

“Green Lead”

- oxymoron or sustainable development

for the lead-acid battery industry?

by

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Abstract

Because of the toxic characteristics of lead, the Lead Industry is potentially faced with a significant constriction of its future markets if it fails to satisfy regulators and communities that its products will be dealt with in ways offering the highest level of safety.

Legislation banning various lead products in different countries continues to expand, particularly within Europe. Denmark has a ban on most uses of lead compounds.

The lead industry is currently coordinating (through the London-based Lead Development Association International) the Voluntary Lead Risk Assessment in Europe. This assessment is providing valuable research data associated with the ecotoxicity of lead.

Building on this, and addressing the issue of changing and improving practices associated with lead, the Green Lead Project is being created as a Product Stewardship initiative of the Lead industry.

Green Lead™ is the vision of mining, processing, transporting, treating, manufacturing, storing, using and recycling lead – with zero harm from lead exposure to people and the environment.

Green Lead is the identification of impacts associated with lead, the establishment of standards to minimise these impacts and certification of organisations and eventually lead products that achieve these standards. It will focus initially on lead used in batteries. Achieving the vision of Green Lead will require collaboration and cooperation between different stakeholders, companies, and industry leaders throughout the product's life cycle.

Green Lead recognises that one or a few companies in the 'chain', alone cannot meet all of their environmental objectives, or produce a truly 'green' product, without the cooperation and input of the other companies that they interact with.

Green Lead is not intended to be a replacement for the current sustainable development initiatives that members of the lead industry may be involved in, including either the International Council on Mining & Metals (ICMM) sustainable development charter and principles or the Australian Minerals Industry "Code of Environmental Conduct".

Green Lead as product stewardship is aimed at contributing to broader and better sustainable development outcomes for the lead industry.

Quarantining the effects of lead from people and the environment is essential to securing the "community licence to operate" for the lead life cycle around the world.

1. Introduction

Green Lead, is the vision of mining, processing, transporting, treating, manufacturing, storing, using and recycling lead – with zero harm from lead exposure to people and the environment. It is a cutting edge approach to product stewardship, to eco-labelling and to branding.

It is significant for several reasons. Firstly it has been developed in the face of growing concern over the toxic effects of its products on human health and the environment. Denmark, for example has banned the use of lead except in car batteries and x-ray shields. The European Union (and other jurisdictions) is tightening controls on its handling and manufacture. Secondly, it is an industry initiated, commercially driven, voluntary third party certification scheme, which combines process certification (under ISO) with strict performance standards for compliance. Lastly, the focus of the certification is not a single enterprise and its products, but a number of enterprises all involved in separate parts of a global lead cycle. This in particular, makes the study interesting and may provide lessons for other sectors of industry seeing the need to certify all aspects of a product from the way it is derived, through its transport, manufacture, use and reuse. The Green lead approach could equally be applied to other non-ferrous substances.

The basic process concept of Green Lead is the identification of impacts associated with lead, establishment of standards and mechanisms to minimise these impacts and the certification of organisations that achieve these standards. It is the world's most ambitious product stewardship exercise. It will focus initially on lead in batteries, which accounts for 75% of global lead use. (Details of the scheme can be found at www.greenlead.com).

BHP Billiton's Cannington mine is the world's largest single mine producer of lead and has been the leader in developing this initiative, both to secure its markets and to demonstrate its social and environmental credentials.

To achieve the vision of Green Lead will require collaboration and cooperation between different stakeholders, companies, and industry leaders throughout the product chain (refer to Figure 1). It will also require these parties' input in the form of ideas, policy making, framework development and commitment to the vision of Green Lead.

