

2015 MALAYSIA UNIVERSITY-INDUSTRY GREEN BUILDING COLLABORATION (2015 MU-IGBC) SYMPOSIUM

Faculty of Engineering, Universiti Putra Malaysia
20-21 January 2015
"Facilitating University-Industry Partnerships"



Post Symposium Report (Green Building Research Agenda)

Prepared by:

Dr. Zalina Binti Shari

MGBC Chair of Education Committee 2014/2015

MGBC Chair of Higher Education & Research Committee 2015/2016

Reviewed by:

Assoc. Prof. Dr. Mohd Faris Khamidi

MGBC Co-chair of Higher Education & Research Committee 2015/2016

Tang Chee Khoay

MGBC member of Higher Education & Research Committee 2015/2016

Approved by:

Ar. Sarly Adre Sarkum

President of MGBC

Date:

27 November 2015



JOINTLY ORGANISED BY



SPONSORED BY



Acknowledgements

This report is the outcome of a two-day symposium organised by MGBC Education Committee in collaboration with Housing Research Centre (HRC), Universiti Putra Malaysia on 20th – 21st January 2015.

MGBC Education Committee 2014/2015

Chairman:

Dr. Zalina Shari, Universiti Putra Malaysia

Co-Chair:

Tan Hwee Yinn, IEN Consultants Sdn. Bhd.

Committee members:

1. **Assoc. Prof. Dr. Ar. Abdul Malek Abd. Rahman, Universiti Sains Malaysia**
2. **Dr. Chan Siew Chong, INTI International Universiti**
3. **Assoc. Prof. Dr. Mohd Zin Kandar, KALAM, Universiti Teknologi Malaysia**
4. **Ir. Meheron Selowara Joo, SEGI University**
5. **Ir. Yong Kee Chiang, Selset Education Sdn. Bhd.**
6. **Dr. Wardah Fatimah Mohammad Yusoff, Universiti Kebangsaan Malaysia**
7. **Peter Toh, Fresco (M) Sdn. Bhd.**
8. **Lim Gene-Harn, IEN Consultants Sdn. Bhd.**
9. **Fuad Abdullah, Microcorp Technology Sdn. Bhd.**
10. **Goh Joon Liang, Wilhams Insulation Far East Sdn. Bhd.**
11. **Fauhan Rosli, UniKL MICET**

Secretariat Staff:

1. **Julian Khor Yun Ling**
2. **Noor Hafizah Ahmad Safri**
3. **Siti Zuliyaismah Zakariya**

HRC, UPM Committee

Prof. Dato Abang Abdullah Abang Ali

Prof. Dr. Thamer Ahmed Mohamed

Secretariat Staff:

1. **Norliyana Abd. Karim**
2. **Siti Norlela Rozaidi**

The committee wish to gratefully acknowledge the support of sponsors who made the symposium possible:

1. **Ajiya Berhad**
2. **Akzo Nobel Paints (Malaysia) Sdn. Bhd.**
3. **Nippon Paint (M) Sdn. Bhd.**
4. **Don Ji (M) Sdn. Bhd.**



DR. ZALINA SHARI

MGBC Chair of Education Committee 2014/2015
MGBC Chair of Higher Education and Research 2015/2016

Foreword by the 2015 MU-IGBC Symposium Chairman

Design and construction of green buildings has increased dramatically in recent years and this expansion has given rise to a host of technical, social, economic and design questions that the building professions are not currently configured to answer. Answering these questions requires strong research collaboration between the university and the industry. Green innovation increasingly depends on the ability of university and industry experts to work together across a number of disciplines, such as technology, design, and engineering. However, for most universities, partnering with the industry does not come naturally. More often than not, research is conducted in isolation at the various universities disparate from the actual needs of the industry and practical applicability.

With the theme, “Facilitating University-Industry Partnerships”, the 2015 Malaysia University-Industry Green Building Collaboration (2015 MU-IGBC) Symposium aims to address these challenges by:

- **Bringing together stakeholders from universities, industry and government that are involved in creating green buildings;**
- **Fostering constructive dialogues among practitioners, researchers, funding organisations, manufactures, building owners, and policy-makers within this sector;**
- **Reporting and learning the experience of previous and current collaborative research, and;**
- **Identifying future research opportunities in the field of green building and creating strategic partnerships between university researchers and companies.**

2015 MU-IGBC Symposium is jointly organised by the MGBC and Housing Research Centre (HRC), the Faculty of Engineering, UPM. On behalf of the Organising Committee of 2015 MUIGBC Symposium, I wish to gratefully acknowledge the support of sponsors who made the symposium possible: Ajiya Berhad, Akzo Nobel Paints (Malaysia) Sdn Bhd, Nippon Paint (M) Sdn Bhd, and Dong Ji (M) Sdn Bhd. To the Organising Committee, a special thank you for your dedication and commitment to see this symposium through. I would also like to extend my appreciation to keynote speakers and invited speakers who have willingly spent much of their valuable time to address this symposium.

Finally, it is my pleasure to welcome all participants to UPM and I sincerely hope that 2015 MUIGBC Symposium will be a catalyst for expanded, effective and creatively collaborative research for green buildings in Malaysia.

Contents

1.0 INTRODUCTION	5
2.0 PARTICIPANTS	6
2.1 List of Speakers and Session Chairs	6
2.2 List of Participants of Business Matching Session	8
3.0 THE SYMPOSIUM	9
3.1 Rationale	9
3.2 Objectives	9
3.3 Theme and Sub-themes	10
3.4 Programme Overview	12
4.0 RESEARCH AGENDA	22
4.1 Past and On-going Research	22
4.2 Proposed Future Research	24
5.0 THE WAY FORWARD	31
APPENDIX: Opening Speech Texts	32

1.0 Introduction

The 2015 Malaysia University-Industry Green Building Collaboration (2015 MU-IGBC) Symposium took place at the Faculty of Engineering, University Putra Malaysia on 20th-21st January 2015. It was organised by the MGBC Education Committee in collaboration with Housing Research Centre (HRC), UPM. The two-day symposium included two keynote speeches, five sessions of presentations (covering 5 sub-themes), an exhibition by sponsors, as well as a business matching session. A total of 81 practitioners and academicians/researchers attended this symposium to share their ideas, expertise and proposals of a wide range of research topics.

