated to be Tk 31 crore

- Savings from import replacement is estimated at Tk 31 crore/Tk.36 crore depending on the assumed import price.

- Market value of reused plate from $ULAB_s$ is estimated as Tk. 20 crore.

- Maximum lead recovery takes place from LAB_s but a considerable amount also comes from CI Sheet (Tin). Lead is used with Zinc for galvanizing tin sheets.

- Market price of locally recovered lead is around T_k 60,000 per ton but the price of imported lead is Tk. 90,000/ton.

- Overall, ULAB recycling activities are providing income-earning opportunity to thousands of informal sector workers and their enterprises plus they are playing a significant role in saving foreign exchange.

- On smelting technology, the study findings suggest the need and scope of increasing the recovery rate of lead from $ULAB_s$. Three types of technology are currently on use. These are: Rotary Furnace (recovery rate 65%), Mondir Chulli (recovery rate 60%), and the Pan or Hole process (55-60%). These rates compare quite unfavourably with the recovery rate in the developed countries (75%+). This suggests the scope of increasing the lead recovery rate in Bangladesh by upgrading the smelting technology currently in use.

- Main pollution occurs when coal is used as fuel for smelting. But other than air pollution from coal burning, soil and water pollutions are also widespread in smelting.

- Persons dealing with battery recycling are not aware of environmental pollution or health hazard of recycling activities.

- No rules and regulations for control, management and handling of $ULAB_S$ have been framed so far by the government.

On the basis of the findings and observations of the ULAB recycling in the country, the study has finally developed three policy options for consideration. In one option, the emphasis is laid to combine economic incentives with regulatory support; in the second option, regulatory measures are to be used to make the formal sector key players in obtaining used batteries; and in the third, strict regulatory provision is suggested for promoting more effective collection and adoption of environmentally sound technology. This is to be made implementable through additional incentive provisions for compliance.

It is to be noted that all three options bear the hallmark of an 'adaptive approach' in the sense that each seeks to recognize and preserve the vital role of the informal sector in the collection process.Each also seeks to introduce some measures of regulation with varied dose of incentive provisions in order to maximize collection of $ULAB_S$ and promote an environmentally sound recycling process.They vary basically in terms of the degree of regulation and in no option regulation *per se* is seen adequate for arriving at an economically viable, socially desirable and environmentally sound management of lead-acid batteries in Bangladesh. Option 3 may appear to be relying more on regulation. But even in this option a sole reliance on regulation is not envisaged because regulation alone will not ensure supply of used batteries to the recycling centers. This is the reason an extra incentive provision is included in Option 3 for ensuring compliance to regulation.

Overall, a significant government intervention and financial support need to be in place. Such support is however worth giving in view of social (employment for the poor/low-income groups), economic (foreign exchange savings from a reduced lead import) and environmental benefits (from avoided cost in disposing of ULABs).

On the basis of discussions with the representatives of all stakeholder groups (users, informal collectors, small buyers, dealers, brokers, repairers, rebuilders, vangari shops, smelters and secondary lead-using battery manufacturers), relative efficacy of the presented options are to be judged and decided for implementation.

An overall policy package also ought to include (a) an awareness campaign, particularly to make all involved workers and parties aware of the health hazards and environmental impact associated with lead reuse and recycling; (b) R & D for possible prolonging of battery life; (c) requiring the smelters to use environmentally sound smelting technologies; and (d) facilitating high capacity utilization of licensed smelters (e.g., by requiring the informal collectors to bring $ULAB_S$ to such smelters) adopting environmentally sound technologies.

Abbreviation

BBS	Bangladesh Bureau of Statistics
CI	Corrugated Iron
EEC	European Economic Commission
EC	European Commission
IQ	Intelligent Quotient
IPS	Instant Power Supply
MoEF	Ministry of Environment and Forest
MSW	Municipal Solid Waste
NIC_d	Nickel and Cadmium
OCED	Organization of European Cooperation and Development
PVC	Polyvinyl Chloride
REB	Rural Electrification Board
R & D	Research & Development
SLI	Starting, Lighting, Ignition
Tk	Taka
ULAB	Used Lead-Acid Battery
LAB	Lead-Acid Battery
$ULAB_s$	Used-Lead Acid Batteries
UPS	Uninterrupted Power Supply

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