What is Product Carbon Footprint?

Carbon footprint is the total greenhouse gas (GHG) emissions caused directly and indirectly by an individual, organization, event or products, and is expressed as a carbon dioxide equivalent (CO₂). A carbon footprint accounts for all six Kyoto GHG emissions: Carbon Dioxide (CO₂); Methane (CH₄); Nitrous oxide (N₂O); Hydro fluorocarbons (HFCs); Perfluorocarbons (PFCs); Sulphur Hexafluoride (SF₆).

Product carbon footprint (PCF) is a measure of GHG emissions across the life of a particular product (goods or service) throughout its "life cycle", from the extraction of raw materials and manufacturing, distribution through to its use and end-of-life.

Why comply with the ISO/TS 14067?

Climate change poses an enormous challenge for farmers in developing countries. In addition to adapting to changing climatic conditions, manufacturer of products are increasingly being asked by retailers to measure and reduce the greenhouse gas (GHG) emissions of their products. A product carbon footprint can help to differentiate the product or service and enhance the brand image. As a result, new market requirements have emerged, mainly in the form of standards on PCF.

The growing trend of PCF standards is driven largely by retailers and several governments in developed and emerging economies. These standards can be classified into three main (though not mutually exclusive) groups based on their stakeholder involvement and pathways of development: International schemes: developed through international consultation with the involvement of stakeholders from public and private organizations, business, NGOs, academia, etc.
The International Organization for Standardization (ISO) is developing a new standard for the carbon footprint of products, ISO 14067. ISO 14067 will support the assessment of life cycle GHG emissions of products, enable CFP to be reported and communicated to supply chains, consumers and other stakeholders, and provide a common basis for the comparison of results arising from the use of this standard.

The new standard builds largely on the existing ISO standards for life cycle assessments (ISO 14040/44) and environmental labels and declarations (ISO 14025). The final IS will have part 1 - Quantification and part 2 - Communication, which aim to:

1. Enhance the credibility, consistency and transparency of the quantification and communication of product-level carbon footprint;

2. Promote continuous improvement by facilitating the evaluation of alternative product design and sourcing options, production and manufacturing methods, raw material choices and the selection of suppliers on the basis of a life cycle assessment using climate change as impact category;

3. Facilitate the development and implementation of GHG management strategies and plans across product life-cycles as well as the detection of additional efficiencies along the supply chain;

4. Facilitate the ability to track performance and progress in reducing GHG emissions;

5. Enhance knowledge on the role of consumer behavior in contributing to reductions in GHG emissions due to consumption.

Moreover, in the wake of that England has started a project based on the PAS2050 from 2008, while the product碳足跡標準的趨勢較大程度上是由發達國家及新興經濟體的零售商和政府引導。這些標準主要由公共或私立的機構、公司、NGOs以及學術圈等國際間利益相關方，以諮詢的形式發展。

國際標準化組織 (ISO) 正在編制一個新的產品碳足跡標準ISO 14067。ISO 14067將為產品整個生命週期中
的温室氣體排放量的評估提供標準，令產品碳足跡能有效於供應鏈、顧客及其他利益相關者之間溝通，並且為
基於比較目的的計算結果提供了一個公認的根據。新標
準主要是基於現存的ISO標準-ISO 14040/44 (生命週期
評估) 及ISO 14025 (環境標籤)。最終的國際標準將包
括兩個部份，部份1-量化及部份2-溝通，其主要目的
為：

1. 增強產品層面碳足跡的量化及溝通的可信性，一致
性以及透明度；

2. 宣導通過評估替代產品設計、採購方案、生產方
式、原材料的選擇以及基於生命週期評價中氣候變
化這個影響進行持續改善；

3. 促進基於產品生命週期與供應鏈的碳管理的策略及
計劃的發展與實施；

4. 協助追蹤溫室氣體減排的過程以及績效過程；及

5. 提高消費者通過改變消費行為進而對溫室氣體減排
做出貢獻的意識。

英國自二零零八年起開始實施PAS2050計算產品碳足跡的
項目，同時其他國家亦相繼開始產品碳足跡的研究，並
開始討論將產品碳足跡的標準國際化，因此產生愈來愈
多對產品碳足跡國際標準的需求。
investigation of the system is started in other countries, discussions on international standardization carbon footprint (CFP), the growing need for international standardization as a result.

