Study on the international standards of product carbon footprint and cases

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ABSTRACT

As the problem of global warming worsens, many countries have developed various flexible mechanisms and supplementary tools to control greenhouse gas and achieve emission reduction. The carbon footprint of products uses Life Cycle Assessment (LCA) to quantitatively calculate the emission of greenhouse gases, in order to help enterprises re-examining the potential of emission reduction during the product lifecycle, achieve the goal of comparing the product carbon disclosure and emission, and guarantees the green procurement for consumers. This study collected the international calculation standards and cases on products carbon footprint in order to find out the characteristics of industrial greenhouse gases emission through application of case statistics, and analyze the differences among all calculation standards, so as to prepare the domestic industrial questionnaire. By statistical analysis and importance-performance analysis, this study further discussed the implementation performance of product carbon footprint constructed in domestic industries, and proposed the five-level improvement strategy and guidance methods. Based on the discussion and analysis, the conclusions are as follows: 1.According to the results of statistical analysis on environmental declaration of products, both product weight and their total energy consumption throughout the life cycle have good linear correlation, and mostly are positively correlated with the amount of greenhouse gases emitted by products. Comparing the various life stages of the products, the slopes in the raw materials development and usage stages of electronic products are larger than those in other stages, indicating that modifying the unit factors could greatly enhance the carbon emission in these two stages. Thus, these two stages are crucial for emission reduction. 2.Logarithmic graph is more suitable to illustrate the relationship between the average weight and slope characteristics of regression electronic products (the regression slope between weight and carbon emission). As seen from the results, the slope characteristic values of heavier electronic products are smaller. Linear graph is suitable to illustrate the relationship between the average weight of electronic products and slope (the regression slope between total emission and carbon emission), which presents a positive correlation, indicating that the slopes of heavier electronic products are larger. 3.The regression results on the carbon emission of products with and without recycling measures and the product weight during the product disposal stage indicate that, the included angle between two regression lines is defined as the recovering reduction gain ψ, the magnitude of which is affected by reusable components of products, components recovery processing procedures and methods, reusing degree and materials of the reusable components. According to the Ψ value calculated in this study, Tetra pack has the smallest included angle (0.02 °), while the average included angle of electronic products is about 60 ° , indicating that Tetra pack has the optimal recovery reduction efficiency of electronic products. 4.According to the questionnaire survey on the difficulties for enterprises to implement all factors for constructing the product carbon footprints, it is found that the main reason is lack of manpower. Among all constituting factors, the implementation capacity of enterprises on client-end emission calculation is the lowest and their cognition on emission distribution mode is the poorest. 5.The results of investigation and analysis reveal that, the performance scores of products carbon footprint constructed by domestic industries are all within Grade II and Grade III, with are relatively unsatisfactory, indicating that that the government and industries should actively promote, cooperate, guide and participate in demonstrative plan, so as to enhance the environmental protection performance and achieve the goal of reducing the emission of greenhouse gases.

Keywords : Greenhouse Gas、Calculation Standard for Carbon Footprint of Product、Life Cycle Assessment、PAS 2050 、Environmental Declaration of Product、Importance-Performance Analysis

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