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Requirements for, and benefits of, environmentally sound and economically viable management of battery recycling in the Philippines in the wake of Basel Convention trade restrictions

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Abstract

The ban on the export of used lead-acid batteries (ULAB) from Annex VII to non-Annex VII countries pursuant to decision III/1 of the Basel Convention reduced the availability of imported scrap feedstock for battery recycling in the Philippines. As ULAB supply from other developing countries becomes scarcer, the ban is likely to encourage and enhance collection and recuperation for domestically generated scrap. From a short-term perspective, this study explores the technological and managerial opportunities for improving the environmental and occupational health performance of the formal battery recycling sector and unregulated reconditioning. From a medium- and long-term point of view, the study investigates restructuring the informal ULAB's collection and recycling sector. The objective has been to make the smaller battery recyclers and reconditioners in the informal sector part of an effective and efficient collection infrastructure that supports an environmentally sound secondary lead sector. This approach gradually phases out uncontrolled, inefficient and environmentally unacceptable methods of secondary lead recovery. Due attention has also been paid to the logistical peculiarities of an archipelago, in particular the regional spread of collection infrastructure, collection and shipment costs as well as the assurance of environmentally safe transport.

Keywords: Basel; Battery recycling; Environment and health; Lead exposure; Philippines; Secondary lead

1. Introduction

To date, the specific impact of environmentally motivated trade restrictions and a review of their effectiveness in achieving the environmental goals of the restrictions have been ill-studied in the context of many multilateral environmental agreements (MEAs). The Basel Convention is no exception. In this light, the United Nations Conference on Trade and Development (UNCTAD) has attempted to analyze the likely environmental and economic impact of the Basel Ban Amendment (decision III/1)[2] for the case of used lead-acid batteries (ULAB) in the Philippines in order to ascertain adjustment requirements and costs, and also to study the effectiveness of the Ban Amendment in improving domestic waste management, and in reducing related human risk and the amount of waste generated.[3]

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[1] The views expressed in this paper are those of the author and do not necessarily represent the position of UNCTAD.

[2] After coming into effect, the Basel Ban Amendment will prohibit the export of hazardous waste figuring in Annex VIII of the Convention from Annex VII (OECD, EU and Liechtenstein) to all other countries. ULAB are one of the hazardous waste items in Annex VIII.

[3] UNCTAD, Requirements for environmentally sound and economically viable management of lead as important natural resource and hazardous waste in the wake of trade restrictions on secondary lead by decision III/1 of the Basel Convention (Basel Ban Amendment): The case of ULAB in the Philippines (this paper will be published as UN document later this year).

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The drafters of the Basel Convention, and in particular the Ban Amendment, assumed a close relationship between reduced trade flows of hazardous waste and the minimization of health and environmental risks, in particular in developing countries. While this is largely true for many low-income developing countries, this causality is not likely to hold for a number of rapidly industrializing developing countries which: (i) play an increasingly significant role as generators of hazardous waste; (ii) have high demand for secondary material due to high rates of economic growth and material-intensive growth patterns; (iii) import large amounts of scrap from other developing countries, which will not only remain unaffected, but may also be further encouraged by the Ban Amendment.

If all hazardous waste shipments from OECD countries are destined for final disposal in low-income developing countries only, the Ban will mostly be socially beneficial. The bulk of hazardous waste shipments from Annex VII countries are, however, destined for recovery and recycling in a few rapidly industrializing developing countries, including the Philippines. Most of this trade is demand- and not supply-driven.

More specifically, it is not high disposal fees or the explicit prohibition of final disposal in OECD countries that is propelling such trade but high material intensity of growth, a limited stock of domestically accumulated scrap and a propensity towards the use of secondary material instead of the more expensive primary resources in the newly industrialized countries. This is why recuperation of such materials is an issue of proper natural resource management as much as a problem of sound waste management.

