Catena-X Automotive Network e.V.

- Electronics PCF Working Group -

Guidance for the Data Quality Assessment on PCF Calculation for Electronic components according to the Catena-X Rulebook: Technology Representativeness – Synthesis Table

Version 2.0

22.07.2025

Technology & Value Creation

Catena-X
Automotive Network

DRAFT

Purpose, Scope and Description of the Document.

1. **Background Information.** The value chain of electronics systems (e.g. control units, sensors) is very long, complex and not always transparent. In the scope of the automotive industry the Product carbon Footprint (PCF) of electronics is estimated to be 8-9 % of the total PCF of the vehicle. In view of the digitalization trend in automotive, software defined vehicles, ADAS and IVI, this share is expected to increase in the upcoming years. The calculation of the PCF for electronic components is equally complex with widely different assumptions, data quality and methodologies among the different stakeholders and along the value chain: e.g. OEMs, tier 1 suppliers, semiconductor companies. A standardization of methodologies and improvement of the underlying data quality is therefore necessary.

2. **The purpose of this document** is to serve as basis for alignment among stakeholders within Catena-X as well as outside organizations on the topic of PCF calculation for electronic components in the automotive industry. This is a working document and should not be seen as a final version. The purpose is to be continuously improved as the consultations with stakeholders proceed.

3. **In Scope** is the complete automotive electronics value chain. The document provides specific guidelines, in accordance with the Catena-X Rulebook, for companies in this space to:

   a) provide relevant PCF data to their customers,
   b) evaluate the quality level of their own PCF data,
   c) provide specific targets/expectations and methodologies to achieve a higher PCF quality level,
   d) assess the PCF data quality of their suppliers,
   e) establish an overall state-of-art and common framework for PCF data quality across the complete electronics value chain.

4. **Description.** The Catena-X Rulebook defines 3 dimensions to assess the data quality of the PCF calculation: Technology representativeness, Temporal Representativeness and geographical representativeness. This document focusses solely on the detail of Technology Representativeness since the other two dimensions are sufficiently defined in the Rulebook. It is therefore a complement to the rulebook specifically for the technology of electronics systems.

5. **Consultation Phase.** Stakeholders are invited to provide comments, improvements and corrections to these proposals to Bernardo.mota@bmw.de.

6. **Relevant Links:**
   TeR Table (separate PDF table attached)
   Catena-X Rulebook

Recommendations and open questions.

7. **Recommendations for a digital implementation.** The Working Group has some recommendations focused on the digital implementation of this methodology. This digital version is seen by the large majority of stakeholders consulted as mandatory given the complexity involved.

a) PCF and TeR/DQR calculation and processing are time- and resource intensive, and not necessarily easy to implement for all players in the supply chain. A single fully digital solution is important without requiring too many resources.

b) For TeR of 4-5, a pre-calculated (worst case but realistic scenario) default PCF value should be used. This value could be automatically calculated by a digital solution. This would prevent for artificial low PCF values to be estimated. Additionally, this high default values could act as an incentive for the company to invest effort in obtaining and using primary data in its calculation in the future.

c) There is the possibility for a perverse effect in using the weighted average of PCF method to calculate the DQA or TeR across the value chain. If, for instance, a semiconductor company brings the PCF of scope 1 and 2 to zero, the weighted average of the TeR could be nevertheless negatively affected if the scope 3 upstream (supply chain) TeR is poor since its PCF would likely be high. This situation would be counterproductive since it would discourage companies to work on their data quality and PCF reduction measures. A possible solution could be to use the energy intensity instead of the actual PCF. In case it is not available, generic industry values could be available through the digital solution.

d) The TeR is calculated based on different sub-categories such as Direct BoM, Indirect BoM, Material/component/part Emission factor or PCF, Process Intensity, Energy Emission Factors and Transportation. The final TeR should be calculated using a PCF weighted average of each sub-category, i.e. it can be a decimal number.