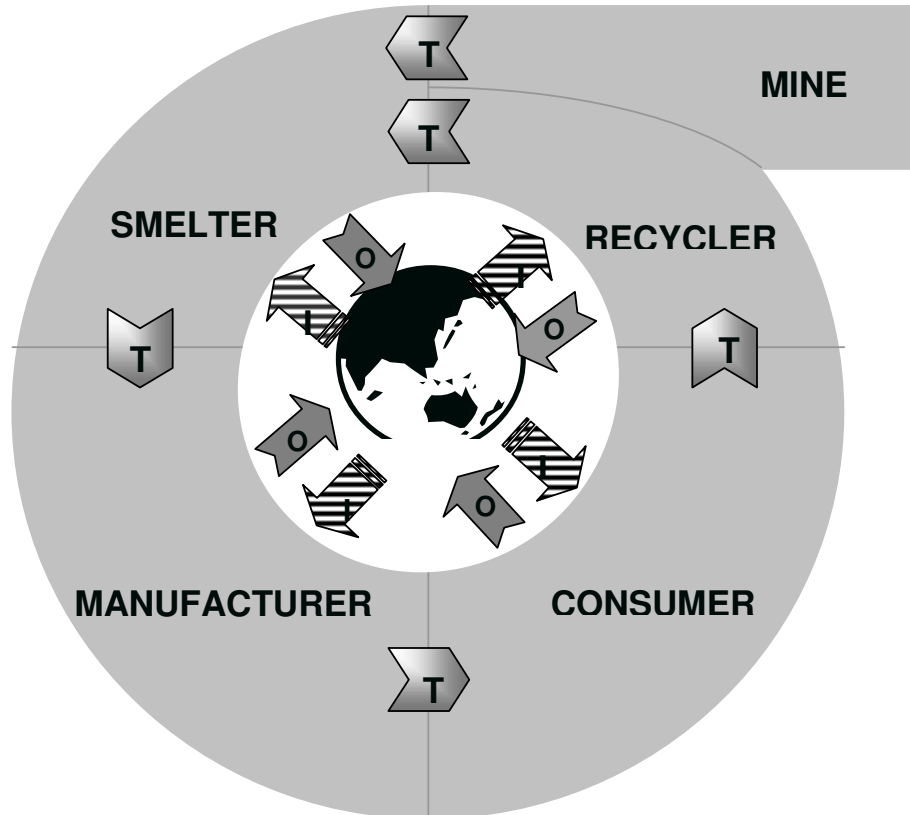


Fig 1 Green lead sigma cycle

Green lead builds on work of the Voluntary Risk Assessment on Lead currently under way in Europe, which involves the collection of data on occupational exposure, environmental emissions and levels of lead in the local environment for facilities that produce and use lead in the EU. It will investigate the risks to occupationally exposed workers as well as to population

and environment surrounding sites and calculate the contribution of industrial emissions to total lead exposure for the general population and for the wider environment.

Both environment and consumer Non Government Organisations (NGOs) are also being consulted and are contributing to the project's development.

Green Lead recognises that one or a few companies alone cannot meet all of their environmental objectives, or produce a truly 'green' product, without the cooperation and input of the other companies with whom they interact.

It is proposed that the lead industry:

- Support worldwide governments with environmental protection efforts by taking the initiative in setting lead industry standards; and
- Unite in taking responsibility for the total environmental impacts of lead, throughout its entire life cycle, in a cooperative, accountable, proactive and benchmark-setting way.

Sustainable development recognises the need for equity between this generation and those of the future. It has been argued that extraction-based industries can never be truly sustainable because of increasing concentrations of substances extracted from the Earth's crust and produced by society. However, in the context of lead the emphasis is shifting towards reducing to zero its deleterious effects upon people and the environment.

2. Product Stewardship

Green Lead is an elaborate product stewardship exercise. Product Stewardship is a principle that directs all sectors in the life cycle of a product to minimise the impacts of that product on the environment. What is unique about product stewardship is its emphasis on the entire product

system in achieving sustainable development. Under product stewardship, all participants in the product life cycle - designers, suppliers, manufacturers, distributors, retailers, consumers, recyclers and disposers - share responsibility for the environmental effects of products (Northwest Product Stewardship Council, 2000).

Traditional environmental management focuses upon minimising environmental impacts within a particular company or at a particular site. Product Stewardship seeks to extend the responsibility for a product throughout the product chain. For example, a producer may assume responsibility for the facilitation of product take-back and recycling in cooperation with a recycler, or a miner may change reagents used in the flotation process to reduce CS₂ emissions from the smelter downstream.

The cooperative nature of Product Stewardship allows opportunities for the identification and reduction of environmental impacts that is not possible with traditional environmental management. Product Stewardship also means that each player is accountable to other members of the product chain for their environmental performance, and is obligated to benchmark and demonstrate best environmental practice, as far as their capabilities allow. Members may set supplier and contractor obligations, which may result in the restriction of whom they will do business with based on environmental and social performance.

3. Life Cycle Assessment

A firm understanding of the environmental aspects of the entire product chain is required. One tool that may be used is LCA.

Life Cycle Assessment (LCA) is the compilation and evaluation of the inputs, outputs and the potential environmental impacts of a product system throughout its life cycle (AS/NZS 14040:1998).