2. Role of imported scrap lead-acid batteries in the Philippines

Imports of scrap lead-acid batteries are not the result of attempts by developed or developing country exporters to dump or easily dispose of such lead waste, but are required to bridge a domestic supply–demand gap of lead in the Philippines. In recent years, this gap has amounted to about 35% to 40% of lead demand and is caused by three factors: (i) rapid growth of vehicle population; (ii) inefficient lead recovery outside the formal battery recycling sector; (iii) domestically generated scrap batteries which remain uncollected.

Rapid vehicle population growth is the most important root cause of the lead supply–demand gap. Whereas registration of new vehicles in the period 1990–1996 stagnated in the USA and Japan and declined by 7% in Western Europe, it increased by almost 80% (some 10% annually) in the Philippines. This generated an annual increase in Philippine lead demand of some 10% to 12% between 1990 and 1996. Current average battery life in the Philippines is about 2 years. The battery scrap available in a year is a function of the battery consumption volume one average lifetime of a standard battery ago, i.e., 2 years. For example, the volume of domestically generated battery scrap in 1996 is determined by the battery consumption volume of 1994. In the light of the demand growth rates outlined above, this creates a supply–demand gap of about 20–25% in volume terms. This cause of the supply–demand gap is confined to countries with very high rates of vehicle population growth, not based on significant imports of vehicles, equipped with new batteries.[4]

The second most important cause of the lead supply–demand gap is inefficient lead recovery by the informal sector, i.e., battery reconditioners and backyard (s)melters. They currently process about 40% to 45% of domestically generated battery scrap, but recover only 40% to 50% of the lead content of scrap batteries. This is not only a major loss of a valuable natural resource, but also a significant source of environmental contamination and human lead exposure.

Only about 10% of domestically generated scrap batteries currently remain uncollected in the Philippines.[5] Despite a well-spread and well-managed collection infrastructure by the formal sector, however, logistical efforts and transport costs are high and the informal sector is shaving off a significant share of the domestic battery scrap supply.[6]

3. Environmental and economic effects of Basel Ban Amendment on scrap lead-acid batteries in the Philippines

The Basel Ban Amendment will hit particularly hard the formal recycling sector, which is the most efficient in lead recovery from scrap batteries and also has the best environmental and occupational health performance. Scrap batteries have only been imported by licensed lead smelters and are required to allow a capacity utilization that is economically viable. The Basel Ban Amendment will gradually increase lead scrap prices for these licensed recyclers (both at the domestic level and for lead scrap from other developing countries) which will oblige them to either reduce capacity utilization or resort to imported primary lead. This has the following environmental and economic implications.

[4] In the Philippines, the share of imported vehicles in newly registered vehicles is only about 5% to 10% in the light of local content requirements.

[5] Only about 17% of the populated areas of the Philippines are not covered by the collection infrastructure of the formal battery recycling industry. This is a remarkable percentage in the light of the fact that the Philippines is an archipelago of more than 7100 islands.

[6] Battery reconditioners are able to offer very attractive scrap purchasing prices because they do not pay taxes and have insignificant or no environmental or occupational health costs.

3.1. Environmental effects

- Less vigorous collection and recycling of scrap batteries by licensed recyclers, which will increase the volume of jettisoned batteries in the country.
- Encouragement of the activities of the informal sector, leading to more spillage of electrolyte, greater lead contamination due to inefficient lead recovery, more sulfur dioxide emissions owing to a not well-controlled desulfurization process by small (s)melters.
- No incentive and lacking profitability to extend significantly battery life as a key tool for reducing waste generation.
- No incentive to use environmentally sound technologies and further improve the environmental performance of licensed battery recyclers.
- Under prevailing trends of historically very low international prices for lead and abundant supply of lead scrap, producers of new vehicle batteries in OECD countries are discouraged from developing lead-free batteries and investing in extending battery life under tropical conditions.

