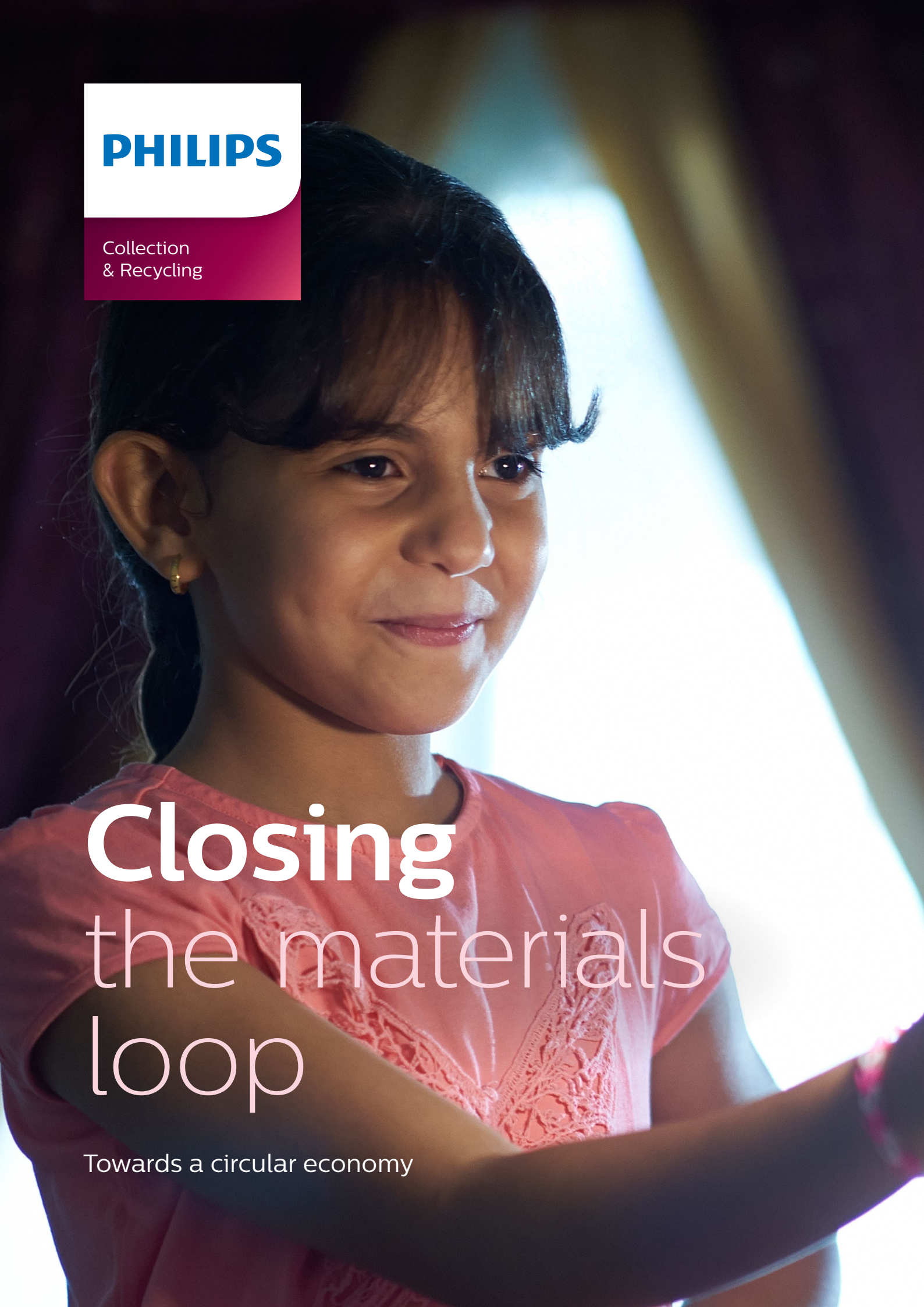




PHILIPS

Collection
& Recycling

Closing the materials loop

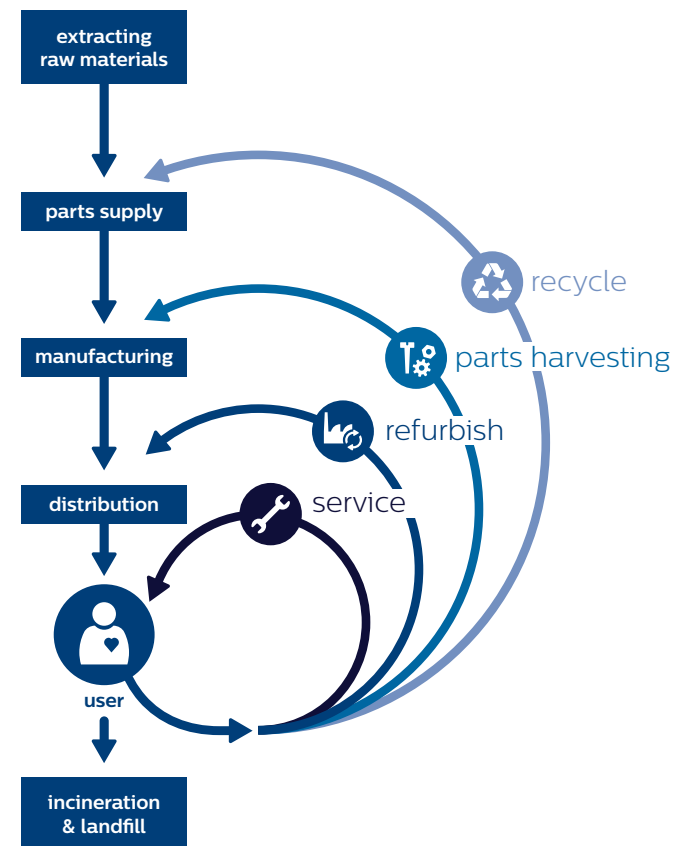
Towards a circular economy

Philips is a technology company that strives to improve people's lives and make the world healthier and more sustainable through innovation.

Our goal is to improve the lives of 3 billion people a year by 2025. To do this, we're developing innovative products and business solutions that generate value by refurbishing and reusing the parts and materials that we collect to create new products.

We work in collaboration with suppliers, peer groups, recycling companies and community organizations. So we can respond to the changing needs of our customers who want a high quality of life without overburdening the earth's scarce resources.

For a sustainable world, the transition from a linear to a circular economy is essential. A circular economy aims to decouple economic growth from the use of natural resources by using these resources more effectively. By 'closing the materials loop' we recover valuable materials from waste that can be re-used in new products.



Going beyond regulations

Waste Electrical and Electronic Equipment (WEEE) is one of the world's fastest growing waste streams. Legislation is an important driver for recycling WEEE as it ensures that all producers are committed to managing collection and recycling in a professional way.



“Philips Lighting aims to reduce the landfill disposal of electrical and electronic waste from our end-of-life products. We encourage the re-use, recovery and recycling of relevant materials, thereby improving the environmental performance over the product life cycle.”

Nicola Kimm, Head of Sustainability,
Philips Lighting

Collection & Recycling

Although there are voluntary collection programs available in some countries, most of the **Collection & Recycling** takes place in countries where recycling legislation has been implemented.

The European Union (EU) has a comprehensive set of directives. These regulate hazardous substances in products that are put on the market and dictate how electronic products are handled at the end of their life.

RoHS (Restriction of the Use of Certain Hazardous Substances in Electric and Electronic Equipment)

This directive restricts the use of certain hazardous substances in electrical and electronic equipment and components. The objective is to completely ban hazardous substances from products and components.

REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals)

The directive regulates the registration, evaluation, authorisation and restriction of chemical substances in the European market. The goal is to improve the protection of human health and the environment from the risks that can be posed by chemicals.

WEEE (Waste Electrical and Electronic Equipment) Directive

The directive aims to ensure environmentally sound disposal, recycling and re-use of electrical and electronic waste from end-of-life products.

The WEEE directive became law in 2003. In 2005, the concept of ‘producer responsibility’ was introduced which required producers to comply with the legislation and at least finance the required collection and treatment of its products. Producers have set up collection schemes with the purpose of increasing the collection and subsequent recycling and/or re-use of WEEE. The directive was reviewed and republished in 2012, and now sets higher collection and recycling targets.

The scope of the directive on WEEE covers 10 product categories. Lighting is category 5 and includes the following product sub-categories: lamps (excluding incandescent and halogen lamps, but including LED retrofit lamps), luminaires with the exception of household luminaires (consumer luminaires) and equipment for controlling and/or spreading light.



The following lamp types are included in category 5 of the WEEE legislation:

Lamp type	Description
Fluorescent lamps	Tubular fluorescent lamps
	Non tubular fluorescent lamps
	Compact fluorescent lamps (integrated and non-integrated)
LED retrofit lamps	LED bulbs
	LED spots
	LED tubes
High intensity discharge lamps (HID)	Discharge lamps

Leading the way in Europe ...and beyond

At Philips we strive to make the world healthier and more sustainable through innovation. A crucial pillar that contributes to this vision is closing the materials loop. The objective is to maximize the reuse of waste from end-of-life products.

Together with the Lighting Industry, we've established a dedicated infrastructure for the collection and recycling of lamps. The collective schemes we have established ensure sustainable financing and guarantee effective and environmentally-sound collection and recycling. This emphasis on lamps has led to best-in-class collection performance for this product category and ensures that more than 80% of the waste that is collected from lamps is re-used.

