Wuppermann

Greenhouse gas balancing of the hot strip galvanizing and tube production of the Wuppermann Group

General information

Wuppermann AG

Contractor
Fraunhofer Institute for Environmental, Safety and and Energy Technology UMSICHT
Osterfelder Strasse 3
46047 Oberhausen

Holder of the LCA
Wuppermann AG
Ottostrasse 5
51381 Leverkusen
Germany

Objective
Preparation of a greenhouse gas balance for hot strip galvanizing and tube production of the Wuppermann Group

Functional units
1 t hot-dip galvanized steel strip
1 t longitudinally welded steel tube

Primary data:
Wuppermann based on a process questionnaire from Fraunhofer UMSICHT

Period data acquisition
01.01.2022 to 30.06.2022

Secondary data
Life cycle assessment databases GaBi SP 43 and ecoinvent 3.8

Date of issue
December 2022

Reference data sets
GaBi SP 43 based on methodology worldsteel organization

Climate impact expressed in t CO_2 equivalents (CO_2 -eq.) per t of hot-dip galvanized steel strip or per t of longitudinally welded steel tube

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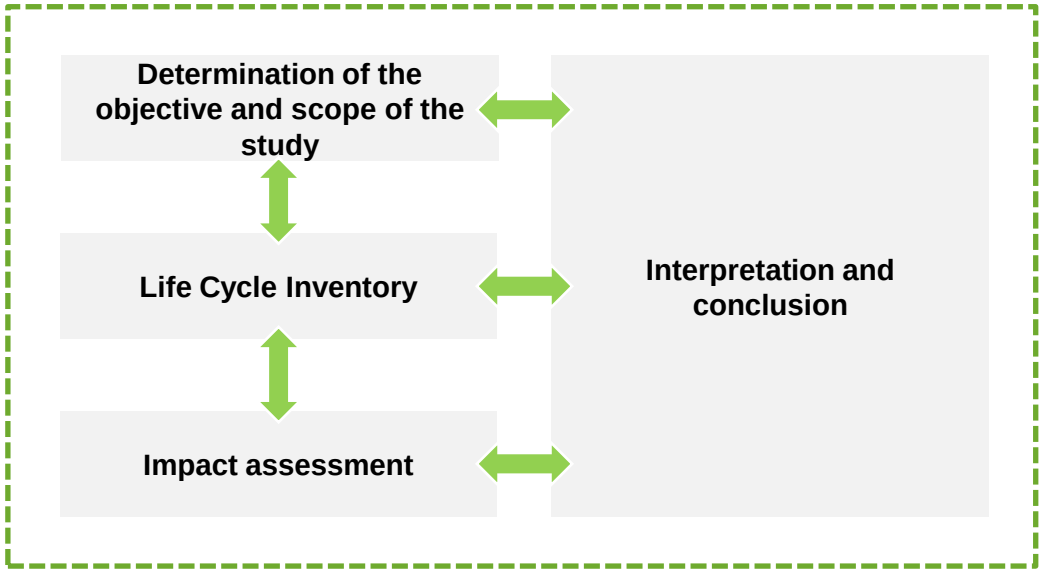
Basics of life cycle assessment



- Standardized procedure according to DIN EN ISO 14040 for determining the environmental impact of products
- Set up of the Wuppermann AG's process for the production continuously hot-dip coated steel strip
- Possibility of recording all relevant potential effects (focus on greenhouse gas emissions) on the environmental compartments
- Consideration of the material flows of raw material inputs and emissions linked to the system to be assessed

Target	• Greenhouse gas balancing of the hot strip galvanizing and tube production of the Wuppermann Group
Balance sheet area and time reference	• Gate-to-Gate (processing at Wuppermann) and Cradle-to-Gate (product incl. upstream stages of the value chain) • Period data acquisition 01.01.2022 to 30.06.2022
Functional units	• 1 t hot-dip galvanized steel strip • 1 t longitudinally welded steel tube
Environmental impact considered	• Climate impact in t CO_2 equivalents per t of hot-dip galvanized steel strip or per t of longitudinally welded steel tube
Systematics	• Consideration of co-products using mass allocation and system space expansion. • Life Cycle Assessment Software GaBi SP 43

Data basis

Wuppermann

- Primary data from Wuppermann AG based on a process questionnaire from Fraunhofer UMSICHT.
  - Site-specific process technology information from WH, WSN, WA, WMT & WPL.
  - Consideration of the utilization of by-products and disposal of residual materials
- Secondary data for the representation of upstream and downstream processes
  - Life cycle assessment databases GaBi SP 43 | ecoinvent 3.8
  - Use of region-specific data sets on energy sources and transports
- Electricity mix information from suppliers' certificates[1] for WA, WMT, WSN
- Unless otherwise stated, the graphics are based on data provided by Wuppermann AG.

Reference

- Data set for the production of continously hot-dip galvanized steel strip
  - " Steel sheet 1.5 mm HDG (ø 0.02 mm Zn; ø 275g/m^2 ; 2 sides); BF route[2] " for Germany
- Data set for the production of cold rolled steel strip
  - "Steel cold rolled coil 1.5 mm; BF route[3] " for Germany
- Data set for the production of hot strip
  - "Steel hot rolled coil (EN15804 A1-A3); BF route[4] " for Germany
- Accounting follows the methodical approach of the worldsteel organization

1 https://www.wuppermann.com/en/downloads/#idCertificate
2 http://gabi-documentation-2020.gabi-software.com/xml-data/processes/516653dd-467e-4c3d-80ef-308a8b9ed6cb.xml
3 http://gabi-documentation-2020.gabi-software.com/xml-data/processes/cfb5da9c-9610-4651-a54b-d89dbf88ca66.xml
4 http://gabi-documentation-2020.gabi-software.com/xml-data/processes/4672623a-fdf6-41ce-b838-d723d5d89280.xml

