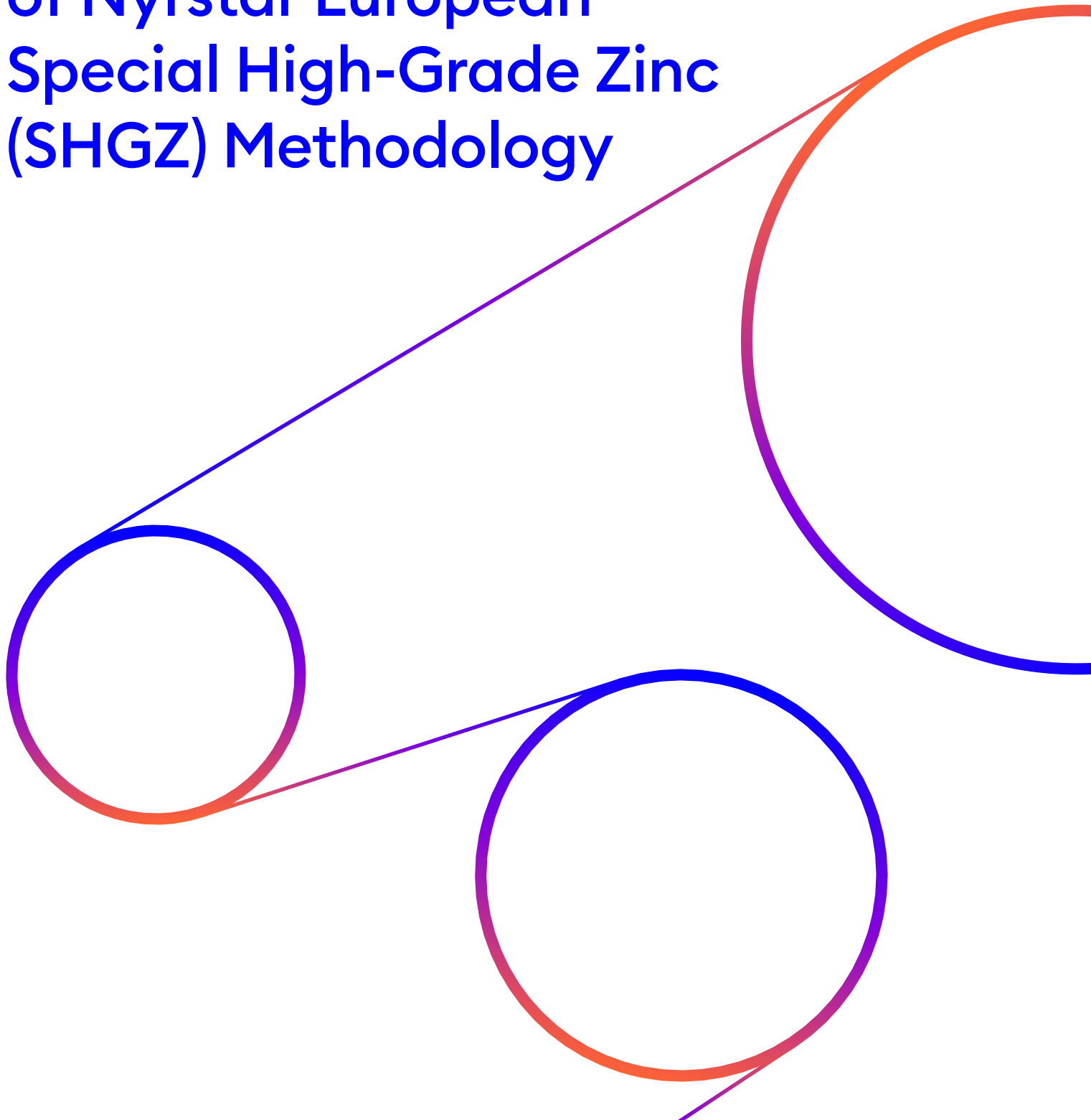# Trafigura

# Life Cycle Assessment of Nyrstar European Special High-Grade Zinc (SHGZ) Methodology

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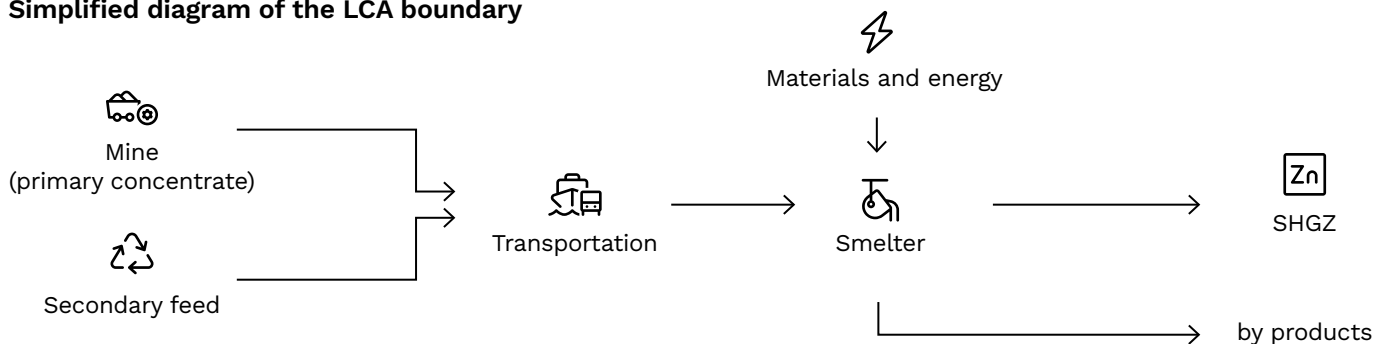
## 1. Introduction

This assessment has been completed in connection and collaboration with LCA studies conducted by the metal associations International Zinc Association (IZA) 2021, in conjunction with Sphera.

Life Cycle Assessment (LCA) is a decision-making tool to identify environmental burden and evaluate the impact on the environment caused by a material, product, process, or service over its life cycle from cradle to gate (typical for basic raw materials and commodities) or cradle to grave (typical for products and services). LCA has been standardized by the International Organization for Standardization (ISO 14040 and 14044) and forms the conceptual basis for management approaches and standards as well as for regulations and product design. Where guarantees of origin (GOOs) are purchased, they have been taken into consideration as part of the LCA.

## 2. Boundary setting

The boundary of this assessment focuses on the production of special high grade zinc from cradle-to-gate including mining, transportation and smelting. Smelting operations fall under Nyrstar Scope 1 and 2 emissions with transportation, feedstock and other inputs falling under Scope 3. The LCA has taken into consideration the primary production of SHGZ from zinc concentrate and Waelz oxides. For the purposes of this study, downstream emissions have not been taken into consideration.

**Simplified diagram of the LCA boundary**

## 3. Data collection and quality

As per the GHG Protocol Product Life Cycles Assessment we have collected data for processes included within the inventory boundary and where Nyrstar has ownership or control, primary data has been collected. As part of the LCA, all secondary data was modelled to be specific to the technologies or technology mixes or country or regions under study. Where this data was unavailable, proxy data was used.

As per the GHG Protocol, the quality of the data has been assessed against the 5 key indicators: technological representativeness, temporal representativeness, geographical representativeness, completeness and reliability.

The data taken into consideration for the LCA study includes primary data associated with the smelting operations. All primary data has been assured as part of the Trafigura third party limited assurance process undertaken on an annual basis. For further details please see page 4, section 8, Assurance.

