UBUNTU METALS TANZANIA LIMITED

Feasibility Report

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PREAMBLE

The company, Ubuntu Metals Tanzania Limited (UMTL), is conceptualized with an object of setting up an environment friendly sustainability projects in Dar-es-salaam, Tanzania. After due considerations and exploring various projects, we have decided to set up a project for extracting the Lead from Used Lead Acid Batteries (ULAB) and lead ore.

Lead metal is the basic and primary material for the Lead acid storage battery. The usage of lead is enormous; it is used from battery industry to electronics industry, electrical industry to polymer industry and so on.

Sources of lead

Lead is a very stable material but will react over time with both oxygen and sulphur, Lead is often found in nature as a sulphide **Pbs** (mineral name: **Lead Galena**) Galena is somewhat unique in the mineral field in that, as a mineral, it has a very bright, shiny, metallic appearance. Most minerals have little or no metallic appearance.

Lead can be sourced in two forms;

1. Primary lead : which is extracted from Lead ores sourced from mines; and
2. Secondary lead : which is basically a re-processing of lead earlier used as an input in a product. Generally, the lead is re-processed from scrap lead acid battery, lead sheets, rejected PCB boards from electronics industry etc.

The lead metal starts at the beginning with primary lead since without primary production, there is no secondary lead.

Secondary production of lead will continue to be the dominant source of the metal, with most of lead utilization being applied to the manufacture of Lead Acid Battery (LAB). Energy and emissions clearly impact the recycling industry with regard to cost and environmental protection, as such, today, electrochemical

methods for recycling LAB have been developed, but secondary smelting remains the dominant mode of lead recycling.

Uses of lead

There are various kinds of storage battery available in the world like, Lead acid battery, Nickel cadmium battery, fuel cell battery, Lithium ion battery, Lithium metal hydride and out of that lead acid battery is the most popular. The main reason for that as lead acid is giving the highest voltage / cell and compare to other batteries it is easy to produce and much cheaper in cost compare to others.

80 percent of modern lead usage is in the production of batteries. Lead is also often used to line tanks that store corrosive liquids and as a shield against X and gamma-ray radiation. The biggest producers of lead are Australia, China and USA, followed by Peru, Canada, Mexico, Sweden, Morocco, South Africa and North Korea.

Eco Friendliness of the Project

Lead is a hazardous metal and can lead to medical disorders and complications in case of prolonged exposure among humans. Scrap Batteries are an ecological predicament in all countries in which automobiles and trucks are a standard mode of transportation. In our country, there is no alternate use of scrap batteries and other products containing lead after their useful life. Generally the products containing lead are thrown as scrap or used for land filling after its useful life and lead to harmful effects on the humans and the soil.

It is therefore obvious; recycling is the only acceptable and sustainable solution to the increasing problem of scrap lead. Recognizing all above and to meet the shortfall in the supply of lead, progressive Communities / Companies have invested substantial time and resources in devising real time solutions to realistically reduce the increasing number of scrap batteries discarded annually.

The company intends to set up a modern lead re-cycling unit in the industrial area located Dares Salaam. The company will have state of the art facilities for the

controlling the pollution of the environment and the exposure of the workers to lead.

PURPOSE

The basic purpose of the project is to set up an industry which would be unique of its kind, with the best available Technology in Secondary Lead Smelting Industry.

The very purpose of the project is to establish an industry where **'State of the Art' in Lead Recycling** shall be carried out with **full compliance of Environmental Regulations of Tanzania**.

Following are elaborated purposes of the project:

- Re-cycling and Re-use of Lead acid Batteries which are already used in different sectors. The wasted batteries storage in the market is hazardous for the immediate Environment. Re-use of such batteries not only helps in keeping Environment non-hazardous, but also develops a Sustainable Industrial growth of the Country.

- Environmental protection and resource conservation. Recycling lead will minimize the need to mine new lead ore and helps to conserve natural resources. Recycling lead batteries ensures that lead material they contain can be recovered and reused in production of new batteries.

- Compliance with regulations: To follow all requirements required by NEMC for disposal of lead and lead-containing materials. Our lead recycling plant will ensure compliance with environmental regulations by safely processing and recycling of lead waste/scrap in an environmentally responsible way.

PROJECT

Ubuntu Metals Tanzania Limited has decided to take-up the Greenfield project of Recycling of lead scrap in Tanzania to produce Remelted Lead (RML), Pure Lead and Lead Alloy in various grades.