The product life cycle for lead can be graphically described as the Green Lead σ -cycle (*sigma*-cycle), which is shown above.

To achieve the Green Lead vision of "zero harm to people and the environment from exposure to lead", the following development process is proposed:

Step 1 - Impact Identification

The first step in the process of ensuring "zero harm" is to identify and quantify the environmental, safety/health and social impacts associated with the lead life cycle. Life Cycle Analysis (LCA) for the lead life cycle is one of the tools that will be utilised to complete this first step. In Stage 1, it is proposed that to fulfil this step an Aspects and Impacts Register and Risk Assessment will be developed.

It is anticipated that to achieve an LCA for the entire lead life cycle, each sector will conduct a full LCA for its operation. Subsequently each of these sector specific LCAs will be combined to develop a LCA for the entire lead life cycle.

Step 2 - Develop Green Lead Standards/Criteria

The next step is the development of performance standards/criteria based on the results of LCA and other tools utilised for impact identification.

These standards/criteria will define the test for "Green Lead". They will not be an absolute guarantee that no lead enters the bodies of humans or the air, the water and the soil, but rather will establish maximum levels allowable below which no identifiable harm will occur. The

standards will employ surrogate measures of lead in blood, in the air, the soil and water, to demonstrate compliance with the 'no harm' claim. This will draw heavily on the Voluntary Risk Assessment in Lead and on the work of groups such as the Society for Environmental Toxicology and Chemistry.

Communication between sectors will be required to determine criteria that can apply across sectors. Sector-specific performance standards may also need to be identified and defined. The standards/criteria will cover areas of environmental protection, workplace health and safety and community issues.

Green Lead is an international undertaking. As such, companies volunteering to join Green Lead will come from a variety of countries, with different legislation and standards of practice. Performance standards therefore will need to go beyond legislative compliance and reflect international best practice.

A staged approach is proposed in which criteria will be developed and reviewed on a regular basis (at least annually) to allow impacts to be dealt with in order of priority and the continual improvement of standards.

Step 3 - Green Lead Process Certification

There are two types of certification with their respective criteria:

- Green Lead Process Certification; and
- Green Lead Product Certification.

Green Lead Process Certification is certification that an operation is managing their environmental, workplace and community impacts in a way that meets established Green Lead

Criteria. It is proposed that ISO 14001, SA8000 and OHSAS 18001 will form the basis of that process certification.

Identification of impacts, establishment of standards and maintenance of Green Lead

Certification will be an ongoing process, but we anticipate a methodology similar to others used for environmental certification, such as the Hazard Analysis Critical Control Point mechanism used for food assurance.

Green Lead Product Certification is certification that a lead product throughout its life cycle has only been processed and handled by certified Green Lead operations and that those operations have demonstrated that they have contained lead within a closed system by meeting the standards for lead in blood, the air, soil and water.

Setting the compliance standard for Green Lead is a complex matter. It poses significant questions such as what is the level below which no harm can be demonstrated in people and the environment? Over what time frame should that be considered? What allowance should be made for lead naturally present in the environment? Should different standards apply to different parts of the lead cycle, such as mines or smelters? As mentioned above, we are looking to the Voluntary Risk Assessment of Lead to provide some guidance and we are also consulting with some of the world's best scientists to assist in this endeavour. One thing is plain. To be credible, with both regulators and the community, the standards will need to be substantially higher than present regulation and be based on the best understanding of the toxicological effects of lead, which may change with time.

It is envisaged that Green Lead will become an environment label used to identify products that are certified as meeting the Green Lead criteria.

To ensure the validity and integrity of the environment label, a "Chain of Custody" process will be developed and implemented to ensure that a lead produced by Green Lead process certified operations is not mixed with uncertified lead. This would involve protocols covering the separation of certified and non-certified streams.

All Green Lead members will have a Chain of Custody Certificate attached to their product at the gate, before transfer to the next member. Each receiving member will use this certificate to ensure that the product they are receiving is certified Green Lead and then take responsibility for protecting its integrity while in their custody.

The only member that would not be required to check for Green Lead Certification is the recycler. It is envisaged that uncertified lead will, by being processed by a Green Lead certified recycling operation, be incorporated into the Green Lead cycle. This will maximise the proportion of lead that is recycled and will help bring uncertified lead into the Green Lead stream.

