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Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) GmbH

Regional Capacity Building

Measuring Carbon Emissions of Non-Electrical Products and Lifecycle Costing for Construction Works Focusing on Energy Consumed and Material Applications

15th – 17th November 2016

Port Dickson, Malaysia

Prepared By:
Noor Akmar Shah

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Summary

Sustainable Consumption and Production (SCP) patterns constitute an essential building block of a low-carbon economy. Access to credible, reliable and 'user-friendly' sustainability information is one of the essential conditions for the shift towards SCP. The project will contribute to the 10 Year Framework of Programmes on SCP (10YFP), more specifically to the Consumer Information Programme. Advance SCP aims at increased awareness, institutional support and technical capacities to develop and strengthen sustainability information policies and tools for sustainable and low carbon consumption and production patterns.

Supported by the initial finding of the Baseline Study of GGP/GPP and the inclusion of climate friendly criteria in the Eco Label Product Criteria Document (PCD) development, the common and importance factor to be practised is measurement of CO2 emission. On that note, with the cooperation of Economic Planning Unit, Prime Minister's Department (EPU,PMD) Malaysia, the Advance SCP project with expert advice from Oeko Institute had designed the Regional Capacity Building event which aims to train and share the knowledge with the participants on methodology in calculating carbon emission and conducting Life Cycle Costing (LCC) on certain product groups.

The objectives of the training:

- The participant will able to measure carbon emission of non-electrical products for Green Public Procurement implementation.
- The participant will able to understand the Life Cycle Costing for construction works which focusing on energy consumed materials application.

The training was conducted from 15th to 17th November 2016 at Corus Paradise Resort, Port Dickson, Malaysia. It was co-organised between GIZ Advance SCP Project on behalf of BMUB, Germany and Malaysian Green Technology Corporation on behalf of Malaysia Government. Fifty (50) participants had attended the event mainly came from four participating countries and two (2) trainers from Oeko Institute, Germany.

Through the observation made during the training, most of the participants had used this opportunity to learn and gather as much information on LCC/LCA methodology and application in Green Public Procurement (GPP) implementation. This information will be essential as for them to plan and apply LCC/LCA in GPP. Besides that, the Oeko Institute had also set expectations in each of the modules for this training. Although, some of the participants had less knowledge or experience in term of Green Public Procurement (GPP) or Life Cycle Assessment (LCA)/ Life Cycle Costing (LCC), but the training was effectively conducted by the trainers. The trainers had wisely designed the training with mix of lecture and work exercise as to get maximum results.

With good planning and cooperation between the Advance SCP project team members and Malaysian partners, the Regional Capacity Building events in Port Dickson, Malaysia had achieved the objectives and expectations. With overall score of 37% rated excellent and 60% rated good by participants, the event can be considered as successful. Although there were downsides especially the accommodation qualities, the project will take note and improve for the future event.

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Background

Sustainable Consumption and Production (SCP) patterns constitute an essential building block of a low-carbon economy. Access to credible, reliable and 'user-friendly' sustainability information is one of the essential conditions for the shift towards SCP. The project will contribute to the 10 Year Framework of Programmes on SCP (10YFP), more specifically to the Consumer Information Programme. Advance SCP aims at increased awareness, institutional support and technical capacities to develop and strengthen sustainability information policies and tools for sustainable and low carbon consumption and production patterns. The project will further support the creation of a market for climate-friendly products which will lead to less pollution of the environment. Regional and global trade and investments are promoted through the harmonization of eco-labels. Through the mediation of knowledge dissemination, access to training and further education, countries are enabled to generate new jobs and eco-friendly products to increase their competitiveness. Public authorities gain lower life-cycle-costs of purchased services and products.

Economic Planning Unit, Prime Minister's Department (EPU,PMD) Malaysia work closely with the Advance SCP project for the formulation of a climate-friendly policy and strategy and to support pilot implementation of climate-friendly public procurement and eco-labels in Malaysia. The Regional Capacity Building aims to train and share the knowledge with the participants on methodology in calculating carbon emission and conducting Life Cycle Costing on certain product groups.

The objectives of the training:

- The participant will able to measure carbon emission of non-electrical products for Green Public Procurement implementation.
- The participant will able to understand the Life Cycle Costing for construction works which focusing on energy consumed materials application.

Rationale

Based on the initial finding of the Baseline Study of GGP/GPP and the inclusion of climate friendly criteria in the Eco Label Product Criteria Document (PCD) development, the common and importance factor to be practised is measurement of CO2 emission. The climate friendly criteria will enhance and promote the measurement of CO2 emission of products or services. Furthermore, with no CO2 emission measurement of products and services, it will be incomplete GGP/GPP implementation since the monitoring and evaluation had not impact of CO2 emission. Therefore, the CO2 measurement is vital to be trained to all countries teams as preparation for GGP implementation and ECO Label PCD development.
Besides that, Life Cycle Costing (LCC) for construction works is also essential components of GGP/GPP implementation. LCC is use for the CO2 emission and cost measurements before GGP/GPP take place as the pre-design activity as well as justification process of GGP/GPP.
There are 2 parts of this training which had been requested to Oeko Institute:

1) Measuring carbon emission of non-electrical products for GGP/GPP implementation.
2) The Life Cycle Costing for construction works which focusing on energy consumed materials application.

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Details of the Event

The training was conducted from 15th to 17th November 2016 at Corus Paradise Resort, Port Dickson, Malaysia. It was co-organised between GIZ Advance SCP Project on behalf of BMUB, Germany and Malaysian Green Technology Corporation on behalf of Malaysia Government.

Fifty (48) participants had attended the event mainly came from four participating countries and two (2) trainers from Oeko Institute, Germany. The summary of the participants is as below:

Country	Number of Participant
Malaysia	22
Thailand	9
Philippines	13
Indonesia	4

Please refer to **Appendix 1** for the detail of participants.

The event was planned as three (3) days programme and divided into 2 sessions:

- Lecture session
- Working Group exercise session

Please refer to **Appendix 2** for details programme

Result

Based on the observation during the training, most of the participants had used this opportunity to learn and gather as much information on LCC/LCA methodology and application in Green Public Procurement (GPP) implementation. This information will be essential as for them to plan and apply LCC/LCA in GPP. Besides that, the Oeko Institute had also set expectations in each of the modules for this training. Although, some of the participants had less knowledge or experience in term of Green Public Procurement (GPP) or Life Cycle Assessment (LCA)/ Life Cycle Costing (LCC), but the training was effectively conducted by the trainers. The trainers had wisely designed the training with mix of lecture and work exercise as to get maximum results.

The participants had opportunity to learn among them and build the networking for their future communication especially during the implementation.

Besides that, the workgroup exercise also contributed significantly in making the participants understand and eventually used the tools. Here are some of the details observation that was gathered during the training.

The photos of the training session are attached as **Appendix 3**.