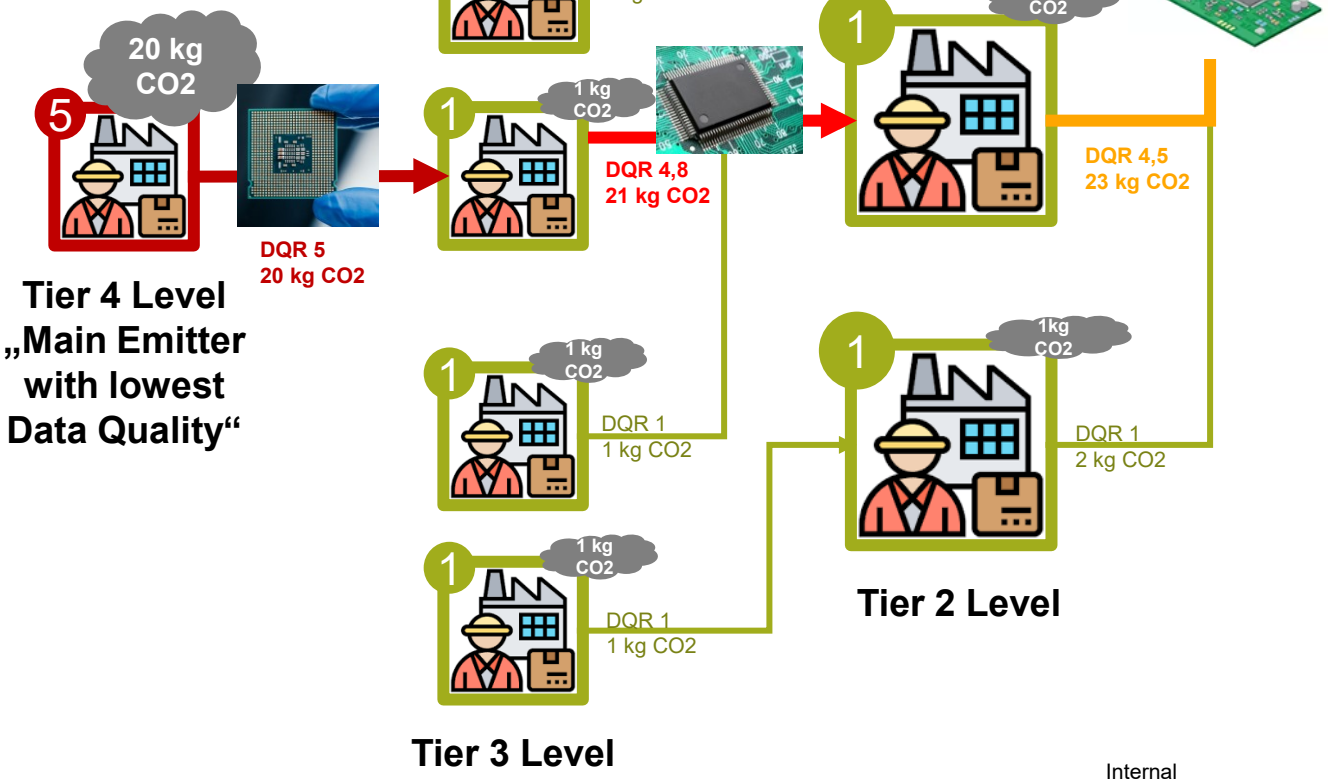
8. **Open Questions.**

a) Several contributors within the Working Group (however non-consensual view) see the “one up / one down” ground rule of CATENA X as a limitation in achieving transparency in the value chain and consequentially an effective PCF reduction. This limitation ´can be clearly seen while analyzing long supply chains such as the one for Electronics.

b) The equal weighting of time, geographic and technical representativeness proposed in the CATENA X Rulebook is questionable. The relative weight should be specific to a given product category.

Supply chain participants can share through Catena-X both the Product Carbon Footprint (PCF) and corresponding Data Quality Representativeness (DQR).

