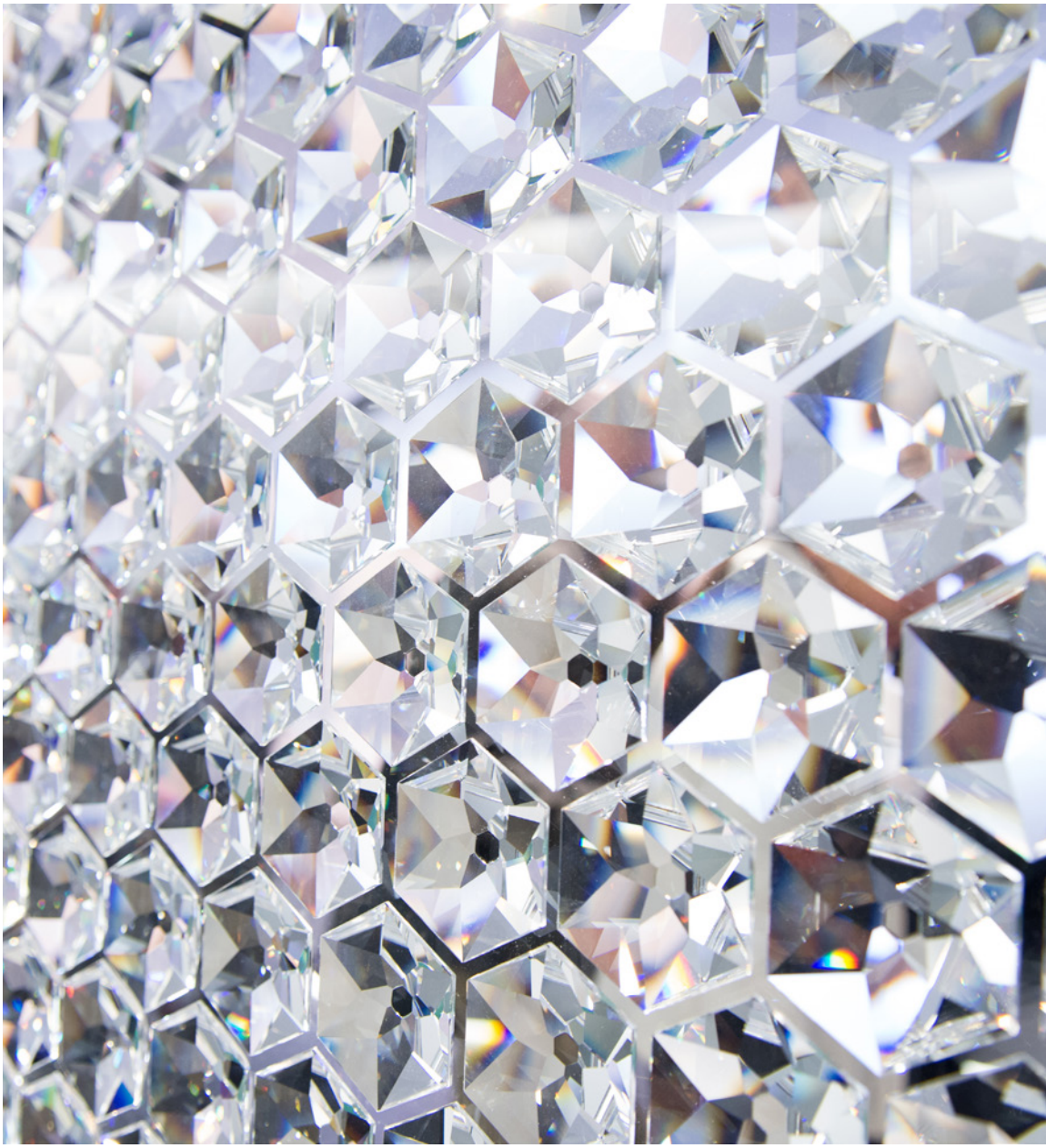

Trucost
ESG Analysis
S&P Global

SWAROVSKI

SWAROVSKI CRYSTAL GLASS ENVIRONMENTAL COST ASSESSMENT

Understanding the environmental impact of producing Swarovski crystal

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SWAROVSKI AND SUSTAINABILITY

The company was founded in 1895 by Daniel Swarovski. He understood that for his company to be successful in the long term, the communities and environment upon which it depends also need to thrive. This vision drives the company's dedication to using responsible methods which produce beautiful products that respect the wellbeing of both people and the planet.

Swarovski crystals are produced within company facilities in Austria, where we have a closed loop water recycling system to ensure we responsibly manage our usage. Also, a significant portion of our energy usage comes from renewable sources and over the last decade the company has considerably decreased its carbon emissions and energy usage[1]. Swarovski crystal adheres to a strict chemical management program. Following 12 years of intensive research all Swarovski crystal is now produced to the Advanced Crystal standard[2].

While crystals are created to last, and waste crystal is inert and harmless to the natural environment, Swarovski employs circular economy activities with used and unused crystal.

Further information on our sustainability program can be found at SwarovskiGroup.com/Sustainability.