This report aims to provide key information and observations relating to the symposium as well as to share the previous, current and proposed research presented and discussed at this symposium. Indeed, the requisite multidisciplinary collaboration for green building begins with communicating shared research priorities to a broad audience. It is hoped that this report will evolve as a result of the dialogue it facilitates, and catalyse subsequent leaps toward a sustainable built environment.

SYMPOSIUM

20-21 January 2015 (Tuesday & Wednesday)
Faculty of Engineering, Universiti Putra Malaysia

2015 Malaysia University-Industry Green Building Collaboration (2015 MU-IGBC) Symposium

Theme
Facilitating University-Industry Partnerships

Rationale
Effective research will involve a complex set of interwoven man-made and natural systems, and thus necessitate collaboration among many academic and professional disciplines representing diverse areas of expertise. However, for most universities, partnering with the industry does not come naturally. Most of the time, there is a lack of proper platform for both parties to meet and initiate collaboration.

Intention
To provide the basis to identify areas needing additional research, and weave existing and needed research into a vision for strategic engagement of funding organisations, researchers, practitioners, manufacturers, building owners and others.

Aim and Aspiration
The aim is to catalyse a new era of expanded, effective and creatively collaborative research for green buildings. The aspiration for this symposium is that it provides the basis for discussion; one which will facilitate organised and constructive dialogue among green building stakeholders and contribute to its impact and evolution.

Call for Speakers
Speakers among university researchers and industry players are invited to verbally present their expertise/niche area, lessons learned from previous collaborations with researchers/private entities/government bodies (if any), and most importantly, their research proposal for future university-industry collaborations. Topics covered in presentations shall be related to themes suggested:

Theme A Delivery Process and Performance Evaluation
Theme B Energy Efficiency and Renewable Energy
Theme C Water Efficiency
Theme D Materials and Waste Management
Theme E Buildings' Interaction with Local Environment
Theme F Buildings' Interaction with Occupants

Key Dates for Submissions

1) Abstract of the presentation (max. 200 words)	29 Oct 2014
2) Notification of acceptance of abstract	21 Nov 2014
3) Submission of presentation-ready electronic Powerpoint file (Presentation duration: 20 mins)	02 Jan 2015

CPD APPLIED
LMA, BOM, BOSH & CAI

JOINTLY ORGANISED BY
MGBC EDUCATION COMMITTEE
UPM HOUSING RESEARCH CENTRE

For more information please contact:
Malaysia Green Building Confederation (MGBC)
A-29-9, Block A, Menara UOA Bangsar,
59000 Bangsar, Kuala Lumpur, Malaysia.
Tel: +603 2282 8232
Web: www.mgbc.org.my

01 Symposium Flyers

SYMPOSIUM

20-21 January 2015 (Tuesday & Wednesday)
Auditorium of the Faculty of Engineering (Fakulti Kejuruteraan), Universiti Putra Malaysia (UPM)

2015 Malaysia University-Industry Green Building Collaboration (2015 MU-IGBC) Symposium

Theme
Facilitating University-Industry Partnerships

Rationale
Effective research will involve a complex set of interwoven man-made and natural systems, and thus necessitate collaboration among many academic and professional disciplines representing diverse areas of expertise. However, for most universities, partnering with the industry does not come naturally. Most of the time, there is a lack of proper platform for both parties to meet and initiate collaboration.

Intention
To provide the basis to identify areas needing additional research, and weave existing and needed research into a vision for strategic engagement of funding organisations, researchers, practitioners, manufacturers, building owners and others.

Aim and Aspiration
The aim is to catalyse a new era of expanded, effective and creatively collaborative research for green buildings. The aspiration for this symposium is that it provides the basis for discussion; one which will facilitate organised and constructive dialogue among green building stakeholders and contribute to its impact and evolution.

Call for Participation
Speakers among university researchers and industry players have been invited to verbally present their expertise/niche area, lessons learned from previous collaborations with researchers/private entities/government bodies, and most importantly, their research proposals for future university-industry collaborations. Topics covered in presentations will be related to the following themes:

Theme A Buildings' Interaction with Occupants
Theme B Water Efficiency
Theme C Materials, Waste & Local Environment
Theme D Delivery Process & Performance Evaluation
Theme E Energy Efficiency & Renewable Energy

Registration Fees

Participant	Exhibitor
RM80	RM3,000/booth (MGBC Member)
	RM5,500/booth (Non-member)

*Seeds and Booths are limited. Registration on a first-come-first-served basis.

For more information, please contact:
Malaysia Green Building Confederation (MGBC)
A-29-9, Block A, Menara UOA Bangsar,
59000 Bangsar, Kuala Lumpur, Malaysia.
Tel: +603 2282 8232
Web: www.mgbc.org.my