The Company will set up the necessary infrastructure and network for the procurement of scrap batteries and other products containing lead from around the country. The company will collect ULABs from Daressalaam, Arusha, Mwanza, Mbeya, Iringa, Dodoma, Zanzibar and other regions of Tanzania. We are also exploring options to import ULABs from neighboring countries by following procedures as per rules and regulations of Tanzania. indirect employment opportunities to the locals of the area who have started procuring scrap batteries for the company have benefitted numerous households.

EMPLOYMENT REQUIREMENT

The proposed Industry would run in three shifts, that is, it would run for 24 hours. The Man power that would be required per shift would be approximately 40, that is a total of 120 numbers of labors would be required per day. Besides this there is a requirement of 15% of Administrative staff. The tentative staff list would be as follows:

Plat staff requirement per shift

→ Foreman per shift
→ Operators for the rotary operation
→ Operators for Refinery and Casting section
→ Foreman per shift
→ Operators for the rotary operation
→ Operators for Refinery and Casting section
→ Skilled operators
→ HSE manager
→ Labours for material receiving, and material handling

→ Electricians, Welders, fitters etc.
→ Drivers for general material handling
→ Operations Manager
→ Quality control Manager
→ Plant Engineer
→ Staff for Shipping/Receiving
→ Labours for maintenance, logistics

The above mentioned Plant staff is the statutory requirement. Besides this, there would be requirement of labours in Security staff in three shifts. There would also be requirement in the Transport division for logistics, Tyre washing, outsourced repairs, reclamation and engineering workshop etc. The above man power shall be required after completion of the entire project.

Hence, setting up of this new Industry shall generate Employment potentiality for the Daressalaam Region. The total direct and indirect employment generated after commencement of the project is estimated at more than 3,000 spread throughout the country.

Equipment for the Project

The lead metal (bullion/ingots) production equipment in our plant includes the following major components of the plant and equipment:

1. The scrap battery breaking (manually and automated process)
2. Melting Furnace, Rotary Furnace and Bullion making
3. Refining furnace
4. Lead casting
5. Air Pollution Control System (APC)

The detailed list of the plant and equipment required for the project is enclosed as Annexure B.

Smelting Process

The process of smelting lead (pure and alloy) from the scrap (battery and other materials) involves the following steps:

Step 1: collection of scrap batteries from the market

Step 2: breaking of the scrap batteries

Step 3: separating the scrap part like: separator, battery case; polypropylene which can be again marketed as second grade raw material, mainly usage for the manufacturing of bucket, furniture's etc.) or hard rubber material.

Step 4: Lead heavy metal, lead active material (mixture of lead powder and lead sulphate)

Step 5: Lead powder fed to the Rotary furnace where in presence of heat lead metal is extracted. During extraction process some amount of flux and other ingredients are used to ensure the recovery of the lead bullion.

Rotary Furnace

Lead scrap feed is loaded into the Rotary Furnace and involves the reduction of lead-bearing scrap into metallic lead, which is discharged in bullion form.

Step 6: I.) Refining process of **lead alloy:** lead bullion charge to the refining pot along with the heavy metals and as per the sample analysis results other component are mixed like antimony, tin, arsenic etc. upon final results of the alloy the lead is getting discharged and cast in the lead ingots cavity and thereby the process gets completed.

Refining and Casting

Crude lead produced during smelling operations is remelted in cast iron kettles and refined by the addition of reagents, such as sulfur and caustic soda. The purified lead is then cast into molds or ingots.