ENVIRONMENTAL COST ASSESSMENT

Swarovski has carried out this assessment to understand the environmental cost associated with raw materials used in crystal production, to ascertain which raw materials have the greatest environmental impact and to increase transparency.

Swarovski commissioned Trucost to tailor its screening tool for an environmental cost assessment of the Swarovski crystal production process.

TRUECOST

Trucost is part of S&P Global. A leader in carbon and environmental data and risk analysis, Trucost assesses risks relating to climate change, natural resource constraints, and broader environmental, social, and governance factors. Companies and financial institutions use Trucost intelligence to understand their ESG exposure to these factors, inform resilience and identify transformative solutions for a more sustainable global economy. S&P Global's commitment to environmental analysis and product innovation allows us to deliver essential ESG investment-related information to the global marketplace. For more information, visit www.trucost.com.

Swarovski is the first crystal company and among the first jewelry businesses to publicly disclose research relating to the environmental impact of its core product, making this a pioneering transparency project.

METHODOLOGY

Trucost's screening tool enabled the cost calculation, used to quantify the environmental impact of using raw materials and chemicals in the production of Swarovski crystals. The analysis considered Swarovski's raw material extraction and processing stages, which are visualised in the outlined section of Diagram 1 (next page).

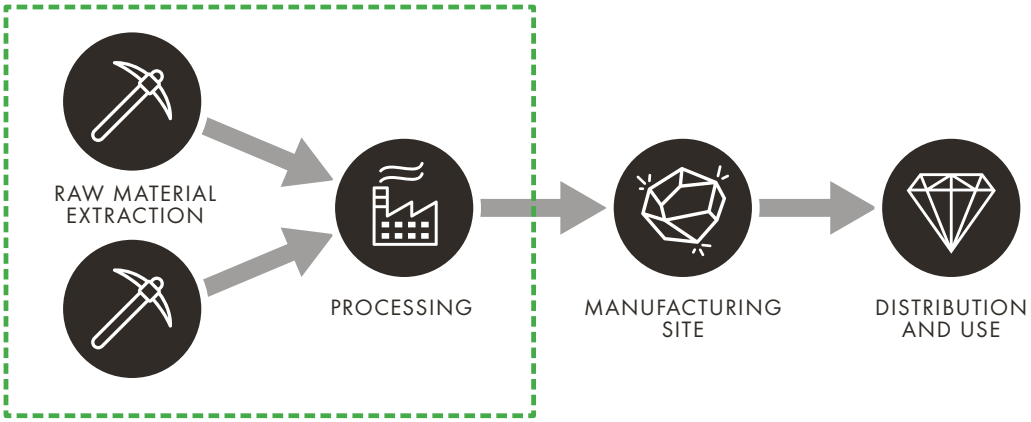

Diagram 1: Environmental Cost Assessment Scope

The analysis was based on Swarovski's 2017 production data. It assessed 53 raw materials across eight environmental impact categories, which are listed below[3]:

ENVIRONMENTAL IMPACT CATEGORIES 8 / RECIPE MIDPOINT FACTORS

Global Warming
Human Toxicity (Carcinogenic / Non-Carcinogenic)
Terrestrial / Freshwater / Marine Ecotoxicity
Freshwater Eutrophication
Marine Eutrophication
Water Consumption
Land Use
Fine Particulate Matter Formation

Trucost uses the ReCiPe method across the environmental impact categories.

Trucost's methodology accounts for impacts associated with each material, including all upstream activities, and draws on published life cycle inventory data, corporate disclosures and other official data sources.

KEY FINDINGS

The assessment used Trucost's methodology to put a financial cost on the environmental impacts for each material across the eight categories to identify where there were standout materials.

The results show on an annual basis that:

- 11 materials stood out as having higher impacts than others - with an environmental impact higher than €200,000
- 3 materials have an environmental impact €1,000,000 or higher: these are hard granulated Zinc Oxide (€3,600,000), Sodium Carbonate (€2,300,000) and Copper (II) Oxide (€1,000,000)
- Among the eight evaluated impact categories, ecotoxicity is the highest impact (equivalent to €7,600,000)
- Followed by global warming (equivalent to €1,500,000)

The overall environmental cost of Swarovski crystal glass is €2 per kilogram

JEWELLERY MATERIAL COMPARISONS

Alongside these findings, this research has enabled a comparison between Swarovski crystals and other jewelry materials that have undergone the environmental assessment[4], as seen in diagram below. Swarovski crystal compares positively – making it a more responsible choice for customers.

IMPACT IN € PER KG MATERIAL[5]

CONCLUSIONS AND NEXT STEPS

This analysis has deepened Swarovski's understanding of the environmental impact associated with the production of Swarovski crystal. With this research, Swarovski is now able to:

- Focus its efforts on the higher impact materials identified in this assessment;
- Make informed decisions on material and design options;
- Understand and manage the specific risks for each raw material; and,
- Set targets, measure progress and report on improvements

Swarovski will investigate possible options for substituting higher impact materials, and in the meantime will increase the efficiencies in the processing of these materials.