CPD APPLIED
LMA, BOM, BOSH & CAI

JOINTLY ORGANISED BY
MGBC EDUCATION COMMITTEE
UPM HOUSING RESEARCH CENTRE

SPONSORED BY
AJIYA
Dulux
Pentens

02 Symposium Flyers

2.0 Participants

2.1 List of Speakers and Session Chairs

Day One

Emcee: Yasmin Rashid, Ecokights President

KEY-NOTE & SPECIAL PAPERS

KEY-NOTE SPEAKERS

Prof. Emeritus Dato' Dr. Ar. Elias Salleh
Universiti Kebangsaan Malaysia

Ir. Ahmad Izdiyar Supaat
Malaysia Green Building Confederation

SPECIAL PAPER

Dr. Mohamad Fakri Zaky Jaafar
Universiti Putra Malaysia

A

BUILDINGS' INTERACTION WITH OCCUPANTS

SESSION CHAIR

Ir. Kok Yen Kwan
Malaysia Green Building Confederation

SPEAKERS

Dr. Chan Siew Chong
INTI International University

Gregers Reimann
IEN Consultants Sdn Bhd

Shamsul Bahrim bin Teh Ahmad
Earnestcom Sdn Bhd

B

WATER EFFICIENCY

SESSION CHAIR

Ar. Alice Leong Pek Lian
Malaysia Green Building Confederation

SPEAKERS

Prof. Dr. Thamer Ahmad Mohammad
Universiti Putra Malaysia

Chuah Chong Tit
Taigate Ind. Sdn Bhd

Aida Elyana Jamil
Veritas Environment Sdn Bhd

Ana Miraa Mohd Yusof
Aura-Lite Sdn Bhd

C

MATERIALS, WASTE & LOCAL ENVIRONMENT

SESSION CHAIR

Prof. Dr. Thamer Ahmad Mohammad
Universiti Putra Malaysia

SPEAKERS

Assoc. Prof. Dr. Sumiani Yusoff
Universiti Malaya

Dr. Nor Atiah Ismail
Universiti Putra Malaysia

Mr. Bikash Sinha
C2C Project Managers Sdn Bhd

2.0 Participants

2.1 List of Speakers and Session Chairs

Day Two

Emcee: Yasmin Rashid, Ecokights President

D

DELIVERY PROCESS & PERFORMANCE EVALUATION

SESSION CHAIR

Dr. Chan Siew Chong
INTI International University

SPEAKERS

Dr. Olanrewaju Abdullateef Ashola
Universiti Tunku Abdul Rahman

Ir. Soong Peng Soon
Pureaire Sdn Bhd

Tang Chee Khoay
Veritas Environment Sdn Bhd

Julian Saw
Veritas Environment Sdn Bhd

Sarah Greenlees
Arkitrek Sdn Bhd

E

ENERGY EFFICIENCY & RENEWABLE ENERGY

SESSION CHAIR

Assoc. Prof. Dr. Mohd Faris Khamidi
Heriot-Watt University Malaysia

SPEAKERS

Assoc. Prof. Dr. Chen Wang
Universiti Malaya

Dr. Karam M. Al-Obaidi
Universiti Sains Malaysia

Fauhan Rosli
Universiti Kuala Lumpur MICET

Assoc. Prof. Dr. Mohd Zin Kandar
Universiti Teknologi Malaysia

Phil Hammet
Wilhams Insulation Far East Sdn Bhd

Tang Chee Khoay
Veritas Environment Sdn Bhd

Ir. Looi Hip Peu
Mektricon Sdn Bhd

Azrul Esfandy Razali
Monier Sdn Bhd

2.2 List of Participants of Business Matching Session

Day Two

Emcee: Yasmin Rashid, Ecokights President

GROUP 1

A: BUILDINGS' INTERACTION WITH OCCUPANTS

B: WATER EFFICIENCY

C: MATERIALS, WASTE & LOCAL ENVIRONMENT

FACILITATORS

Ir. Kok Yen Kwan

Malaysia Green Building Confederation

Ar. Alice Leong Pek Lian

Malaysia Green Building Confederation

MEMBERS

Assoc. Prof. Sr. Dr. Adi Irfan Che-Ani

Universiti Kebangsaan Malaysia

Nor Lely Idris

Universiti Sains Islam Malaysia

Shamsul Bahrim bin Teh Ahmad

Earnestcom Sdn Bhd

Tang Chee Khoay

Veritas Environment Sdn Bhd

Aida Elyana Jamil

Veritas Environment Sdn Bhd

Chuah Chong Tit

Taigate Ind. Sdn Bhd

Phil Hammet

Wilhams Insulation Far East Sdn Bhd

Kua Chin Tee

Jentrikon Perunding Sdn Bhd

Hardip Singh a/l Kernail Singh

Brunsfeld International Group

How Yoke Teng

Brunsfeld International Group

Goh Yuet Ping

Brunsfeld International Group

Afandi Che Din

Afandi Architect

GROUP 2

D: DELIVERY PROCESS & PERFORMANCE EVALUATION

E: ENERGY EFFICIENCY & RENEWABLE ENERGY

FACILITATOR

Assoc. Prof. Dr. Mohd Faris Khamidi

University of Reading Malaysia

MEMBERS

Assoc. Prof. Dr. Mohd Zin Kandar

Universiti Teknologi Malaysia

Dr. Karam M. Al-Obaidi

Universiti Sains Malaysia

Dr. Mohamad Fakri Zaky Ja'afar

Universiti Putra Malaysia

Aniza Abu Bakar

International Islamic University Malaysia

Fauhan Rosli

Universiti Kuala Lumpur MICET

Sayang Syazanna Raf'ee

Universiti Teknologi Petronas

Fazaneh Moayed

Universiti Teknologi Petronas

Ali Sotoodeh

Universiti Putra Malaysia (student)

Wee Shuon Tzern

Brunsfeld International Group

Ir. Looi Hip Peu

Mektricon Sdn Bhd

Azrul Esfandy Razali

Monier Sdn Bhd

Julian Saw

Veritas Environment Sdn Bhd

Ng Kok Cheong

San Miguel Yamamura Woven Products Sdn Bhd

Lye Chit Bin

G&P Infra Sdn Bhd

3.0 The Symposium

3.1 Rationale

Design and construction of green buildings has increased dramatically in recent years and this expansion has given rise to a host of technical, social, economic and design questions that the building professionals are not currently configured to answer. Answering these questions requires strong research collaboration between the universities and the industry. Green innovation increasingly depends on the ability of university and industry experts to work together across a number of disciplines, such as technology, design, and engineering. However, for most universities, partnering with the industry does not come naturally. More often than not, research is conducted in isolation at the various universities disparate from the actual needs of the industry and practical applicability.