Wuppermann

WBS
IT Services

Business Unit Flat

WSN, NLS
Plant Moerdijk, Netherlands

WH, WHLS
Plant Győr-Gönyű, Hungary

WS
Sales, Purchasing

WF, WOR, WTS, Galva
Sales companies

WE
Research & Development

Staba / WT
Licenses

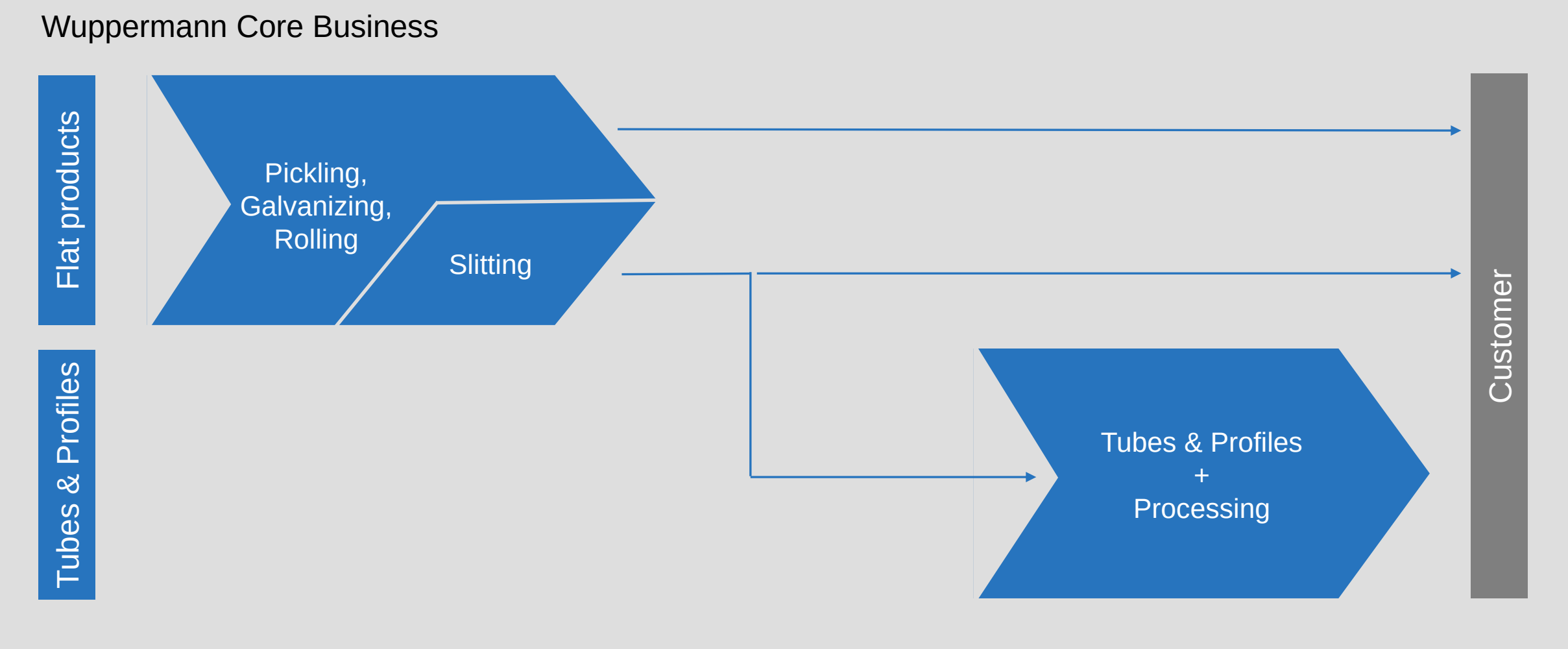
Business Unit Tube

WMT
Plant Altmünster, Austria

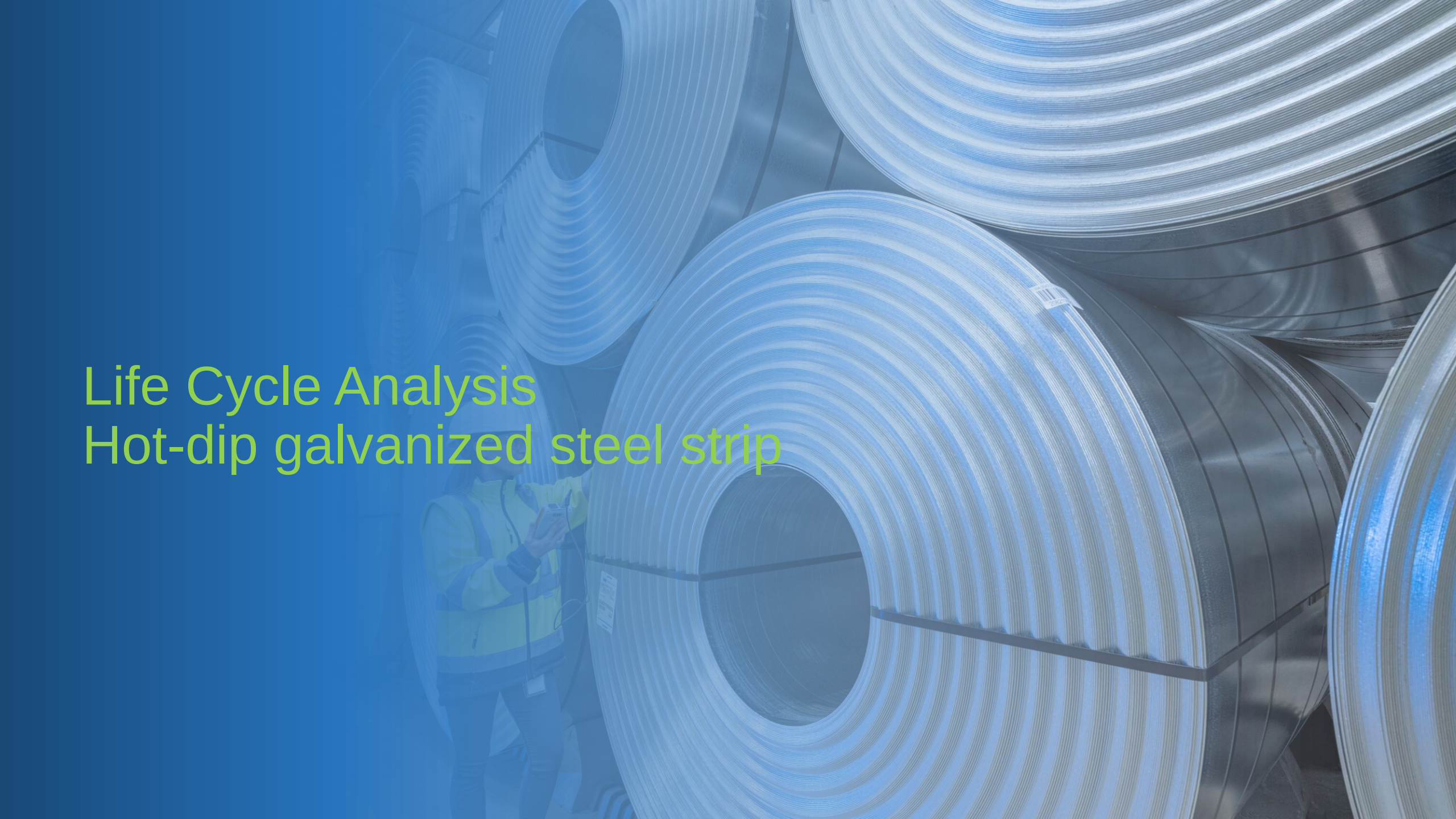
WA
Plant Judenburg, Austria

WPL
Plant Małomice, Poland

Wuppermann offers a wide range of products from its own production

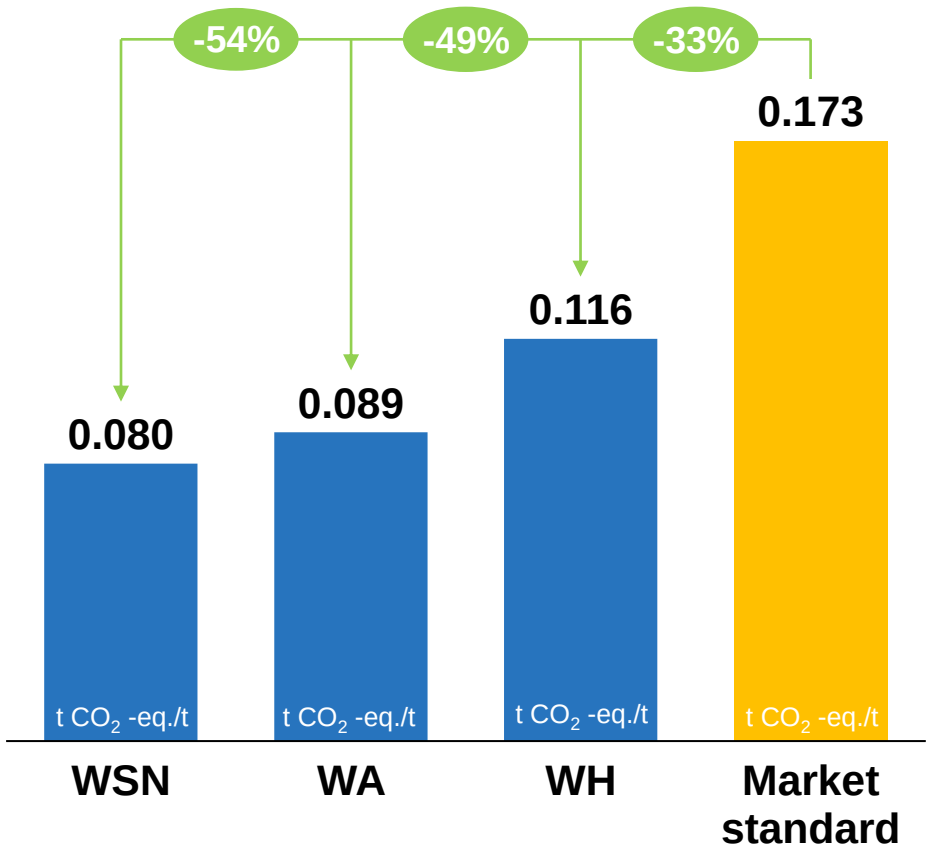


Life Cycle Analysis
Hot-dip galvanized steel strip

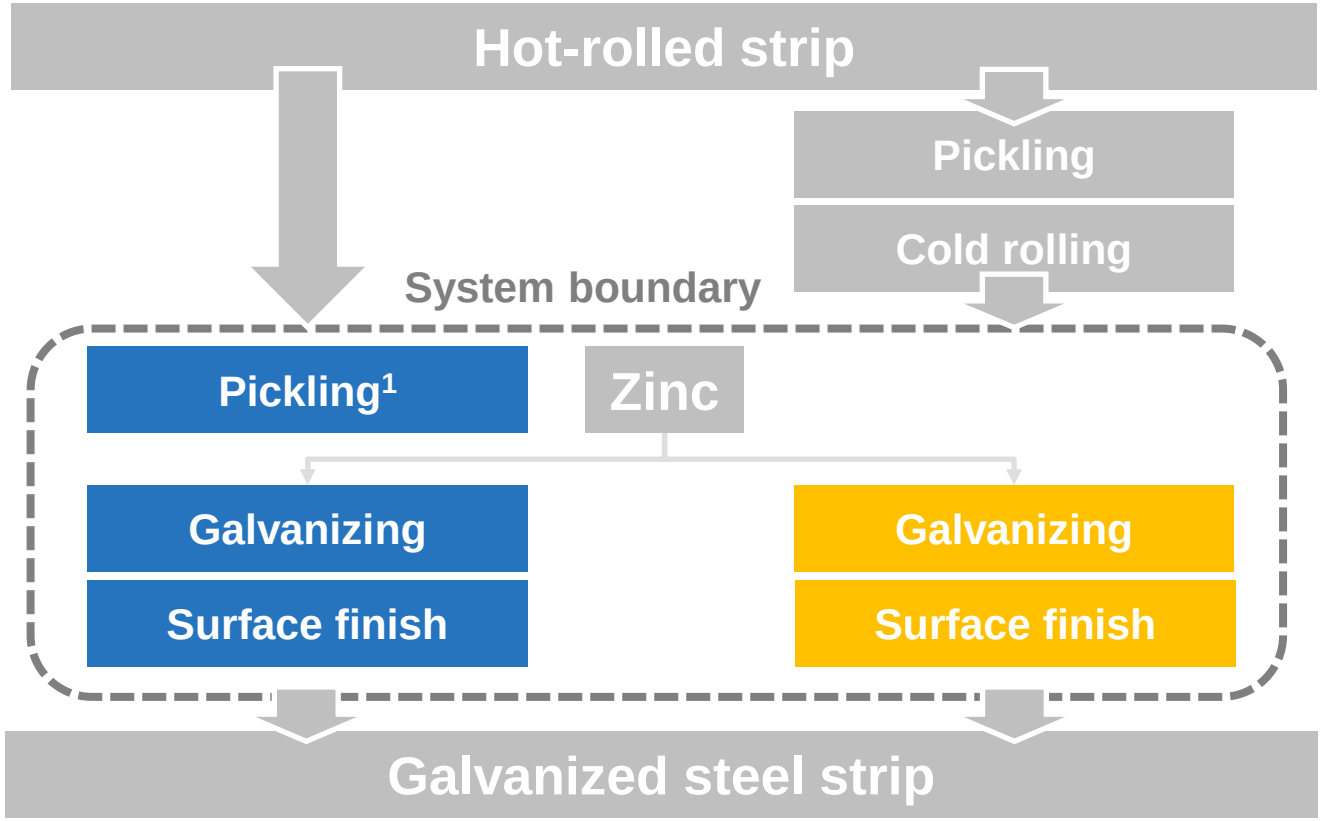


Environmental impact of the Wuppermann Group's "Heat-to-coat" strip galvanizing process

Overview CO_2 emissions production sites