3.2. Economic implications

- The very existence of a modern battery recycling industry,[7] which has not only entirely met Philippine lead and battery demand, but generated export earnings, is put in jeopardy by higher feedstock prices and competition from OECD battery manufacturers.
- A drastically higher import bill (currently, battery scrap imports amount to US$3 million; primary lead imports of the same volume would cost US$8 million; new battery imports, equivalent to currently domestically produced vehicle batteries, would cost US$60 million). In addition, there would be a loss in export revenue of manufactured batteries of up to US$13 million.
- There may also be significant public costs for entirely or partly setting up a domestic collection and export system for scrap batteries along the lines of Singapore.

A number of conclusions can be drawn from the above. First, without a profound restructuring of the Philippine battery recycling industry, there will be insufficient access to domestic sources of scrap supply. Given that lead demand is inelastic to the Basel Ban Amendment, however, imports of lead to bridge the domestic supply–demand gap will be indispensable — unless Article 11 agreements[8] or joining of Annex VII are made possible for the Philippines under the Basel Convention, the Ban Amendment will encourage the import of primary lead. This, in turn, undermines efforts by licensed recyclers to increase collection of domestically generated scrap batteries and drives more and more battery scrap into the informal sector. This results in far higher environmental lead contamination and human exposure to lead, as well as spillage of electrolyte.

Second, the Ban Amendment does not encourage the use of environmentally sound technologies and the development of less polluting and less waste intensive products. In the Philippines, shortage of scrap battery feedstock will lead to significant under-utilization of recycling capacity among modern licensed smelters, which makes the use of environmentally sound technologies economically non-viable. Furthermore, the modern integrated battery recyclers/manufacturers will not have sufficient profits to be used for research and development into extending battery life under tropical conditions which would reduce the generation of battery scrap and, thereby, narrow the gap between lead supply and demand in the country.

Third, the Basel Convention has no financial mechanism, nor does it currently allow access to global financial mechanisms, such as the Global Environmental Facility, to compensate for incremental costs incurred as described above. This is why any restructuring of the lead recycling industry in the Philippines has to be environmentally sound and economically viable. Therefore, environmentally sound management of lead battery waste has to be seen in the context of sustainable management of lead as an important natural resource.

Finally, unless the Philippine government pursues a pro-active strategy aimed at limiting the distortionary effects of the trade restrictions of the Basel Ban Amendment on scrap batteries, the objectives of the Basel Convention cannot be met and sustainable natural resource management is compromised. The pro-active strategy should include a restructuring of the battery recycling industry, which can be implemented on the basis of different policy packages.

These policy packages and the elements of the restructuring of the lead battery recycling industry will be discussed by a multi-stakeholder policy forum on encouraging sustainable management of lead as important natural resource and hazardous waste in the Philippines, which

[7] The biggest recycling company in the Philippines, named Philippine Recyclers (PRI), operates a modern pyro-metallurgical plant, bought as turn-key project in the USA at the beginning of the 1990s. The plant accounts for 70% to 80% of the capacity of all licensed Philippine recyclers. Economic and environmental performance have significantly been improved in recent years and PRI has been the first Filipino-owned company in the country which has ISO 14001 certified (to date, there are less than a handful of lead smelters worldwide who have received this certificate).

[8] The interpretation of the further use of Article 11 agreements under the Ban Amendment differs among OECD countries. Some are in favour of continued use of such agreements, other OECD countries seem to find them incompatible with the objective of the Ban Amendment. Article 11 agreements allow trade in hazardous waste between Parties and non-Parties, provided such bilateral agreements are not less stringent than the provisions of the Basel Convention.

will be jointly organized by UNCTAD and UNDP, in collaboration with the International Lead Management Center (ILMC) and the Asian Institute of Management. The multi-stakeholder forum will advise the Government on the sustainable management of lead, including lead recovery.

The elements of the restructuring of the lead-acid battery recycling industry in the Philippines and the policy packages, which can be used to implement the restructuring, are summarized later. It would go beyond the scope of this study, however, to elaborate on them.

4. Some general lessons

The analysis of the Philippine situation offers some interesting questions that are as yet unanswered by the trade and environment debate surrounding the Basel Convention.

First, it is unlikely that trade restrictions are very effective for goods, commodities or materials that have an inelastic demand. Trade restrictions in such cases may only encourage illegal trade and informal sector activities to meet demand.