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Day One (15th November 2016)	
Life-Cycle Assessment (LCA) and Product Carbon Footprint (PCF) – Basic principles, applications and implications for GPP	LCA is the is an assessment to evaluate the environmental burdens associated with the entire life cycle of a product, process, or activity by identifying and quantifying energy and materials used and wastes released to the environment. A Product Carbon Footprint (PCF) is a means for measuring, managing and communicating greenhouse gas (GHG) emissions related to goods and services. A carbon footprint is based on a life cycle assessment (LCA) but focuses on a single issue which is global warming (Source: pre-sustainability.com). Government Green Procurement (GGP) is an acquisition of products, services and work in the public sector that takes into account environmental criteria to conserve natural environment and resources, and minimizes and reduces negative impacts of human activities. Hence, before the Government to procure the green products, services or works, we need to have some the assessment as a guidance tool to make sure that the products, services or work are really green and environmental friendly. Possible limitations of applying LCA & PCF in GPP ✓ Lack of /or poor policy direction and commitment at high level/ decision maker in the organization ✓ Availability and affordability of the green products in the market ✓ Lack of national data (data input & emissions factor) to conduct the LCA & PCF ✓ Issues on the confidentiality and reliability of national data to conduct the LCA & PCF Possible action in dealing with the lack of data & information for LCA & PCF in GPP? ✓ Initiation on focus/target specific project on primary data- for example to develop national emissions factor for transportation sector ✓ Centralized data repository
Life Cycle Costing (LCC) - Basic principles, applications and implications for GPP	LCC is the assessment of all costs, connected to the entire life cycle of a product, process, or activity. Different approaches of LCC ✓ Conventional LCC (static model)- accrual cost & savings don't play a role. ✓ LCC (dynamic model)- accrual cost & savings play a role The advantages and disadvantages of applying different approaches of LCC in GPP? ✓ Dynamic model is suitable if there is changes in near future on the discount rate, inflation rate and energy prices. If not, the static model can be used.

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<table>
<tr>
<td>Bringing together LCA and LCC in GPP – Case studies</td>
<td>It is important to combine LCA and LCC in GPP due to:
✓ LCA and LCC is important in GGP to determine the most cost effective products with the minimal of environmental impacts.
✓ If there are several products available for tender evaluation, we can use the LCA and LCC to determine the long-term cost savings and environmental friendly products.
Country observation:
✓ Malaysia: To establish a policy to implement GGP and to integrate the LCA and LCC in the e-procurement system as part of the tender evaluation. As well as the formation of consortium at national level consisting of the relevant agencies who are directly involved in policy making (GGP), technical expertise (LCA, LCA).
✓ Philippines: To use LCA/LCC in the procurement planning and priming the market to include environmental information in their products</td>
</tr>
<tr>
<td>Introduction to the SMART SPP tool for applying LCA and LCC in GPP – Example Desktop-PCs vs Notebooks</td>
<td>Application of an Excel-based tool for calculating Greenhouse Gas emissions and Life-Cycle costs of various PC models. Participants needs to learn:
✓ First to determine the Planning horizon, Discount rate (nominal) and Inflation rate of the country
✓ To collect the data specifications of the desktop, PC and Notebooks which includes the life span, energy consumption,
✓ To determine the number of units to be purchased/leased and Purchase price, grid connected electricity emission factor (tCO2eq/MWh)
✓ To gather data on the installation cost and maintenance costs as well as Remnant Value / End-of-Life Costs
✓ To determine the total embedded emissions (production, transportation, installation and disposal) for each of the desktop, PC and Notebooks
The data and information sources to carry out the LCA and LCC calculations using the Excel-Tool
<table>
<tr><th>DATA</th><th>SOURCES</th></tr>
<tr><td>Planning horizon</td><td>The analysis (planning horizon need to be longer than the life span of the products</td></tr>
<tr><td>Discount rate (nominal) and Inflation rate</td><td>Central Bank of the country</td></tr>
</table>
</td>
</tr>
</table>

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	Specifications of the desktop, PC and Notebooks which includes the life span, energy consumption	From each of the supplier or desktop research on the brochure
	Number of units to be purchased/leased & Purchase price	No. of units: the Ministry Purchase price: From each of the supplier or desktop research on online procurement
	Grid connected electricity emission factor (tCO2eq/MWh)	Normally ministry of energy
	Installation cost and maintenance costs as well as Remnant Value / End-of-Life Costs	From each of the supplier or desktop research
	Total embedded emissions (production, transportation, installation and disposal) for each of the desktop, PC and Notebooks	From each of the supplier or desktop research on the LCA for each of the products

Important factors that need to be considered while collecting data & information for LCA & LCC.

- ✓ Data reliability and accuracy

The Tender Evaluation in public procurement using the results of LCA and LCC can be conduct through integrating the LCA and LCC the tender evaluation.

Day Two (16th November 2016)	
Applying LCA for non-electrical products	LCA applied for non-electrical products within the context of GPP using Cradle to Grave approached method. The LCA applied by accessing the EOL (Environmental impact throughout the life cycle of product). The database of Life Cycle Inventory (LCI) datasets supports the eco-labelling programs, life cycle assessment studies, eco-design, environmental declaration communication and other environmental management initiatives that require life cycle inventory information. The limitations and challenges of applying LCA & PCF for non-electrical products in GPP is lack of significant local data and information In order to deal with the lack of data & information for applying LCA & PCF for non-electrical products in GPP;

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	✓ The participant acknowledged there should have central body who consolidate and compile all the required data for life cycle inventory information. ✓ Conduct briefing session for the industries must be widespread and conduct in order to obtain their awareness.
Group 1, 2, 3, 4 (5 persons each): Product Group "*Lighting Equipment*" (combining LCA & LCC) **Group 5, 6, 7, 8 (5 persons each): Product Group "*Cleaning Services, using the example of Textile vs Paper products*" (LCA for non-electrical products**)	In this session, the participant acknowledged that the tool is important in GPP because it can be used to analyze the cost-effectiveness and how green of the lighting equipment. During the training, participants learn that LCC can be used to do a comparison and provide the lowest cost and lowest annual CO2 which are the important results before evaluation. In doing LCC for lighting equipment, the difficulties would be in getting the reliable data and LCA would be in terms of study of these products, in such as to many model and brands and there is no such study conducted yet. LCC allows a direct comparison of different bulbs or hand dryer (cost, CO2, Payback Period and CO2 Savings), for LCA we can know each phase of life cycle of product, what is the environmental attributes encounter.
Group 1, 2, 3, 4 (5 persons each): Product Group "*Cleaning Services, using the example of Textile vs Paper products*" (LCA for non-electrical products) **Group 5, 6, 7, 8 (5 persons each): Product Group "*Lighting Equipment*" (combining LCA & LCC)**	The data gathering was done through google and its reliability was depending on the owner of issuance of the report and who is the 3rd party verifier. LCC, the difficulties would be in getting the reliable data and LCA would be in terms of study of certain model and brands, in such countries don't have any study conducted yet and also the validity of such data or reports The benefits would be in tender specification and determining the environmental claim for certain products would be easier. Overall comment More example of case studies should be taught in related to 5 sectors (energy, transport, building, waste and water)
Lessons learnt & challenges while applying LCA and LCC in GPP?	The SMART SPP tool to be used in tender specification, the cost comparison for the CO2 emission (before and after reduction). During the group work, the challenge would be to obtain reliable data, at such we have to goggle to search for the product data sheet information which manufactures declares by its own without the 3rd party verified. To counter the challenge, the participants must find a reference website to consolidate all the data.

