

**SME Development Fund/
Dedicated Fund on Branding, Upgrading and Domestic Sales
(Organisation Support Programme)**

Final Report of Approved Project

Project ref. no. : D12 001 007

Project title : Development of an embedded Greenhouse Gas (GHG) emissions database with a G-BOM analyzer and a SME advisory kit for electrical and electronic industries to respond to the implementation and compliance of ISO 14067 (carbon footprint of products)

Period covered : From 01/10/2012 to 31/01/2015
(dd/mm/yy) (dd/mm/yy)

1. Project Details

(Please mark with "*" if any of the following project details is different from that in the project proposal appended to the project agreement.)

Project Reference and Title

Development of an embedded Greenhouse Gas (GHG) emissions database with a G-BOM analyzer and a SME advisory kit for electrical and electronic industries to respond to the implementation and compliance of ISO 14067 (carbon footprint of products)

Project Summary (in not more than 150 words)

In order to help Hong Kong SMEs to comply with ISO/TS 14067 and increase product competitiveness by estimating the GHG emissions of their products, the G- BOM analyzer, an embedded GHG emissions database based on product's bill of materials (BOM) is developed. Product carbon foot print study of two end products and two components were carried out by implementing the embedded GHG emissions database and G-BOM analyzer as showcases. Seminars and workshops are held to promote the awareness of ISO 14067, basic concepts, case study, and supply chain carbon footprint management. An advisory kit corresponding to ISO/TS 14067 and a guideline of G-BOM analyzer were produced based on the showcase practice.

As a result, Hong Kong SMEs can increase their competitiveness to better adapt themselves to the international market, avoid extra consulting fee in terms of carbon footprint study, reduce potential management risk for future changes in environmental regulations, as well as cut down overall environmental impacts, especially Product carbon footprints, by applying our advisory kit and utilizing the G-BOM analyzer.

Project Objective(s) (in not more than 80 words)

The objectives of this project are to :

1. An embedded GHG emissions database which will include around 3000 items;
2. A G-BOM analyzer which will take into account future changes in production processes and technology for electrical and electronic products;
3. Case studies results (verified by SGS) of electronic scale and induction cooker for SMEs as end product showcases; PCB and LCD panel as component showcases.
4. An SME advisory kit to correspond to the coming ISO 14067. The content of the advisory kit will be updated when the finalized version of ISO 14067 is released;
5. Case study of the SME advisory kit: Downstream companies can have showcase about how to implement supply chain carbon management and upstream companies as suppliers can know how to comply with procurement with carbon disclosure requirements;
6. Project dissemination activities including seminars, workshops and exhibition.

Grantee /Collaborating/Implementation Organisation Agent

Grantee : The Hong Kong Polytechnic University

Collaborating Organisation(s) : 1. Hong Kong Electrical Appliance Industries Association (HKEAIA)
2. The Hong Kong Electronic Industries Association (HKEIA)
3. The Hong Kong Green Manufacturing Association (HKGMA)
4. Hong Kong Printed Circuit Association (HKPCA)
5. Hong Kong & Kowloon Electrical Appliances Merchants Association Ltd.

Implementation Agent(s) : N.A.

Key Personnel

	<u>Name</u>	<u>Company/Organisation</u>	<u>Tel No. & Fax No.</u>
Project Co-ordinator :	<u>Winco Kam-Chuen, YUNG</u>	<u>Department of Industrial and Systems Engineering, The Hong Kong Polytechnic University</u>	<u>Tel- 27666599</u> <u>Fax-23625267</u>
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Project Period

	<u>Commencement Date</u> (day/month/year)	<u>Completion Date</u> (day/month/year)	<u>Project Duration</u> (No. of months)
As stated in project agreement	<u>01/10/2012</u>	<u>31/07/2014</u>	<u>22</u>
Revised (if applicable)	<u></u>	<u>31/01/2015</u>	<u>28</u>

Methodology Employed

- (a) Analysis of the current international standards and carbon related policies
- (b) Framework development from existing carbon labelling programmes and supply chain management;
- (c) Identification of requirements and features of an embedded GHG emissions database and G-BOM analyzer;
- (d) Data collection for the embedded GHG emissions database;
- (e) Forming an embedded GHG emissions database with a G-BOM analyzer for SMEs;
- (f) Application of data base and analyzer for two electrical and electronic products and two electrical and electronic components as showcases;
- (g) Development of application guideline for embedded GHG emissions database and G-BOM analyzer;
- (h) Development of ISO 14067 advisory kit for SMEs;
- (i) Application of advisory kit for downstream and upstream manufacturers in the supply chain;
- (j) Carbon footprint verification statement for products;
- (k) Dissemination of project deliverables through media, training workshops, seminars and exhibition(s).

