This catalogue has been compiled by Associate Professor Misuzu Asari, Kyoto University and Ministry of the Environment, Japan, the leads of the Waste Management Area (WMA) under the UNEP Global Mercury Partnership in cooperation with the partners of the WMA, with a view to disseminate information of technologies, products, services related to mercury waste management owned by partners in an effective manner.
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The Association of Lighting and Mercury Recyclers is a non-profit organization comprised of recycling firms and others engaged in recycling, who operate from over 60 locations in 27 states in the U.S., with some members operating in the EU, and some provide technology throughout the world. Since its formation in 1999, the ALMR has become an educational and informational resource to government agencies, municipal authorities, industries and business entities, waste handlers, generators, environmental groups, industry trade organizations, and the public at large. The ALMR actively assists government agencies at all levels to establish and implement programs, rules and regulations which encourage and promote the recycling of all mercury containing products and waste materials. The ALMR received a grant from the USEPA to develop and manage the Lamp Recycling Outreach Project from 2003-2007. We provided the details and scope of this program to UNEP during the presentation of Success Stories. More recently, we have developed technology to reclaim Rare Earth Elements from lamp phosphors and we have embarked on a project to assist SIDS and developing countries keep mercury from the environment as a way to stimulate local involvement and improve tourism.

Locations of our member’s company operations are found on the Map page at www.almr.org and each member’s web links describe more about their individual activities and locations throughout the world. Since 2011 the ALMR has provided the Global Mercury Project with details of our technologies, reverse distribution system, Success stories, information for the Sourcebook, attendance at partnership meetings and technical comments on the various topics and approaches considered by the project participants.

2. Overview of technology/product/service provided

The ALMR has provided the project with technical details and descriptions of the methods for recycling light bulbs and recovering mercury, including photos. You are free to replicate that information here.

To summarize:

1. Lamps are collected from any location in a country where they used and stored. Historically we have collected about 500 million lamps per year.

2. Lamps are disassembled in a negative pressure system, where components are mechanically separated and isolated from each other. Clean (mercury free) components are recovered and sent for reuse in any process needing glass, aluminum, tungsten, or other raw materials found in lamps.

3. The Phosphor component is heated in a vacuum distillation system so that mercury is recovered in a nearly pure form, for reuse or sequestering depending on location.

4. The mercury-free phosphors are then concentrated to remove any remaining impurities and then subjected to a chemical process (patented and proprietary technologies) to recover pure Rare Earth Oxides for reuse by governments and industry. The principle Oxides produced are Europium, Terbium and Yttrium.

5. Thus, nearly all of the materials comprising lamps are rendered non-hazardous, mercury is reclaimed and the critical minerals needed for strategic applications are produced.
3. Strengthening/Advantage

This information is included in 2. above. The principle advantages are the protection of human health and the environment from the toxic affects of mercury, and the reclamation of rare and valuable minerals for alternative energy, industrial, aircraft and defense applications. We are the only organization in the world that is performing all of these activities.

We have offered to share all information we have developed for public education and outreach to businesses and individuals with any member of the GMP at no cost. We have offered to assist anywhere in the world to set up a reverse distribution network and arrange for the recycling in the most appropriate location. Further described in the next section.

Drum-Top Crushing Device for Pre-recycling consolidation
Courtesy of Terracycle Inc.

Integrated Lamp Recycling System used throughout the world
Courtesy of Balcan Ltd.

4. Applicability

Our industry has been operating and performing the activities described here for approximately 25 years. Physical operations are primarily in North America and Europe. Our member companies also provide engineering and technology to establish commercial operations worldwide. Recycling locations are available in Asia, Middle East, South Africa and Australia. Currently, there is a complete lamp recycling system in Manila, Philippines that is not being used due to public and private infrastructure problems.

Recently, we arranged for the collection of large quantities of lamps from Sri Lanka and the recycling of these lamps in Dubai. This project was outside the scope of our membership, yet we are committed to networking with any legitimate participant to keep lamps and mercury out of the environment. We have also assisted in similar projects in Central America.