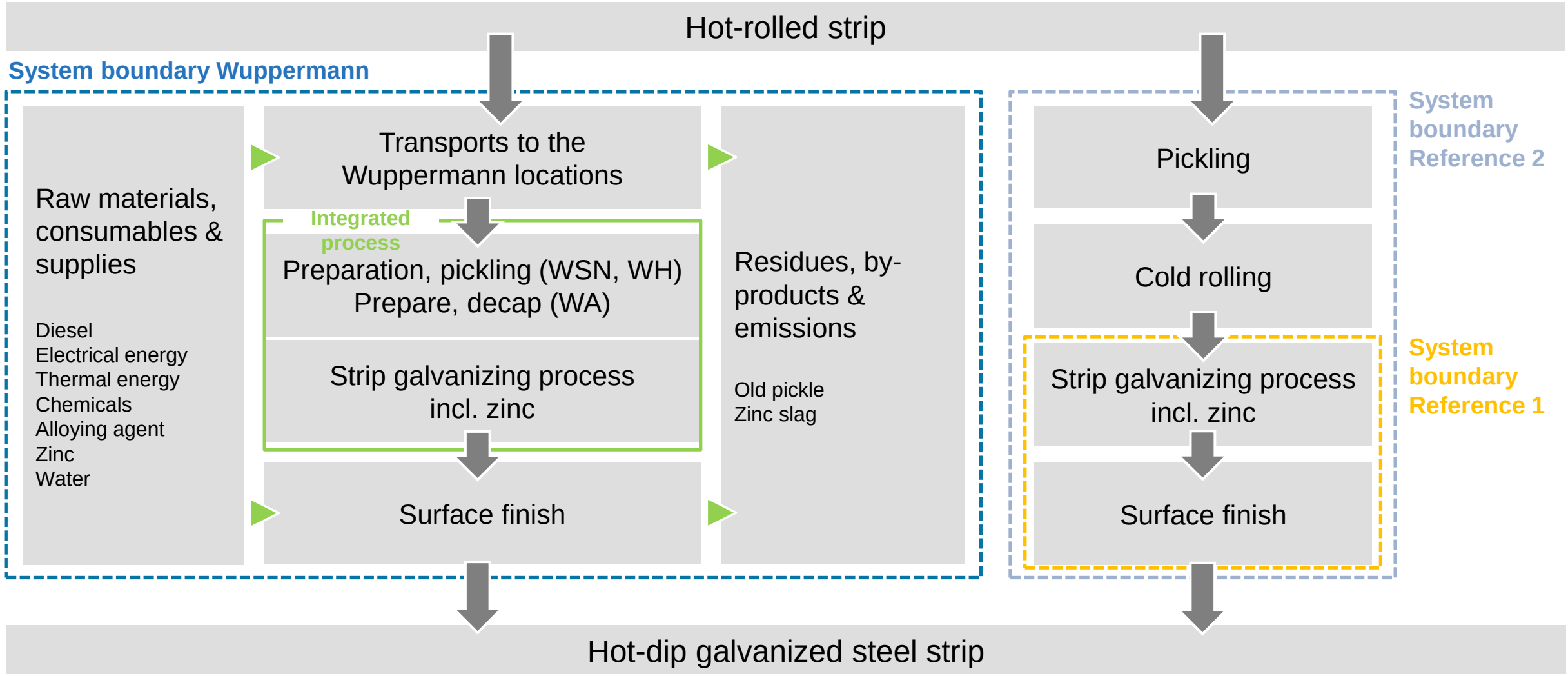


Gate-to-Gate consideration



[1] WH & WSN only

System boundary hot-dip galvanized steel strip



Differences between the "heat-to-coat" process and the reference process of cold strip galvanizing

Strip galvanizing process

Wuppermann	Reference
Hot-rolled steel strip	Cold-rolled steel strip
	Gas-fired preheating furnace: recrystallization annealing at approx. **750** °C
Electric induction furnace: Heating up to galvanizing temperature	Cooling to galvanizing temperature
Galvanizing at approx. **450°C**	Galvanizing at approx. **450°C**
Galvanized steel strip	

Key differences:

1) Maximum temperature in the Wuppermann process: approx. 450°C instead of 750°C
2) Wuppermann does not use fossil fuels (gas) in the process