The development of ISO/TS 14067

At a meeting in Mexico City ISO/TC207/SC7 in January 2008, are installed SC7/WG2 as a working group to discuss the international standardization system CFP, CFP international standardization system in Bogota SC7/WG2 meeting of June 2006 (: New Work Item Proposal NP) has been carried out of the proposed start. After that, voting is done by the Member States, NWIP approval in November of the same year, it was decided that the development of ISO14067, the international standard on CFP system is started. Including Tokyo so far, a total of 11 times SC7/WG2 meeting has been held in various parts of the world. Although the ISO 14067 is still under development and refinement to be the final international standard, as a technical specification, the ISO/TS 14067:2013

Greenhouse gases - Carbon footprint of products - Requirements and guidelines for quantification and communication has been published on 21st May, 2013.

The effects of ISO/TS 14067 on Electronic industry

The calculation of carbon footprint could almost be applied in all products, they could be tangible products and intangible products (such as services, test, etc.); they may be the final products or the intermediate products (such as materials, components, etc.) Since the calculation of product carbon footprint (PCF) is based on the life cycle assessment, i.e. the collection of raw materials information is crucial. Moreover, the carbon emission of raw materials always has a significant contribution in a total product carbon footprint, it always happens in electronic products and components. Comparing to other products,
electronic products have relatively large amount of parts for assembly, which also coupling with a longer and more complex supply chain. Thus, the calculation of their PCF requires much information from various suppliers, indicating that the disclosures of PCF are usually essential through the whole supply chain.

Printed circuit Board (PCB), the major component exists in most of the electronic products, which also belongs to the upstream of a supply chain. Meanwhile, from a structural point of view, PCBs are more complex than the other electronic components. The carbon emission of the PCB manufacturing plays a pivotal role in the entire carbon footprint of an electronic product. For carbon footprint assessment of electronic goods to end user, carbon footprint of PCB would definitely affect the accuracy of final product carbon footprint.

Help to comply with ISO/TS 14067 - the efforts of PolyU

Aiming at helping the electronic industry to comply with the new ISO 14067 on effective calculation of product carbon print throughout the product life cycle, communication of the result and supply chain carbon management, with the support of the SME Development Fund of the Government of HKSAR, and six industrial sponsors, the Department of Industrial and Systems Engineering of The Hong Kong Polytechnic University (PolyU) launched the G-BOM analyzer with embedded carbon footprint database and SME advisory kit Program for Electrical and Electronic Products.

Project objectives:

1. Develop an embedded GHG emissions database for SMEs to check the environmental performance of a product during the design and development stage in order to increase product competitiveness, the database includes not only the major database worldwide, but also the local database collected by the research group of PolyU;
2. Develop a G-BOM analyzer which is easier to handle for SMEs to estimate product carbon emission in a simple and cost-effective way;

3. Implement the embedded GHG emissions database and G-BOM analyzer to electronic scale and induction cooker as showcases of the end product; PCB and LCD display as showcases of component respective for the previous two end products;

4. Develop a SME advisory kit for the electrical and electronic industries to correspond to the coming ISO 14067;

5. Implement the advisory kit to a downstream end-product manufacturer and a upstream component manufacturer as case studies for low carbon supply chain.

Although stakeholders have been searching for tools and methods to develop products that have low environmental impacts and carbon emissions, several tools are available in Hong Kong which concern about human activities in primary footprint rather than CO₂ emissions from the whole life cycle (include raw material use, manufacturing, distribution, use and end-of-life) of products in the secondary footprint. None calculate the carbon footprint based on a whole product life cycle approach. The project’s deliverables will fill the gap.