We have described a plan in detail to the GMP members to integrate lamp collection and recycling in 3rd World Countries and Small Island nations where improper management practices lead to mercury pollution in nearby marine environment. We submitted proposals to the 10 YFP Trust Funds Project, and we have submitted preliminary proposals to the Regional Center in the Caribbean and to GEF. We continue to seek UN/GEF support for setting up local infrastructure to collect lamps and ship them to integrated recycling facilities in nearby countries. We continue to offer this approach and we welcome all advice on finding funding sources to support local efforts.

5. Further information

For additional information visit www.almr.org
Contact information: Paul Abernathy, Executive Director mail@almr.org
BATREC Industrie AG

**Tags:** stabilization, recovery, product waste, decontamination, adsorbents, amalgams, mining residues, oil & gas

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### 1. Profiles

BATREC is a Swiss company specialised in hazardous waste treatment and recovery.

- **1991:** year of Foundation
- **2019 Turnover:** 17.70 Mio CHF = 16.68 Mio €
- **80 employees**

ISO 9001, ISO 14001 & OSHAS 18001

BATREC is a subsidiary of VEOLIA, especially of SARP Industries which is the European leader for the treatment and recovery of hazardous industrial waste.

**5 Core Businesses:** Stabilisation of liquid mercury, Recycling of mercury absorbents, Treatment of mercury materials, Reactivation of spent activated carbon and battery recycling.

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### 2. Overview of technology/product/service provided

The company provides mainly 2 services in terms of mercury waste handling:

- Hazardous waste containing mercury
- Extraction of Mercury enabling recycling of other compounds
- Stabilisation of Mercury
- Recycling of other compounds and Mercury*

**Stabilisation**

(final disposal and permanent storage as Mercury Sulphide HgS in Germany – K+S Herfa Neurode)

\[
\text{Hg}^{(l)} + \text{S}^{2-} \rightarrow \text{HgS}^{(s)}
\]

**Recovery**

(ultra purification of Hg with a purity > 99.9999%)*

* In accordance with Minamata – limited applications

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BATREC can manage many types of mercury waste such as Hg guards, AC contaminated with Hg, sludges, contaminated soils, contaminated PPE, filters, liquid mercury, thermometers, dental wastes (amalgams)...

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**Last Update:** March 6, 2020
3. Strengthening/Advantage

BATREC provides safe and traceable treatment services for waste containing mercury in compliance with regulations as the Minamata and Basel Conventions.

Compliance BATREC provides services with high Swiss standards and quality having its own laboratory
Experience BATREC develops its mercury handling services since 1992
Expertise BATREC handles any types of mercury wastes
Flexibility BATREC organises and supervises transports of hazardous waste from all over the world

4. Applicability

One of BATREC’s service is to take care of the whole process from client’s site up to the final stabilisation (including all logistics*) with the help of trusted partners (e.g Veolia Field Services and K+S Herfa Neurode – salt mine for final disposal).

BATREC has experience in managing mercury waste from different origin such as:
- Oil and Gas
- Mining
- Chlor-alkali plants
- Healthcare, Instrumentation and other small volume applications

* BATREC is able to organise and supervise transports of hazardous waste coming from all over the world.

5. Further information

<table>
<thead>
<tr>
<th>Contact details</th>
<th>Office</th>
</tr>
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<tbody>
<tr>
<td>Tel +41 (0)33 657 85 00</td>
<td>Niesenstrasse 44</td>
</tr>
<tr>
<td>E-Mail <a href="mailto:batrec@batrec.ch">batrec@batrec.ch</a></td>
<td>3752 Wimmis</td>
</tr>
<tr>
<td>URL Website <a href="http://www.batrec.ch/en/">http://www.batrec.ch/en/</a></td>
<td>SWITZERLAND</td>
</tr>
<tr>
<td>Managing Director – Dieter Offenthaler</td>
<td></td>
</tr>
<tr>
<td>Sales Manager – Edwina Decazes</td>
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</table>
1. Profiles

Ecocycle Pty Ltd is an Australian mercury recycling company founded in 1996. Head Office and main processing capability is located in the State of Victoria at Campbellfield. National coverage is serviced through additional facilities located in Perth – Western Australia, Adelaide – South Australia, Sydney – New South Wales, Brisbane – Queensland and Rocherlea – Tasmania. Agents also represent the company in Darwin – Northern Territory, New Zealand, Indonesia, Papua New Guinea and New Caledonia. Ecocycle Pty Ltd employ highly experienced staff committed to servicing industry and protecting the environment fully supporting the values and vision of both Minamata Convention and UNEP Global Mercury Partnership.