The integrity of the environment label will need to be enforced by the use of independent accredited Certification bodies to assist in, auditing the process for certification. Certification will be provided by an independent, not for profit third party, which is external to the lead industry, to provide a credible, transparent result. The details of the mechanism will be developed in parallel with the first steps of Stage 1. Regular audits would form part of the improvement process, which will include the review and modification of certification criteria in light of information concerning best science, increased industry standards for environmental performance and feedback from stakeholders.

Step 4 and Beyond- Product Stewardship and Sustainable Development

It is anticipated that the concept of Product Stewardship will be achieved through the process of participants in the lead life cycle collectively examining their lead impacts, setting high

standards and achieving improvements in environmental safety and health performance. These efforts and the ultimate achievement of the Green Lead goal, will contribute to the pursuit of Sustainable Development for the lead industry.

It has been decided that “Green Lead” will initially only apply to lead in batteries, as this constitutes 75% of lead use (at least in OECD countries), they are perfectly recyclable and there are significant structures in place to enable the process to be trialled throughout an entire lifecycle.

Due to the virtual impossibility of ever recovering lead in some uses, such as leaded fuel, in glass and ceramics, it may be that these products will never be “Green Lead” certified.

It is anticipated that ultimately Green Lead criteria will include restrictions entailing Green Lead organisations selling lead only to other Green Lead organisations and only utilising Green Lead suppliers.

4. Marketing Green Lead

Central to the Green Lead concept is the acceptance of the need to effectively market the certification and the trademark.

According to the International Social and Environmental Accreditation and Labelling Alliance (ISEAL, 2001) successful eco-labelling programs rely on:

- previous consumer awareness on the type of information contained within the label;
- third party certification;
- market structure;
- consumer willingness to pay for a premium labelled product;

- inexpensive and clear labelled format;
- the relevance and significance of the environmental criteria;
- marketing of the eco-label to inform the consumer of the meaning of the label, and to assist them to realise the market benefits of the product label; and
- re-examination of the criteria after a period of time to allow for changes to technology and new developments to be recognised and implemented in the production of the product.

In addition, labelling scheme companies should be transparent about their organisational structure. This includes the source of their funding, the board of directors and certification standards, publication of information, and establishment of inquiry points. Transparency will assist in satisfying consumer interest and trust in the eco-labelling scheme.

It is proposed that an amount, at least equalling the certification license fee, will be levied on licensees to fund a substantial and ongoing marketing campaign to ensure that consumers understand the certification, the logo and its meaning. We believe that without this effort, the industry will be unable to convince communities, and hence regulators, that the product can be used safely and that a voluntary mechanism is adequate.

5. Proving the Concept

In order to begin the process of proving up the issues arising from the Green Lead concept, we have commenced a 'Pre –certification audit' of operations at BHP Billiton's Cannington silver, lead and zinc mine in Queensland, Australia. This included its mining and processing operations on site in North Western Queensland, trucking to its railhead at Yurbi, rail transport to Townsville and ship loading in the Port of Townsville.

Following on from this initial proving up exercise, is the establishment of a Coalition of Green Lead Partners from each other part of the full Green Lead cycle, including the transport chains that link the different sectors. This will include miners, road transporters, railways, shippers, smelter, manufacturers, consumers and recyclers.

In addition to this, we are in active discussion with a major car manufacturer to enlist them in the Green Lead cycle, both as a user of Green Lead batteries, but also to assist in the battery recovery process.

We propose that the Coalition of Green Lead Partners will be heavily involved in the design of the final Green Lead process and standard along with other stakeholders such as environmental and consumer Non Government Organisations's. Governments and multilateral organizations will also be invited to contribute. The degree of success of the green lead project will be directly proportional to the level of inclusiveness that is achieved in the development and implementation stages of the project.

6. How can the battery industry contribute?

With the decline in other uses of lead in the last 30 years, the dependence on the production and marketing of lead acid batteries has been paramount for the global lead industry. Over 75% of lead produced each year is used in the manufacture of lead-acid batteries.

Data recently (July 2003) published in a report by the International Lead Zinc Study Group (ILZSG) show that the proportion of lead used in the United States which goes to the production of lead acid batteries has risen from about 35% in 1960 to over 86% in 2000 (ILZSG 2003a).

The report continues, “ Lead-acid batteries are set to remain the technology of choice for the *starter, lighting and ignition (SLI)*, 12V automotive battery market. Its durability, simplicity of design for recycling, and low cost are unlikely to be challenged by substitute battery solutions. Buoyant growth in the Asian car and motorcycle industries over the coming decade should ensure annual world SLI battery market growth in excess of 3.5% a year over this period.”