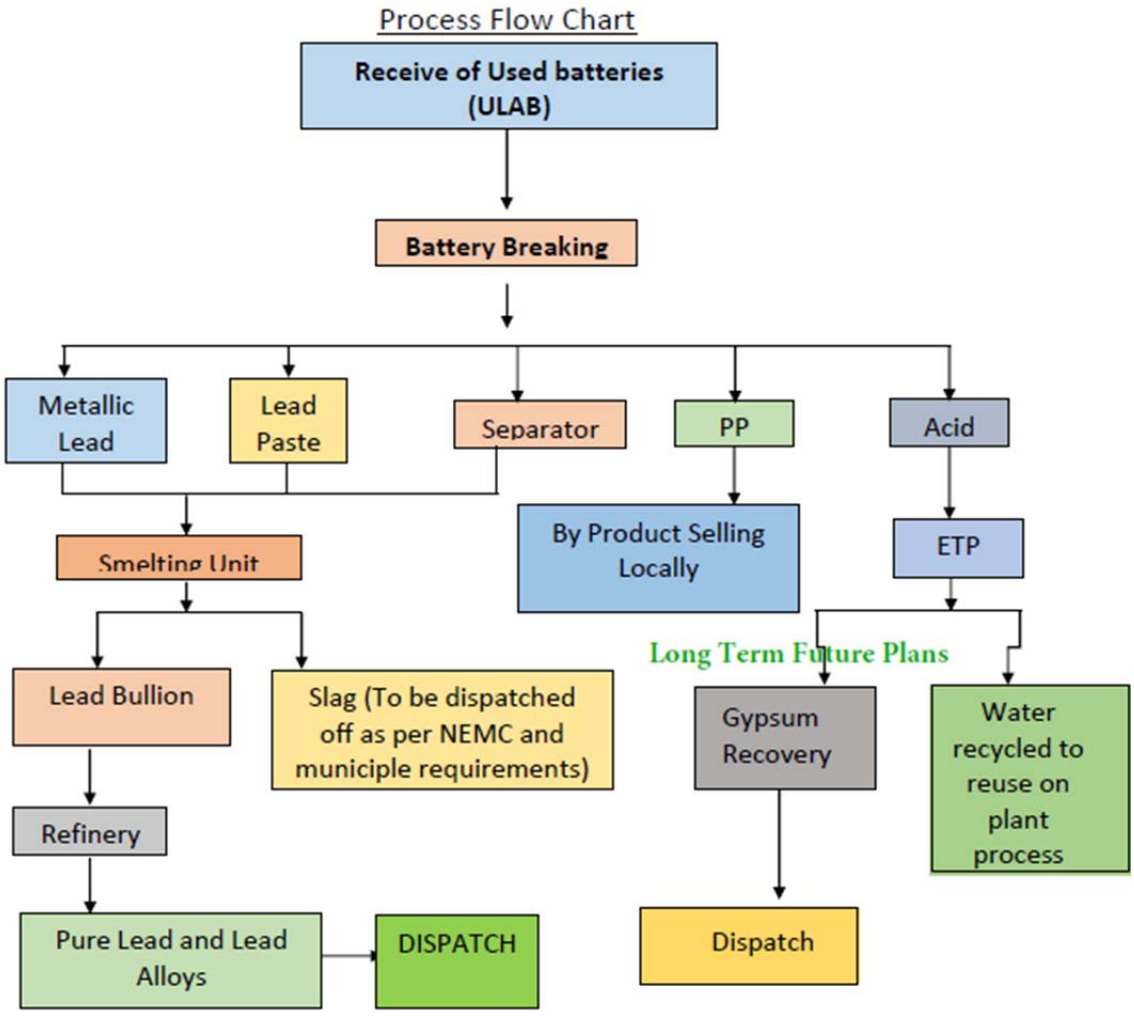
Step 6: II.) to make pure lead it is basically the reduction process, with the help of certain chemicals and other reagents like sulphur & caustic soda the other elements present are removed from the bullion and then as per the sample analysis results pure lead is discharged.

Quality Control

A strict quality check is to be carried out at all stages of production from incoming raw materials to the finished product.

In order to elaborate the production process project, we would like to give a brief introduction of the Process flow diagram of the proposed Industry.

The detailed process flow chart dealing the aforesaid activities is enclosed as below:



Treatment of Air Emissions

Metallurgical processing in the smelting operation generates three major types of air emissions: sulfur dioxide, particulates, and constituents such as fluorides.

Though it is well known that Sulphur Di-Oxide gas is the primary pollutant generated by the smelting of Copper, Lead and Zinc ore concentrates, Proposed Smelter is Secondary Smelting Unit. The Raw Material is Used Lead Acid batteries instead of Ore. Sulphur Di Oxide emission in this case will be very less compared to Primary Smelting Unit which directly deals with Sulphide Ore.

Control Measures

Emission of SO2 being less in quantity can well be neutralized through Wet scrubber by spray of water with Alkali dossing.

Control of the fine particles requires efficient collection equipment such as bag houses, electrostatic precipitators and high pressure drop scrubbers.

Pollution abatement measures:

The flue gas coming out from the furnace will be taken into the settling chamber where velocity of the gas gets reduced by expanding inside higher volume chamber. Coarse particles with higher weight will get settled inside the chamber. The next step will be to take the gas to the Bag filter system. Solid particles of size greater than 5 micron will get separated here. In next step Gas with finer particles will be treated to Wet scrubber by sonic water spray with Alkali dossing. This will separate fine particles, volatile constituents from the gas as well as will dissolve SO_2 gas into alkaline water. The clean gas will go to the atmosphere through a chimney of height 25 Mtr.