2. Overview of technology/product/service provided

Ecocycle Pty Ltd have installed high volume crush and separation plant across the country with European distillation facilities located at the Head Office. The company processes all mercury wastes from a wide range of industry including Mining, Oil & Gas, Lighting, Dental and the general public. All materials received into our facilities are 100% recycled. Ecocycle Pty Ltd has specific interest in recycling Dental Amalgam and has invested heavily in process and awareness on this subject across the industry.
Ecocyle Pty Ltd utilize the latest technology for the safe processing of mercury wastes in an highly efficient and environmentally sound manner. Our company is fully accredited to the following standards:

- ISO 9001:2015
- ISO 14001:2015
- AS/NZS 4801:2001
- AS/NZS 5377:2013
- OHSAS 18001:2007

Ecocyle Pty Ltd have sort out and assisted mercury recycling programmes in South Pacific countries and Indonesia. The company has a broad reach as member of industry bodies such as:

- Waste Management Association of Australia
- Victoria Waste Management Association
- Australian Battery Recycling Initiative (ABRI)
- Fluorcycle
- Exitcycle

Further details and extensive information can be found at www.ecocycle.com.au/ and we encourage visitors to our web pages to sign up to our regular and informative newsletter.

All enquiries can also be directed to:

- Mr Daryl Moyle, Business Development Manager
daryl.moyle@ecocycle.com.au
- Telephone 61 432732735 / 61 394089415
- Fax 61 394089416
1. Profiles

- Started operations in August 2008.
- Urban Mining & special waste management company, located in Panama City, Panama
- Value at US$200K
- Partner of the UNEP Global Mercury Partnership’s waste management and disposal areas since 2008
- With national operation permit from Health and Environment’s Secretaries since 2012
- Recycling and final disposal of containing and contaminated mercury waste.
- UNIDO’s mercury waste workshop participant.

2. Overview of technology/product/service provided

- Lightning and medical equipment, e-waste, electrical waste, reduction, collection, separation, storage
- Lightning and E-waste recycling, cooper, aluminum and bronze removal & recovery
- Gold, Cooper, aluminum and bronze melting for ingot production.
- Steel scrap recycling & plastic waste disposal.
- Mercury containing waste’s final disposal via concrete encapsulation.
- Long term storage of mercury compounds, elemental mercury and mercury containing waste for future process.
3. Strengthening/Advantage

- Recycling efficiency, high quality of raw material for up and downstream use.
- Lower risk of contamination and resources recovery for circular economy
- No use of hazardous chemical / substance
- Manual components & wire stripping
- User-friendly & easy melting operation
- Co-benefit
  - Higher prices for recovered metal
  - More recycled material for industrial use
  - Less waste to municipal landfills
  - Less pollution due to no plastic burning

4. Applicability

Circular economy in the waste management had been one way to increase their incomes, but mainly in the aluminum, glass, plastic and cardboards, but not in the special electric & Electronic waste. All metals, specially iron/steel, had been send to larger recycling operations to receive residual incomes, less than the actual metal recovery cost.

Since the e-waste and lightning and electrical waste include an important metal footprint and the melting technology is getting more accessible in terms of size and price, there is a convergence to add value and increase general incomes to urban mining & special waste management companies.

Urban Mining, Circular Economy as well as a Better Design for better recyclability in consumer products, will increase the recycling rate, recycled material participation in industrial process and the success of recycling operation around the world.