Second, as the Basel Convention does not even partly compensate for adjustment costs of trade restrictions (i.e., incremental costs discounting for any national benefits) and does also not provide for access to global financial mechanisms, such as the Global Environmental Facility, adjustment measures for complying with trade restrictions of the Convention have to be environmentally sound and economically viable.

Third, currently there is no guarantee that a country, such as the Philippines, after having made and paid for a complex adjustment process to comply with Basel Ban Amendment induced trade restrictions (and ultimately being, at least for a specific sector, on a par with environmental performance in OECD countries), can indeed graduate into the 'developed country' group and thus become exempt from further trade restrictions. This is why clear and legally binding clarification on the use of Article 11 agreements and scientific criteria for joining the group of Annex VII are required, if arbitrary and unjustifiable trade restrictions should be avoided.

Fourth, there is a real risk that trade restrictions, as illustrated in the case of the Philippines, may undermine otherwise viable industries in developing countries whose environmental performance could be further improved. This may put in jeopardy the achieved level of self-sufficiency in the concerned product/resource and its sustainable management. As a result, there may be a higher dependence on imports of manufactures (i.e., new batteries) from developed countries.

Fifth, unless transfer of environmentally sound technologies is funded by global or bilateral financial mechanisms, economic incentives determine the choice and effective use of environmentally sound technology, not the other way round. Prescriptive approaches on technology transfer are therefore unlikely to be effective. This is a very important conclusion for shaping the activities of the Regional and Sub-regional Centres on Training and Technology Transfer of the Basel Convention, two of which (one in China and the other in Indonesia) are already operational in Asia.

Finally, there is much more need for fact-based analysis of the effectiveness and undesirable side/distortionary effects of the trade restrictions of the Basel Ban Amendment, particularly in rapidly industrializing developing countries. On this basis, recommendations can be made to the various stakeholders at the national level on measures that avoid or minimize distortionary effects and reduce adjustment/compliance costs of trade restrictions. There is also room for South–South co-operation in analyzing in advance the likely effects of trade measures and in making recommendations on suitable adjustment policy measures and specific capacity building assistance required from developed countries to comply with the trade restrictions in a cost-effective and developmentally benign way.

5. Scope of project

The project aims to provide a brief characterization of the Industry in terms of the size, the number of people employed, the technology used, the various leaded feedstock material, and the output of the following two battery recycling sectors:

- The Formal Licensed Sector; there is only one Company in this Sector, viz. Philippine Recyclers in Manila.
- The Informal Unlicensed sector which includes the battery reconditioners, the cottage melters, the smaller battery recyclers and secondary smelters.

Furthermore, the project examines the Inter-relationship between these two different commercial groups with respect to the supply and demand for feedstock and recovered lead. Also characterized are the exposure problems associated with the environment and occupational health. Practical, feasible and affordable options for short-term upgrading of environmental and occupational health performance are assessed.

Long-term restructuring options for the two target groups are analyzed with a view to:

(i) increasing collection of domestically generated ULAB for the licensed environmentally sound battery recyclers;
(ii) reducing uncontrolled, partial lead recovery in a socially tolerable way.

Also included for consideration are recommendations to the Philippine Battery Recycling Industry and the Philip-

pine Government agencies responsible for Environment and Health, and Trade and Industry for an integrated approach to reducing the risk of lead exposure.

6. Characterization

6.1. Battery reconditioners

Throughout the major cities of the Philippines, and in particular the capital Manila, there are hundreds, possibly thousands, of small battery reconditioners which collectively employ as many as 6000 Filipinos. The typical battery reconditioner occupies small shop premises located along main city roadways with street access and is usually found among other shops selling a variety of provisions, fast foods, and domestic and consumer goods. Experience has shown that reconditioned batteries have a very short life compared with new batteries. Nevertheless, the struggling self-employed truck, 'Jeepney' or taxi drivers, with little or no financing, are only too pleased to rent or lease recondtioned commercial batteries for monthly, weekly and even daily accounting periods. Those cells that are 'spent' and batteries that are beyond 'reconditioning' will be broken open and the acid 'dumped' by washing it into the nearest storm-water drain or allowing it to percolate into the soil. The rubber or polypropylene cases are sold to either a plastic recycling plant or directly to a battery manufacturer for re-use.