2. Summary of Project Results

Project Deliverables

(Please list out the targeted project deliverables as stated in the project proposal appended to the project agreement and provide details of actual result achieved, including beneficiaries, for each of them.)

1. An embedded GHG emissions database which will include around 3000 items
 - **An embedded GHG emissions database** was developed for Hong Kong electrical and electronics SMEs to check the greenhouse gas data related to product design and development during the entire product life cycle. There are totally around **3,900** emissions factors from the five database sources from the different regions used in the embedded GHG emissions database. These five databases include four databases available in the market, along with one from the Green Manufacturing and Eco-Design Research Group, who has computed more than 60 items of our own customized emission factors which are not available in the other four databases in order to enhance the user-friendliness of the G-BOM analyzer.
2. A G-BOM analyzer that takes into account future changes in production processes and technology for electrical and electronic products:
 - **A G-BOM analyzer**, a free of charge product carbon footprint analyzing tool, which is specially designed for local electrical and electronics SMEs to calculate their product carbon footprint based on a whole product life cycle method, was developed. This G-BOM analyzer can be applied for both “downstream” end-product manufacturers and “upstream” component/part manufacturers, and acts as a niche compared to existing carbon footprint calculation tools which allow manufacturers to input their product information according to the product life cycle, which includes raw material stage, manufacturing stage, distribution stage, use stage and end-of-life stage, to simply calculate the product carbon footprint using the embedded greenhouse gas (GHG) emissions database provided.
3. Case study results of electronic scale and induction cooker for SMEs as end product showcases; PCB and LCD panel as component showcases:
 - Detail reports of product carbon footprint for four showcases were conducted and SGS verified results were obtained. These **four published reports** are examples of carbon footprint study in compliance of ISO/TS 14067 for SMEs.
4. An SME advisory kit to correspond to the coming ISO 14067:
 - **A SME advisory kit** was developed and printed in **68 pages** (English version) and **66 pages** (Chinese version) with an insert of G-BOM analyzer guideline, a detailed manual which has **103 pages** (English version) and **100 pages** (Chinese version) describing the step-by-step procedures in order to instruct SMEs how to undertake product carbon footprint study by complying ISO/TS 14067. **500 sets** of advisory kit in Chinese (with Chinese guideline of G-BOM analyzer that contains five GHG emissions databases) and **500 sets** of advisory kit in English (with English guideline of G-BOM analyzer that contains five GHG emissions databases) have been printed out and **420 sets** of each have been distributed. The rest of copies will be distributed in future events for continuous promotion for this project.
5. Case study of the SME advisory kit:
 - One downstream and one upstream companies implemented SME advisory kit before the advisory kit were printed out. **Valuable feedbacks and comments** regarding its sufficiency and clearance were given by the company representatives.

6. Project dissemination activities including seminars, workshops and exhibition:

- **One exhibition, five workshops, and five seminars** for project promotion and dissemination of deliverables were held.

Details of activities are listed as follows,

Date/	Category	Description	Venue	No. of participants
28-31/ 10/ 2013	Exhibition	1.Eco Expo Asia 2013 - Green Tech for a Low-carbon Economy	AsiaWorld-Expo HK	6980
14/04/ 2014	Workshop	1.Workshop on "ISO 14067 on Product Carbon Footprint-Implication and Showcase for Electronic Industry" (to associations)	HKPCA	15
14/04/ 2014		2. Workshop on "ISO 14067 on Product Carbon Footprint-Implication and Showcase for Electronic Industry" (to associations)	PolyU (EF619)	13
16/04/ 2014		3. Workshop on "The challenges and opportunities by the international standard on product carbon footprint for SMEs in Hong Kong (downstream enterprises) - How to comply with ISO/ TS 14067?"	HKEIA	19
16/04/ 2014		4. Workshop on "The challenges and opportunities by the international standard on product carbon footprint for SMEs in Hong Kong (upstream enterprises) - How to comply with ISO TS 14067?"	HKEIA	15
22/01/ 2015		5. Workshop on "Quantification of Product Carbon Footprint"	PolyU (CF401)	38
10/01/ 2013	Seminar	1."Preparing for the Upcoming ISO 14067 (Product Carbon Footprint), a Focus on Hong Kong e-Products Manufacturers (SMEs)"	PolyU (M1603)	89
17/04/ 2013		2.Seminar on "New Environmental Focus of Industries: Carbon Footprint of Products ISO 14067 with HKIE	PolyU (QR402)	55
15/04/ 2014		3.Seminar on "ISO 14067 on Product Carbon Footprint-Implication and Showcase for Electronic Industry" in HK Electronic Expo	Hong Kong Convention & Exhibition Centre	65
21/01/ 2015		4. Seminar on "Implementation of ISO 14067- Carbon Footprint of Products in Hong Kong Electrical and Electronic SMEs (I)"	PolyU (U208)	55
21/01/ 2015		5. Seminar on "Implementation of ISO 14067- Carbon Footprint of Products in Hong Kong Electrical and Electronic SMEs (II)"	PolyU (U208)	57