5. Further information

- [https://www.facebook.com/ecologicpanama/](https://www.facebook.com/ecologicpanama/)

- Contact information
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  - Ecologic, S.A.
  - +507 391-9181
  - +507 6649-3220
  - jconte@ecologic.com.pa
1. Profiles

econ industries services GmbH is a German-based company delivering turn-key equipment for resources recovery from industrial hazardous waste worldwide. econ’s aim is to avoid the elimination of waste through incineration and landfilling but to achieve a resource-conserving material recycling instead. The main technology, the so-called VacuDry®, separates harmful substances in a fully encapsulated system under heat and vacuum. Particularly when it comes to energy efficiency and low carbon emissions, this method is far superior to other thermal desorption techniques and is accepted as state of the art by approval authorities worldwide.

Within Europe econ industries offers on-site mercury waste treatment and surplus mercury conversion services. econ industries has been delivering solutions for mercury waste treatment since 2006. Currently approx. 50% of the turnover of the company is related to services and equipment supply for mercury waste.

- **Corporate value:** zero industrial waste – Our goal is to enable local partners to treat mercury waste on-site or locally with Best Available Technology (BAT) to avoid transboundary waste shipment.

- econ industries is an active industrial partner of the UNEP Global Mercury Partnership

2. Overview of technology/product/service provided

econ industries offers a broad portfolio of technologies for mercury waste treatment. In combination all major mercury waste streams can be treated.

**VacuDry® Vacuum Distillation** - The VacuDry® process is a specially designed vacuum distillation. The material is continuously mixed and heated under controlled vacuum to safely evaporate water, hydrocarbons and mercury. It can be utilized for all waste streams containing metallic mercury and mercury compounds with a boiling point of up to 450°C. **Capacity:** up to 100 tons per day. In combination with soil washing: up to 500 tons per day possible.

**Mobile Mercury Conversion Unit (MMCU)** - MMCU is designed for on-site mercury conversion. Mercury is converted to stable and non-toxic HgS and packed for final disposal. **Capacity:** 0.5 to 5 tons per day

**High Temperature Treatment Unit (HTTU)** - HTTU is designed for industrial scale treatment of spent catalysts and other mercury and sulphur containing wastes. In the HTTU mercury sulphide (HgS), and other mercury compounds are decomposed at high temperatures. Hydrocarbons and sulphur are oxidized. SO₂ created by the process is neutralized in the off-gas treatment system. **Capacity:** 100 kg to 2.5 tons per hour

**Mercury purification** - Where mercury shall be recovered for reuse a high mercury quality is required. econ utilizes a special vacuum distillation at high vacuum to produce metallic mercury with a purity of > 99.999%.
econ can call upon over 20 years of experience in industrial and recycling plant construction. Its VacuDry® technology is able to recover 100% of mercury wastes. Tailor-made research, development, consulting, engineering, delivery and commissioning are econs core competencies. As an owner-managed independent company econ guarantees individual support for each customer. The plants are “made in Germany” although they can - on the basis of our engineering - also be produced abroad if the customer requests so.

**Advantages of econs mercury treatment plants:**
- High flexibility — Every mercury waste stream can be treated
- Expensive and long-lasting notification and transportation procedures incl. related expenses are eliminated
- Decentral treatment of mercury wastes
- Full transparency of the waste handling process
- Safest technology – due to closed vacuum system
- Technologies of the world market leaders of mercury recycling
- Turn-key solution — including setup of material handling and safety regulations

**4. Applicability**

econ industries offers solutions for all types of industrial scale mercury wastes from all industrial sectors such as oil and gas industry, chlor-alkali industry, chemical industry, recycling and waste management industry, mining industry, soil remediation

**Typical applications are mercury containing**
- Spent catalysts
- Contaminated soil and building rubble
- Filter cakes
- Sludges
- Oily wastes containing mercury
- NORM / TENORM waste containing mercury
- Surplus mercury for conversion as preparation for final safe disposal

Outlook: Provide on-site mercury waste treatment and mercury conversion for final disposal outside of Europe.

