R4R
REGIONS FOR RECYCLING

MONBAT RECYCLING

Ilfov, Romania

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1. GENERAL INFORMATION ON THE GOOD PRACTICE (GP)

1.1 General information

Region	Ilfov
Country	Romania
Short name of the good practice	Monbat Recycling
Geographical level of implementation (country, region, municipality…)	Intercommunal group – all districts in Romania – the recycling plant is in Ilfov District
Target group	Industrial users and Households
Date of implementation/duration	2010 – ongoing
Waste stream (and subcategory)	Starter batteries, stationary batteries, deep cycle batteries, batteries for special applications, locomotive batteries, leisure batteries
Legal framework	-
Main local instruments involved	CAS Specialised service shops
Scale (pilot/partially roll out /roll out)	Roll out
Initiator/coordinator	Monbat
Demography	
Population	364 241 inhabitants
Number of households	116 325 households
Area (km²)	1 583
Population density (number of inhabitants/km²)	226
General waste data (Not necessarily related to the GP but to give some background information. Data about the GP should be included under 3.1)	
Year of the following waste data	2012
Sum of all waste streams excl. residual & bulky waste (kg/inhabitant/year) (Use indicator 1 or 2 from the R4R Online Tool)	315.5
Residual waste (including sorting residues) (kg/inhabitant/year) (Use indicator 8 or 9 from the R4R Online Tool)	74.0
Total waste (add up the previous two)	389.5
Sum of all waste streams excl. residual & bulky waste to DREC (kg/inhabitant/year) (Use indicator 3 of the R4R Online Tool)	19.48 – even if the collection rates increased during the last years, we still have to work at increasing recycling rates

1.2 Context

Given that the Romanian Government imposed, through HG 1132 / September 2008, a target of 45% collection of used batteries till 2016, all batteries producers / importers started to get preoccupied in recovering and recycling their sold batteries.

For industrial batteries there is not a target imposed, given that these are less likely to be eliminated in the MSW stream. Usually, professionals are working with these batteries and they are more environmental educated and interested in recycling them in terms of costs.

More so, there are legal restrictions and high penalties associated with them for all operators who don't collect and send these batteries for recycling.

Given this, more and more producers start to be interested in recycling the used batteries by themselves. Thus, they have a cheaper supply of raw matter for the new batteries and a better control of the collection of used ones.

The retailers are forced by law to practice a "one to one" exchange for all batteries. When they deliver the client a new battery, they have the obligation to take for free, on demand, the used one. Who does not comply with this rule, risks penalties of 10.000 to 20.000 RON – respectively 2.300 to 4.500 Euros.

1.3 Short description

Monbat Group of Companies is a leading European manufacturer of lead-acid batteries for various applications, present on the international markets for more than 50 years. The 6 manufacturing facilities are specialised in batteries, mostly of industrial use. During the last 10 years, the Group proved to be also a leading producer of lead and lead alloys through its subsidiary Monbat Recycling EAD.

Monbat Group of Companies consists of:

- ✓ MONBAT PLC - manufacturer of starter lead-acid batteries and AGM batteries for various applications;
- ✓ START PLC - manufacturer of lead-acid starter batteries for trucks, buses, heavy-duty automotive and road Construction Equipment;
- ✓ MONBAT RECYCLING EAD - recycling of lead and lead alloys;
- ✓ OCTA LIGHT PLC - manufacturer of powerful high-brightness light emitting diodes and LED luminaries.

Brief history:

- ✓ 1959-1990: the plant produced mainly batteries for military vehicles, tanks and armored vehicles;
- ✓ 1998-1999: the plant became a private company with Prista-Oil Plc., being a majority shareholder;
- ✓ 2000: the company built its first installation for recycling of used lead-acid batteries;
- ✓ 2001: initial production of AGM batteries;
- ✓ December 2006: Monbat became a public company and was listed on the stock exchange;
- ✓ 2010: Monbat acquired 51% of Octa Light Plc. shares.

Monbat production facilities are located in the town of Montana, North-West Bulgaria. The company stakes on continuous development and introduction of innovative products to the market, which, along with the team of highly qualified experts and the use of modern technologies and equipment, makes it highly competitive on both local and international markets.

In 2010, Monbat has launched its own recycling facility in Romania, Ilfov District. The company Monbat Recycling represents a green-field investment worth 13 million Euros of the Group MONBAT in Romania, built with the latest equipment and machinery from Italy and France. The main activity is the recycling of automotive and industrial batteries.

The factory has a maximum capacity of 40,000 tonnes per year, and produces a quantity of 20,000 tonnes of refined lead and lead alloys. In addition to lead alloys, from the crushing of the batteries, also results polypropylene and sodium sulphate, products that are commercialized in the industrial field, respectively chemical. The finished product, refined lead is delivered to the 2 factories belonging to the group Monbat batteries, and other partners in the EU.

The waste generated from the production facilities, such as slag and separators, are eliminated according to the legislation, having contracts with the 2 major authorized companies in this field in Romania.