6.2. Cottage melters

The number of backyard melters in the Philippines has proven impossible to estimate, as the melting operations tend to be spasmodic and this renders the task of tracking down these clandestine activities extremely difficult. Needless to say, we did not find any small-scale melting operations in Manila.

6.3. Smaller battery recyclers

There are 12 known smaller battery recyclers in the Philippines. These employ about 150 Filipinos and produce approximately 12 000 tons of secondary unrefined lead ingots per annum. Six of the smelters are located on the main island close to Manila, and six on the smaller islands. The small recyclers smelt the plates and probably recover at least 90% of the available lead in the grids and battery paste.

6.4. Licensed formal sector

The Manila-based subsidiary of RAMCAR, PRI, has been producing batteries since 1919 and for over 80 years has been the largest and most integrated manufacturer of lead-acid storage batteries in the Philippines and Southeast Asia. RAMCAR employs more than 400 Filipinos of which 146 are employed directly at the PRI Bulacan site.

7. Environmental and occupational health problems

7.1. Electrolyte disposal

The most immediate problem posed by the battery reconditioners is the disposal of the battery electrolyte, viz. dilute sulfuric acid. Acid tipped into the drainage and municipal sewer system has to be neutralized at the tax payers' expense at one of the city's water-treatment plants. Acid that is allowed to percolate into the soil renders the surrounding soil infertile and contaminates groundwater. Acid tipped into streams and rivers, depending on the extent of the dilution, lowers the pH of the water and adversely affects the local ecosystem.

7.2. Occupational hygiene

Personnel observed working in the reconditioning shops and the small recyclers rarely wear any protective clothing, hard hats, or safety goggles. Although a few of the smaller recyclers have ventilation units, none are working satisfactorily and operating personnel are exposed to leaded fumes especially immediately after charging and tapping.

7.3. Atmospheric pollution

Smelting furnace stacks at the majority of the informal sector smelters inspected externally were observed to be fuming white smoke, typical of unfiltered furnace exhaust gases which contain lead fume. Two of these sites are in heavily populated areas and, thereby, expose residents to lead fume and sulfur dioxide gases.

7.4. Furnace residues

Only PRI have the necessary metallurgical processes to produce stable inert furnace residues and there is great concern that toxic leachable slags are being dumped in an unregulated manner. While all the furnaces at the sites inspected are either housed in separate buildings or under cover, the solid waste residues are sorted and stored outside and exposed to the elements.

7.5. Population exposure

It should be noted that all of the battery reconditioners observed are located in busy streets and adjacent to other general food stores including outdoor 'fast food' vendors. Three of the four informal sector smelters are located in populated areas and thus expose the local communities to leaded dusts and fume.

8. Inter-relationships

There may be two distinct battery recycling sectors in the Philippines, but they are closely related.

If, for example, a Jeepney driver's battery fails, a replacement can be purchased at either one of RAMCAR's 800 'Balik Baterya' retailers or at an independent supplier. As and when the new battery fails, the 'Balik Baterya' battery can be taken back to the RAMCAR retailer and traded for a discounted new battery and the used battery is sent to PRI for recycling and refining for use in RAMCAR's battery-manufacturing plants. Alternatively, the Jeepney driver might not want to incur the expense of a new battery and decide to send it to the reconditioner for recharging or reconditioning. In the event that the battery cannot be reconditioned, for whatever reason, the Jeepney driver then has a choice of buying another new battery or perhaps leasing a reconditioned battery or even a new one purchased from one of the independent retailers. In any event, the reconditioner will dismantle the used automotive battery, utilize the good cells and sell the spent grids to one of the small informal sector recyclers. This recycler will, almost invariably, sell the lead bullion produced either directly to one of the battery-manufacturing plants or to PRI for final refining prior to delivery to one of RAMCAR'S four battery-manufacturing plants.