**5. Further information**

For further information please visit [www.econindustries.com](http://www.econindustries.com) or contact us directly

Reinhard Schmidt
Email: r.schmidt@econindustries.com
Schiffbauerweg 1
82319 Starnberg
Germany
Tel.: +4981514463770
1. Profiles

- IDM is the global body for National Dental Industry Associations, functioning for 25 years.
- IDM is domiciled in Switzerland
- IDM has been represented at the Minamata INC 4 and 5 and COPS 1 & 2.
- IDM participated in the East African Dental Amalgam Phase Down Project in Tanzania, Kenya and Uganda
- IDM has also attended phase down meetings in London, Johannesburg and Sao Paulo, Brazil
- IDM works with FDI – the World Dental Federation and with UNEP and WHO on the Minamata Convention

2. Overview of technology/product/service provided

- Dental equipment manufacturers developed dental amalgam separators over 30 years ago.
- The ISO 11143 Amalgam Separator standard was published in 1999.
- No technical changes have been made to the document at the customary 5 year reviews.
- Dental amalgam separators are placed after the dental suction machine and in front of the waste water outlet of the dental surgery capturing a minimum of 95% amalgam waste.
- Amalgam waste is generated when the dentist either removes an old amalgam restoration or places a new amalgam restoration and the amalgam is polished at high speed.
- If an amalgam separator is not installed the amalgam waste goes into the municipal drains and eventually out to sea or landfill.
- Amalgam separators capture the waste amalgam and this is then collected/sent for recycling.
- The extracted mercury is then sequestered or on sold for permitted uses.
- There are several technologies available including centrifuge models, sedimentation models, filtration models and units range in capacity from large hospitals to single surgery dental practices.
- The well known brands include Durr, Metasys, Cattani, Solmetex, and other brands can be found with a simple google search on dental amalgam separators.
- The existing dental companies in the country will have the knowledge of what is available in each jurisdiction.
- As well as the installation of the amalgam separator attention should be paid to the following,
- The primary filter located in the dental chair will hold amalgam waste and this needs to be collected /stored in a separate container for recycling. This is considered contact waste and the amalgam and bodily fluids, blood, saliva, teeth may be present. This waste should be immersed in a non chlorine disinfectant and covered with a tight fitting lid.
- The non contact amalgam – what the dentist has left over and not used on the patient should also be stored in a separate container for re-cycling.
- If plumbing pipes between the chair and the amalgam separator are replaced the pipe should be capped off at both ends and sent to the recycler.
- Because of the weight of amalgam particles they may settle in the pipe between these two points.
3. Strengthening/Advantage

- The use of amalgam separators greatly reduces the amalgam waste burden in the oceans.
- Figures from the recycler in Australia show that from July to September 2018, 1,021 kg. of amalgam sludge was collected in 671 ISO 11143 certified Amalgam Separators and from this sludge 382 kg. of mercury was extracted.
- Furthermore 5.1 kg. of contact amalgam was collected and 1.8 kg. of mercury was extracted.

4. Applicability

The technology of amalgam separators has been in use for around 30 years and the separators are widely used in Europe.

As a participant in the East African Dental Amalgam Phase Down Project, I supplied a sedimentation type of separator that relied on gravity feed, not electricity.

Some of the models are computer driven and not suitable where power outages may occur.

Discussions with waste collectors and mercury recyclers are very important in the beginnings of such a program as this.

A plan on the handling of the waste should be in place.

5. Further information

- Contact information
- Mrs Pam Clark, AO
- IDM Ambassador,
- Cattani Australia Pty Ltd,
- 280 Dundas Street,
- Thornbury 3071
- Australia.

- E-mail pam@cattani.com.au
- Phone + 61 403244456
At Nomura Kohsan, we treat mercury wastes through a roasting process. Mercury wastes are heated at a temperature of around 600°C to 800°C in order to evaporate the mercury. The evaporated mercury then flow into the exhaust gas channel and be collected in the scrubber and cooling tower. In order to prevent the remaining mercury from discharging into the atmosphere, the plant is equipped with a mercury absorber at the final stage of the process. After roasting, we safely manage residues at our leachate-controlled landfill site.
3. Strengthening/Advantage

Any and all types of mercury wastes covered
Fluorescent lamp, Dry Cell Battery, Sphygmomanometer, Catalyst, Activated carbon, Oil sludge etc.

