Carbon Leakage List - Methodology for the Quantitative Assessment

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1. Introduction Carbon Leakage Indicator

2. Trade Intensity

3. Emission Intensity
   a. “Direct Emission Intensity”
   b. “Indirect Emission Intensity”

4. Final indicator and quality checks
1. Introduction Carbon Leakage Indicator

Breakdown CLI:

Carbon Leakage Indicator (CLI) = Trade Intensity (TI) x Emission Intensity (EI)

TI = \( \frac{\text{Imports} + \text{Exports}}{\text{Turnover} + \text{Imports}} \)

EI = Direct Emission Intensity (DEI) + Indirect Emission Intensity (IEI)

DEI = \( \frac{\text{Direct Emissions}}{\text{GVA entire sector Direct Emissions}} \)

IEI = \( \frac{\text{Indirect Emissions (IE)}}{\text{GVA entire sector Indirect Emissions}} \)

IE = Net electricity consumption x Emission factor
2a. Trade Intensity - definition

- **Definition:** Value of imports and exports to non-EU ETS countries in relation to the domestic market (domestic turnover + imports) in the European Economic Area
- **Base period:** 2013-2015
- **Scope:** Mining & quarrying sector and manufacturing sector
  - 245 subsectors (NACE 4-digit)
- **Data published by Eurostat:** (Comext/PRODCOM and Structural Business Statistics)
- **EFTA countries are treated as any other EU country**
  (trade between EU and NO/IS is considered internal trade)
2a. Trade Intensity - data sources

- Data provided by Eurostat in value (Euro) as of December 2017

- Trade data:
  - EU Trade since 1988 by CPA_2008 (EU Member States)
  - EFTA Trade Since 2003 By HS2,4,6 (Norway & Iceland)

- Turnover data:
  - Prodcom Annual Sold production data (Comext database)
    - If no data available, Structural Business Statistics turnover data is used for gapfilling
    - For Norway/Iceland additional gapfilling based on data published by national statistic offices and Eurostat exchange rates as of January 2018
Emission Intensity
3. Emission Intensity

- The Emission Intensity:
  Direct and indirect emissions of a sector per Gross Value Added at factor cost (GVA) [kg CO2/€]

- Equals the sum of the Direct Emission Intensity and the Indirect Emission Intensity (caused indirectly by electricity consumption)

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EI = Direct\ Emission\ Intensity\ (DEI) + \ Indirect\ Emission\ Intensity\ (IEI)
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\[
DEI = \frac{Direct\ Emissions}{GVA\ entire\ sector\ Direct\ Emissions}
\]

\[
IEI = \frac{Indirect\ Emissions\ (IE)}{GVA\ entire\ sector\ Indirect\ Emissions}
\]

\[
IE = Net\ electricity\ consumption\ *\ Emission\ factor
\]
3a. Direct Emission Intensity - definition

- Direct emissions are those emitted by each industry as a result of its own production process following the coverage and definitions by the EU ETS directive and guidelines.
- Direct emission intensities are calculated by dividing the direct emissions by the sector GVA (in Euro).
- Base period: 2013-2015
3a. Direct Emission Intensity - data

• **Direct emissions:**
  • Based on emissions recorded in the EUTL (t CO2 equivalent) as of September 2017
  • Emissions are attributed to NACE sectors at EUTL installation level, largely based on operator information provided for free allocation (National Implementation Measures - NIMs)
  • New entrants were added
  • Double check of attribution taking into account EUTL sector, company profiles and industry information

• **GVA:**
  • Value added at factor costs stems from the Structural Business Statistics by Eurostat (in Euro) as of December 2017
  • Standardized gap filling for missing data points based on information at aggregated level

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EI = \text{Direct Emission Intensity (DEI)} + \text{Indirect Emission Intensity (IEI)}
\]
\[
DEI = \frac{\text{Direct Emissions}}{\text{GVA} \times \text{Direct Emissions}}
\]
3b. Indirect Emission Intensity - data

- Indirect emission intensity measures a sector’s average emissions caused by the sector’s electricity consumption per € Gross Value Added (GVA)

- **Data**
  - Net electricity consumption:
    - MS data (MS’s statistical agencies)
    - Years: 2013-2015
    - NACE 4-digit
  - Coverage:
    - 20 Member States submitted electricity consumption data
    - GVA coverage of these MSs in mining & quarrying and manufacturing sector: 71% (2015)

- **GVA**:
  - Eurostat
  - NACE 4-digit
3b. Indirect Emission Intensity - methodology

• General approach:
  - \( IEI = \frac{Net \ final \ electricity \ consumption \times \ Emission \ factor}{GVA} \)
  - Net final electricity consumption and GVA: Sum of all countries (per sector) which submitted electricity data, average 2013-2015
  - In words: The net electricity consumption of MSs that submitted data was summed and divided it by the aggregated GVA of those MSs (per sector)

• Auto production:
  - Net electricity consumption = Electricity Consumption - Electricity production \( \rightarrow \) corrected for auto production

• Emission Factor:
  - An ETS-region wide Emission Factor is used: 0.376
  - Same methodology as in phase 3, base year is 2015
3b. Indirect Emission Intensity - methodology

• **Data gaps**
  
  • Data can be used if 2 conditions are met:
    1. MS submitted data for specific sector and year;
    2. GVA of corresponding sector, country, year is available in Eurostat.

• **GVA gaps filled**
  
  • When electricity data available but GVA data not available, gap filling is applied

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EI = Direct\ Emission\ Intensity\ (DEI) + Indirect\ Emission\ Intensity\ (IEI)
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\[
IEI = \frac{Indirect\ Emissions}{GVA_{Indirect\ Emissions}}
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\[
IE = Net\ electricity\ consumption \times Emission\ factor
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Final indicator and quality checks
4. Final indicator and quality checks

Final indicator:

\[
\text{Carbon Leakage Indicator} = \text{Trade Intensity} \times (\text{Direct Emission Intensity + Indirect Emission Intensity})
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• Quality checks:
  • General check
    • Comparison with previous Carbon Leakage List data (Phase 3)
      • Compared with previous outcome
      • Applied methodology from phase 4 on data from phase 3
4. Final indicator and quality checks

- **Component specific quality checks:**
  - **Trade intensity:**
    - Calculation of the share of exports in production
    - Sensitivity analysis of sectors with gap filling
  - **Direct emission intensity:**
    - Double check of sectors with significant fluctuations in emission intensity between years
    - Sensitivity check for sectors with gap filling for specific years
    - Sensitivity check for industrial electricity generators
    - Comparison of data quality changes compared to the phase 3 CL exercise (notably data quality/availability for non-CO2 gases improved).
4. Final indicator and quality checks

• Component specific quality checks:
  • Indirect emission intensity:
    • Comparison with electricity consumption data with (more aggregated) Eurostat data
    • Double check on the gap-filling procedure
    • Checked if the indirect emission intensity significantly affects the CLI for each sector given the direct emission intensity and trade intensity
Thank you for your attention

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