Had the Jeepney driver bought a new battery from an independent retailer, the life-cycle would have been very similar. Without a 'buy-back' incentive, the used battery would have been taken straight to a reconditioner and the driver faced with the same choices, to recharge, recondition, lease or buy another new battery. The used battery would then follow the same path through the small recyclers to one of RAMCAR's battery plants via PRI.

In so many ways, PRI is the financial pivot which supports the whole of the formal and informal recycling sectors and it is in this role that PRI can exert tremendous influence over the operating standards adopted throughout the Industry.

9. Short-term improvements

9.1. Environmental controls

The unauthorized disposal of battery electrolyte must cease. The simple solution is not expensive, but does require education of the battery reconditioners and distribution of materials and reagents. The Philippine Government may want to consider suitable legislation which includes distributing, to the reconditioning shops, 100-l heavy-duty plastic drums to facilitate storage of electrolyte drained from the discarded batteries or arrange for PRI to treat the battery electrolyte collected from the reconditioners.

Slag sorting and storage, prior to returning the slags to the process, should be under cover to minimize weathering and the degradation of the slag into a dusty residue. Additional buildings are expensive and the only inexpensive solution would be for the owners to manage the undercover space available more efficiently and construct small storage and sorting bays with simple partitions.

9.2. Occupational education

The Philippine Government will have to make an effort to educate and encourage owners to follow simple safety precautions. Reconditioning shops should reinforce any education programme with inexpensive signs that are clearly visible in the place of work.

Although most of the owners of the small secondary smelters visited have respiratory and safety equipment available at the smelting sites, few operators wear any proprietary personal protective equipment. A thorough education programme for the secondary lead-smelting workers detailing the potential dangers and hazards associated with lead recycling should be a priority. In addition, there should be outreach programmes for those operators with families living near to the recycling plants to minimize the risk of contamination in the home.

10. Ten commandments

Any education programme should focus on the following 'golden rules' to reduce the risk of lead exposure.

(i) Make respirators available, ensure they are worn during charging and tapping.
(ii) Operators must only wear work clothes in the workplace.
(iii) Shower after every shift and whenever contamination risks have been high.
(iv) Change into clean work-wear every day or shift.
(v) Avoid procedures which generate high levels of exposure.
(vi) Segregate working and clean eating areas.
(vii) Keep eating and drinking areas clean and lead-free.
(viii) Wash hands and face prior to eating at work.
(ix) Keep homes clean and lead-free, do not take work-wear home.
(x) Do not smoke in a lead-recycling plant.

11. PRI blood lead levels: 1997–1999

By following the above simple rules and low-cost changes in operating procedures, PRI has reduced the

levels of occupational lead exposure. Average blood lead levels have fallen by just over 30% in the last 2 years.

12. Long-term restructuring options

Company-focused efforts on improving the environmental and occupational conditions are unlikely to surpass a certain benchmark unless accompanied by macro-economic measures which are aimed at restructuring the battery recycling industry of the country with a view to making lead recovery environmentally sound and economically viable.

Long-term solutions to improve the environmental performance of the recycling industry and reduce the risk of occupational and population lead exposure fall into four distinct categories:

- reduce lead recovery in the informal sector
- raise domestic collection rates
- define a role for the small recycler
- further integration of the informal sector into Philippine recycling.

12.1. Reduce lead recovery in the informal sector

The first stage of any major restructuring in this industrial sector must be the introduction of long-life batteries which provide up to 5 years of reliable life and, thereby, reduce the number of batteries in the recycle loop and render the reconditioned battery poor value for money.

New grid technology which dramatically increases the life of a battery would be the driving force to displace reconditioned batteries. Moreover, this would be a slow transition over a number of years, effective only as the new units become available and confidence in the new technology grows. This process of change should be sufficiently slow as to allow those engaged in the trade to seek new ventures and alternative employment.