3.2 Objectives

The objectives of the symposium were as follows:

- To promote green building knowledge
- To foster contacts between professionals and academics, and
- To identify future research opportunities in the field of green building and initiate strategic partnerships between them.



01 Symposium booklets and press kits



02 Symposium booklets and press kits



01 Secretariat preparing the registration counter



02 Participants signing up at the registration counter



03 Participants signing up at the registration counter



04 A participant receiving a goodie bag from one of the symposium sponsors

3.3 Theme and Sub-themes

The theme of the symposium was **“Facilitating University-Industry Partnership”**. The presentation sessions covered four green building sub-themes, as explained below.



Sub-theme 1: Building's Interaction with Occupants

Buildings are habitats for people. Just as with natural systems, the quality of the habitat strongly influences the health and well-being of its residents. The goal of research under this sub-theme is to develop and maintain indoor environments that benefit occupant health, comfort and performance through superior indoor air quality; good visual, thermal and acoustic conditions; and connection to the outdoor environment. Other relevant research topics are those aiming to improve the scientific understanding of building's impacts on occupant health and performance.



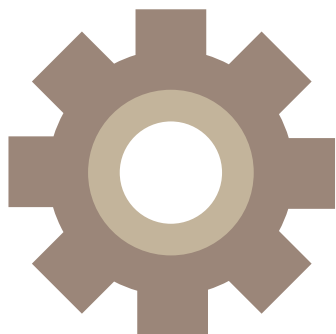
Sub-theme 2: Water Efficiency

Research contributing to this sub-theme includes measures to gain understanding of how water is used in and around buildings; the development of fixtures, appliances, systems and equipment that use less water than current practices to dramatically reduce potable water needs of buildings; and strategies to achieve similar or even greater water savings outdoors through the low water use landscaping strategies, more efficient irrigation equipment, more advanced irrigation controls, and innovative strategies for using graywater or collected rainwater.



Sub-theme 3: Materials, Waste and Local Environment

A smart economy minimises the production of waste and reuses waste as a resource. Research contributing to this sub-theme addresses the whole or anywhere in the production and consumption cycle, from waste prevention and the design of processes and products for recyclability to reuse and waste management. It includes the development of products that account for environmental impacts at all stages of their life cycles. Research under this theme also seeks to gain a greater understanding of how buildings interact with their local and regional environments. This includes the development of greater understanding of how to mitigate stormwater runoff, development of more effective strategies to remove pollutants from stormwater and prevent the urban heat island effect, and a new approach to restore brownfields or damaged ecosystems.



Sub-theme 4:

Delivery Process and Performance Evaluation

Research under this sub-theme considers the needs of decision makers throughout the project development process from inception to completion, and beyond to occupancy and ultimately to deconstruction or re-use. It examines the information needed to make high-quality decisions at each stage, and seeks to understand the mechanisms of decision making. Specifically, it relates to building delivery and operations processes, performance metrics and evaluation, and the economics and financial attributes of sustainable design.



Sub-theme 3:

Energy Efficiency and Renewable Energy

A smart economy minimises the production of waste and reuses waste as a resource. Research contributing to this sub-theme addresses the whole or anywhere in the production and consumption cycle, from waste prevention and the design of processes and products for recyclability to reuse and waste management. It includes the development of products that account for environmental impacts at all stages of their life cycles. Research under this theme also seeks to gain a greater understanding of how buildings interact with their local and regional environments. This includes the development of greater understanding of how to mitigate stormwater runoff, development of more effective strategies to remove pollutants from stormwater and prevent the urban heat island effect, and a new approach to restore brownfields or damaged ecosystems.

3.4 Programme Overview

Day One

The symposium was privileged to have Yasmin Rashid, the President of EcoKnights as the symposium's master of ceremony. Welcoming remarks were delivered by Ar. Sarly Adre Sarkum, the President of MGBC, and Prof. Dato Abang Abdullah Abang Ali, the Director of HRC, UPM.



01 The opening ceremony of the symposium



02 Ar. Sarly and Prof. Dato Abang delivering their welcoming speech



03 Ar. Sarly and Prof. Dato Abang delivering their welcoming speech



04 Datuk Harjeet delivering his opening speech

The symposium was officiated by Y.Bhg. Datuk Harjeet Singh a/l Hardev Singh, the Deputy Secretary-General of the Ministry of Energy, Green Technology and Water. Datuk Harjeet Singh expressed his concern over the severe environmental degradation experienced in our country and reminded that the construction industry cannot continue to ignore the environment. He stated that there is a direct circle of influence between research, education, industry, government and community that has to be considered when introducing change. He said the establishment of partnerships and practical cooperation between these sectors is essential to the success of the R&D agenda and plays an important role in introducing meaningful change. Next he offered several ways in which the private sector can partner with the universities. The private sector can work with the universities to adapt or replace existing practices to achieve greater efficiency and improve sustainability. A partnership between universities and the private sector can also assist with the commercialisation of new products and processes developed in the universities. Client groups can form partnerships with universities to help them identify the possible benefits of sustainable construction for their specific operations, and to identify and develop ways of leveraging funding to cover the additional costs. Similarly, partnerships must be developed with universities to assist clients in educating themselves on the need for and requirements of sustainable construction. The full opening speech is provided in the Appendix of this report.



01 Datuk Harjeet Singh receives an appreciation trophy and Green Pages from MGBC president Ar. Sarly. Looking on are HRC Director Prof. Dato Abang Abdullah and Symposium Chairman Dr. Zalina.