- Lower energy consumption
- CO_2 emissions dependent on energy consumed

Wuppermann Staal Nederland B.V., Moerdijk (NL) | WSN

Employees: ~150*

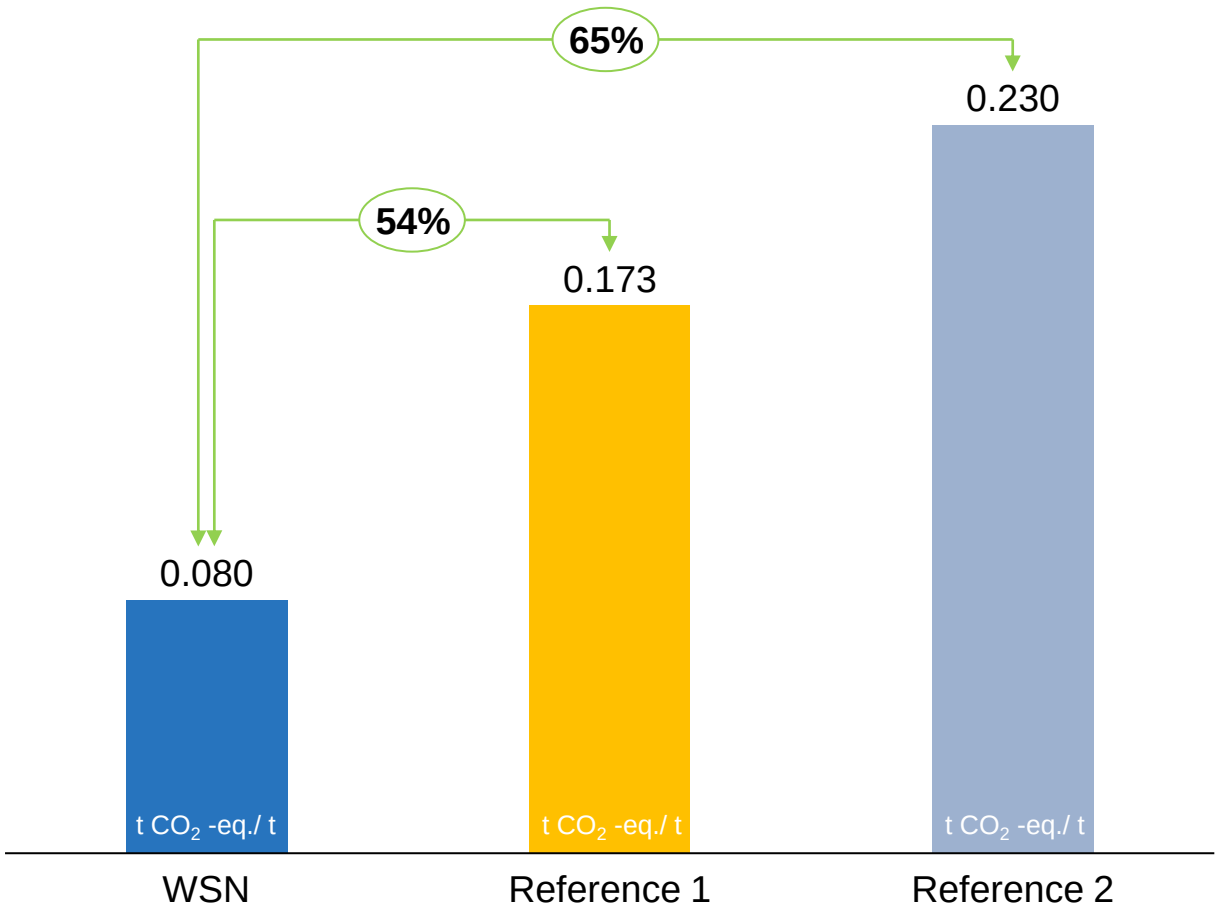
Products
Galvanized steel strip
Pickled steel strip

Strip galvanizing line
Thickness:
1.50 to 4.20 mm

Width:
950 to 1,560 mm,
Slit strip from 20 mm

Coating:
Zinc up to 600 g/m²

Environmental impact of galvanizing process
Zinc coating thickness 275 g/m²

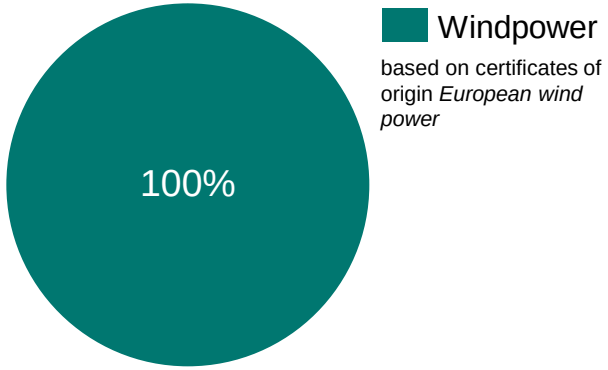


System boundary see p.9

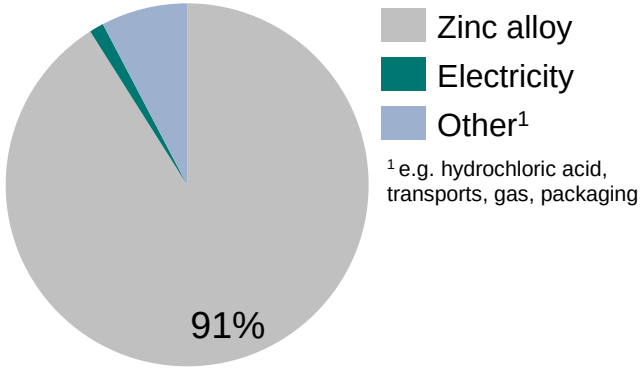
* at the Moerdijk site

Evaluation WSN | Zinc coating thickness 275 g/m²

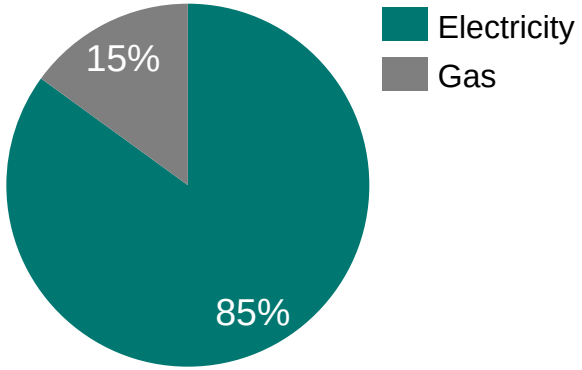
Electricity composition [in %]



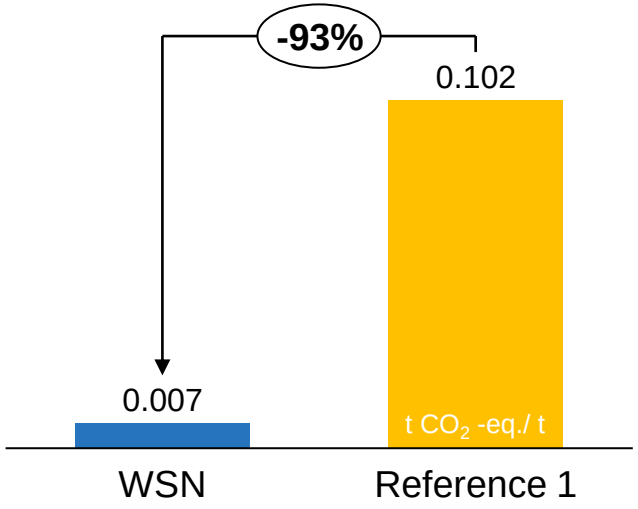
CO_2 -eq. contribution per source [in %]



Primary energy consumption [in %]



CO_2 emissions excl. zinc alloy [in t CO_2 -eq. / t].