During this period, it is imperative that the Philippine Government and the secondary lead producers extend battery collection incentives to encourage some of the reconditioners to become scrap ULAB collectors and for the public to return used batteries to the retail trade. The Government should consider legislation that requires whole scrap batteries complete with electrolyte to be collected and stored prior to shipment to a secondary smelter.

Research funds also need to be directed towards the development of either a cheap commercial battery suited to the leasing market, or a viable battery-exchange scheme for reconditioners that would support a cost-effective service to low-income transport businesses. In this way, the demand for reconditioned batteries would decline dramatically and with it the poor environmental practices associated with this sector.

12.2. Raise domestic collection rates

The independent retailers do not necessarily collect ULAB when a new battery is sold and even if they do, it is doubtful whether it is profitable for retailers not located on the main island of Luzon to economically return small quantities for recycling. Indeed, there are regions of the Philippines where PRI collects only a few batteries. In these regions, it would be beneficial for both the owners of the small recyclers and the environment of the Philippines if they could be located in these areas. Ideally, those smelters located in populated urban areas would relocate to remote locations or industrial zones. Such a strategy will undoubtedly improve overall collection rates of ULAB in the Philippines.

There are virtually no small battery recyclers in OECD countries because over the last 20 years, the enormous cost of complying with environmental and occupational health standards could only be met by those companies with high-capacity recycling plants. New technologies developed in the last 10 years could, however, improve the prospects for small recyclers, because environmentally sound battery reprocessing plants can be designed on a smaller scale.

It is therefore feasible for some of the owners of the small recycling plants in the Philippines to consider upgrading their processes over the next 5 years to include those items of plant that would enable them to comply with the licensing requirements of the EMB.

There are a number a competing pyro-metallurgical and hydro-metallurgical processes that can be ‘tailored’ to suit the smaller recycler. In many ways, the hydro-metallurgical technologies offer a new way forward to environmentally fume-free recycling.

Under the above scheme, the smaller recyclers would have a role in the future growth of the secondary lead industry in the Philippines and would be more receptive to cooperating with the Government in the implementation of this project.

12.3. Define a role for the small recycler

It is expensive, however, for PRI to ship ULAB from the many islands in the Philippines to Luzon in compliance with the statutory environmental requirements. Consideration should therefore be given to setting up Regional Secondary Lead Consortia between PRI the Smaller Battery Recyclers. PRI would send all the ULAB collected in the outlying islands under the RAMCAR ‘Balik Baterya’ collection scheme to local small battery recyclers in the Consortia as follows:

- Battery scrap would be collected and segregated
- Electrolyte would be neutralized
- Leaded scrap would be toll-processed
- Clean polypropylene and lead ingots would be shipped to PRI.

The Consortia would provide the smaller recyclers with a niche in the market and PRI would avoid the high transport costs of shipping the scrap back to the main island of Luzon for treatment.

12.4. Further integrate recycling in the Philippine Republic

It is imperative throughout the period of adjustment following the introduction of both short- and long-term improvements that the Environmental Management Bureau (EMB) of the Department of Environment and Natural Resources applies uniform standards throughout the Philippines. The EMB must also remain vigilant in their pursuit of those recyclers that do not meet the minimum standards of environmental control.

