GHG accounting

for manufacturers and suppy chains

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Introduction

Carbon footprint calculation = Greenhouse gas (GHG) accounting

- GHG emissions produced by an organization (ISO 14064 and GHG Protocol –standards)
- Industry GHG emissions 21% of EU total
- Sustainability Reporting Directive 2024
- Standard (guidelines) not yet available for manufacturing industry

➢ This study gives insights on how to get started with GHG emissions accounting in the factories and supply chains

GHG emission calculation

kg of CO_2 equivalent

$= \sum_i$ ActivityData (consumption) $\times$ EmissionFactor$_i$ (CO_2e per unit consumed) x GWP

- GWP; Global Warming Potential
- CO_2 accounts for 86% of EU industry GHG
- Scope 1-3 GHG emissions

Scope of GHG accounting in GREEF

- Focus on metal fabrication sector
- Emission data collection in the level of:
  - Factory
  - Manufacturing unit process
  - Supply chain
- Practical case study: Finnish gear manufacturer

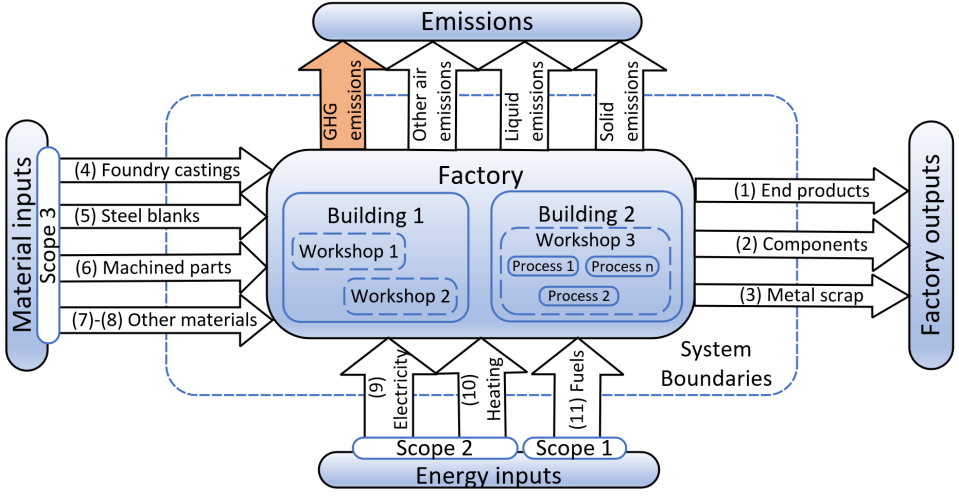
Modified from: Kellens, K. (2022). Collection and application of Unit Process LCI data. In Qualidata-Manufatura, (Online), São Carlos, Brazil.

Factory level

Relatively easy and straightforward!

Annual consumption

- Scope 1 fuels from ERP
- Scope 2 electricity and heating from bills
- Scope 3 materials from ERP
- Fabricated products and components from ERP
- Metal scrap from bills



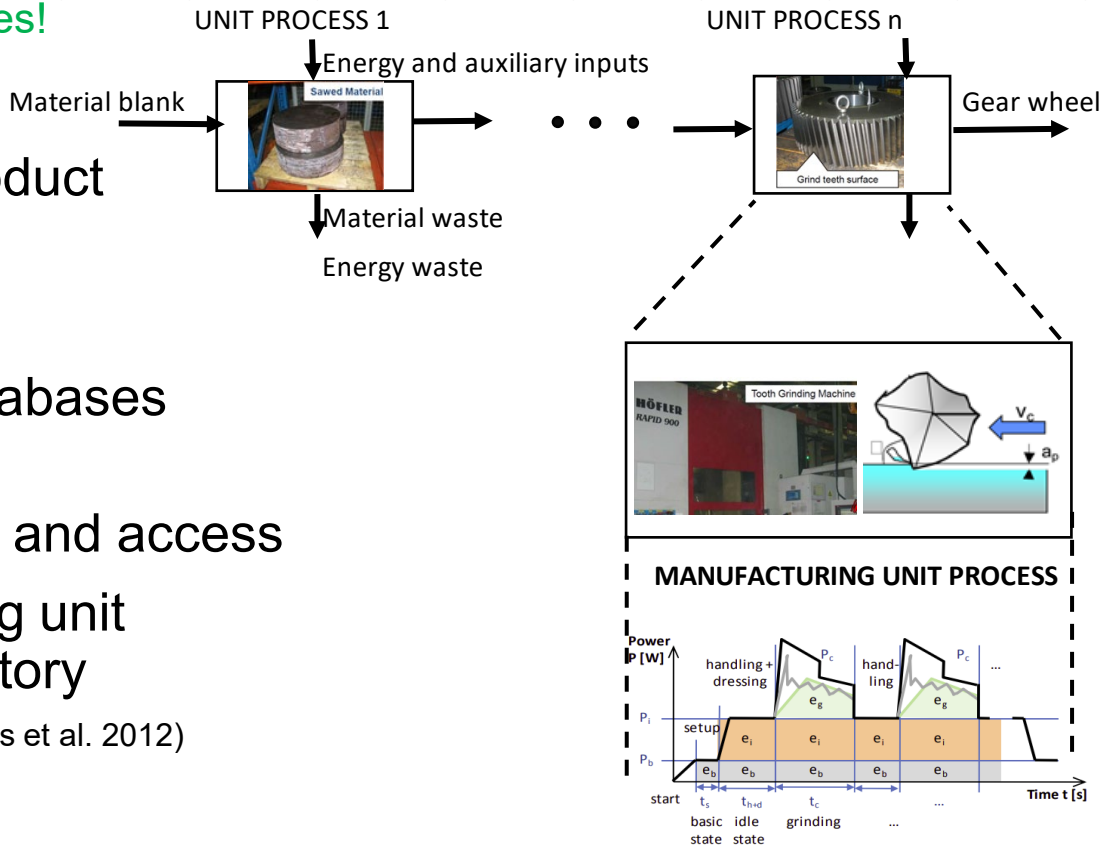
Data collection template:

(Työkaluja konepajan ympäristötyöhön)

https://sakky.fi/fi/kestavan-tyoelaman-edistajat

Manufacturing unit process level

Needs understanding of processes!



Consumption per kg of product

- Direct measurement
  → time-consuming
- Life-cycle-inventory databases (EcoInvent, GaBi)
  → limited processes and access
- Reusable manufacturing unit process life-cycle inventory (UPLCI) templates (Kellens et al. 2012)

Supply chain level

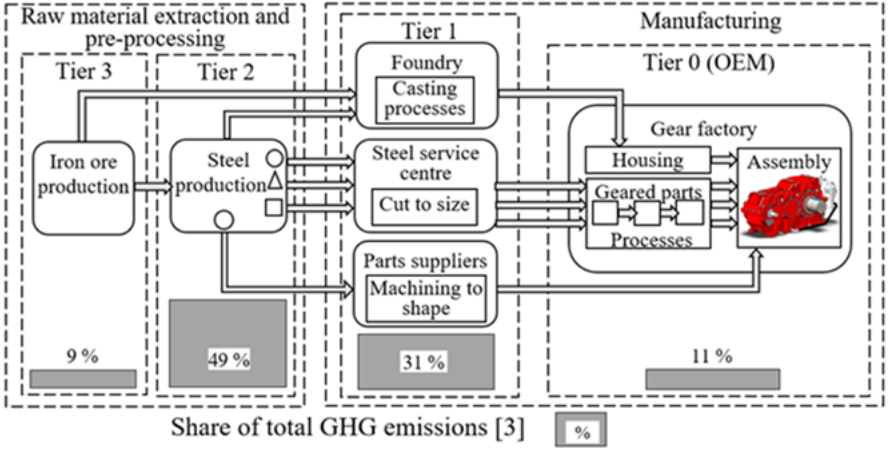
Needs inquiring and understanding of processes!