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Day Three (17th November 2016)	
Group 1, 2, 3, 4 (5 persons each): Product Group "*Air-Conditioners*" (combining LCA & LCC) **Group 5, 6, 7, 8 (5 persons each): Product Group "*Paints*" (LCA for non-electrical products)**	In this session, all participant used the tool which important in GPP because it can be used to analyze the cost-effectiveness and how green of the Air Conditioner and Paint. During the training, participants learn that LCC can be used to do a comparison and provide the lowest cost and lowest annual CO2 which are the important results before evaluation. The difficulties in carrying out LCC or LCA for this product are data availability, confidentiality and reliabilities The benefits of doing LCA or LCC for GGP implementation or any related activities is LCC allows a direct comparison of different product (cost, CO2, Payback Period and CO2 Savings) The learning in this exercise was the importance of LCC and LCA as an evaluation tool of product life cycle and at the same time as a decision-making tool in order to make most efficient decision and help to plan operative costs in advance. Overall comment ✓ Participants get experience with using the SMART SPP tool in terms of combining LCA and LCC for the purpose of tender evaluation with the public procurement. ✓ Participants get some basic knowledge on the technical parameters of the air-conditioners. ✓ Participants get experience with applying LCA for non-electrical products ✓ Participants get some basic knowledge on evaluating a non-electrical product e.g paint from the perspective of LCA.
Group 1, 2, 3, 4 (5 persons each): Product Group "*Paints*" (LCA for non-electrical products) **Group 5, 6, 7, 8 (5 persons each): Product Group "*Air-Conditioners*" (combining LCA & LCC)**	The important and reliable of the tool is LCC combines all relevant costs (CO2, annual cost) which a product generates throughout its whole product life cycle. Therefore, the officer can make a comparison based on most cost-efficient and green product. The data gathering process and reliability of the information provided will ensure a full calculation of all cost, the significant information and data should be provided such as planning horizon, discount rate, embedded emission factor, disposal rate and etc. therefore the lack of information or data will reflect the overall calculation and comparison. The difficulties in carrying out LCC or LCA for this product were lack of data and knowledge and experience on LCC or LCA. The benefits of doing LCA or LCC for GGP implementation or any related activities was application of good tool to assess environmental impacts associated with all stages of product life cycle.

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	The participants get experience on how to do a systematic evaluation of the environmental aspects and cost-effectiveness of a product or services by using LCA and LCC. Overall comment was: ✓ Participants get experience with applying LCA for non-electrical products ✓ Participants get some basic knowledge on evaluating a non-electrical product from the perspective of LCA. ✓ Participants get experience with using the SMART SPP tool in terms of combining LCA and LCC for the purpose of tender evaluation with the public procurement. ✓ Participants get some basic knowledge on the technical parameters of the air-conditioners.
Lessons learnt & challenges while applying LCA and LCC in GPP	The group work also assisted the participants to use the application in implementing GPP especially assess environmental performance of a product evaluated based on whole life cycle chain in terms of cost and environmental perspective. LCA is more applicable to use in planning process while LCC is more complicated to use because there is system already established. The participants anticipated the challenge and problem which emerged during the group work is to build up national emission factor for environmental impacts by category of activities (e.g. transportation, utilities) before the SMART Tool used effectively and lack of information on national data on recycling rate, disposal and collection prices as well as Baseline data and LCA studies of certain product. However, during the exercise the participants able to remove the problems which emerged through solving the problems based on assumptions and modelling of internationally available studies. The participant suggested in order to counter the challenge, ✓ formation of consortium at national level consisting the relevant agencies who are directly involved in policy making (GPP), technical expertise (LCA and LCC) and ✓ Promoting LCA study to encourage the researcher to conduct LCA study.

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Evaluation

After completion the third day of training, all the participants had been given evaluation form for them to rate the training which includes accommodation, food, training contents, training room, facilities and trainers' performance and here are the results.

No	Items	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	Training Course	-	-	**11%**	**64%**	**25%**
2	Training Tools	-	-	**19%**	**46%**	**31%**
3	Trainer: Mr. Siddharth Prakash	-	-	-	**33%**	**67%**
4	Trainer: Mr. Florian Antony	-	**3%**	**7%**	**37%**	**55%**
5	Training Environment		9%	30%	37%	23%
		Excellent	**Good**	**Average**	**Poor**	**Very Poor**
The workshop overall score		**37%**	**60%**	**3%**	-	-

Besides the scores, there are also written comments that had been collected which mostly commented on the accommodation quality and training room facilities especially internet services that found to be poor. There were several other complaints especially on:

- The rooms were dirty with a lot of stains
- Room's toilets were not properly maintained.
- Cockroach in the room.
- Leaking in the rooms during rain.
- Internet service in the training room always interrupted.

Details of the evaluation are attached as **Appendix 4**.

Conclusion

In conclusion, the Regional Capacity Building events in Port Dickson, Malaysia had achieved the objectives and expectations. With overall score of 37% rated excellent and 60% rated good by participants, the event can be considered as successful. Although there were downsides especially the accommodation quality, the project will take note and improve for the future event.

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Appendix 1: Attendance List

	REGIONAL CAPACITY BUILDING ON GOVERNMENT GREEN PROCUREMENT **Corus Paradise Resort Hotel, Port Dickson** 15th - 17th Nov.2016, (Tuesday - Thursday)				
	Local Participants				
No	**Name**	**Email**	**Contact**	**Designation**	**Organisation**
1	**Norhasliza Mohd Mokhtar**	hasliza@greentechmalaysia.my	03-89210800	Vice President	Malaysia Green Technology Corporation
2	**Wan Nadia Kamarudin**	nadia@greentechmalaysia.my	03-89210800	Associate	Malaysia Green Technology Corporation
3	**Komathi Mariyappan**	komathi@greentechmalaysia.my	03-89210800	Associate Consultant	Malaysia Green Technology Corporation
4	**Siti Fatimah Noor Saidin**	sitifatimah@greentechmalaysia.my	03-89210800	Analyst	Malaysia Green Technology Corporation
5	**Norzarifah Ismail**	norzarifah@greentechmalaysia.my	03-89210800	Analyst	Malaysia Green Technology Corporation
6	**Nur Syahira Abdul Rahim**	nursyahira@greentechmalaysia.my	03-89210800	Executive	Malaysia Green Technology Corporation
7	**Noor Hidayu Hashim**	hidayu.hashim@kettha.gov.my		Ketua Penolong Setiausaha	Kementerian Tenaga, Teknologi Hijau dan Air (KeTTHA)
8	**Nuryusnita Yusoff**	nuryusnita.yusoff@treasury.gov.my	03-88824465 03-88824290	Penolong Setiausaha	Kementerian Kewangan
9	**Wan Mazlina Binti Wan Hussein**	wmazlina@sirim.my	03-55446569 03-55446590	Ketua Seksyen / Penyelidik Kanan	SIRIM Berhad
10	**Yati Binti Kamarudzaman**	yatikama@sirimy	03-55446563 03-55446590	Pegawai Penyelidik	SIRIM Berhad
11	**Farah Binti Abdul Samad**	farahas.jkr@1govuc.gov.my	012-6930482 03-40411988	Ketua Penolong Pengarah Kanan	Jabatan Kerja Raya (Cawangan Alam Sekitar & Tenaga)
12	**Ar. Siti Mazlina Binti Zarmani**	SMazlina@jkr.gov.my	012 345 5951	PENOLONG PENGARAH (ARKITEK J44)	Jabatan Kerja Raya (Cawangan Alam Sekitar & Tenaga)