Swarovski strives to offer the most responsible and transparent crystal on the market. This is part of our offer of what we call *conscious luxury*.

APPENDIX

(1) Swarovski 2017 Sustainability Report
https://www.swarovskigroup.com/S/aboutus/Sustainability_report_2017_final.pdf

(2) Following 12 years of intensive research, all Swarovski crystal is now produced to the Advanced Crystal standard – this includes the crystals used in our jewelry and lighting. Advanced Crystal is an innovative, lead-free* formula which is patented by Swarovski in the US, Japan and 16 European countries. Advanced Crystal has raised the bar for quality and sustainability in the industry, offering our customers crystal of the highest quality, whilst ensuring our products meet and surpass legislation, regulations and industry standards. As a result of Advanced Crystal, Swarovski now leads the industry in sustainable crystal composition. *Crystal glass and all other materials containing 0.009% lead or less

(3) 8 RECIPE MIDPOINT H CHARACTERIZATION FACTORS

ReCiPe MidPoint H Characterization Factors	Units	Description
Global Warming	kg CO2e	The global warming potential expresses the amount of additional radiative forcing integrated over time (100 years in this case) caused by an emission of 1kg of a greenhouse gasses relative to the additional radiative forcing caused by the release of 1 kg of CO2.
Fine Particulate Matter Formation	kg PM2.5 eq	This quantifies the potential increase in human morbidity and mortality due to fine partciluates being emitted to air. Air pollution that causes primary and secondary aerosols in the atmosphere can have a substantial negative impact on human health, ranging from respiratory symptoms to hospital admissions and death. Fine Particulate Matter with a diameter of less than 2.5 µm (PM2.5) represents a complex mixture of organic and inorganic substances. PM2.5 causes human health problems as it reaches the upper part of the airways and lungs when inhaled. Secondary PM2.5 aerosols are formed in air from emissions of sulfur dioxide (SO2), ammonia (NH3), and nitrogen oxides (NOx), among other elements.
Freshwater Eutrophication & Marine Eutrophication	kg P eq	Quantifies the eutrophication potential of a substance in freshwater relative to phosphorus (P), or in marine water relatative to nitrogen (N). Emissions to seawater do not lead to freshwater eutrophication as there is no transport from seawater to freshwater. Characterization of aquatic eutrophication in LCIA typically only takes into account those nutrients that are limiting the yield of aquatic biomass, which is merely phytoplankton (algae) but also duckweed. Biomass growth in different aquatic ecosystems may be limited by different nutrients. "Limiting" implies that only one nutrient is controlling the growth of these primary producers and that there is an excess of the other nutrients. Most of the time, aquatic ecosystems are saturated by either nitrogen or phosphorus. In temperate and sub-tropical regions of Europe, freshwaters are typically limited by phosphorus, whereas nitrogen usually limits production of algal biomass in marine waters.
Terrestrial Ecotoxicity Freshwater Ecotoxicity Marine Ecotoxicity Human Toxicity (Carcinogenic) Human Toxicity (Non-Carcinogenic)	kg 1,4-DCB eq	The chemical 1,4-dichlorobenzene (1,4-DCB) is used as a reference substance in the midpoint calculations by dividing the calculated potential impact of the chemical by the potential impact of 1,4-DCB emitted to urban air for human toxicity, to freshwater for freshwater ecotoxicity, to seawater for marine ecotoxicity and to industrial soil for terrestrial ecotoxicity. Humans are exposed to these pollutants through inhalation of urban air, ingestion via root crops, leaf crops, meat, dairy, eggs, freshwater, marine dish, and drinking water.
Land Use	m2a crop eq	The impact of land transformation and occupation are based on relative species losses. The impact of land use on relative species richness is assessed here through a comparison of species richness in a certain land use situation with the situation in a reference state. This approach assumes that a natural situation would be present had no land use occurred. Therefore, the species richness of the current, anthropogenic land use is compared with the natural reference, not accounting for any other anthropogenic land uses that may have been in place before the current land use.
Water Consumption	m3	Water consumption is the use of water in such a way that the water is evaporated, incorporated into products, transferred to other watersheds or disposed into the sea. Water consumption is the amount of water that the watershed of origin is losing. This is not water extraction, which is the withdrawal of water from surface water bodies or the abstraction of groundwater from an aquifer irrespective of return flows to the water bodies or water use efficiencies.

(4) Trucost & Pandora Group – Material Sourcing Natural Capital Assessment, 2017

(5) MATERIAL CHOICES AND THEIR IMPACTS SELECTED FOR COMPARISON

Material Choice	Life Cycle Coverage	Key Performance Indicators (KPI)
Mined Gold vs Recycled Gold	Cradle to pure gold ingots	Greenhouse gases Air Pollution Land Occupation Water Depletion Land & water pollution Greenhouse gases Air pollution
Mined Silver vs Recycled Silver	Cradle to pure silver ingots	
Diamond vs Cubic Zirconia	Cradle to unrefined stones (excluding cutting and polishing)	