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Supplier Carbon Footprint Methodology Development for Automotive Original Equipment Manufacturers

Authors : Nur A. Özdemir, Sude Erkin, Hatice K. Güney, Cemre S. Atılgan, Enes Huylu, Hüseyin Y. Altıntaş, Aysemin Top, Özak Durmuş

Abstract : Carbon emissions produced during a product's life cycle, from extraction of raw materials up to waste disposal and market consumption activities are the major contributors to global warming. In the light of the science-based targets (SBT) leading the way to a zero-carbon economy for sustainable growth of the companies, carbon footprint reporting of the purchased goods has become critical for identifying hotspots and best practices for emission reduction opportunities. In line with Ford Otosan's corporate sustainability strategy, research was conducted to evaluate the carbon footprint of purchased products in accordance with Scope 3 of the Greenhouse Gas Protocol (GHG). The purpose of this paper is to develop a systematic and transparent methodology to calculate carbon footprint of the products produced by automotive OEMs (Original Equipment Manufacturers) within the context of automobile supply chain management. To begin with, primary material data were collected through IMDS (International Material Database System) corresponds to company's three distinct types of vehicles including Light Commercial Vehicle (Courier), Medium Commercial Vehicle (Transit and Transit Custom), Heavy Commercial Vehicle (F-MAX). Obtained material data was classified as metals, plastics, liquids, electronics, and others to get insights about the overall material distribution of produced vehicles and matched to the SimaPro Ecoinvent 3 database which is one of the most extent versions for modelling material data related to the product life cycle. Product life cycle analysis was calculated within the framework of ISO 14040 – 14044 standards by addressing the requirements and procedures. A comprehensive literature review and cooperation with suppliers were undertaken to identify the production methods of parts used in vehicles and to find out the amount of scrap generated during part production. Cumulative weight and material information with related production process belonging the components were listed by multiplying with current sales figures. The results of the study show a key modelling on carbon footprint of products and processes based on a scientific approach to drive sustainable growth by setting straightforward, science-based emission reduction targets. Hence, this study targets to identify the hotspots and correspondingly provide broad ideas about our understanding of how to integrate carbon footprint estimates into our company's supply chain management by defining convenient actions in line with climate science. According to emission values arising from the production phase including raw material extraction and material processing for Ford OTOSAN vehicles subjected in this study, GHG emissions from the production of metals used for HCV, MCV and LCV account for more than half of the carbon footprint of the vehicle's production. Correspondingly, aluminum and steel have the largest share among all material types and achieving carbon neutrality in the steel and aluminum industry is of great significance to the world, which will also present an immense impact on the automobile industry. Strategic product sustainability plan which includes the use of secondary materials, conversion to green energy and low-energy process design is required to reduce emissions of steel, aluminum, and plastics due to the projected increase in total volume by 2030.

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