Wuppermann Austria GmbH, Judenburg (AT) | WA

Employees: ~105

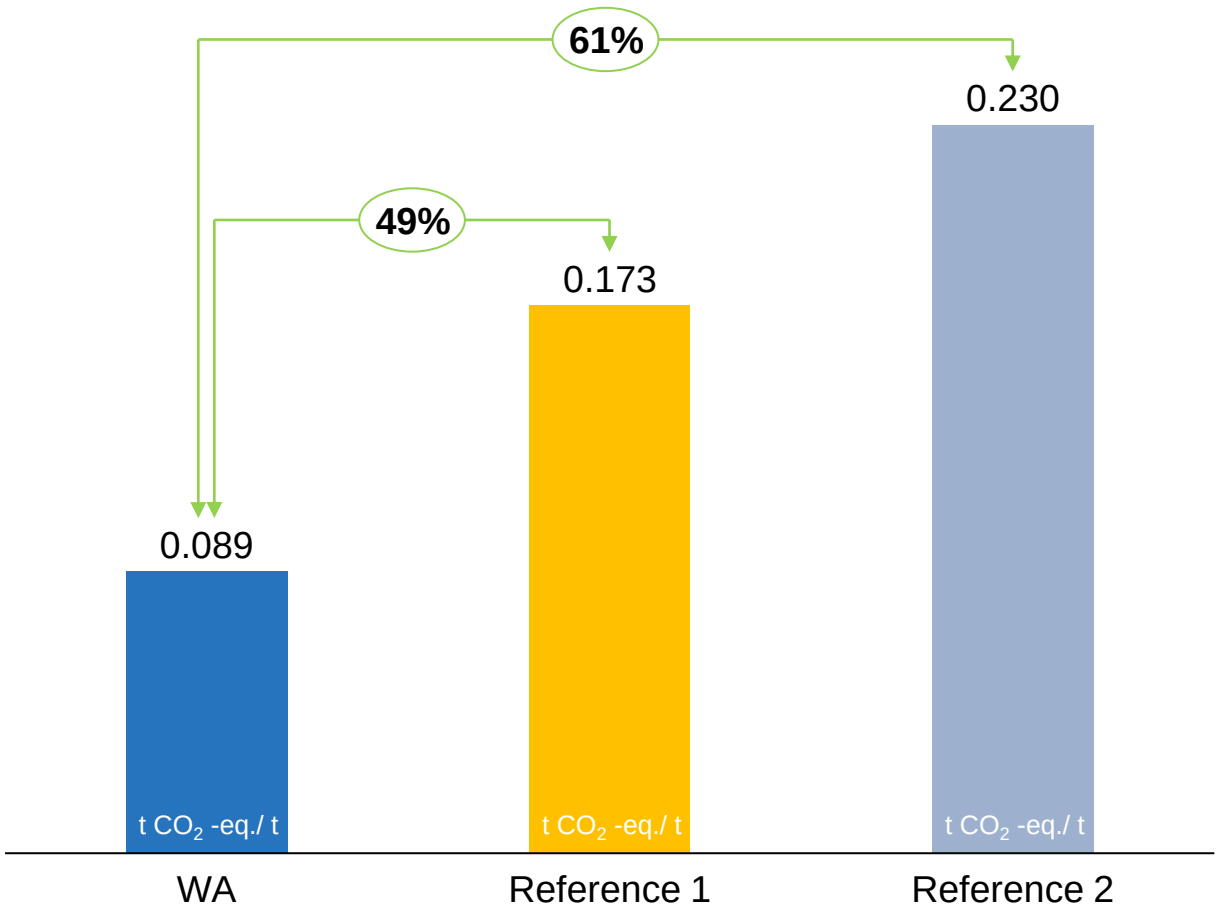
Products
Galvanized slit strip

Strip galvanizing line
Thickness:
1.25 to 5.00 mm

Width:
20 to 400 mm

Coating:
Zinc up to 1,200 g/m²
Zinc magnesium up to 1,000 g/m²

Environmental impact of galvanizing process
Zinc coating thickness 275 g/m²

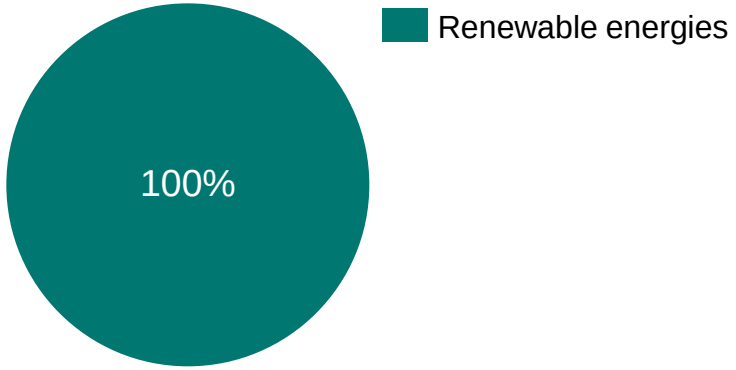


ZM275 = 0.088 t CO_2 -eq./ t

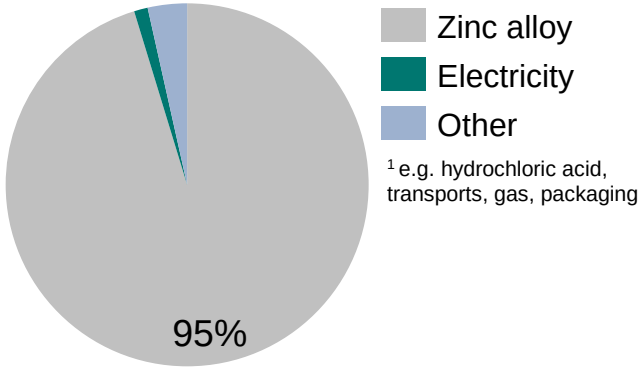
System boundary see p.9

Evaluation WA | Zinc coating thickness 275 g/m²

Electricity composition [in %]

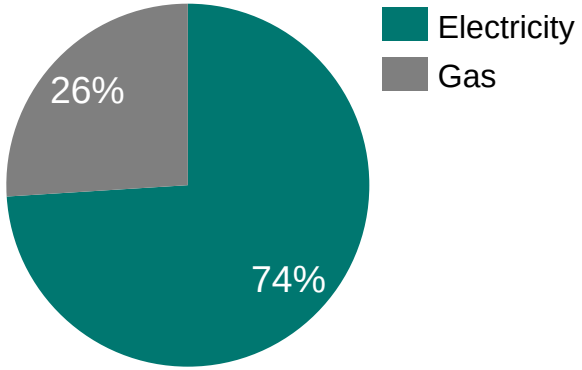


CO_2 -eq. contribution per source [in %]

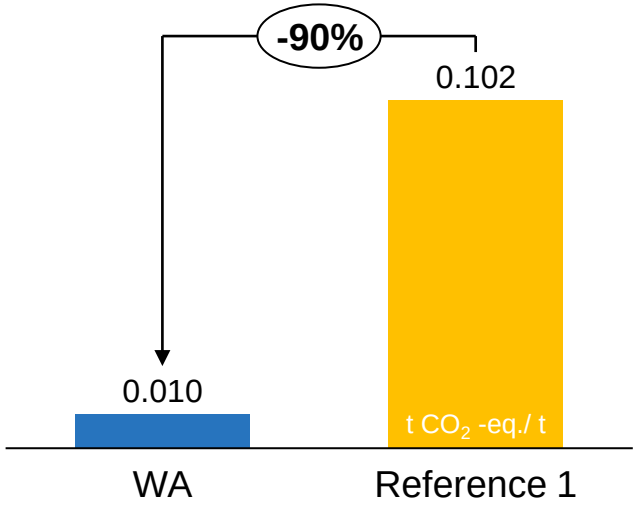


[1] e.g. hydrochloric acid, transports, gas, packaging

Primary energy consumption [in %]



CO_2 emissions excl. zinc alloy [in t CO_2 -eq. / t].