Stabilization and Solidification
Nomura Kohsan has established a safe and reliable way to produce mercury sulfide (HgS) using the mechanochemical reaction. HgS is very stable with very little risk of volatilization and elution of mercury. Dissolution tests conducted on mercury sulfide produced using this method have shown less than 0.005mg/L. Additionally in order to minimize mercury from coming into contact with the environment and reduce the risks of mercury sulfide converting into other forms, HgS is solidified. This is an important barrier that prevents mercury release to the environment. The solidified HgS will be dispose in leachate-controlled final landfill site.

4. Applicability

Developed the collection scheme for used fluorescent lamps in the Philippines

Nomura Kohsan has installed an intermediate fluorescent lamp processing system for local companies. By working hand in hand with local companies who crushes the lamps on their premises, this system will reduce inefficiencies by only requiring the remaining mercury waste to be sent to Japan for final treatment.

5. Further information

CONTACT INFORMATION
Tel: +81 3 5695 2531
Email: info@nkcl.jp
Home Page: http://nkcl.jp

If you have any question, feel free to contact us!
REMONDIS QR is the REMONDIS Group’s expert for disposal of metallic mercury and mercury containing wastes.

REMONDIS QR commenced its operations in Germany in 1989 and is waste management partner for chemical industry as well as for multi-national oil & gas explorers and mining companies. REMONDIS QR has got two plants in Germany, both equipped with an excellent logistical infrastructure and direct access to European shipping ports.

With its longstanding experience and know-how REMONDIS QR is the partner for trans frontier waste shipments of metallic mercury and mercury containing waste – from nearly all places of the world.

2. Overview of technology/product/service provided

REMONDIS QR is specialised in disposing of two types of mercury waste: 1) metallic mercury and 2) mercury containing waste.

Mercury containing waste – such as spent catalysts, activated carbon, soil and sludge – is being distilled in our rotary kiln. By heating up the waste in the kiln, the mercury is transformed into gas and can be removed from the waste. Later the recovered mercury is being converted into mercury sulfide in our vacuum mixer and finally disposed of in a German underground mine. That’s exactly what we do with metallic mercury in our REMONDIS QR plant, in Dorsten.

REMONDIS QR assists with application for export license under the Basel Convention and provides special containers for transport and short-term storage of metallic mercury. REMONDIS QR of course complies with all current laws and regulations – from German Waste Law via European Mercury Regulation and Minamata Convention as well as Basel Convention.
3. Strengthening/Advantage

REMONDIS QR is Mercury waste management "Made in Germany" - committed to stringent safety and environmental policies.
REMONDIS QR offers an all-in package for waste producers - no matter where the waste is being produced in the world.
REMONDIS QR does not set any quantity limits – we care about smallest amounts as well as several hundred tons of waste. Our approved storage capacity is several thousand tons.
REMONDIS QR has reliable partners - mobile field service teams on site as well as proven shipping companies and ocean carriers.

4. Applicability

REMONDIS QR is not a technology provider but a complete-service provider. In most of the world’s countries metallic mercury and mercury containing waste only occurs in smallest or small amounts – mostly not on an regularly basis.

REMONDIS QR served several customers and handled successfully projects with less quantities and in the world’s inhospitable areas such as Central America, the MENA region and South-East Europe.

REMONDIS QR promotes Mercury waste management “out of sight, out of mind” – the waste producer and its country can co-benefit and rest assure: the mercury waste is neither longer in the country any more nor being treated there. It’s made in Germany.

5. Further information

- www.remondis-qr.de
- Martin.Pakulat@remondis.de
TerraCycle Regulated Waste (TCRW) has a mission to develop tools and services that are easy to use, save money, are environmentally protective and produce effective results. Currently we work out of our offices located in Trenton, NJ and Lisle, IL.

TCRW is a result of TerraCycle Inc’s acquisition of the AirCycle corporation in 2017. AirCycle was founded in 1978 and since then has been providing various storage and recycling solutions for regulated waste. Currently we have over 12,000+ Bulb Eaters® in use worldwide and since 2017 we have sold over 150+ units internationally.