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13	**Azila Binti Ahmad**	azila.ahmad@moh.gov.my	03-8892 4429 03-8892 4568	Ketua Penolong Pengarah Kanan	Kementerian Kesihatan Malaysia
14	**Muhammad Taheri Bin Abdul Rashid**	mtaheri@moh.gov.my	03-8892 4850 013-8023380 03-8892 4803	Jurutera Elektrikal	mtaheri@moh.gov.my
15	**Kolonel Ir. Anhar Bin Anuar**	anhar@mod.gov.my anhar.anuar@yahoo.com	03-2071 3727	Pengarah Cawangan Trafik Pembangunan	Angkatan Tentera Malaysia
16	**Arni Hasliza Binti Aziz**	arnihasliza@kwp.gov.my	03-8889 7839 03-8889 7730	Ketua Penolong Setiausaha	Kementerian Wilayah Persekutuan
17	**Khadijah Tahirah Binti Razani**	khadijah@mohe.gov.my	03-8870 5351 03-8870 6896	Penolong Setiausaha	Kementerian Pendidikan Tinggi
18	**Mohamed Zairi Bin Razali**	zairirazali@moe.go.my	03-8884 6881 03-8884 6893	Jurutera Mekanikal Kanan	Kementerian Pendidikan Malaysia
19	**Dr. Irwan Wahyudi Hj. Ibrahim**	irwan.wahyudi@moha.gov.my	03-88868640	Ketua Penolong Setiausaha	Kementerian Dalam Negeri
20	**Ahmad Kamal Wasis @ Waksis**	kamal@epu.gov.my	03-8872 5499 03-8872 3232		Unit Perangan Ekonomi
21	**Fatimah Wati Che Abdullah**	fatimah.abdullah@epu.gov.my	03-88723237		Unit Perangan Ekonomi

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	International Participants				
NO	**Name**	**Email**	**Country**	**Designation**	**Organisation**
1	**Mr. Thomas Lehmann**	-	Thailand	Project Director	GIZ - Advance SCP Project
2	**Miss Kanchanatetee Vasuvat**	-	Thailand	Project Manager	GIZ - Advance SCP Project
3	**Miss Lunchakorn Prathumratana**	-	Thailand	Technical Expert	GIZ - Advance SCP Project
4	**Miss Suchaya Khemanusuk**		Thailand	Admin Manager	GIZ - Advance SCP Project
5	**Miss Mothinee Aopreeya**	-	Thailand	Environmentalist	Pollution Control Department (PCD)
6	**Miss Sujitra Kanyawilat**	-	Thailand	Environmentalist	Pollution Control Department (PCD)
7	**Ms Suphrueksa Yaprom**	-	Thailand	Assistant Program Officer	Thailand Environment Institute (TEI)
8	**Miss Phuangphan Srithong**		Thailand		Thailand Greenhouse Gas Management Organization (TGO)
9	**Miss Pinthong Tonrub**		Thailand	Environmentalist	Pollution Control Department (PCD)
10	**Mr. Noor Akmar Shah**		Malaysia	National Project Coordinator	GIZ - Advance SCP Project
11	**Ms. Susy Nurmayanti**	-	Indonesia		Ministry of Environment and Forestry
12	**Ms. Linda Puspita**		Indonesia		Ministry of Energy and Mineral Resources
13	**Mr. Cecep Hender Supriadi**		Indonesia		LKPP
14	**Mr. Wandi Try Karya Utama**		Indonesia		
15	**Ms. Kristi Pasqual Rutab**		Philippines	Procurement Management Officer	Government Procurement Policy Board (GPPB-TSO)
16	**Mr. Ian Tolo Fajarito**		Philippines		Procurement Services

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17	**Mr. Jayson Capacia Erquiza**		Philippines	Procurement Management Officer	DTI
18	**Mr. Edward Rosas Saddi**		Philippines		Procurement Services
19	**Mr. Jerry C. Digo**	-	Philippines		Government Procurement Policy Board (GPPB-TSO)
20	**Mr. Tareeq Yahya Timhar A. Radjaie**	-	Philippines		Government Procurement Policy Board (GPPB-TSO)
21	**Ms. Carla B. Portugal**	-	Philippines		Government Procurement Policy Board (GPPB-TSO)
22	**Mr. Manuel Anthony S. Tan**		Philippines		Government Procurement Policy Board (GPPB-TSO)
23	**Mr. Randy E. Flores;**		Philippines		Government Procurement Policy Board (GPPB-TSO)
24	**Ms. Diane Angela A. Marcos**		Philippines		Government Procurement Policy Board (GPPB-TSO)
25	**Ms. Katrina L. Paala**		Philippines		Government Procurement Policy Board (GPPB-TSO)
26	**Ms. Shari-Ann Harriet F. Cabuhat**		Philippines		Government Procurement Policy Board (GPPB-TSO)
27	**Ms. Annie R. Almojuela.**		Philippines		Government Procurement Policy Board (GPPB-TSO)
28	**Mr. Siddarth Prakash**		Germany	Trainer	Oeko Institute
29	**Mr. Antony Florian**		Germany	Trainer	Oeko Institute

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Appendix 2: PROGRAMME

Regional Capacity Building: Measuring Carbon Emissions of Non-Electrical Products and Lifecycle Costing for Construction Works Focusing on Energy Consumed and Material Applications

15th to 17th November 2016
Port Dickson, Malaysia

DAY-1: 15th November 2016 (Tuesday)	
08:30 – 09.00	Registration
09:00 – 10:15	Workshop opening - Welcome note by MOF - Opening remark by GIZ Project Director - Introduction round - Group Photo Session
10:15 – 11:00	Life-Cycle Assessment (LCA) and Product Carbon Footprint (PCF) – Basic principles, applications and implications for GPP by Florian Antony, Oeko-Institute
11:00 – 11:15	Morning Break
11:15 – 12:00	Life Cycle Costing (LCC) - Basic principles, applications and implications for GPP by Siddharth Prakash, Oeko-Institute
12:00 – 12:45	Bringing together LCA and LCC in GPP – Case studies by Siddharth Prakash, Oeko-Institute
12:45 – 14:00	Lunch Break
14:00 – 16:00	Introduction to the SMART SPP tool for applying LCA and LCC in GPP – Example Desktop-PCs vs Notebooks by Siddharth Prakash, Florian Antony, Oeko-Institute Tea Break will be served
16:00 – 17:00	Wrap up Day-1
18:00 – 21:00	Welcoming Dinner at Corus Paradise Resort