Power and DG Backup

The total power requirement is 2500 KVA. Provisions of 1 nos. 250 KVA DG Set shall be used for the proposed Industry which shall be synchronized.

DG Sets will be used for 100% back-up. So, during power failure DG Set will be the main source of air and noise pollution. Gaseous pollutants like NO_2, SO_2, and PM shall be generated from activities like burning of fuel through DG Sets. HSD diesel will be used with low Sulphur. During operation, vehicular movement and operation of DG Sets are the major sources of noise pollution. But both these activities – DG Sets and vehicular movement will not have any significant impact on the people residing in the area. Since DG sets will not be operational continuously and moreover it will be placed enclosed with suitable enclosure, hence no or minimal impact will be anticipated. It is envisaged that the movement of the motor vehicles will be restricted to the designated carriageway only.

Impacts on air quality

⇒ Impacts on ambient air quality during operation due to emissions from the stacks attached to standby DG Sets will be very less. However suitable mitigation measures will be adopted.

Mitigation measures for Impacts of DG sets on Ambient Air Quality

⇒ DG Sets will comply with the applicable emission norms.

⇒ Adequate stack height for DG Sets will be provided as per regulatory norms.

Environment Pollution Abatement:

The proposed smelting plant at Daressalaam has been proposed to be set up with the objective of minimizing the pollution potentiality of Secondary Lead Smelting Industries in the environment. The broken or used batteries will be recycled in this plant for recovery of Lead by means of State of the Art technology with minimum adverse impact on the nature. The used batteries

used to create mass pollution in the environment when dealt in the unorganized sector for recovery of valuable elements through crude and unscientific processes by local vendors.

The control measures initiated

are: Air Pollution:

The stack height has been considered as 25m for release of the spent gas in the environment.

Employment of Venture Scrubber (wet) and Fabric filter units to arrest maximum particulate matters as well as SO_2 gas from escaping into the atmosphere.

In summary:

The basic objective of the smelting plant is to salvage lead and Sulphur from the waste batteries. This will substantially reduce the demand on mining operations of both the elements in the battery industry that will directly have a positive effect on the reduction of Carbon Footprint of such Industries which will consequently help on reduction of Global Warming. This Project is therefore basically a Green Field Project.

Plant Capacity

The company will have the necessary infrastructure to smelt more **than 4,500 MTs of lead per** year as the installed capacity **of the plant will be 5,000 MTs and** it is expected that before the 1st quarter of 2024, the project should be operating at about 80% of the capacity to ensure the profitable production.

The foreign exchange earnings based on the projected realizations in the export market will ensure that the foreign currency inflows to the country would be in the range of about **US$ 750,000 per month**.

PROSPECTS

The demand for Lead worldwide is increasing substantially whereas the availability of primary metal is limited and to add to the situation, supply of lead is not sufficient to meet current global demand thus pushing up the international prices of Lead to new highs in the last few years.

The demand for ferrous and non-ferrous metals in the coming years is also expected to be buoyant in light of the surging demand from the Asian countries, especially India and China leading to a situation of shortages in the world market. The prospects for the company are bright in the future to continue to cater to the export market and earn precious foreign exchange for the country.

Demand for lead is primarily driven by lead-acid batteries used in conventional fuel car batteries as well as electric vehicles (EVs). Global lead metal production is recovering following a 5% decline to 4.5 million tonnes (Mt) in 2020. Lead production is forecasted to reach 5.2 million tonnes in 2025, according to Global Data.

Demand higher than supply

The drop has come despite preliminary data compiled by the International Lead and Zinc Study Group (ILZSG) indicating that, in 2022, global demand for refined lead metal exceeded supply by 99,000 tons. Inventories reported by LME, Shanghai Futures Exchange, producers, merchants and consumers decreased by 84,000 tons and totaled 3,14,000 tons at the end of the year. Weak demand growth in the rest of the world will limit the rise in refined lead prices in 2023 as a whole," said Fitch Solutions Country Risk and Industry Research, a unit of the Fitch Group.

MANAGEMENT PROFILE

Ubuntu Metals Tanzania Limited (UMTL) is a startup company. UMTL is aiming to setup its foot from Tanzania and in long run aiming to grow in sustainable recycling of ferrous and non-ferrous metals in Tanzania. Further to lead smelting plant our promoters have plans to invest in recycling of Lithium-ion batteries. With development of the electric vehicles sector, combined with an increase in the use of cell phones and laptops is increasing the volume of lithium-ion batteries ending up in landfills. In turn, leading to toxicity of leached metals in the environment. As part of our commitment to sustainability, we are planning to establish a circular economy in lithium-ion battery business. By recycling Li-ion batteries, we will recover valuable materials that are part of these products and leverage science into delivering sustainable solutions in future. We believe the Africa will be a strategic hub for our future expansion needs in next 10-15 years.