Wuppermann Hungary kft, Győr (HU) | WH

Employees: ~200*

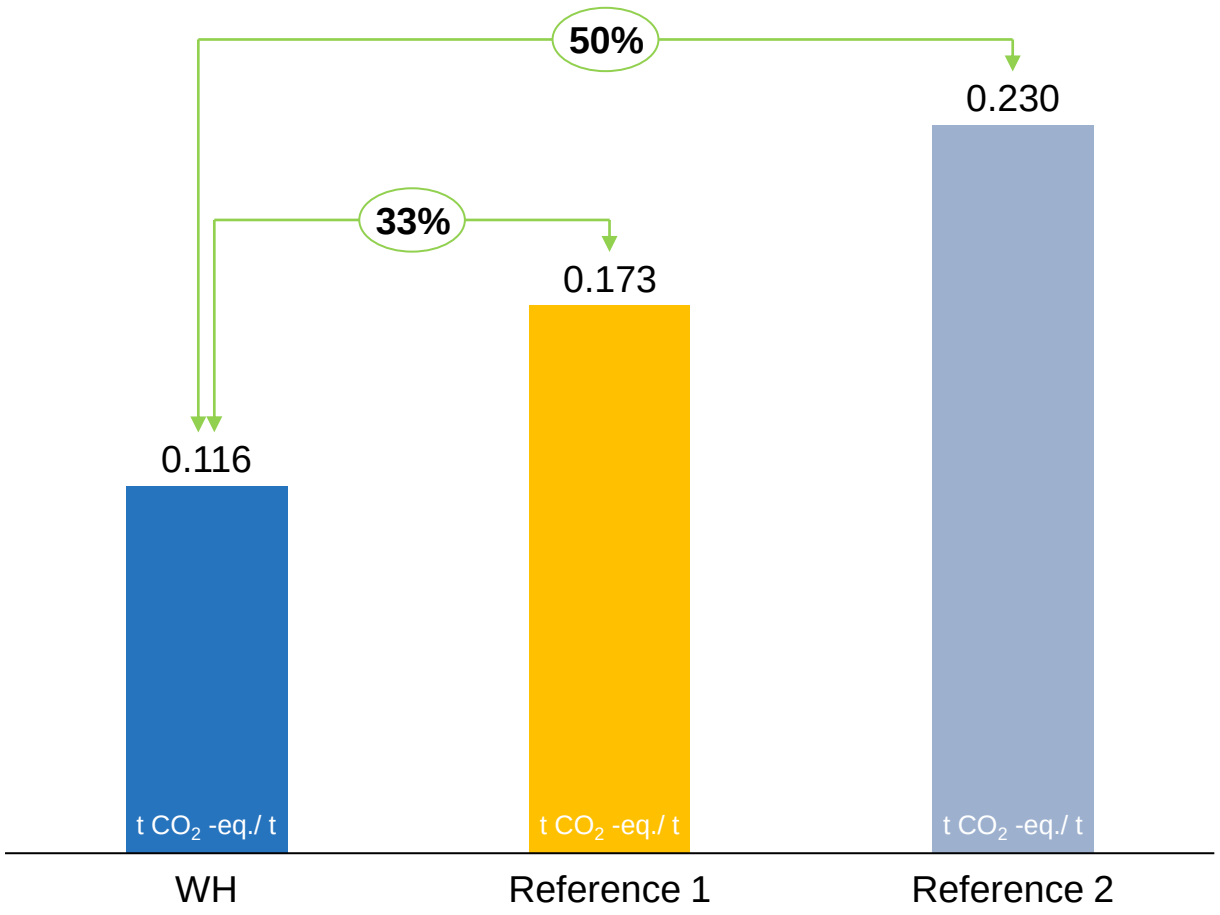
Products:
Pickled steel strip
Galvanized steel strip
Steel strip with zinc magnesium
WProtect

Strip galvanizing line
Thickness:
1.00 to 6.00 mm

Width:
600 to 1,650 mm,
Slit strip from 20 mm

Coating:
Zinc up to 1000 g/m²
Zinc magnesium up to 310 g/m²

Environmental impact of galvanizing process
Zinc coating thickness 275 g/m²

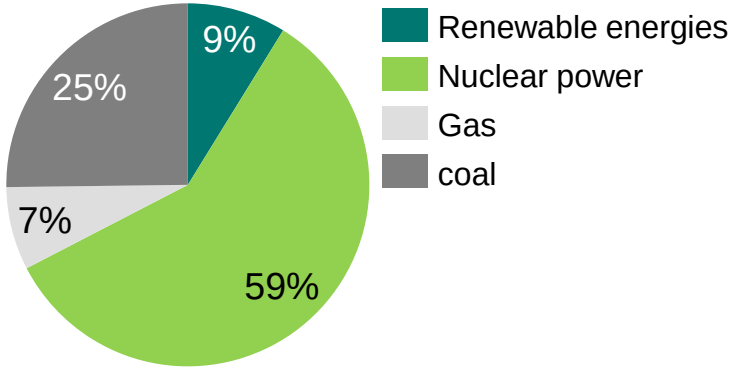


System boundary see p.9

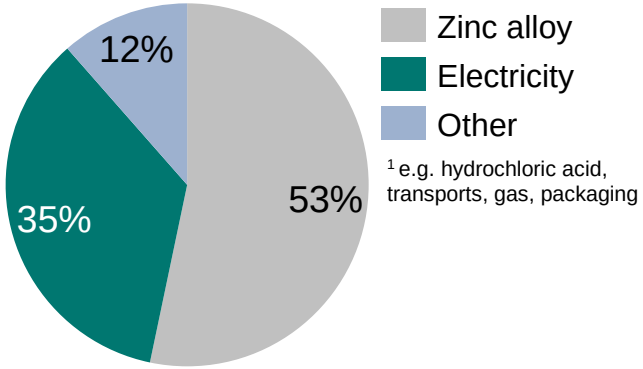
* at the Győr site

Evaluation WH | Zinc coating thickness 275 g/m²

Electricity composition [in %]

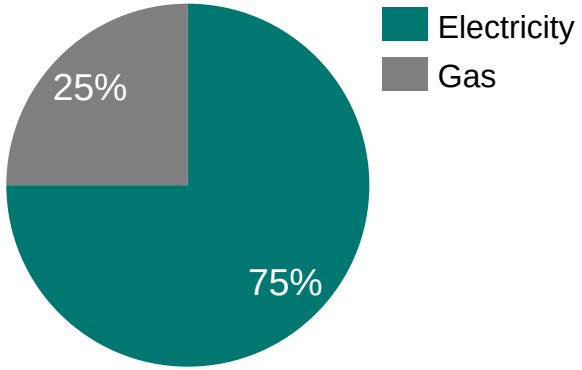


CO_2 -eq. contribution per source [in %]