Illustrative Example

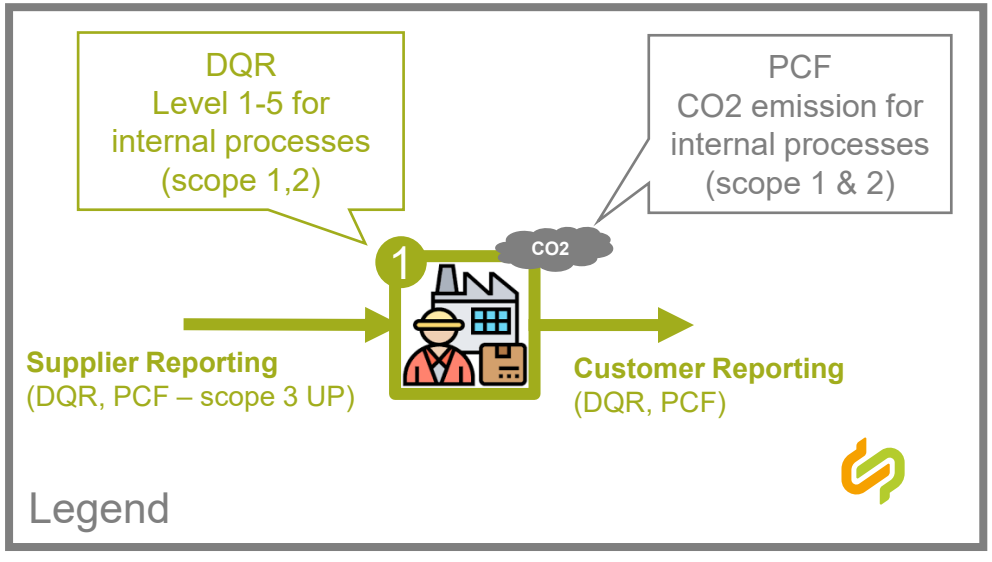


DQR 3,8
29 kg CO2

Please improve your PCF and DQR

Tier 1 Level

Customer / Auto OEM



BACKUP:
Relevant Catena-X Rulebook Extracts

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Catena-X Rulebook Extract: **Technology Representativeness.**

	1	2	3	4	5
Technology Representa-tiveness (TeR)	The dataset has been created based on data reflecting the exact technology employed (i.e. plant specific process/equipmen t data for the plant/equipment where the product has been manufactured) Explanation: this quality score can be achieved only in case of use of primary data	The dataset has been created based on data reflecting the company-specific and same technology to the one employed for the actual manufacturing (i.e. same technology, the company/site specific but not necessarily plant specific – it could be an average if several company/site specific data are available) Explanation: this quality score can be achieved only	The dataset has been created based on data reflecting an average for an equivalent technology to the one employed for the actual manufacturing (i.e. same technology, but not company specific) Explanation: this is the maximum score achievable with secondary data	The dataset has been created based on data reflecting a technological proxy (i.e. similar but not same technology, irrespectivel y if based on averages or supplier specific data)	The dataset has been created based on different or unknown technology vs technology actually employed

Catena-X Rulebook Extract: **Temporal Representativeness.**

	1	2	3	4	5
Temporal/time Representa-tiveness (TeR)	The difference between "Reference Period End" of the dataset and "Date of Issue" of the PCF is ≤1 year (i.e. 366d (to count for leap year))	The difference between "Reference Period End" of the dataset and "Date of Issue" of the PCF is >1 year and ≤2 years (i.e. 731d)	The difference between "Reference Period End" of the dataset and "Date of Issue" of the PCF >2 years and ≤3 years (i.e. 1096d)	The difference between "Reference Period End" of the dataset and "Date of Issue" of the PCF is >3 years and ≤4 years (i.e. 1461d)	The difference between "Reference Period End" of the dataset and "Date of Issue" of the PCF is >4 years