Actual Benefits to SMEs/Enterprises

(Please indicate in clear, specific, tangible and quantifiable terms the benefits of the project and its contribution to enhancing the competitiveness of Hong Kong's SMEs / enterprises in general or SMEs / enterprises in specific sectors / assist Hong Kong enterprises in general or in specific sectors in developing brands, upgrading and restructuring business operations, and promoting domestic sales in the Mainland, in not more than 400 words.)

The benefits to the Hong Kong SMEs from the project output are listed as follows:

1. Economic aspects

- With guidance of how to implement ISO/TS 14067 and guidelines to utilize the G-BOM analyzer with an embedded GHG emissions database , Hong Kong SMEs are able to better adapt themselves to the Asian,

American, and European markets.

- SMEs can carry out their product carbon footprint study without help from experts. Extra consulting fee can be avoided by using the G-BOM analyzer.

- Downstream companies can better control their product's carbon footprint and approach carbon footprint reduction simply based on the database and the analyzer's calculation on the basis of their own BOM.

Meanwhile, the upstream manufacturers can achieve purchaser' requirements on the environmental related information disclosure without additional cost by implementing the advisory kit and G-BOM guideline.

- Management risk of a SME will be decreased through preparing requirements from regulations and customers proactively.

- Competitive advantages of SMEs increase because of the implementation of international standard for their products.

- Implementation of environmental innovations in Hong Kong industries using the advisory kit developed in this project will assist the industry in being more environmentally friendly. This change will lead to the creation of new opportunities in the ever expanding eco-products market and in technology innovation.

2. Environmental aspects

- Greenhouse gas emissions and resource consumption can be reduced through the improvement of products during the design and development stage by setting up strategies based on product carbon footprint study.

- Overall environmental impacts of a product or an SME will be decreased through the product carbon footprint calculation and also through carbon footprint supply chain management.

Milestones (in chronological order)

(# Please indicate if the milestone is completed (C), deferred (D) or not achieved (N). If it is deferred, please indicate the revised completion date. For those milestones which are deferred or not achieved, please also provide the reasons under item 2.4.)

<u>Milestone</u> (as set out in the approved project proposal appended to the project agreement)		<u>Original target completion date</u>	<u>Revised target completion date</u> (if applicable)	<u>Status</u> (C/D/N) #
(a)	Analysis of the current international standards and carbon related policies	30/11/2012	N.A.	(C)
(b)	Framework development from existing carbon labelling programmes and assessment methods for products	31/01/2013	N.A.	(C)
(c)	Identification of the requirements and features of an embedded GHG emissions database and G-BOM analyzer	28/02/2013	N.A.	(C)
(d)	Data collection for the embedded GHG emissions online database	31/07/2013	N.A.	(C)
(e)	Forming an embedded GHG emissions database with G-BOM analyzer for SMEs	30/11/2013	N.A.	(C)
(f)	Application of database and analyzer for two electrical and electronic products and two electrical and electronic components as showcases	30/11/2013	31/10/2014	(D)

(g)	Development of application guidelines for embedded GHG emissions database and G-BOM analyzer	28/02/2014	15/12/2014	(D)
	Development of the SME advisory kit for the ISO14067for SMEs	30/04/2014	15/12/2014	(D)
(i)	Application of advisory kit for downstream and upstream manufacturers in the supply chain	30/06/2014	10/01/2015	(D)
(j)	Carbon footprint verification of products	30/04/2014	30/10/2014	(D)
(k)	Dissemination of project deliverables through training workshops, seminars and exhibition	31/07/2014	31/01/2015	(D)

Reasons for Deferring or Not Achieving certain Milestones, if any.

Item 2.3 (f), (i), and (j)

Induction cooker is one of our product carbon footprint showcases of the project. When conducting data of the induction cooker, the sponsor "Gold Best Limited" was unable to send the aforesaid information to us. The main reason is that "Gold Best Limited" is only the sole agent of the sponsored induction cooker. Product development and manufacturing of the induction cooker are handled by a mainland company who was reluctant to share their products' information with us in the very beginning. After 8 months of discussion and communication, this problem was settled between GoldBest and the mainland company. Nonetheless, milestones (f), (i) and (j) (corresponding to deliverables 3 and 5 respectively) were delayed and rescheduled.