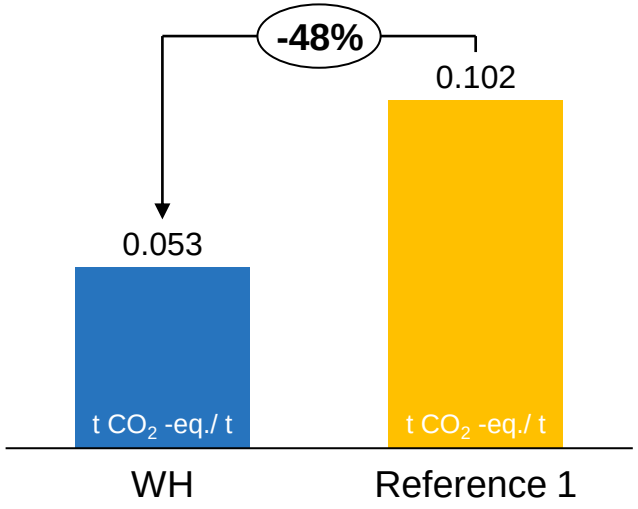


[1] e.g. hydrochloric acid, transports, gas, packaging

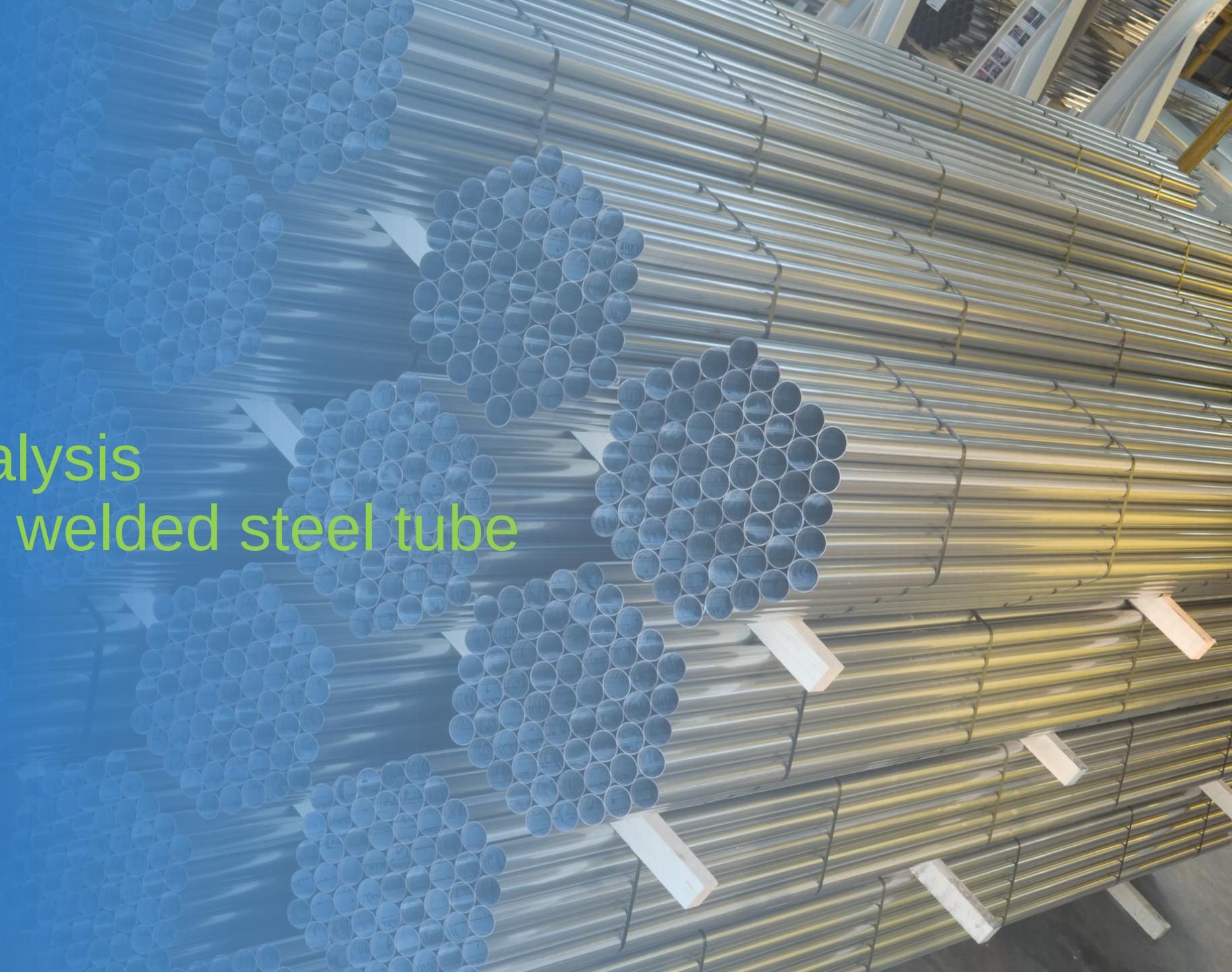
Primary energy consumption [in %]



CO_2 emissions excl. zinc alloy [in t CO_2 -eq. / t].



Life Cycle Analysis
Longitudinally welded steel tube



System boundary longitudinally welded steel tube

Hot-rolled strip // Pickled hot-rolled strip // Galvanized hot-rolled strip

System boundary Wuppermann

Raw materials, consumables & supplies

Diesel
Electrical energy
Thermal energy
Chemicals
Water

Transports to the Wuppermann sites

Integrated process

Preparation

Roll forming

Finish

Residues, by-products & emissions

Steel scrap
Emulsions

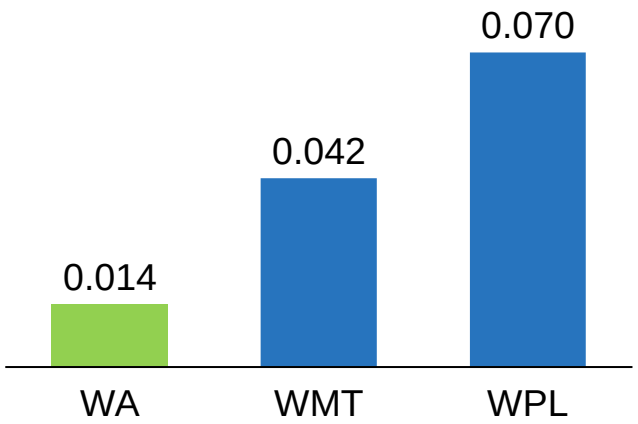
Black, pickled, galvanized tubes & profiles

Wuppermann Austria GmbH, Judenburg (AT) | WA

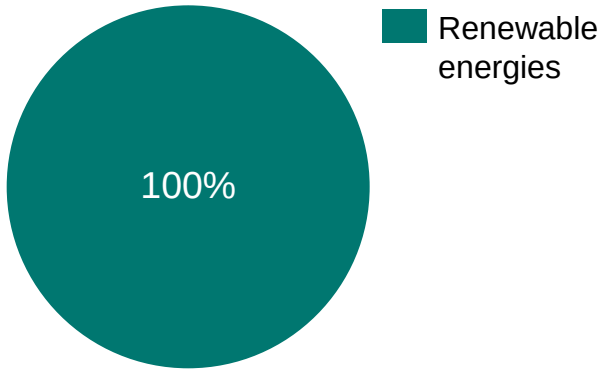
Employees: ~105

Galvanized Tubes & Profiles
Round tube: ø 30 to 115 mm
Rectangular tube:
40 x 10 to 130 x 50 mm
Square tube:
25 x 25 to 90 x 90 mm
Tube lengths:
2,500 to 15,000 mm
Wall thickness:
1.50 to 4.00 mm
WGalweld:
Galvanized tubes with internal galvanized weld seam

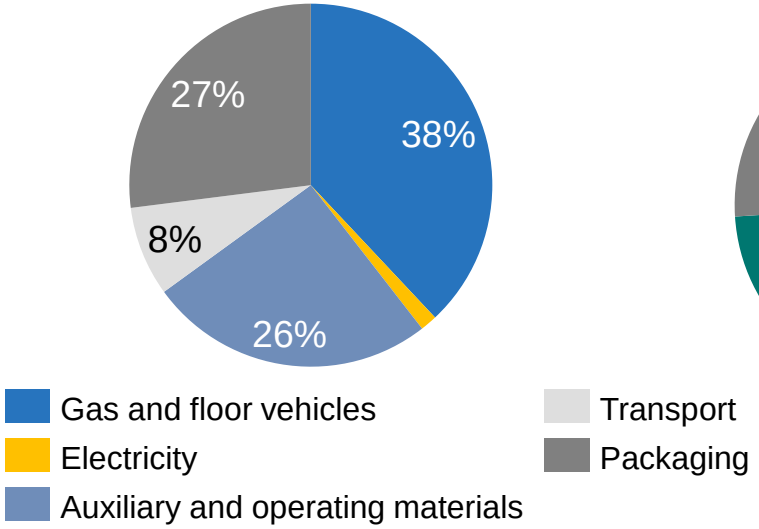
Overview of emissions [t CO_2 -eq./ t].



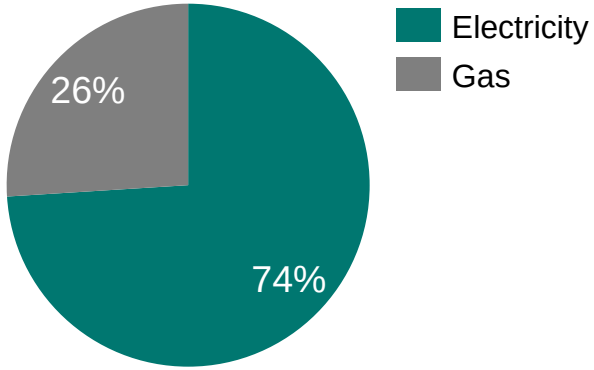
Electricity composition [in %]



CO_2 -eq. contribution per source



Primary energy consumption [in %]