## 4. Allocation

Applying a mass allocation approach separates the zinc produced from Nyrstar smelters into two products with primary feedstocks and secondary feedstocks. The mass balance approach ensures that the volume of material entering the process is equivalent to the volume of material produced.
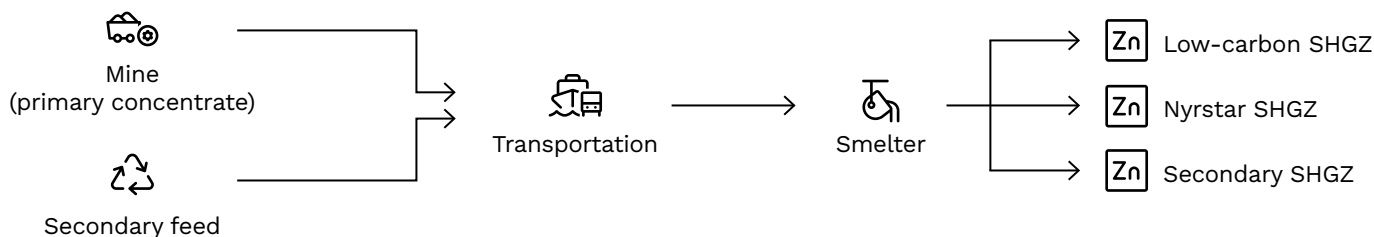


## 5. Uncertainty

The LCA methodology applies procedures to account for co-products associated with the production of SHGZ. Through system expansion by substitution, the environmental impact of sulphuric acid, including GWP, is subtracted from the SHGZ LCA output in the form of a credit. Due to the assumptions made this could lead to double reporting of associated environmental impacts. We will look to expand the LCA assessments to cover co-products produced across the smelters to overcome this. Where there are other uncertainties associated with the data, the best available proxy datasets have been used.

Nyrstar took part in the IZA, the Zinc environmental profile, Life Cycle Assessment, 2023 Updated based on 2021 Industry Data (scan the QR code for more information). The IZA LCA methodology considered a location-based approach. In addition to the IZA LCA study, Nyrstar requested additional outputs from the Sphera Zinc model to apply a market-based approach to include the purchase of guarantees of origin.

Zinc environmental profile,
Life Cycle Assessment, 2023:

## 6. Results of the LCA Study

### Zinc industry averages

As published by the IZA, the Zinc environmental profile, Life Cycle Assessment, 2023 Updated based on 2021 Industry Data sets out the average global warming potential across the zinc industry at a global and European level. Please refer to table 1.

Table 1. The 2021 average GWP of SHGZ production across the zinc industry considering primary production and primary production with 14% recycled content.

Within the IZA LCA update it was discovered that on average about 14% of all zinc produced came from Waelz oxides.

**Table 1.**

| | GWP tCO$_2$e/tSHGZ |
|---|---|
| Global Average – primary production | 3.50 |
| Global Average – primary production with 14% recycled content | 3.80 |
| European Average – primary production | 2.00 |
| European Average – primary production with 14% recycled content | 2.50 |

### Nyrstar European Smelter GWP Results

The detailed results of the assessment are shown in table 2. The GWP has been split by the main feedstocks, primary concentrates and secondary Waelz oxides. Waelz oxides have a high GWP due to the recycling process. Comparably, primary concentrate feedstocks have a lower GWP.

Table 2. The 2021 GWP of SHGZ across the European Nyrstar smelters considering GWP with a mixture of primary and secondary feed, GWP where only primary feed is considered and GWP where only Waelz oxide is considered.

**Table 2.**

| | | Nyrstar European Average (Inclusive of Guarantees of Origin) |
|---|---|---|
| tCO$_2$e/tSHGZ | GWP | 1.86 |
| | GWP Only Primary feedstock | 1.06 |
| | GWP only Secondary feedstock | 3.86 |

## 7. Conclusions

In comparison, Nyrstar European SHGZ average GWP is lower than the Global and European average GWP results, as per the IZA LCA study.

By applying a mass balance approach, we are able to produce three product types. A 'low-carbon' primary concentrates SHGZ, a 'secondary' product type and a Nyrstar SHGZ.

## 8. Assurance

All primary data has been assured to a limited level of assurance as part of the Trafigura annual third-party assurance process. Please scan the QR code for details. We are currently seeking additional assurance for the GWP outputs of the LCAs.

Trafigura annual third-party assurance process: