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Carbon accounting and energy flow analysis of a multifaceted enterprise

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Industry Partners: Zelsius & Durrer Spezialmaschinen AG, a young startup in the energy sector and a recognised swiss SME in the manufacturing sector.

1. Background, Challenge & Objectives

Background
Around 99% of Switzerland's enterprises fall into Small and Medium Sized Enterprises (SME). In a decarbonization scenario, that translates in a significant potential to address sustainable practices to reduce emissions effectively.

Only half of Swiss SMEs presently have a sustainability strategy. This shows that there is still opportunity to incorporate sustainable measures. Aids that support decarbonization efforts should be made more accessible. Simplifying and standardizing sustainability plans becomes essential for Switzerland's economic landscape.

Objectives
- Create a CO2 accounting within the framework of an international standard.
- Familiarize with industry-specific accounting standards.
- Determine the existing data in the SME and their quality.
- Perform a sensitivity analysis of the individual parameters.
- Identify niche GHG emission reductions.
- Present the determined correlations.

Hypotheses
The aim of this project is to create a CO2 accounting report within the framework of the GHG Protocol. It is hypothesized that when scope 3 emissions are considered, the uncertainty that arises from calculating the carbon emissions and the lack of efficient reporting measures obstacles the GHG accounting practices.

2. Methodology / Materials

Methodology

- Data collection phase e.g. business questionnaire, visit the business, national statistics etc.
- GHG Protocol Standards and guidance
- GHG emissions Report
- GHG inventory
- Sensitivity and uncertainty analysis
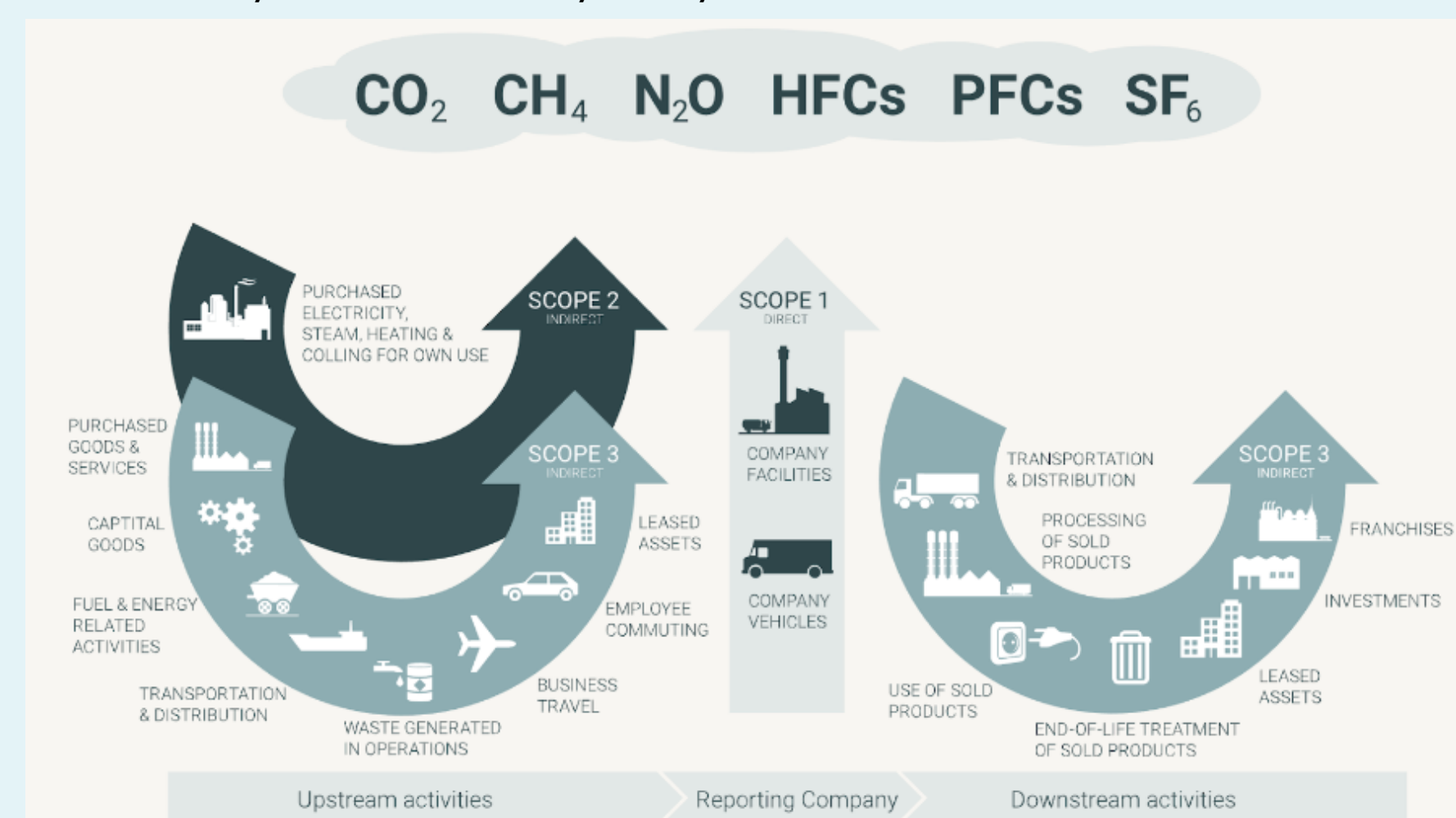
Materials / Data / Tools

- GHG Protocol Standards, Guidelines, Guidance
- Federal Statistical Office
- NOGA
- UNFCCC

- Industry specific information
- Emission factors for processes, materials, transport, countries etc.
- Excel

3. Results / Solution / Recommendations

Scopes
Scope 3 emissions dwarfs scope 1 and 2 when all of the downstream and upstream processes are considered.