The symposium attendees were also privileged to hear from two renowned keynote speakers: 1) Prof. Emeritus Dato' Dr. Ar Elias Salleh, a Principal Research Fellow at Solar Energy Research Institute, University Kebangsaan Malaysia, and 2) Ir. Ahmad Izdihar Supaat, the Honorary Secretary of MGBC, GBI facilitator and director of Exergy Malaysia Sdn Bhd. Prof. Elias called for more data and case studies on green buildings in order to transform our marketplace. The key point he was trying to make was the greater emphasis being placed on indoor environmental quality especially thermal comfort which affects workers productivity. Ir. Ahmad, on the other hand, gave a very inspirational talk and reminded that 'green' is not a colour, it is a state of mind and it is the responsibility of all. He described 'green' as a process instead of a status, and persuaded the audience to think of 'green' as a verb, not an adjective.



01 Prof. Elias delivering his keynote speech



02 Prof. Elias receives an appreciation trophy from MGBC president Ar. Sarly



03 Second keynote speaker Ir. Ahmad Izdihar (right) waiting for his turn to speak



04 Dr. Mohamad Fakri Zaky (right) waiting for his turn to speak

Upon the completion of the opening ceremony, Datuk Harjeet, accompanied by Ar. Sarly, Ir. Ahmad and Dr. Zalina proceeded to a VIP room for an interview session with representatives from the media. Attendees on the other hand, heard a special paper from Dr. Mohamad Fakri Zaky Jaafar, the Deputy Director of Innovation Promotion and Marketing, Putra Science Park, UPM. He shared his insights on transferring knowledge from university to industry by delivering some models of technology transfer and various types of collaboration that can be undertaken with a university.



01 Answering questions from the media after the opening ceremony



02 Answering questions from the media after the opening ceremony

Friendly chatting during a coffee break



Then the rest of the day was occupied with presentations from 10 invited speakers, grouped into 3 sub-themes and each was moderated by its respective session chair. These sub-themes are Buildings' Interaction with Occupants; Water Efficiency; and Materials, Waste & Local Environment (see list in page 6). Throughout the 2-day running of the symposium, the participants also gained information about green products from the exhibitors/sponsors.



01 Mr. Yen Kwan (right) visiting the exhibition booth by Dulux, one of the symposium's sponsors.



02 Participants visiting the exhibition booths.



03 Participants visiting the exhibition booths.



04 Participants visiting the exhibition booths.



05 During the lunch break.



06 During the lunch break.



07 During the lunch break.



08 During the lunch break.

Day One

The second day continued with another 13 invited speakers whose presentations were related to two sub-themes: Delivery Process and Performance Evaluation, and Energy Efficiency and Renewable Energy (refer to list in page 7). After the lunch break, the symposium was concluded with a Business Matching Session to brainstorm on future needed research related to the symposium's sub-themes. A mix of 27 researchers and practitioners participated in this session and they were divided into two groups, moderated by their respective facilitator(s) (see list in page 8).



02 Participants getting ready for the session.



01 Yasmin Rashid giving a short briefing to the participants of business matching session.



01 Ir Yen Kwan (standing) and Ar. Alice (sitting on Yen Kwan's right) are moderating Group 1 discussion during the business matching session.



02 Assoc. Prof. Dr. Mohd Faris is moderating Group 2 discussion during the business matching session.



01
Dr. Zalina closing the symposium. Dr. Zalina handing over an appreciation trophy and certificate during the closing ceremony:



02 The master of ceremony
Yasmin Rashid



03 Group 2 facilitator Assoc.
Prof. Dr. Mohd Faris



04 Group 2 facilitators Ar. Alice



05 Ir. Yen Kwan.

project news main feature futurarc interview futurarc showcase projects people commentary **HAPPENINGS**

milestones

Malaysia

2015 Malaysia University-Industry Green Building Collaboration Symposium

Held on 20–21 January 2015, the 2015 Malaysia University-Industry Green Building Collaboration (2015 MU-IGBC) Symposium was successfully concluded at the auditorium of the Faculty of Engineering (Fakulti Kejuruteraan), Universiti Putra Malaysia (UPM) with the theme Facilitating University-Industry Partnerships.

In her foreword, chairman of education committee and board member of Malaysia Green Building Confederation (MGBC) Dr Zalina Shari said the symposium "aims to address the theme's challenges by bringing together stakeholders from universities, industry and government that are involved in creating Green buildings; fostering constructive dialogues among practitioners, researchers, funding; organisations, manufacturers, building owners, and policymakers within this sector; reporting and learning the experience of previous and current collaborative research; and identifying future research opportunities in the field of Green building and creating strategic partnerships between university researchers and companies."

Y.B. Datuk Seri Panglima Dr Maximus Johnny Ongkili, minister of Energy, Green Technology and Water (KeTTHA), said in his opening speech, "Mitigating the impact of the construction industry is like treating a disease by reducing the symptoms. Ultimately, if a cure is to be found, it will be necessary to address the root cause of the disease. Thus, while we are doing damage control, it is crucial that we start thinking about alternatives to current practices and technologies that will steer the way we build and live towards a more sustainable model. The research in this regard is long term, with long turnaround times in investment, and it requires skills and resources that may not be readily available in our country. Nonetheless, if these problems can be addressed, these technologies can become an important driver for the future economic growth of developing countries."

"Research and education does not happen in a vacuum. There is a direct circle of influence between research, education, industry, government and community that has to be considered when introducing change. The establishment of partnerships and practical cooperation between these sectors is essential to the success of the R&D agenda and plays an important role in introducing meaningful change."

He stated that the 2015 MU-IGBC Symposium was a good initiative as it opened up knowledge-sharing opportunities between researchers and the

Green building industry. It also offered a platform for the industry to start partnerships and collaborate with academia to Green design, construction and development between the academia and industry. Lastly, he expressed his appreciation for being put together by the private sector and the public sector between an NGO (MGBC) and a research institution (HRC), UPM).