Whilst these are encouraging forecasts for the lead industry, any uncontrolled growth in the industry without regard for product stewardship is not sustainable in the eyes of the community at large. Hence the suggested introduction and implementation of the green lead project.

The battery sector of the lead life cycle can contribute to the green lead project by:

- individual battery manufacturers openly supporting and endorsing the green lead project;
- encouraging battery representative organisations to openly support and endorse the green lead project;
- suggesting improved assessment methodologies to ‘measure’ green lead practices;
- participating in the development of the green lead project in the battery sector;
- being creative in the promotion of green lead in the battery sector;
- contributing to the pilot assessment phase of green lead in the battery sector;
- helping to design systems that will facilitate the identification and recovery of green batteries.

The ongoing success of the Green Lead project is dependent on the support of all sectors in the life cycle of lead to improve the practices within the lead life cycle (Roche2003a).

7. Conclusion

The ability for the lead life cycle to taking a lead role in product stewardship is solely dependent on the ability to engage with all the sectors of the entire life cycle of lead. The inclusive nature of the Green Lead project is one that seeks active input from all sectors of the lead life cycle.

8. References

- American Chemistry Council**, (2000), <http://www.cmahq.com/>
- Department of Environmental Protection (WA)**, (2000), “Cleaner Production”, <http://www.environment.wa.gov.au/DEP/cleanprod>
- Environment Canada**, (2000), “Minerals and Metals: Towards a Sustainable Future”, *Eighth Session of the United Nations Commission of Sustainable Development*
- European IPPC Bureau**, (2000), “Integrated Pollution Prevention and Control: Reference Document on Best Available Techniques in the Non Ferrous Metals Industries”, *European Commission*
- Kendall, R** (2002), “BHP Billiton closes lead loop”, in *Ethical Investor* 14, August 2002 p 25
- Fishbein, B. K.**, (1998), “Extended Producer Responsibility: A Primer”, *Presented at Take it Back! 1997 Producer Responsibility Forum*
- Green Lead Website:** <http://www.greenlead.com>
- Herbertson, J.**, (2001), “Sustainable Resource Processing”, http://www.sustainability.dpc.gov.au/SRPFinalReport_files/slide0103.htm
- ILZSG** (2003a) “Lead and Zinc in Batteries” International Lead and Zinc Study Group, 49pp
- ILZSG** (2003b) “Principal uses of lead and zinc”, International Lead Zinc Study Group, 67pp
- Northwest Product Stewardship Council**, (2000), <http://www.govlink.org/nwpsc/about.htm>
- Roche, M.**, (2001a), “Green Lead - An Update”, *Environmental & Licensing Professionals*.

Roche, M (2001), “Community reporting on environmental performance – the Cannington experience”, presentation given at the 13th International Lead Conference, Brussels, June 2001

Roche, M (2002), “Green Lead”, Presentation to the Business Leaders Forum on Sustainable Development, Melbourne, Victoria Australia. February 2002

Roche, M (2002a), “Green Lead – a Cannington initiative”, presentation given at Economic and Environment Committee International Lead and Zinc Study Group Stockholm Sweden, October 2002

Roche, M (2002b), “Earth, earthlings and earnings – a new approach to sustainable development in the mining industry”, presentation given at the Environment Institute of Australia 14th Annual National Conference, Brisbane Australia, August 2002.

Roche, M (2002c), “Broadening our horizons”, presentation given at the Minerals Council of Australia Sustainable Development Conference, Port Kembla, New South Wales Australia, November 2002

Roche, M (2002d), “Best practice stakeholder communication and involvement: the shift to Corporate stewardship”, presentation given at Corporate Reputation Mangement Conference, Sydney, New South Wales Australia, May 2002

Roche, M (2002e), “The World Wildlife Fund scorecards the Australian Mining industry - how BHP Billiton responded at Cannington”, presentation to the 74th Annual Meeting of the Lead Industries Association, Arlington Virginia USA, March 2002

Roche, M (2003a) “Green lead – changing the practices rather than changing the image” Presentation given at the “Marketing and Communications Conference”, Gold Coast Australia July 2003.

Roche, M, Toyne, P, Haylock, B & Payne, T(2003b) “Green Lead – a product stewardship discussion paper”, available at www.greenlead.com

The Australian Environmental Labelling Association, (2001), “Lead Acid Batteries: Voluntary Environmental Labelling Standard – Draft”, <http://www.aela.org.au>