Monbat Recycling owns integrated environmental authorization no. 66, complies with all regulations required by the European Union, also all the rules on health and safety at work.

Monbat in figures:

- ✓ 110 mln. EUR Turnover 2012
- ✓ 3 500 000 Starter Batteries Production Capacity
- ✓ 250 000 AGM Batteries Production Capacity
- ✓ 475 Employees

1.4 Objective

The main objective of this good practice is to permanently increase the collection of used batteries, so that, by recycling them, the economy can get cheaper raw matter and the environment is more clean and safe for the population.

1.5 Method used to identify the good practice

This good practice was chosen by analysing the evolution, taking into consideration the situation on the Romanian market before this facility started working and the present situation.

1.6 External factors

This good practice was enforced to overcome challenges linked to illegal dumping or situations when the consumers keep in their households / facilities, in unsafe conditions, used batteries and are not motivated to take it to collection and recycling.

2. IMPLEMENTATION

2.1 Preparation phase

The company Monbat Recycling represents a green-field investment worth 13 million Euros of the Group MONBAT in Romania, built with the latest equipment and machinery from Italy and France.

Monbat Recycling had to obtain an integrated environmental authorization, that complies with all regulations required by the European Union, also all the rules on health and safety at work.

2.2 Technical implementation

Technological process:

The main activity developed on the mentioned site is the recycling of used lead batteries, by reducing lead oxides in a revolving furnace, in the presence of coke, iron span and sodium carbonate obtained by paste desulphurization, as well as of metallic parts resulted from batteries.

The activity is developed in three essential stages:

1. Storage of used batteries, crushing and division the components:

- ✓ receiving and storing the used accumulators with electrolyte;
- ✓ discharge of acid from accumulators in a tank located at the end of the production shed, from which it is transferred by a channel within the board of the shed to the accumulator tank; this channel is made of concrete and it is protected by an acid-proof layer;

- ✓ the electrolyte tank pump sends the collected sulphuric acid (H2SO4) to a filter to remove the debris and to the electrolyte storage tank (used sulphuric acid), of 22 mc. Batteries handling will be performed by a front end loader with a built-in special revolving equipment to run down the batteries;

- ✓ using a conveyer-belt , the batteries are taken from the bus and sent to a vibrating screen, where there is performed the magnet parting of ferrous and non-ferrous parts, that are eliminated from the process;

- ✓ transportation of used batteries, from which there were extracted the iron parts, using another conveyer – belt to the crusher admission hopper;

- ✓ breaking/crushing the batteries in the crusher and creating a heterogeneous blend containing: polypropylene, ebonite and other plastic materials, electrolyte parts, mashed lead grids and lead sulphate paste (PbSO4);

- ✓ hydrodynamic parting of solid parts, in a special separator tank, where there is used an ascending water-course which transports the lighter parts (ebonite, polypropylene, others) to a screw paddle conveyor, while the heavier lead components deposit at the bottom of the tank;

- ✓ the polypropylene and ebonite are dried by a shaker and stored in the shed for the polypropylene, to be exploited within Monbat Bulgaria;

- ✓ the water used for washing and hydrodynamic parting is cleaned of the lead impurities and the rest of the mud by blending with flocculating agents and antifoams.

2. Sweetening and neutralization, followed by the production of sodium sulphate that can be exploited:

- ✓ lead sulphate paste (PbSO4) and the mud with lead impurities that is collected after flocculation are taken using a scraper bridge and sent, after the thickening in a special tank, to the sweetening flow;

- ✓ the paste sweetening is performed to remove the sulphur from the lead salt composition; by adding sodium carbonate (Na2CO3) there results a sparingly soluble deposit similar to the natural ore – ceruse – lead carbonate (PbCO3), that is introduced in the melting furnace together with the grid lead;

- ✓ from the lead sulphate paste (PbSO4), after filtering the lead carbonate deposit (PbCO3), it remains the sodium sulphate solution (NasSO4), that is crystallized to obtain sodium sulphate crystals (anhydrous NasSO4) used as raw material in the detergents industry;

- ✓ technologic waste water resulted from washing the rest of electrolyte contained by the used car accumulators, washing the lead grids, washing the lead sulphate paste (PbSO4), washing the lead carbonate deposit (PbCO3) and from the wet scrubber to

retain solid impurities are introduced in the sweetening process; as a result of the chemical processes of sweetening it is obtained a saturated solution of sodium sulphate (NasSO4): by heating this solution there are obtained sodium sulphate crystals (NasSO4) and "clean" industrial water vapors, that condense in a special basin and it is reintroduced in the process as washing water (the circuit is restarted).