On a meta-level, communication with SMEs is a topic which has to be addressed and from which this thesis enriches. Future courses of actions must have a clear strategy for data collection from the SME e.g. ask the right questions, use of creative approachs for the missing information.
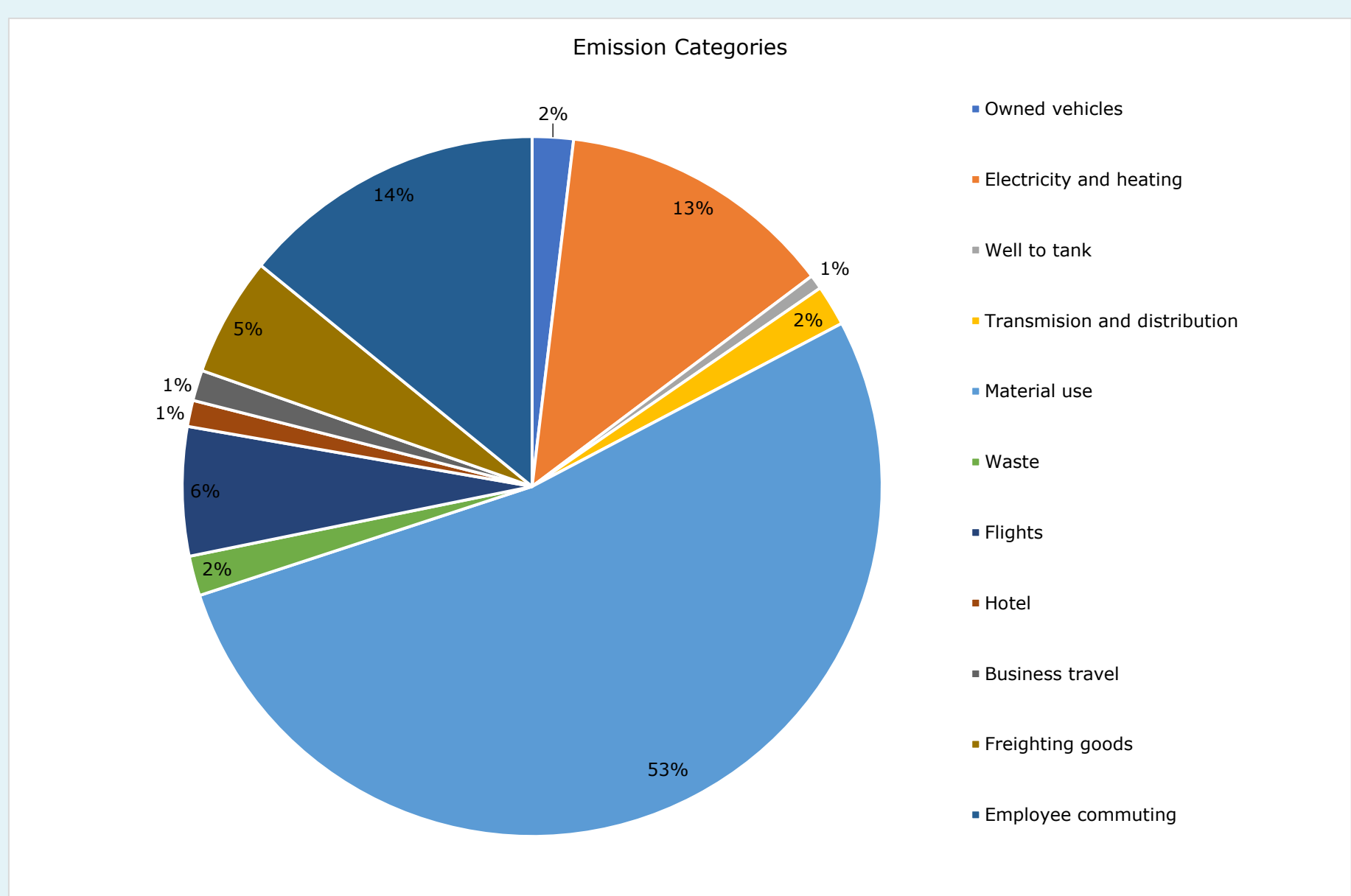
Potential CO2 drivers

The sensitivity analysis highlights those components which contribute to most of the carbon emissions. Identifying potential carbon intensive categories allows to allocate viable and niche solutions. This five categories compose 99.79% of all carbon emissions:

Material use, Employee commuting, Air transportation, Electricity and Heating demand.

4. Discussion, Conclusions & Outlook

Discussion
Global accounting standards do not satisfy or enable easy reporting practices for SME with little to no knowledge of their emissions.

Conclusions
Further investigation is required to ensure the quality of the information collected from SMEs.

Outlook
More user-friendly approaches are needed to make the accounting process more intuitive like questionnaires and a compilation of the common issues other SMEs had to face.

Literature

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- Calculation Tools and Guidance | GHG Protocol. (n.d.). https://ghgprotocol.org/calculation-tools-and-guidance.

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