DAY-2: 16th November 2016 (Wednesday)	
09:00 – 09:15	Recap Day-1
09:15 – 10:00	Applying LCA for non-electrical products by Florian Antony, Oeko-Institute
10:00 – 10:30	Morning Break
10:30 – 12:30	Group Work A: Combining LCA and LCC in GPP and implementing LCA for non-electrical products in GPP Group 1,2,3,4: Product Group "Lighting Equipment" (combining LCA & LCC) Group 5,6,7,8: Product Group "Cleaning Services, using the example of Textile vs Paper products" (LCA for non-electrical products) Independent group work under the guidance of Oeko-Institute
12:30 – 13:45	Lunch Break
13:45 – 15:45	Group Work B: Combining LCA and LCC in GPP and implementing LCA for non-electrical products in GPP Group 1,2,3,4: Product Group "Cleaning Services, using the example of Textile vs Paper products" (LCA for non-electrical products) Group 5,6,7,8: Product Group "Lighting Equipment" (combining LCA & LCC) Independent group work under the guidance of Oeko-Institute
15:45 – 16:15	Tea Break
16:15 – 16:35	Lessons learnt & challenges while applying LCA and LCC in GPP?
16:35 – 17:35	Lessons learnt & challenges while applying LCA and LCC in GPP?
17:35 – 17:45	Wrap up: Day 2

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18:00 – 20:00	Dinner
20:00 – 22:00	Saujana Beach Tour

DAY-3: 17th November 2016 (Thursday)	
08:30 – 08:40	Recap Day-2
08:40 – 10:40	Group Work C: Implementing LCA and LCC in GPP Group 1,2,3,4: Product Group "Air-Conditioners" (LCC in GPP) Group 5,6,7,8: Product Group "Paints" (LCA for non-electrical products) Independent group work under the guidance of Oeko-Institute
10:40 – 11:00	Morning Break
11:00 – 13:00	Group Work D: Implementing LCA and LCC in GPP Group 1,2,3,4: Product Group "Paints" (LCA for non-electrical products) Group 5,6,7,8: Product Group "Air-Conditioners" (LCC in GPP) Independent group work under the guidance of Oeko-Institute
13:00 – 14:15	Lunch Break
14:15 – 14:45	Lessons learnt & challenges while applying LCA and LCC in GPP?
14:45 – 15:15	Presentation of Lessons learnt & challenges while applying LCA and LCC in GPP
15:15 – 15:30	Tea Break
15:30 – 16:00	Presentation of Lessons learnt & challenges while applying LCA and LCC in GPP
16:00 – 16:45	Overall conference feedback Wrap up Closing remark
18:00 – 20:00	Dinner
20:00 – 22:00	Teluk Kemang Beach Tour

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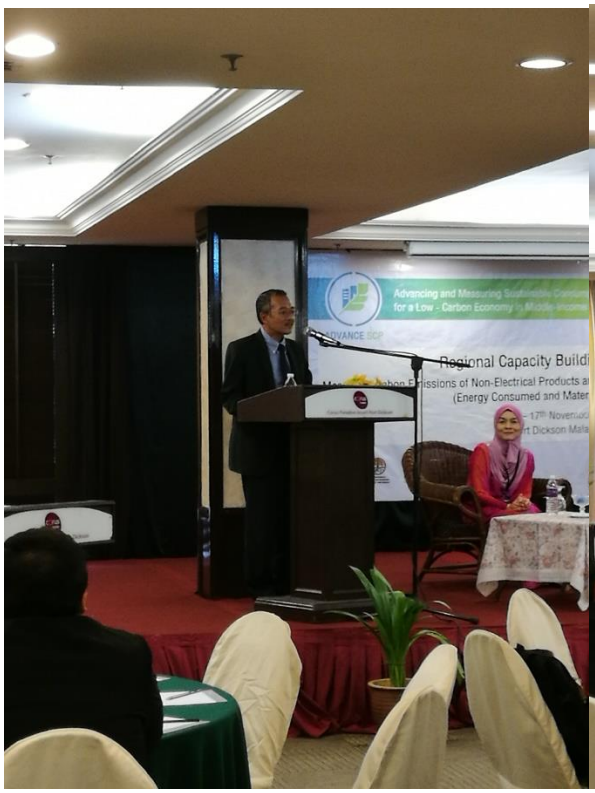
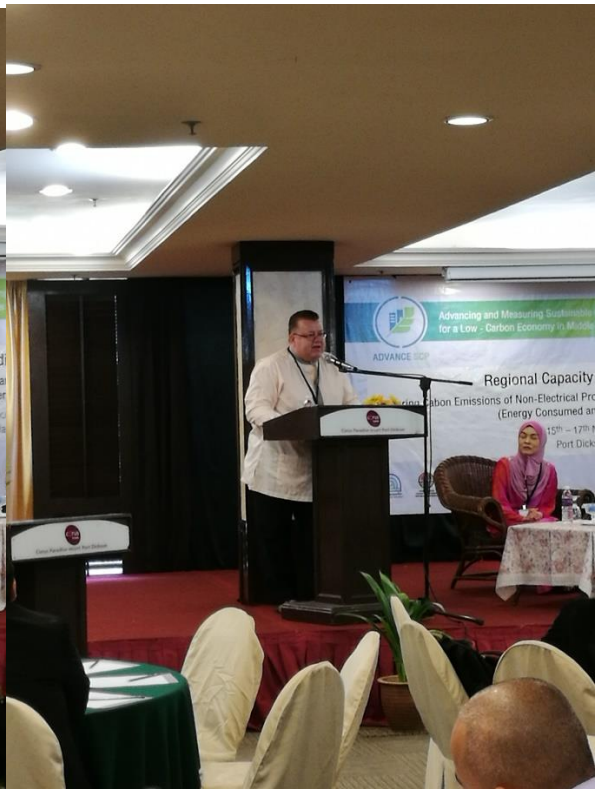
Appendix 3:

The Photos during Regional Capacity Building event in Port Dickson, Malaysia





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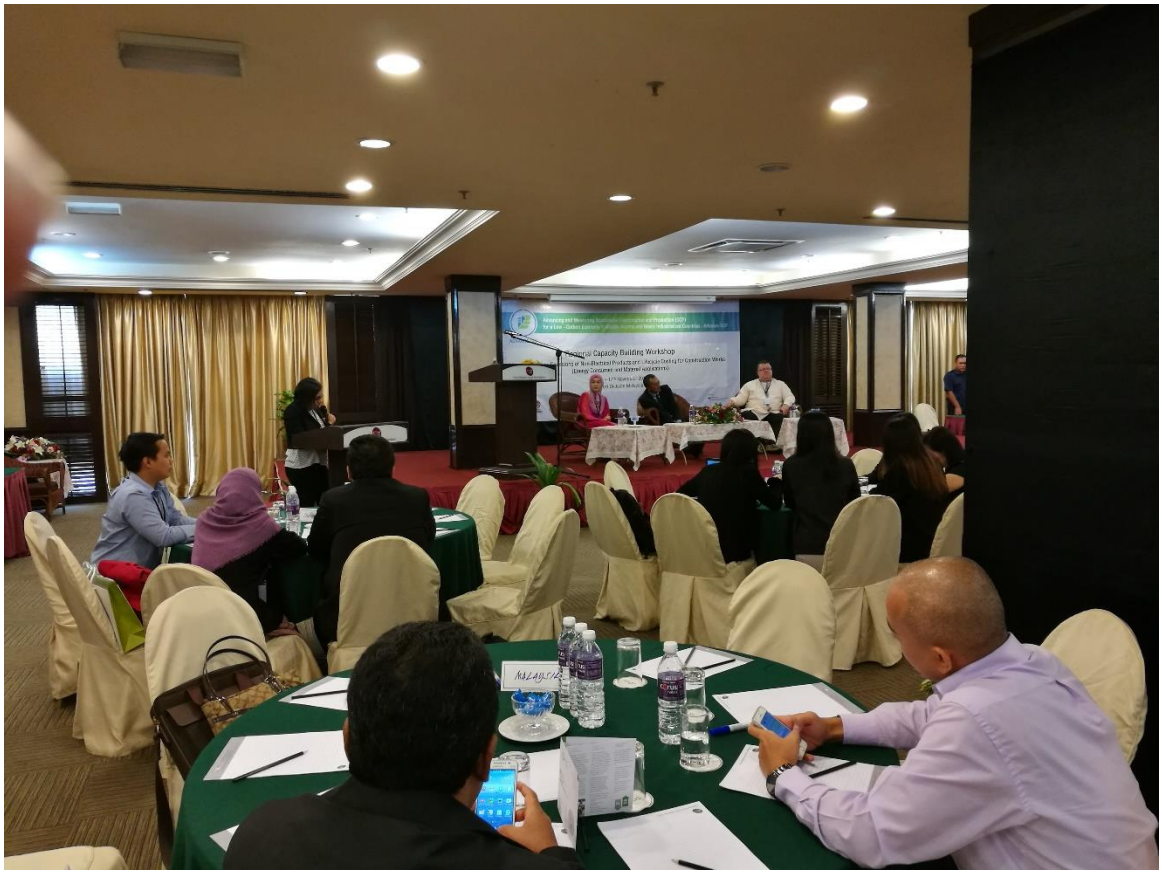