The approach outside the EU is to steer the legislation in an appropriate way to facilitate the optimal collection and recycling of lamps. Furthermore, Philips has joined the United Nations Environment Programme (UNEP) en.lighten project.

The objective of this initiative is to implement legislation for energy efficiency, collection and recycling, taking the lead in end-of-life solutions. Furthermore the Ambilamp Academy in Madrid has been founded to educate worldwide governments on the right sequence of steps to take.

Collection & Recycling

At their end of life lighting products are collected, stored, transported and treated. There are several treatment methods resulting in a number of fractions including glass, metal, plastic, fluorescent powders and mercury.

In 2003, European lamp manufacturers (including Philips) decided to found Collection and Recycling Service Organizations (CRSOs) that were dedicated to lamps. The need for this was driven by the fact that the collection and treatment of lamps is costly, whereas most other waste categories contain valuable materials that generate a residual value. The high cost for lamps is mainly due to the high

volumes with a low average weight and the special treatment required due to their fragility and the mercury that is included in most lamps types.

Separate CRSOs have been established in each EU Member State. The CRSOs manage the responsibility for disposing of WEEE on behalf of all producers or importers that participate in these collective schemes (so called participants). The CRSOs are financed via a WEEE-fee that is paid by participants as part of a pay-as-you-go scheme based on products that are put on the market.

The activities that are performed by the CRSOs are:



Managing infrastructure and transport for collection of waste



Managing the proper treatment of the waste (recycling)



Marketing activities to create awareness among end-users for correct disposal of waste

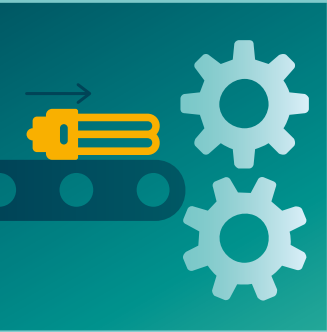


Market surveillance

Country	Lamps CRSO	Luminaires CRSO
Austria	UFH Altlampen www.ufh.at	UFH www.ufh.at
Belgium	LightRec www.recupel.be	LightRec www.recupel.be
Czech	EKOLAMP www.ekolamp.cz	EKOLAMP www.ekolamp.cz
Denmark	Lyskildebranchens WEEE Forening www.LWF.nu	Elretur www.elretur.dk
Estonia	Ekogaisma Eesti www.ekogaisma.ee	Philips is not considered to be a producer
Finland	FLIP www.flip.fi	SELT www.elker.fi
France	Récylum www.récylum.com	Récylum www.récylum.com
Germany Lightcycle	Lightcycle (Collection) www.lightcycle.de	Lightcycle (Collection & Recycling) www.lightcycle.de
Germany LARS	LARS (Recycling) www.lampen-recycling-service-gmbh.de	
Greece	Appliances Recycling S.A. www.electrocycle.gr	Appliances Recycling S.A. www.electrocycle.gr
Hungary	ELECTRO-COORD www.electro-coord.hu	ELECTRO-COORD www.electro-coord.hu
Ireland	WEEE Ireland www.weeeireland.ie	WEEE Ireland www.weeeireland.ie
Italy	Ecolamp www.ecolamp.it	Ecolamp www.ecolamp.it
Latvia	Ekogaisma www.ekogaisma.lv	Philips is not considered to be a producer
Lithuania	Ekosviesa www.eko-sviesa.lt	Philips is not considered to be a producer
Netherlands	LightRec Nederland www.lightrec.nl	LightRec Nederland www.lightrec.nl
Poland	ElektroEko www.elektroeko.pl	ElektroEko www.elektroeko.pl
Portugal	Amb3E www.amb3e.pt	Amb3E www.amb3e.pt
Romania	Recolamp www.recolamp.ro	Recolamp www.recolamp.ro
Slovakia	EKOLAMP www.ekolamp.sk	EKOLAMP www.ekolamp.sk
Slovenia	ZEOS www.zeos.si	Philips is not considered to be a producer
Spain	AMBILAMP www.ambilamp.com	AMBILAMP www.ambilamp.com
Sweden	El-kretsen www.el-kretsen.se	El-kretsen www.el-kretsen.se
United Kingdom	Recolight www.recolight.co.uk	Recolight www.recolight.co.uk

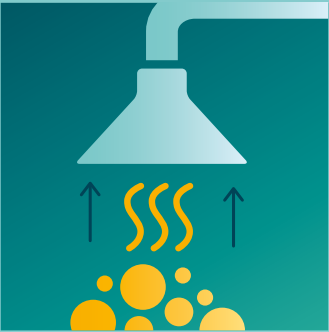
Lamp recycling is carried out by specialized treatment facilities. This recycling process ensures that over 80% of the materials resulting from recycling lamps can be re-used. The most commonly used recycling techniques for lamps that contain mercury are

crushing



01

The lamps are fed into a crushing unit, which breaks them into smaller pieces in order to facilitate further treatment and recovery of the various fragments.