Professor Emeritus Dato' Ar Dr Elias @ Ilias Bakharev, Director of Research Institute (SERI, UKM) and Ir Ahmad Ismail, secretary, MGBC were the keynote speakers for the symposium.

Other speakers in the symposium were university researchers who presented in their areas of expertise, including previous collaborations with researchers, private industry, and their research proposals for future collaborations. Topics covered in the presentation included the following themes: buildings' interaction with the environment; materials, waste and local environment; delivery and construction; evaluation; energy efficiency and renewable energy.

The 2015 MU-IGBC Symposium was jointly organised by HRC, Faculty of Engineering, UPM.

Singapore

Dialogue on engineering solutions for hotels

UTC Building & Industrial Systems, a unit of UTC Corporation and a major global provider of air-conditioning technologies, launched its inaugural seminar on hotels in Singapore on 18 December 2014 to discuss engineering solutions available for hotels to be more energy efficient.

The one-day seminar, organised in partnership with the Construction Authority of Singapore (BCA), Singapore Green Building Council (SGBC) and Singapore Hotel Association, addressed the challenges that hotels in Singapore face in achieving energy efficiency, safety, and energy and operational efficiency.

Buildings consume about 40 percent of global energy. In Singapore, systems on average consume about 40 percent of total energy. For hotel buildings in countries with tropical climate, air-conditioning units can consume more than 50 percent of total energy usage due to higher temperature and humidity. Hotel buildings are some of the most energy-intensive buildings in all-year, round-the-clock operations. Based on data collected by UTC Building & Industrial Systems, 45 percent of hotel buildings have a chiller plant system with a coefficient of performance (COP) of 4.0 or lower. These hotels have the potential to save up to 10 percent more in total energy costs per year.

The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) chiller plant performance index (COP) standard adopted by many government associations and benchmark groups chiller plants into four categories: Poor (0.85 kW/tonne or below); Good (0.85 kW/tonne to 0.7 kW/tonne); Needs Improvement (0.7 kW/tonne to 0.6 kW/tonne); and Excellent (0.6 kW/tonne or below).

The Furama City Centre Hotel chiller plant is in Singapore. The hotel previously fell under the Needs Improvement category. After retrofitting the chiller plant, the hotel achieved an Excellent range after retrofitting the chiller plant. As a result, the hotel achieved around 16 percent energy savings and became the first hotel to be certified as a Green Building by the Singapore Green Building Council (SGBC).



Ar Sarly Adre Sarkum, president of MGBC; Datuk Harjeet Singh, deputy secretary-general (Green Technology and Water), KeTTHA; Prof Dato' Abang Abdullah Abang Ali, director of HRC, UPM; and Dr Shari

120 FUTURARC

A cutting from FuturArc: The Voice of Green Architecture in Asia-Pacific, Vol. 41 (Mar-April) 2015, p.120. Also available at <http://www.futurarc.com/index.cfm/events-news/happenings/2015-happenings/mar-apr-2015-malaysia-symposium/>

4.0 Research Agenda

The research agenda presented here is national in scope – naturally and implicitly touching on MGBC's concerns as well as those of other organizations. It comprises of various research topics – past, on-going and future needed research – presented and/or discussed at the symposium. Most importantly, this agenda is intended to disseminate information on needed research, thus acting as a basis of discussion among researchers, industry players, funding sources and others. It is also hoped that it will catalyse the necessary university-industry collaboration and funding for achieving a transformative leap in building performance and sustainability.

4.1 Past and On-going Research

The following research objectives were verbally presented at the symposium, written based on the abstracts provided and PowerPoint files presented. These research works were either on-going or completed at the time of the event. However, it should be noted that in most cases, it was not clear whether these research works had any university-industry collaboration.

1 (Completed)

To improve understanding of how to effectively integrate natural and electric lighting to support occupant needs, and visual comfort and health, while also reducing consumption of non-renewable energy sources. This research involved a comparison between a green and a conventional building in terms of the occupants' satisfaction levels and lighting effectiveness.

Presented by Dr. Chan Siew Chong (INTI International University). Email: planner_chan@yahoo.com.my

2 (Completed)

To develop an empirical model to predict the rainwater volume from rainwater depth with reasonable accuracy.

Presented by Prof. Dr. Thamer Ahmad Mohammad (Universiti Putra Malaysia). Email: thamer@upm.edu.my

3 (Completed)

To develop an ultrafiltration technology to effectively treat rainwater by removing sediment, bacteria and viruses.

Presented by Ana Miraa Mohd Yusof and Rachel Koh (Aura-Lite SB). Email: ana@aura-lite.com.my ; rachelkoh@aura-lite.com.my

4 (Completed)

To develop an integrated audio-visual solution to reduce building energy consumption in existing multi-tenant buildings due to occupant negligence.

Presented by Shamsul Bahrim The Ahmad (Earnestcom SB). Email: sam_desd@yahoo.com

5 (Completed)

To verify the applicability of conventional air-conditioning design assumptions for a typical building (such as the sizing of chiller, air-handling unit, duct, pump and cooling tower) in the today's practice. The problem with these design assumptions or rules of thumb is that they are not 100% accurate all of the time; for example, if peak cooling load is not accurate, all other equipment will be sized wrongly. Further, these design assumptions were determined and have been practiced since the days of low energy-cost. Since the cost of energy has increased significantly and most likely to be higher in the long term, the application of these design assumptions in the current and future practice is questionable. This study helps to avoid systems overdesign that lead to increased capital and operational costs.

Presented by Julian Saw (Veritas Environment SB). Email: julian.saw.chern@veritas.com.my

6 (Completed)

To examine the lighting performance of three prototypes of solar bottle bulbs (made of plastic bottles filled with water) and to compare the lighting effects related to three different interior bottle exposures levels (1/3, 1/2 and 2/3 of the bottle height is under the roof plane). A solar bottle bulb can produce luminance equivalent to about 50W incandescent bulb. Although this eco-friendly bulb can only supply daylight into living space during daytime, it has greatly changed the impoverished people's lives because the materials are cheap, easy to install, and free to operate.