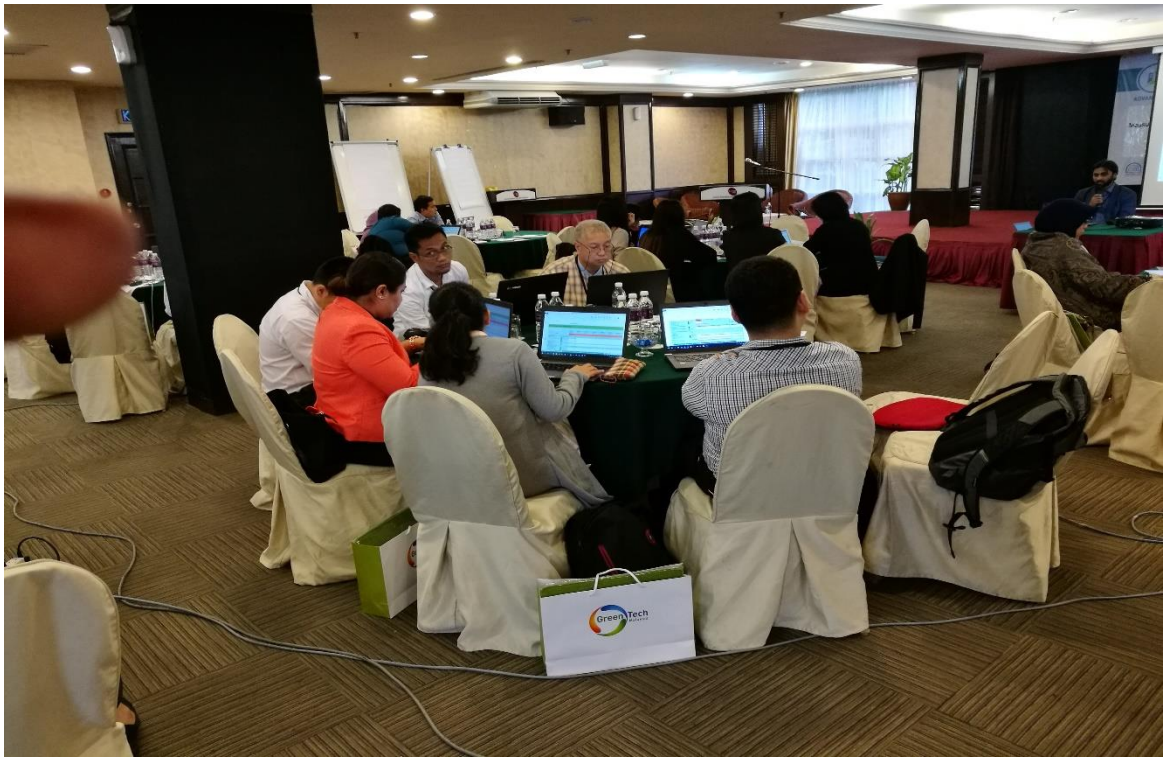
GreenTech

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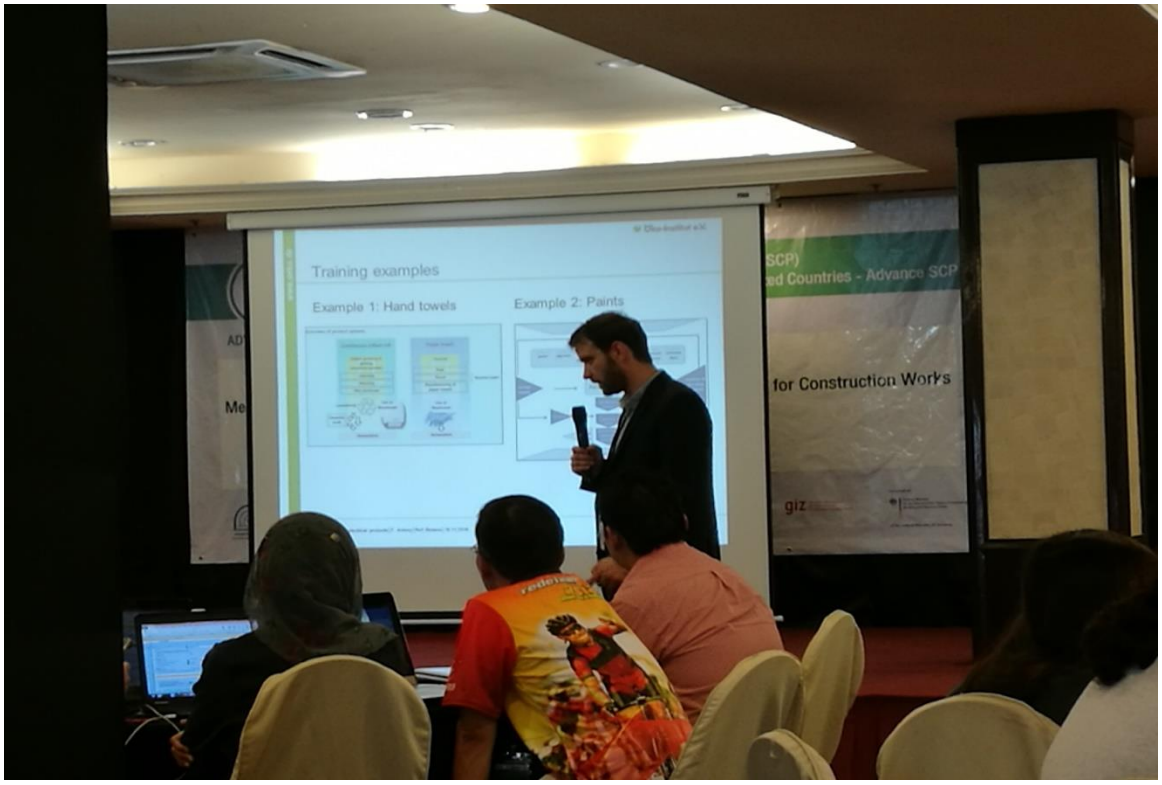
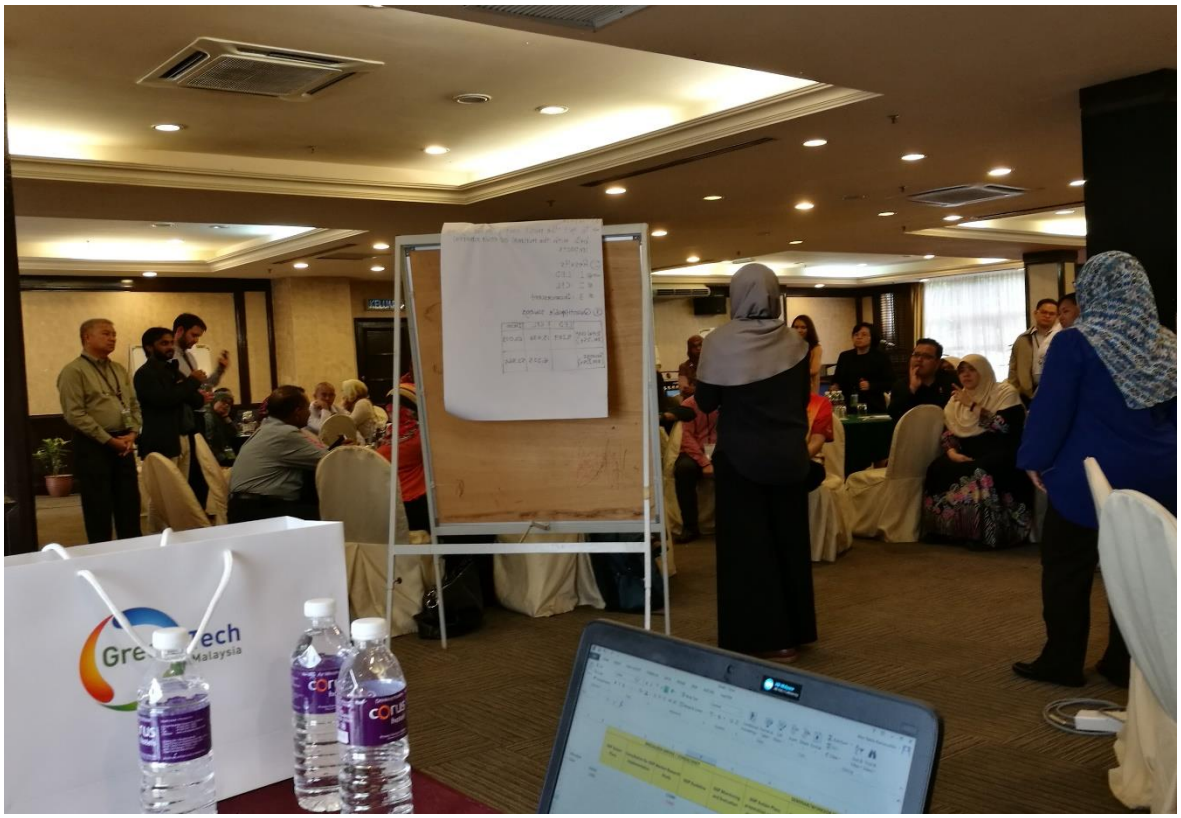

Training examples
Example 1: Hand towels
Example 2: Paints
for Construction Works
giz



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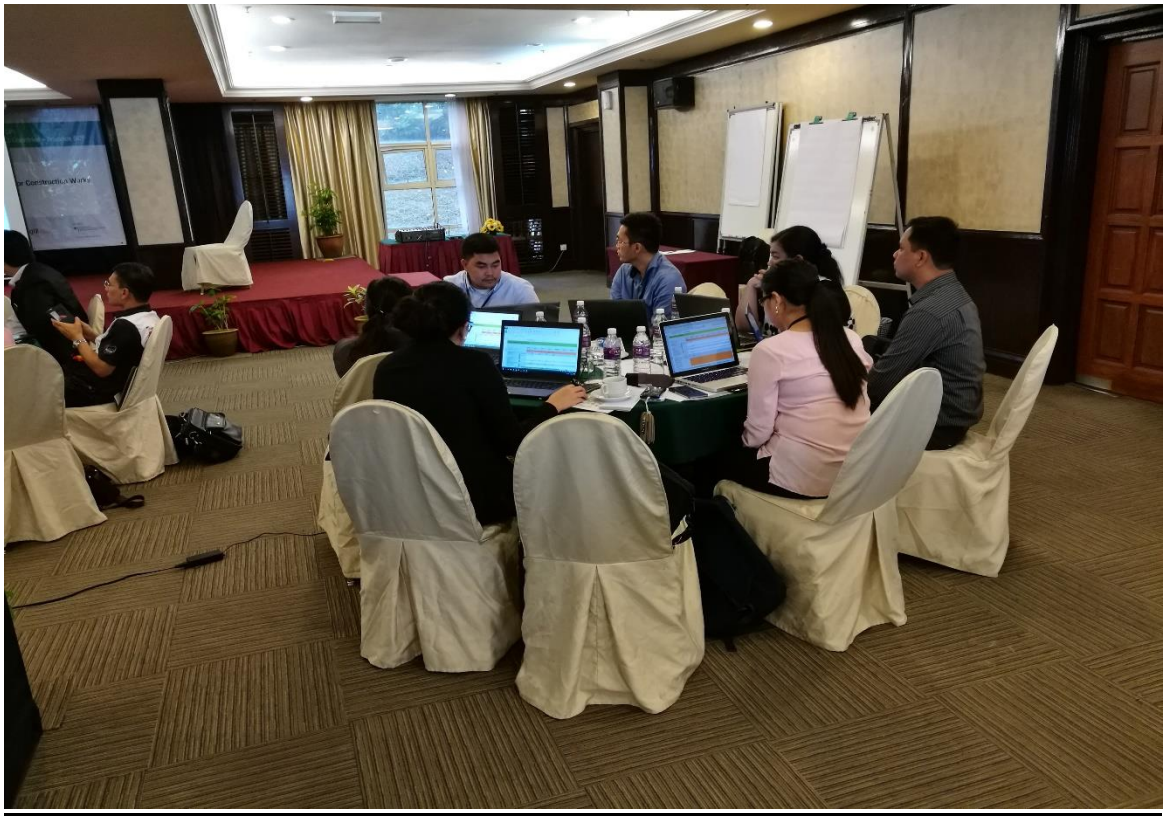