3. Melting and refining, producing ingots of lead alloys, reused in the production of car accumulators:

- ✓ the lead grids are taken over by a grid extractor conveyer, after a second wash with circulating water to remove the lead paste and they are introduced in the melting furnace;

- ✓ the lead (Pb) obtained both from the lead grids of the accumulators as well as from the sweetening of lead sulphate paste (PbSO4) is melted in the revolving furnace with the capacity of 3 mc, it is separated from the slag and sent to the refinery in the 4 refining furnaces;

- ✓ to obtain the lead ingots there are created alloys according to the further use of the lead product a) antimony lead (Pb-Sb) – also known as "hard lead" used to manufacture shutters and pumps; b) lead-calcium alloy (Pb-Ca) – known as "soft lead", 99,99% purity, used in industry to produce accumulators, lead oxide (PbO), used for glass, enamel and pigments for oil paints; c) lead – calcium alloy (Pb-Ca) used in industry for batteries manufacture, lead oxide (PbO) used for bottles, e-mails and pigments for oil paints. d) Other types of lead alloys

- ✓ melted lead, after refinery is transported, with pumps, through ducts to the ingots casting machine;

- ✓ the wastewater used during washing and cooling of lead ingots and cooling of furnaces is filtered (to retain lead chips) and it is circulated in the process as washing and cooling water.

Engitec Technologies process is based on:

* Mechanical and physical operations: batteries breaking, components separation; components cleaning, paste thickening, paste separation (filtration) and repulping, solution crystallization, salt drying;

* Chemical reactions: paste and grids desulphurization and sulphate solution treatment. Mechanical and physical operations;

* The batteries are broken by means of a hammer mill crusher;

* The paste is separated from the solids by means of a vibrating screen, flat grid type, while the different solids are separated one from another taking advantage of their different specific gravities;

* The metal lead (crushed grids and poles) is separated from the other solids by a hydrodynamic separator, in which a water stream, entering the bottom, carries over the solids lighter than lead (ebonite, polypropylene and separators), while the lead falls to the bottom and it is removed from here by means of a screw extractor towards a second hydrodynamic washing step; the washed grids are extracted to the storage bunker;

* The polypropylene floating on the water is extracted from the top of the 1st hydrodynamic separator by means of paddles and screw conveyor;

* The ebonite and separators carried over by circulating water are de-watered on a vibrating screen;

* The small, very fine portion of paste (and grids) carried over by the water stream circulating through the hydro separators is allowed to settle and is transferred to the paste collecting and thickening tank;

* The solid components come into contact with recirculating water, which washes away from their surfaces most of the paste still stuck on them;

* The paste slurry falling through the vibrating screen is collected in a clarifier/thickener in order to separate a thick solid sludge from the suspending solution and obtain the latter as clear as possible with the help of flocculating agent;

* Desulphurized paste is filtered in the paste filter press, provided with cake washing and blowing system, in order to obtain: a paste with the minimum content of diluted wetting sulphate solution, and a concentrated sulphate solution to be de-leaded and neutralized.

* The treated sulphate solution undergoes evaporation and salt crystallization; the salt is pneumatically transported and dried.

2.3 Communicative implementation

To better communicate the service, Monbat established partnerships with all relevant players in Romania that use industrial batteries: Starter batteries, Stationary batteries, Deep cycle batteries, Batteries for special applications, Locomotive batteries and Leisure batteries.

At direct marketing level, the company put together a kit of materials that were spread throughout the local communities, with the support of local authorities – for example to inform all auto services in Ilfov District about this opportunity to recycle used batteries collected from their clients.

2.4 Organisations

The company Monbat Recycling represents a green-field investment worth 13 million Euros of the Group MONBAT in Romania, built with the latest equipment and machinery from Italy and France. The main activity is the recycling of automotive and industrial batteries.

2.5 Key success factors

Two main instruments are of high importance:

- ✓ Communication materials: clear and adapted communication materials have been produced to sum up the main information regarding the batteries recycling, with both practical information and benefits of the activity at community level;
- ✓ Coordination with local authorities: communication materials are also provided to local authorities and municipalities, so that they can promote the system using their traditional communication methods (municipal bulletins, dedicated brochures, etc.).

2.6 Resources

The investment is recovered by:

- reusing in other Monbat plants of the recovered raw materials and thus decreasing the production costs;
- selling the raw materials obtained to other industries that need similar raw material.

3. RESULTS

3.1 Monitoring of the progress of the GP

The factory has a maximum capacity of 40,000 tonnes per year, and produces a quantity of 20,000 tonnes of refined lead and lead alloys. In addition to lead alloys, from the crushing of the battery, also results polypropylene and sodium sulphate, products that are commercialized in the industrial field, respectively chemical. The finished product, refined lead is delivered to the 2 factories belonging to the group Monbat batteries, and other partners in the EU.

3.2 Other results

Besides the better management of used batteries and the increase of recycled quantities, other positive outcomes can be noted. Which one? That could be local employment, local development…

This GP sustains the reduction of illegal dumping. More so, given the penalties imposed by law, the level of illegal dumping in what concerns used industrial batteries tends to 0.

4. LESSONS LEARNED

4.1 Negative effects

There are no negative effects of this GP.

4.2 Challenges

The major challenge is to manage and recover from the market the necessary quantity of used batteries so that the facility can function at full capacity. Recycled raw material can be cheaper only if the process of recovery and recycling is fully optimised. Otherwise, it can be more expensive than the one coming from mineral resources.

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