Presented by Assoc. Prof. Dr. Chen Wang (Universiti Malaya). Email: derekisleon@um.edu.my

7 (Completed)

To design a special roofing system under Malaysian climatic condition for single storey building (low cost), which allows for natural light while overcoming the heat accumulation problem to provide cooler natural light.

Presented by Dr. Karam M. Al-Obaidi (Universiti Sains Malaysia). Email: karam_arc@yahoo.com

8 (Completed)

To determine the return on investment (ROI) of, and the reduction of lighting and air-conditioning electricity consumption when a daylight dimming lighting control system is used, through a techno-economic feasibility study. Daylight dimming lighting system uses a photo-sensor to measure the light level in a space and then adjust the dimming ballast of a lighting fixture.

Presented by Fauhan Rosli (UniKL MICET). Email: fauhan@unikl.edu.my

9 (Completed)

To develop a 'Passivhaus Building Technology' that integrates super-insulated, air-tight building envelope, high performance windows, thermal bridging reduction technology and Mechanical Ventilation and Heat Recovery (MVHR) system to minimise the cooling demand and provide excellent indoor air quality.

Presented by Phil Hammett (Wilhams Insulation Far East Sdn Bhd). Email: phil@wilhams.com.my

10 (On-going)

To develop an integrated and sustainable waste management model to achieve a campus with zero waste to landfill through strategic partnerships with various stakeholders in Universiti Malaya and the industry.

Presented by Assoc. Prof. Dr. Sumiani Yusoff (Universiti Malaya). Email: sumiani@um.edu.my

11 (On-going)

To develop sustainable maintenance management frameworks for the housing sector in an effort to provide systematic support to sustainable housing design, construction and operation.

Presented by Dr. Olanrewaju Abdullateef Ashola (Universiti Tunku Abdul Rahman). Email: olanrewaju@utar.edu.my

4.2 Proposed Future Research

The followings are various research proposals that were either verbally presented by the speakers or discussed by the participants of the Business Matching Session:

Illustrative Research Topics

1 To determine the performance of high-performance envelope components and systems that manage thermal loads and facilitate daylighting based on local climate.

This topic calls for a university-industry collaboration in conducting a real-life testing of various façade systems on campus hostels, which is called "The Living Lab". The Living Lab should ideally be built so the facades are changeable allowing new batches of facades to be installed over the semester break, when the hostels are unoccupied. Activities within this topic would develop metrics, performance assessments and benchmarks for high performance. These methods should enable one to evaluate the impacts of varying design and operation configurations of dynamic facades for thermal and daylighting functions, and for naturally ventilated and mixed-mode buildings. These would provide valuable feedback for the industry to improve their products, especially overseas green building solutions which may not suit the local climate.

Presented by Gregers Reimann (IEN Consultants Sdn Bhd). Email: gregers@ien.com.my

2 To develop or improve best management practices for on-site stormwater management, including effective utilization, treatment, infiltration and storage.

The recent massive flash floods in Malaysia have proven the inadequacy of current MASMA requirements in managing stormwater. For example, the enforceable part of MASMA is only on the reduction of stormwater flow rate going out of a site but not the total water quantity discharged out of a site. Projects that attempt to infiltrate stormwater into the ground or remove pollutants from surface runoff are still quite rare in Malaysia. A common goal of green building projects is not to increase stormwater runoff from a site, or to reduce stormwater runoff. Future goals will be to eliminate all stormwater runoff and to maximise the use of storm and rainwater to reduce the need for portable water supplies. Achieving these goals demands innovations in both practices and technologies, and research into long-term performance, environmental benefits, maintenance requirements, and cost-effectiveness of these systems. Practices needing further research include systems to remove pollutants from surface runoff, development of infiltration basins and raingardens, porous pavement systems, constructed wetlands, and green roofs. There is a need for significant additional research in these areas, especially pollutant removal systems and the design of infiltration and storage capability of landscapes, as well as the integrated systems that will support effective use of on-site water. Through field studies of existing systems, these benefits can be quantified in actual facts and figures. For example, porous pavement systems allow increased stormwater infiltration, thus helping to reduce downstream flooding, limit surface water pollution, recharge aquifers, and reduce the frequency of combined sewage overflow problems. Outcomes of this research would be new technologies and systems integration strategies, as well as design guidelines for landscape elements.

Presented by Gregers Reimann (IEN Consultants Sdn Bhd). Email: gregers@ien.com.my

3 To improve the effectiveness of green building commissioning practices.

The commissioning process cuts across the design, delivery and performance evaluation of green initiatives that requires expertise in architectural, mechanical, electrical and any innovative technologies, so much so that commissioning is the work of a team of experts rather than an individual. Verification processes often require expensive and sophisticated instruments that are beyond the reach of general professionals. Therefore, this area calls for existing teams of conventional commissioning specialists to collaborate with experts in universities to measure the performance of green buildings. Aspects to be measured or extra expertise needed by conventional commissioning specialists include daylight harvesting, sun path analysis, rainfall study, vegetation study, heat island effect, energy use verification, indoor air quality, noise pollution, thermal comfort and etc.

Presented by Ir. Soong Peng Soon (Pureaire SB). Email: pssoong88@gmail.com

4 To investigate the local requirements for thermal comfort (i.e. mean radiant temperature and air speed), indoor air quality (i.e. particulate count) and lighting comfort (i.e. lux level) to refine MS1525.

It is often heard from Malaysian professionals that Malaysians are different from the rest of the world. For example, 1) mean radiant temperature has long been included in international standards as part of the thermal comfort parameter but not in MS1525; 2) air speed requirement specified in MS1525 is very much lower than the one in international standards; 3) performance of particulate matter filters or air cleaners in air-conditioning system is required in international standards but not in MS1525; and 4) office lux level specified in MS1525 is very much lower than international standards. This research calls for a university-industry collaboration to investigate and verify such differences through post-occupancy evaluations of multiple local case studies.