Currently, our most noteworthy product is our Bulb Eater®. The Bulb Eater® 3L is the latest generation of the Bulb Eater®. The award-winning fluorescent lamp crusher helps facilities save time, space, and money over other bulb disposal solutions. We also provide mail back programs and bulk – recycling pick up services domestically. Our EasyPak™ recycling containers provide a safe and easy way to recycle fluorescent bulbs, batteries, ballasts sharps and electronics. Our boxes utilize VaporShield® technology that contains the release of mercury vapor should the contents break. Customers order the containers, fill them with their items and then send them back to be recycled.

We currently offer our Bulb Eater® internationally however we still have yet to develop our serviced based solutions outside of the US. As a result, we are interested in and actively pursuing new partnerships that may allow us to do so.
3. Strengthening/Advantage

SAFETY – 99.99% of vapors, including mercury vapor emission, are captured with our system. Our highest quality HEPA filter works in conjunction with an activated carbon filter that neutralizes the mercury vapor released during crushing. REDUCE STORAGE & HANDLING – Minimize storage space by up to 80% by using the lamp crusher and crush up to 1350 T8 4’ per 55 gallon drum. By handling all the spent bulbs at once, facilities can save up to 20 hours of labor per 1000 lamps by crushing rather than boxing the lamps! COST SAVINGS – Save up to 50% on recycling costs. By pre-crushing lamps facilities are able to save money on their recycling costs. Savings can reach up to 1$ per lamp.

How it works:
- One size entry tube fits all lengths and diameters of linear lamps
- Powerful DC motor crushes lamps which are then filtered and sealed in drum
- 4–stage filter system (5 stage in 3® model) collects vapors
- Sensors detect when drum is full and prevent further crushing

4. Applicability

TCRW has a global market and we are constantly looking to develop our operations around the world. We have currently sold our Bulb Eater® technology into a variety of locations including, Suriname, Ethiopia, India, Malaysia, Panama, Trinidad and Tobago and many other countries.

Our technology is well suited for use in the developing world because it is easy to use and provides a quick and simple solution to safely storing fluorescent lamps in an environmentally friendly way. Each unit sold increases the likelihood that mercury from spent fluorescent lamps will be contained and recovered in an environmentally sound manner rather than disposed of in a landfill and subsequently released into the environment. We currently plan on expanding our collaboration with the UN and we hope to work with its various initiatives.

There are numerous UN procurement opportunities we hope to be a part of. One initiative we are particularly keen on collaborating on is the United for Efficiency initiative aimed at implementing a broader use of LED’s as a lighting source and standard in developing nations. As a result, a safe and environmentally friendly solution for the end of life management of spent fluorescent lamps is required and we hope to work with the UN and be a part of this solution. Additionally we hope to continue our participation in the Global Mercury Partnership to find solutions to safely handling and storing mercury around the world.

5. Further information

- For more information please visit our websites at:
  - AirCycle: https://www.aircycle.com/
  - International Distributors: https://www.aircycle.com/international-distributors/
- General Manager: Joe Day -- Joe.Day@terracycle.com
Related Technologies and Services
CURIUM is dedicated in the management of chemical and radiological risks. We offer to industrial companies different expertise including:

- Technical studies/consulting
- Environmental Project Management: tender specifications, supervising on site for dismantling or decontamination projects
- Works on site: remediation, decontamination, gas transfer, hazardous waste management

CURIUM owns its own chemical emergency team able to intervene 24/24 and 7/7.

CURIUM is involved in mercury decontamination and chlor-alkali mercury cells dismantling for 25 years in Europe and Africa.

**2. Overview of technology/product/service provided**

**CONTAMINATION DIAGNOSTIC**

The contamination diagnostic is the main essential step before the start-up of the works. It allows to map mercury gas and surface quantity, in order to determine the most appropriate decontamination methods. It includes:

- Evaluation of the contamination facilities, ducts, HVAC and extraction systems
- Specific decontamination process appropriate for mercury
- Decontamination validation protocol in the facilities, ducts...