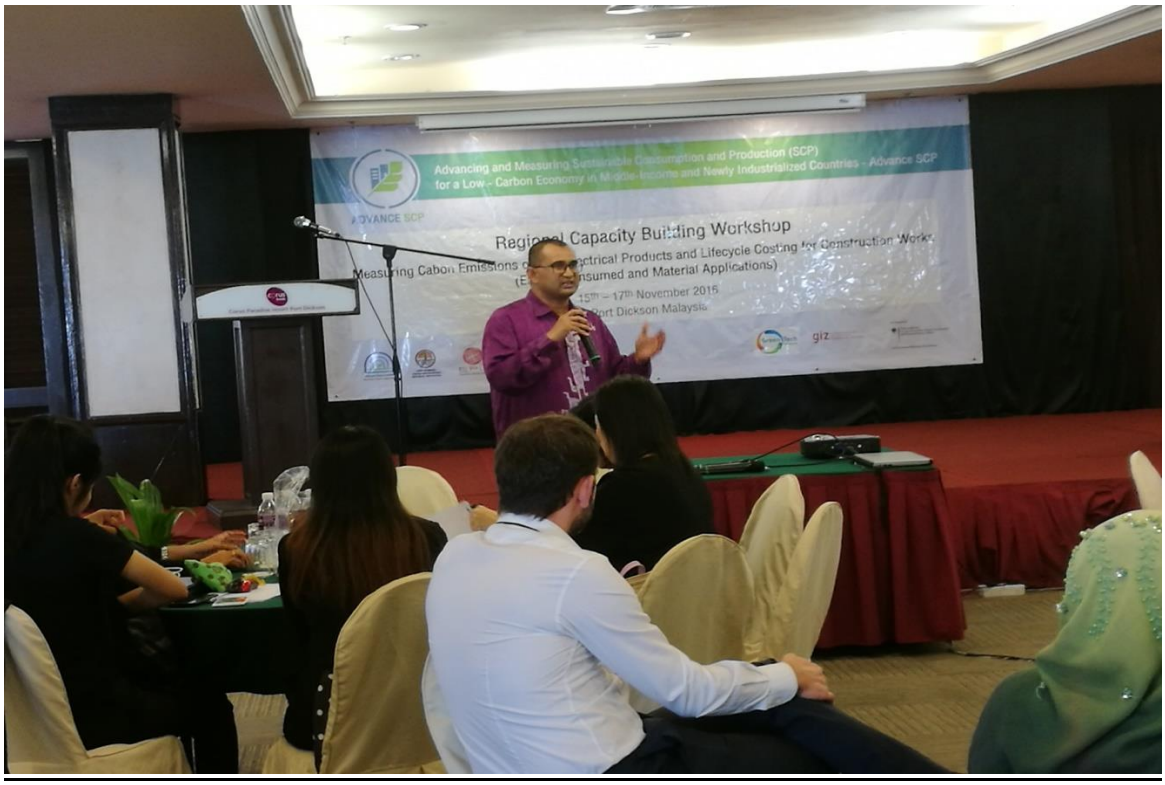
Advancing and Measuring Sustainable Consumption and Production (SCP)
for a Low - Carbon Economy in Middle-Income and Newly Industrialized Countries - Advance SCP
ADVANCE SCP
Regional Capacity Building Workshop
Measuring Carbon Emissions
(E
nsumed and Material Applications)
15th – 17th November 2015
ort Dickson Malaysia
giz

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Appendix 4: Evaluation

EVALUATION		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
	TRAINING COURSE:					
1	The workshop met my expectations.			11%	69%	20%
2	I will be able to apply the knowledge learned.			17%	60%	23%
3	The workshop objectives for each topic were identified and followed.			6%	66%	29%
4	The content was organized and easy to follow.			6%	69%	26%
5	Adequate time was provided for questions and discussion.			14%	57%	29%
	TRAINING TOOLS:					
6	The group exercises help me to learn the training information.			6%	46%	49%
7	The learning tools (i.e. excel sheets exercises, PowerPoint slides) assisted my learning.			9%	54%	37%
8	The technology equipment worked properly.		11%	43%	37%	9%
	TRAINER: Mr. Siddharth Prakash					
9	The trainer was knowledgeable about the content.				31%	69%
10	The trainer was responsive to questions and other needs.				40%	60%
11	The trainer presented the content in an interesting manner.				40%	60%
12	The trainer communicated well.				26%	74%
13	The trainer encouraged a participatory and interactive learning environment.				26%	74%
	TRAINER: Mr. Florian Antony					
14	The trainer was knowledgeable about the content.			6%	29%	66%
15	The trainer was responsive to questions and other needs.			9%	37%	54%
16	The trainer presented the content in an interesting manner.		3%	9%	40%	49%
17	The trainer communicated well.			9%	46%	46%
18	The trainer encouraged a participatory and interactive learning environment.		3%	3%	34%	60%

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	TRAINING ENVIRONMENT:					
19	The training location was suitable place (i.e. training room, hotel, accommodation, and hotel facilities).		14%	34%	34%	17%
20	Organizing arrangements met my acceptation. (logistics, food & beverage)		3%	26%	40%	29%
		Excellent	**Good**	**Average**	**Poor**	**Very Poor**
21	**How do you rate the workshop overall**	**37%**	**60%**	**3%**		
22	**What aspects of the workshop could be improved?**					
	The facilities such as internet connections since it is very relevant during exercise.					
	More time for workshop					
	To remind participants to bring along calculator also.					
	The use of interactive multimedia could be an option.					
	The internet connection which was not stable all the time. Need more case studies to understand the challenges and solutions.					
	Perhaps the content of the module can leverage to LCC to non-electrical products too.					
	Meeting facility					
	more exercise focuses on non-electrical product i.e. cement, furniture					
	To improve the accommodations, foods + internet networking					
	Hope the organizer can provide good internet facility where internet usage is hardly expected in courses					
	Training exercise on LCA -> how to use LCA software					
	workshop should give longer time					
	Logistics					
	Maybe we could consider sometime to go places to visit since this is international travel for us					
	Mixed personnel of the group from different country					
	The training is need 'good' internet connection					
	Internet connection, since the workshops largely depended on access to data via internet					
23	**Other comments**					
	great job					
	thank you					
	Prefer to have Hands-on Training with real data and guidance from LCA/LCC experts for smaller focus group.					
	thank you GIZ team :)					
	thank you and please invite us again attention to our names / DBM					
	systematized textures					
	good training					
	TQ to organizer for organizing such as a good training					
	To organize another workshop focusing on "building" - include LCA + LCC in order to get the value of green procurement for 'works'					

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	Collaborative project initiation would be great to spur the GPP implementation beyond planning / policy making
	Extend the workshop for at least two more days to enhance the use of the SPP smart tool, more LCA & LCC sample workshop
	Provide data to all for practice and give time to gather data