Scope 3 materials production

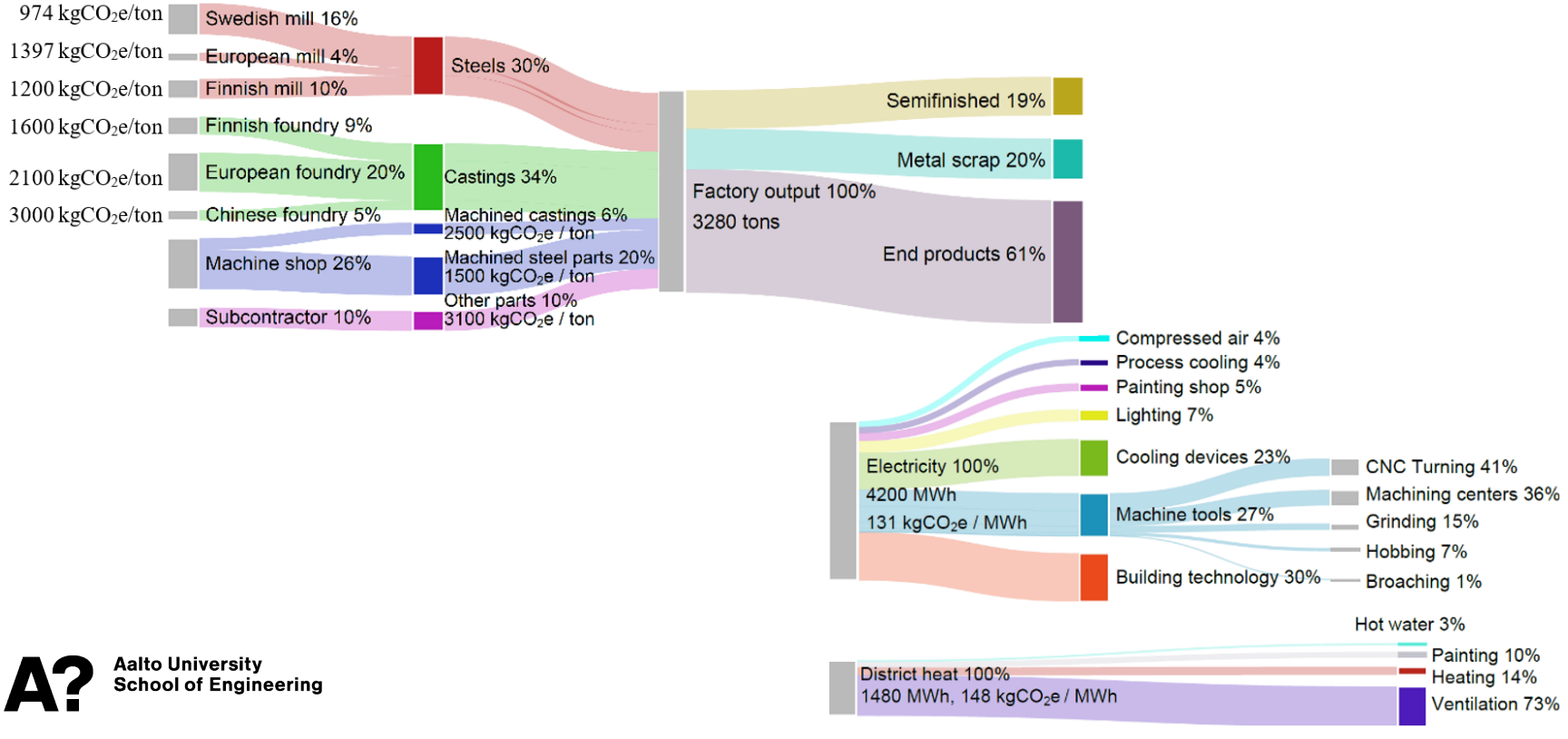
- Steel production (cum. Tier 3&2) from WorldSteel database or specific producer
- Intermediate products fabrication

  (Tier 1) from specific supplier

  → Limited access to data



Results: Materials and energy consumption and emission factors



Conclusions

- This study serves as a starting point for manufacturers to estimate GHG emissions in their factories and supply chains.
- GHG accounting needs consumption and emission factors data from various sources.
- Evaluating emissions of specific intermediate product suppliers is more difficult as there is little access to the suppliers' data.
- Available templates for data collection and consumption / emission estimations for specific unit processes.
- The Corporate Sustainability Reporting Directive (2024) mandates companies to calculate their emissions.

Aalto project team

- Esko Niemi, Professor, GREEF PI
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- Kai Häkkinen, Project Specialist
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Thank you!

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