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Technical Sector Report on Data Models for Electronic Components

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Executive Summary

Targeted and abridged approaches for environmental assessments of the main components of any electronics assembly have been developed and verified:

- Semiconductors

- Passive Components

- Printed Circuit Boards

The methodology reflects the typical role of SMEs in the related supply chain: Whereas SMEs are customers of the passive components and semiconductor industry, but are rarely manufacturer of these components in the PCB business SMEs are present in both roles, as manufacturer and as customer.

Consequently the approach for passive components and semiconductors targets at a transparent and standardised provision of environmental data. For passive components the approach of distinct umbrella specifications for broader component classes is followed, whereas for semiconductors a parameterised model was needed to calculate the carbon footprint of the broad variety of possible IC designs properly. The result are now a verified methodology paper (Product Category Rules) for passive components to establish data on Cumulative Energy Demand and carbon footprint, and for semiconductors a calculation framework to quantify the carbon footprint of IC production even before wafer start.

The result for the semiconductor sector is a parameterized model based on several key parameters. This model also includes the number of good dies and the carbon emission factor of electricity and loading, suitable for all semiconductor enterprises to predict the carbon footprint of any IC. R^2 of all regression models with different functions are from 0.47 to 0.93. The model has the potential to reduce the requirements of time and cost to undertake an LCA. It also provides criteria for green chip design by adjusting technical parameters: The data model for semiconductors even allows IC designers, which occasionally are found in SMEs as well, to model the environmental impacts of design decisions.

Similarly, for the PCB sector in correspondence with the findings of the needs assessment in Work Package 1, an approach has been developed, which enables PCB designers to calculate with a generic model likely environmental impacts of a given technical board layout. PCB manufacturers can populate the data model in-house and thus model their own production facility.