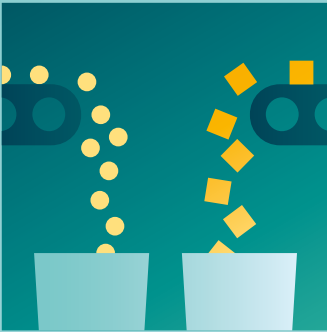
02

Activated carbon filters filter out the mercury during every step of the process and safely deposit it in a series of drums.



03

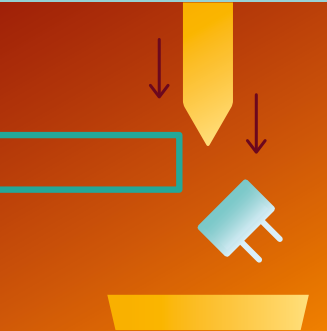
The fluorescent powder is removed in one of two ways. Using the dry technology method, the dust is sucked up using sieving or cyclones. In the wet technology method, the glass is washed and the powders are subsequently removed from the water.



04

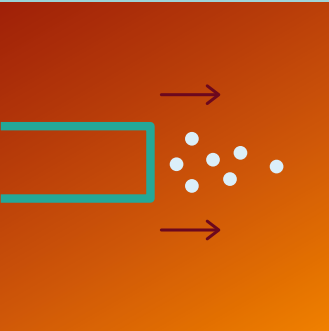
The glass is separated from the plastic/metal caps and the circuit boards. The caps are crushed and separated into separate containers. The glass is crushed into smaller pieces and sent to a rotating drum to obtain glass that is free from impurities.

cutting



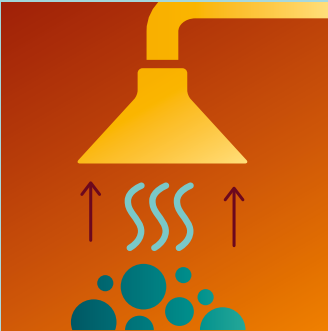
01

The ends of the tubes are heated with burners and then cut off. The parts that are separated are the aluminum caps with pins. After cutting, the ends fall into the corresponding containers.



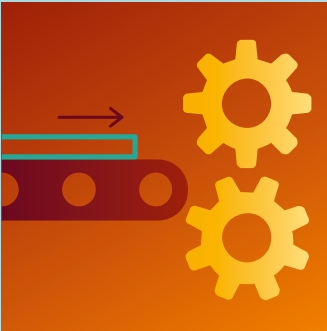
02

The glass tubes which contain fluorescent powder are blown with compressed air at one end and sucked at the other, causing the fluorescent powder to be released from the glass so it can be passed through filters.



03

Activated carbon filters filter out the mercury during every step of the process and safely deposit it in a series of drums.



04

The clear glass tubes are crushed and stored in containers for recycling later. If the clear glass index is appropriate and optimal, the glass can be recycled in other furnaces where other glass products are manufactured.

End-of-life

The crushing technique is used for all types of lamps. Lamps are crushed and the various fragments are separated by either metal separation, sieving or washing.

Photography: Wecycle Netherlands

After the treatment process, over **80%** of the materials extracted from the lamps can be re-used.



Photography: Wecycle Netherlands

The technique of cutting and separation is only used to recycle linear lamps (or tubes).

Tube end caps (essentially made of metal) are cut and separated from the glass part of the tube. These are then blown to extract fluorescent powders and mercury. The glass tube sections are cleaned and crushed. Any remaining fragments of metal are removed by a metal separator.



Photography: Wecycle Netherlands

Closed loop

Output Fraction	Purpose	Recipient
Glass	Glass	Glass industry Lamp industry
	Glazing	Ceramic industry
	Fusion agent within black copper foundry	Metal industry
	Abrasive sand for cleaning	Cleaning
	Clinker	Building/cement industry
	Sand replacement	
	Under layer for asphalt road	
	Glass wool	
	Silicon substitute	Incinerators
Caps and metallic components	Metal foundries	Metal industry
Plastics	(Mix of) plastic	Plastic industry
	Plastic waste	Energy recovery Controlled incineration Controlled landfill
Fluorescent powders	Recycling	Rare earth industry
	Recycling	Lamp industry
	Waste	Controlled landfill
Mercury	Cathode	Chlorine and caustic soda industry
	Mercury	Lamp industry
	Waste	Controlled landfill

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Typical fractions from lamps recycling

80–90%
Glass



7–14%
Metal & Plastic

1–3%
Fluorescent powder

<0,01%
Mercury