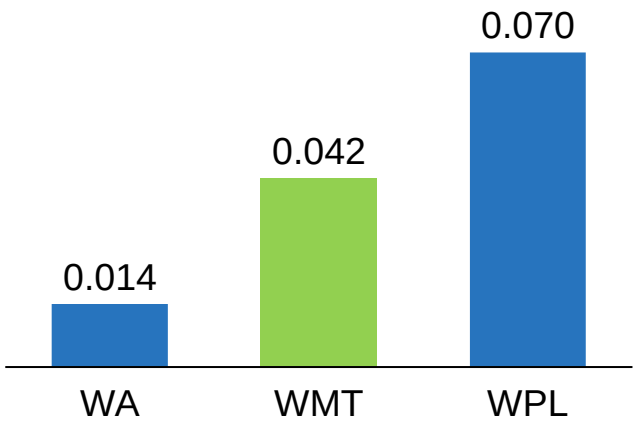


Wuppermann Metalltechnik GmbH, Altmünster (AT) | WMT

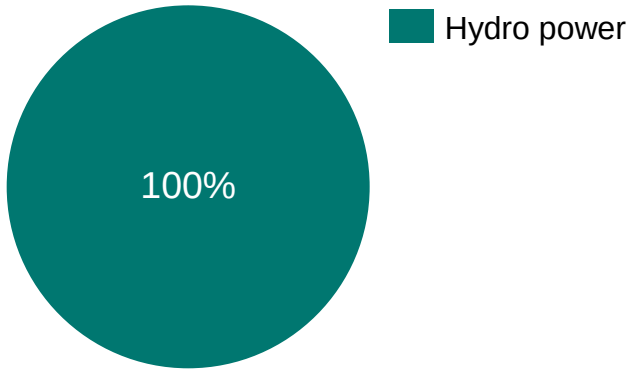
Employees: ~150

Stained tubes & profiles
Round tube: ø 30 to 90 mm
Rectangular tube:
30 x 15 to 100 x 50 mm
Square tube:
25 x 25 to 75 x 75 mm
Tube lengths:
2,500 to 12,000 mm
Wall thickness:
1.00 to 3.00 mm
Premium tubes:
Tight outside, inside & wall thickness tolerances

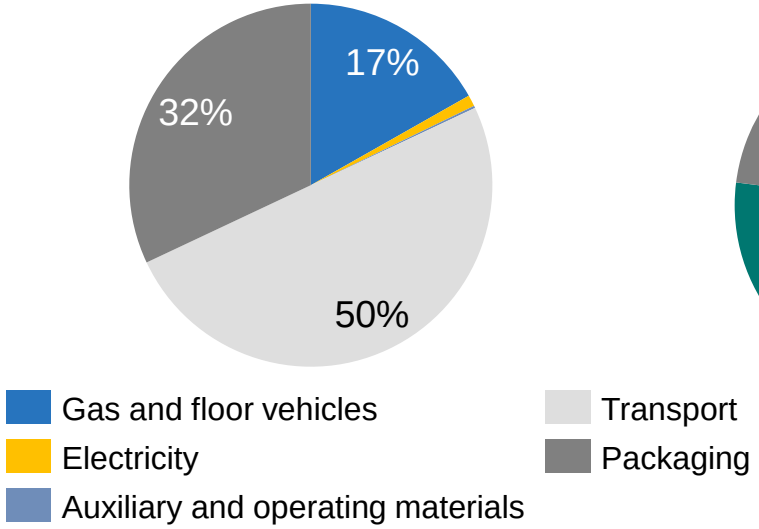
Overview of emissions [t CO_2 -eq./ t].



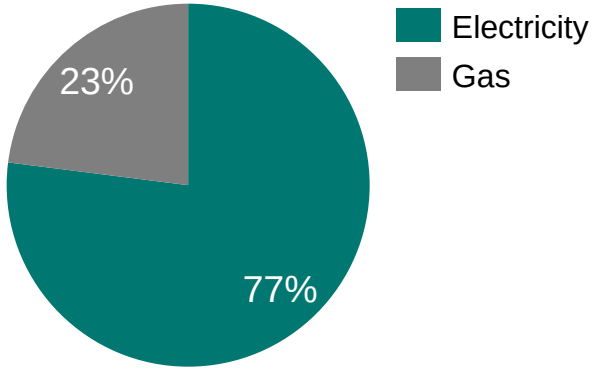
Electricity composition [in %]



CO_2 -eq. contribution per source



Primary energy consumption [in %]



Wuppermann Polska sp. z o.o, Małomice (PL) | WPL

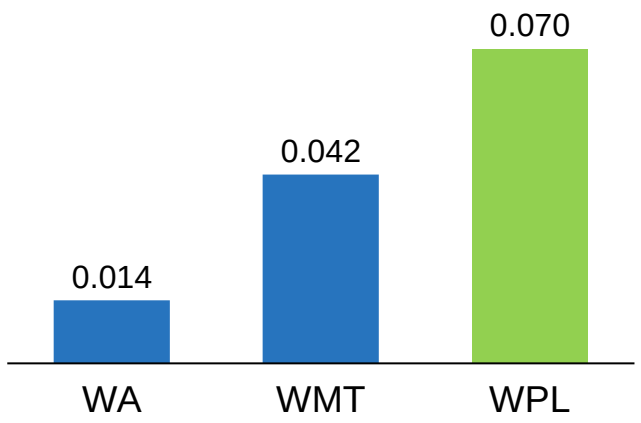
Employees: ~100

Black, stained & galvanized tubes:
Round tube: ø 28 to 88.9 mm
Rectangular tube: 30 x 18 to 80 x 40 mm
Square tube: 25 x 25 to 60 x 60 mm
Flat oval tube: 50 x 30 mm
Tube lengths: 2,500 to 12,000 mm

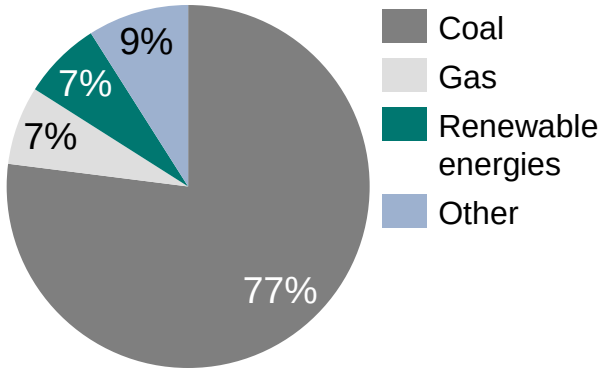
Wall thickness: 1.00 to 3.00 mm
Fixed lengths: 300 to 3,000 mm (tolerance +/- 0.5 mm)

Other services:
Tube processing & sawing, slit strip

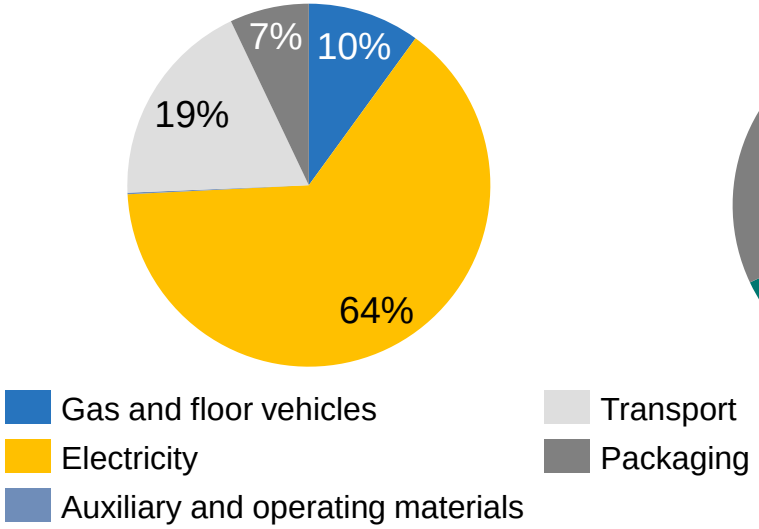
Overview of emissions [t CO_2 -eq./ t].



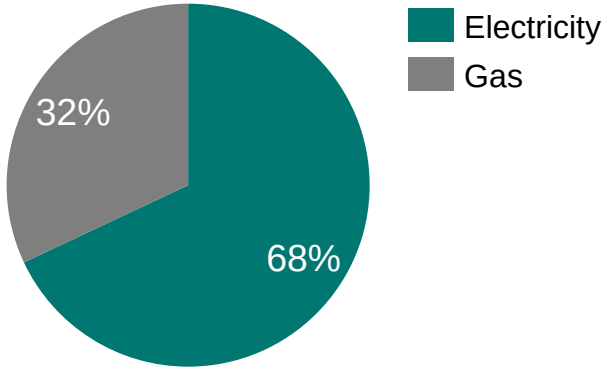
Electricity composition [in %]



CO_2 -eq. contribution per source



Primary energy consumption [in %]



Wuppermann

Greenhouse gas balancing of the hot strip galvanizing and tube production of the Wuppermann Group