Catena-X Rulebook Extract: **Geographical Representativeness.**

	1	2	3	4	5
Geographical Representa-tiveness (GeR)	The dataset has been created based on data reflecting the country subdivision in which the product has been manufactured Example for country subdivision: Provinces in China, States in the US, applicable for bigger countries	The dataset has been created based on data pertaining the country, in which the product has been manufacture d The area where the dataset is generated is valid for the geographical area where the site is located Example 1: The site is in California and the dataset is a US average.	The dataset has been created based on data pertaining the geographical region (e.g. Europe, Asia, N. America), in which the product has been manufactured The area where the dataset is generated is valid for the geographical area where the site is located. Example 1: The site is in Spain and the dataset is a European average	The dataset has been created based on global averages Example: The site is in Japan and the dataset is a global average	The dataset has been created based on data with a geographical scope which is either unknown or pertaining a country, or region not including the site in which the product has been manufacture d Example 1: In absence of a global average, the dataset geographical applicability is unknown. Example 2: The site is in Mexico, but the dataset is a US average, or a Finnish average or an Asian average or a European average

Catena-X Rulebook Extract: **Primary Data Share (PCF, DQR).**

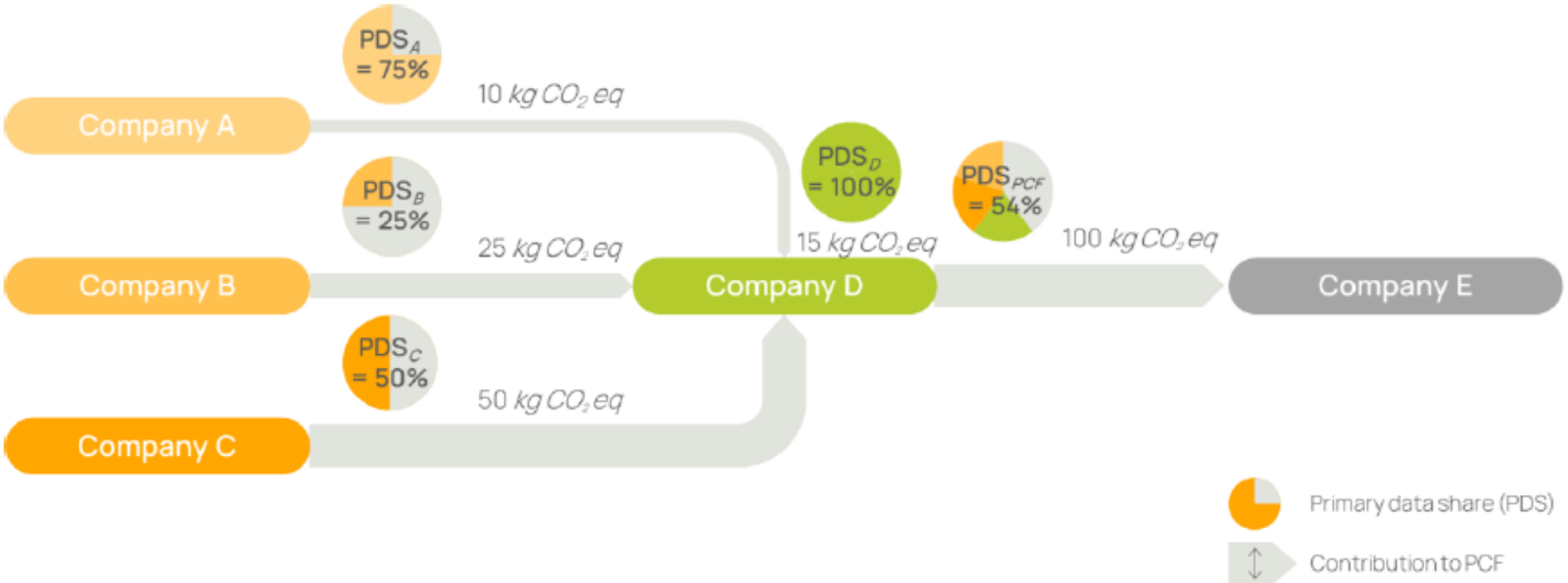

Figure 12: PCF cascade of primary data for an exemplary supply chain