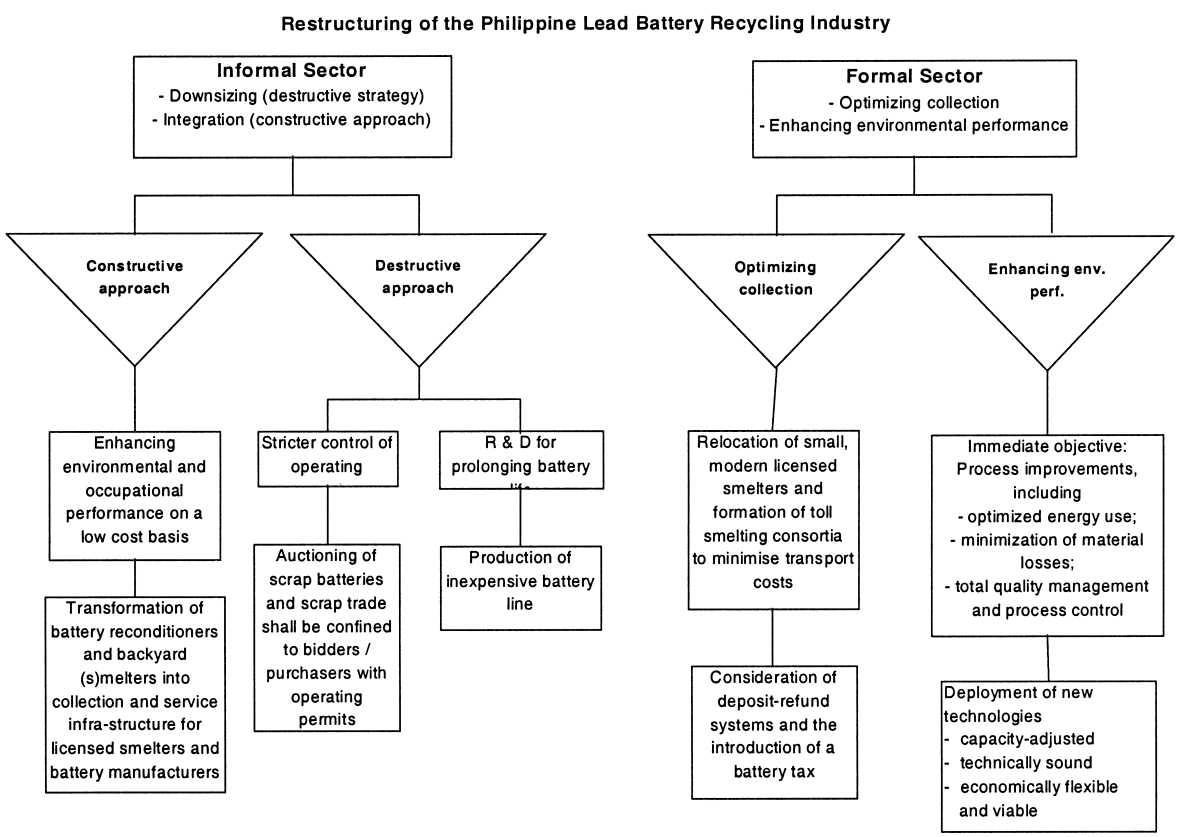
The Government and the EMB have a key role in these strategies to ensure that assistance is available to provide relocation incentives and technology transfer to those small recyclers who are receptive to environmental improvements. Nevertheless, the EMB should consider penalties against those recyclers who consistently fail to meet the standard required. These penalties should include a mandatory revoking of the operating license of persistent offenders and statutory fines to cover the cost of any remediation.

13. Benefits

The benefits to the Republic of the Philippines for adopting these strategies are four-fold:

- the environment will be protected from the adverse effects of ULAB recycling
- occupational and population lead exposure will be reduced
- immediate and severe financial hardship will not be inflicted on those involved in battery recycling by improved environmental performance
- the Philippine economy will be less reliant on the import of primary lead to meet the shortfall of secondary lead.

Appendix A. Restructuring of the Philippines lead battery recycling industry



Appendix B. Possible packages of policy approaches to implement the restructuring of the battery recycling industry

(1) Significant government intervention and financial support	(2) Allowing high capacity utilization at licensed smelters	(3) Combination of approaches 1 and 2
(a) collection	(a) supplementary regulation and public financial support for collection	(a) if international lead price fell much below US$500 for quite some time
(b) R&D for prolonging battery life	(b) private sector investment in new smelting technology and R&D for prolonging battery life	(b) if foreign or domestic battery demand significantly shrunk
(c) production of low-price battery line	(c) public support for improving sales conditions of inexpensive battery line	
(d) facilitating use of environmentally sound technologies	(d) allowing scrap imports by suitable and certified secondary smelters	