In terms of printed circuit board (PCB), another showcase product, our collaborating organization, Hong Kong Printed Circuit Association (HKPCA) helped us choose the PCB manufacturer "Supertech" as the showcase company. However, "Supertech" changed the contact person-in-charge of the carbon footprint project. This change badly affected the progress of the data collection. Further, as the company relocated its manufacturing lines from Shenzhen to Jiangxi in 2014, the company suggested the project team to use the data of the new manufacturing plant in Jiangxi. But it is not feasible as the location is too remote and such travelling cost and time were not budgeted in the proposal. Regarding this issue, the team had spent a few months to settle this issue with the sponsoring company. Therefore the milestones (f), (i) and (j) were delayed and rescheduled.

Item 2.3 (g), (h), (i), and (k)

The ISO 14067 Standard was expected to be published and launched in August 2012 (as mentioned in the proposal). However, the international standard organization (ISO) rescheduled and published it on 31st May 2013 (after a 10-month delay). Therefore milestones (g), (h), and (i) had to be rescheduled.

Although all the workshops and seminars stated in the proposal had been completed before proposed deadline. However, consequent to revised item (g), (h), and (i) above, additional seminar/workshop event was held in order to promote the latest ISO 14067 standard's information and changes. Thus, milestone (k) was revised and delayed.

Marketing/Dissemination Activities (in chronological order)

(Please provide details of all completed and on-going promotional and/or dissemination activities for each of the project deliverables. Such activities may include advertisements, seminars, workshops, etc.)

<u>Date/ Period</u>	<u>Description</u>	<u>No. of beneficiaries (SMEs/Enterprises*)</u> *please delete as appropriate
10/01/2013	Seminar on "Preparing for the Upcoming ISO 14067 (Product Carbon Footprint), a Focus on Hong Kong e-Products Manufacturers (SMEs)"	89
01/2013	Promotional advertisement in HKEIA Bulletin (Issue 2013 No.1)	300
17/04/2013	Seminar on "New Environmental Focus of Industries: Carbon Footprint of Products ISO 14067 with HKIE	55
05/2013	Promotional advertisement in HKPCA journal (Issue No.48)	200
05/2013	Promotional advertisement in HKEIA Bulletin (Issue 2013 No.3)	300

07/2013	Promotional advertisement in HKEIA Bulletin (Issue 2013 No.4)	300
07/2013	Promotional advertisement in HKEAIA journal (Issue No.35)	180
08/2013	Promotional advertisement in HKPCA journal (Issue No.49)	200
10/2013	Promotional advertisement in HKEAIA journal (Issue No.36)	180
28-31/10/ 2013	Eco Expo Asia 2013 - Green Tech for a Low-carbon Economy	6980 (From statistics data of HKTDC, total number of visitors is 10,817. The no. of HK SME is estimated at 6980)
11/2013	Promotional advertisement in HKEIA Bulletin (Issue 2013 No.6)	300
02/2014	Promotional advertisement in HKPCA journal (Issue No.51)	200
03/2014	Promotional advertisement in HKEIA Bulletin (Issue 2014 No.2)	300
04/2014	Promotional advertisement in HKEAIA journal (Issue No.38)	180
14/04/2014	Workshop on “ISO 14067 on Product Carbon Footprint-Implication and Showcase for Electronic Industry” (to associations)	15
14/04/2014	Workshop on “ISO 14067 on Product Carbon Footprint-Implication and Showcase for Electronic Industry” (to associations)	13
15/04/2014	Seminar on “ISO 14067 on Product Carbon Footprint- Implication and Showcase for Electronic Industry” in HK Electronic Expo	65
16/04/2014	Workshop on “The challenges and opportunities by the international standard on product carbon footprint for SMEs in Hong Kong (downstream enterprises) - How to comply with ISO/ TS 14067?”	19
16/04/2014	Workshop on “The challenges and opportunities by the international standard on product carbon footprint for SMEs in Hong Kong (upstream enterprises) - How to comply with ISO TS 14067?”	15
08/2014	Promotional advertisement in HKPCA journal (Issue No.53)	200
11/2014	Promotional advertisement in HKEIA Bulletin (Issue 2014 No.6) - 2 times	300
01/2015	Promotional advertisement in HKEAIA journal (Issue No.39/001)	180
21/01/2015	Seminar on “Implementation of ISO 14067- Carbon Footprint of Products in Hong Kong Electrical and Electronic SMEs (I)”	55
21/01/2015	Seminar on “Implementation of ISO 14067- Carbon Footprint of Products in Hong Kong Electrical and Electronic SMEs (II)”	57
22/01/2015	Workshop on “Quantification of Product Carbon Footprint”	38
Total no. of beneficiaries :		10,721

Future Plan for Promoting the Project Deliverables

1. The online G-BOM analyzer will be open for access and maintained by PolyU continuously.
2. The advisory kit with G-BOM guideline will be continuously distributed in future events.