The Business will be managed by experienced professionals in the field of lead smelting, chartered accountant by profession with immense entrepreneur skills to forge company in future while pursuing short and long term objectives on the quality of products, services, and human resource development. The management team led by them with a philosophy of evolution for all is forging the Group to a position of market leader in all its activity segments.

The mission statement of the company is similar to meaning of its name:

“I am because we are” We believe in mutual growth of self, employees and society as whole.

Mr. Subrat Patel
Director and Share holder

Mr. Subrat Patel is a seasoned businessman with over 18 years of experience in Tanzania. He worked with different companies in Tanzania till 2021 driving finance function on strategic planning and implementation. He brings wealth of

experience and expertise to the table, who has proven track record of turning around loss-making units and achieving profitability. With more than 18 years of experience in the country, he has an in-depth understanding of the local market, culture, regulations and business practices.

Our partner's management profile is characterized by his strategic thinking, exceptional leadership skills, and in-depth knowledge of the industry. He has successfully built and led high-performing teams and is comfortable working across different functional areas, including operations, finance, sales and marketing. He is highly client focused and understands the importance of delivering outstanding customer service in order to buil long-term relationships and drive growth.

In addition our management team includes a group of experienced professionals with complementary skills and expertise in different areas, including project management, finance, human resources and operations Our team is committed to achieving continuous improvement, and who have a proven track record of delivering high-quality projects on time and within budget.

Our management philosophy is centered around excellence, transparency and accountability, and we are dedicated to working closely with all stakeholders to ensure that the project is delivered successfully, on time, and to highest standards of quality. We believe that our combined experience and expertise make us well-equipped to overcome any challenges and capitalize on opportunities in the market.

Apart from Mr. Subrat Patel, our other two shareholders are,

Mrs. Hiral Shah - Director and Shareholder and
Mrs. Mohini Gwali - Director and Shareholder

AVAILABILITY OF FEED

The company has initiated the process of discussion with machinery suppliers since the conceptualized of the project in the year 2023. Our experienced management has business relations in the related business activities spread throughout the country which will assist in developing the network of collection of scrap batteries and other materials containing lead.

The current demand of the automotive batteries in the country is in the region of about 1,800/2,000 Metric tons batteries per month which also indirectly means that about the same level of batteries are discarded / replaced during the month. Initially even if the company can source 30% to 40% of the discarded/replaced automotive batteries, it would be sufficient to ensure that the scrap is available to feed as raw material for the operations.

In the initial months, the company will be sourcing about 350-400 Metric tons of scrap on a monthly basis, which will be increased to about 600-650 Metric tons per month. This is more than sufficient to take care of the monthly raw material requirements of the company and also adds to the inventory of the company.

FINANCIALS

In initial estimated cost of the project would be US$ 0.7 Milion

Detailed profit and loss statement, balance sheet and fixed assets register is attached.

SWOT ANALYSIS

STRENGTHS

- Environment friendly Greenfield project
- Tested smelting technology
- Experienced promoters and management team

WEAKNESSES

- Unorganized market of raw material sources
- Lead ore is a finite source, and fluctuations in its availability and price can impact the viability of lead smelting operations

OPPORTUNITIES

- The company has the opportunity to tap the nearby countries for its feed requirements and plan to expand the capacities in the future.
- Pioneering effort and major contributor to protecting environment by recycling waste, therefore support and assistance from Government & UN agencies.

THREATS

• Creating awareness among people to retain the old batteries for recycling than putting them into landfills or incinerating them.

CONCLUSION

The project is potentially viable and beneficial to the interests of all the stakeholders, ecologically very beneficial to the society and economy at large.

The projected financials of the company and he background and track record of the promoters in executing and handling similar projects and business operations in Tanzania and in East Africa at large, speak volumes and by themselves justify the project.

Also the following indicators point out the viability of the project on all

a. Positive Cashflows and profitability in all the years
b. Recycling of scrap batteries would save environmental damage
c. Provide gainful employment and create opportunities in the economy
d. Provides incremental foreign exchange earnings to the country

Hence, we request the authorities to consider the proposal favorably for the grant of Incentive Certificate under TIC.