**MERCURY ELECTROLYSIS DISMANTLING**

International Regulations limit the use of mercury (Minamata Convention) to protect human being and the environment. Today the chlor-alkali industry commits itself to begin the closure or conversion of mercury electrolysis before end of 2025. CURIUM has experience to support industrial in their dismantling of mercury. Our services includes: The contamination diagnostic; Selection and management of subcontracting companies; Liquid mercury repackaging, transport and disposal.
Our contamination diagnosis allows company to have a complete mapping of the contamination, indicating:
- The contamination area
- The contamination level
- The threshold to reach to validate the non-contamination

CURIUM’s trained personnel uses different portative equipment to measure mercury vapours and mercury contamination on surface.

A complete report is joined to each diagnosis.

This report defined appropriate decontamination methods. When decontamination isn’t possible appropriate hazardous Treatment Facilities is proposed (CURIUM has an inventories Of all Mercury Treatment Facilities in the world)

CURIUM can offer the decontamination operation with its skilled chemists.

<table>
<thead>
<tr>
<th>Point n°</th>
<th>Mercury vapour measurement results (μg/m²)</th>
<th>Mercury Vapour measurement results (μg/m²)</th>
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<th>Comment</th>
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<tr>
<td>1*</td>
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<td>A number of small mercury droplets present (visible)</td>
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<td>Probably mercury droplets presence (not visible)</td>
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4. Applicability

Our contamination diagnosis can be used in case of:
- Chemical spill
- Accident
- Laboratory or production equipment transfer
- Dismantling

We intervene in the following industrial sectors:
- Pharmaceuticals
- Chemicals
- Semiconductors
- R&D centers

Our application areas are: production processes, laboratories, cleanrooms, HVAC System, laboratory equipment (hoods, autoclaves...)

5. Further information

Further details and additional information can be found at www.curium.world
You can send your enquiries to:

Aiguerim HERENSTEIN, Decontamination Project Manager
a.herenstein@curium.world
Phone: +33 6 23 88 51 92
1. Profiles

- SICK is a leading manufacturer of intelligent sensors and sensor solutions for industrial applications. The company was founded by Dr. Erwin Sick more than 70 years ago.
- Today SICK has more than 9000 employees and over 50 subsidiaries worldwide. The company has extensive experience in various industries and understand the processes and requirements.
- Our devices are used for emission monitoring as well as for monitoring the effectiveness of pollution abatement systems. We have installations of continuous Mercury monitoring systems in over 40 countries around the world.
- Our contribution to the UNEP Global Mercury Partnership is our expertise in continuous on-line monitoring of gaseous mercury compounds. We support with training, consulting and wherever possible providing data for use in minimizing gaseous Mercury emissions.

2. Overview of technology/product/service provided

The MERCEM300Z extractive gas mercury analyzer monitors total Hg in flue gases.
- Applications include:
  * Emissions monitoring in flue gas from Waste incineration plants, in combustion of sewage sludge or hospital waste.
  * Flue gas monitoring upstream of a scrubber or flue gas treatment, to aid in the control of Mercury abatement systems.
3. Strengthening/Advantage

- Advantages of the MERCEM300Z include:
  * Reliable results for the actual measured values of elemental and chemically bound Hg in gases
  * Measuring ranges from 0 – 10 µg/m³ up to 0 – 1000 µg/m³ without any change of hardware
  * Smallest certified measuring range of 0 – 10 µg/m³ compliant with the newest regulations
  * Rapid response can be used for control purposes especially with rapid variation of concentration values
  * Measuring operation without using consumables for ease of use
  * Extremely low operating cost
  * Self-adjusting gas analyzer provides high long-term stability with low maintenance
  * Convenient, quick access for easy service and user-friendly remote diagnostics

4. Applicability

The MERCEM300Z has been installed in 40 countries around the world especially in Europe but also in Asia and America. The MERCEM300Z has most recently been installed in Indonesia and India to comply with the emission limits from coal fired power plants in those countries. Local service technicians perform the start-up services and can help with initial field calibration and periodic maintenance of the systems.

5. Further information

For more information about SICK AG and to find your local contact, please visit SICK.com
- [https://www.sick.com/de/en/contact/worldwide](https://www.sick.com/de/en/contact/worldwide)