Presented by Tang Chee Khoay (Veritas Environment SB). Email: ck.tang@veritas.com.my

5 To develop innovative and environmental-responsive building components and assembly technologies based on organic/natural or waste stream materials, and subsequently test them onto case projects.

Although the potential of stabilised earth bag construction, natural fibre bio-composites and bamboo woven panels have been developed and tested by Arkitek Sdn Bhd, the scope and technology of these materials need to be further explored and post-occupancy studies on case buildings need to be conducted. On top of that, research is needed in order to explore and test other organic/natural materials for the purpose of developing an environmental-friendly, low-tech architecture. As such, the company looks for university researchers with new and innovative ideas on such materials and technologies and offers to source a real-life small community project as a test case.

Presented by Sarah Greenlees (Arkitek Sdn Bhd). Email: sarah@arkitek.com

6 To carry out a continuous post-occupancy studies (POE) of, and new green materials/products testing and improvement using, the 'UTM Eco-Home' prototype.

'UTM Eco-Home' prototype was initially designed and built by the Universiti Teknologi Malaysia (UTM) researchers as a zero-energy affordable home for the competition at the Solar Decathlon China 2013. Since then, the design of the prototype has been revised to become a showcase eco-home-office building and research laboratory in UTM Johor campus by incorporating sustainable strategies and solutions, appropriate to our local climatic conditions. This new UTM Eco-Home is now open for researchers to conduct POE studies on the aspects of indoor environment (thermal comfort, daylighting, electric lighting, glare control, indoor air quality), energy efficiency of equipment, Building Automation System, renewable energy (Grid Connected PV, solar heating), rainwater harvesting system, building materials and other area. In addition, companies in the industry are called to use this new UTM Eco-Home as a testbed to install their materials or products for further studies and improvements.

Presented by Assoc. Prof. Dr. Mohd Zin Kandar (KALAM, UTM Skudai). Email: drzin2000@yahoo.com

7 To improve energy index for residential buildings by providing a clear understanding on the following aspects:

1) Developing retractable roof insulation to allow radiation of heat into the cool night sky; 2) Optimising thermal massing for thermal comfort (Thermal Time Constant and Diurnal Heat Capacity); 3) Optimising passive design for a naturally cooled house; 4) Using ground as a heat sink by channelling air pre-cooled in underground chamber before directing into internal space; and 5) Investigating the riddle of the cool roof. These recommendations were highlighted as a response to the results of a study conducted by the Building Sector Energy Efficiency Project (BSEEP), a programme funded by UNDP and managed by JKR. The study found that the Overall Thermal Transfer Value (OTTV) and Roof Thermal Transfer Value (RTTV), a passive low energy design approach to reduce active cooling load through good thermal envelope, are not good indicators of energy Passive House or air conditioning load in residential buildings. An alternative approach is from the perspective of thermal comfort which considers thermal mass, mean internal radiant temperature, and natural ventilation and building form.

Presented by Ir. Looi Hip Peu (Mektricon Sdn Bhd). Email: mektricon@gmail.com

To compare the design and resulting performance of OTTV between low- and high-rise residential types.

Discussed by Group 2 during the Business Matching Session.

8 To improve the BSEEP Technical Passive Design Guidelines by providing a clearer and deeper understanding on the following aspects:

1) performance of low-emissivity radiant barriers in roof spaces, especially in comparison to a thick insulation foam or mineral wool; 2) Malaysian climatic data, particularly on hours and months (therefore the position of the sun) where direct solar radiation is the strongest. This study will inform architects on the impact of direct and diffused radiation on a building; 3) Validation of hourly wind data to confirm the behavior of wind speed and wind direction. As architects need to design buildings with effective cross-ventilation, this study will inform architects on the possibility to divert hot wind away from occupants during certain hours/condition of the day and divert cool air towards occupant during certain hours/condition of the day; 4) Validation of how far to push the boundaries of acceptable maximum level of glare (i.e. acceptable luminance intensity for various lighting levels), daylight uniformity, and minimum lux level or daylight factor; 5) More design solutions for skylight, light scope and jack roof that provide optimum daylight harvesting; 6) the impact of the building form, orientation, core location and building fabric on the energy efficiency of a low-rise building and a residential building; and 7) effective ventilation strategies for a residential building.

Presented by Tang Chee Khoay (Veritas Environment SB). Email: ck.tang@veritas.com.my

9 To measure and empirically quantify the performance of various radiant barrier products based on the local climate.

The study calls for collaboration between the industry (particularly Reflective Insulation Manufacturer of Malaysia) and university to validate the manufacturers' claims that their products can reduce the temperature of, and incoming heat fluxes into, the internal living space. The results of this study will provide the foundation for further research in radiant barrier performance.

Presented by Azrul Esfandy Razali (Monier Sdn Bhd). Email: azrul.esfandy@monier.com

10 To further develop holistic Water Efficiency Benchmarking Index for Malaysia.

The study calls for an industry-university collaboration to investigate the holistic water usage in different types of buildings, regardless of the technologies or systems used, so that water consumption and efficiency data could be compared and benchmarked.

Proposed by Group 1 during the Business Matching Session.

11 To determine if Malaysia's green buildings whose designs were certified by Green Building Index (GBI), are outperforming conventional buildings specifically in their performance in energy and water use and in their performance to provide occupant satisfaction.

The study will involve collaboration between university researchers and the industry (i.e. building owners and managers) to conduct post occupancy evaluation of buildings with and without GBI certification. The assessment will include evaluating energy and water consumption, building design, monitoring indoor environment, as well as surveying the building occupants to determine how changes to the way buildings are designed improve or impact on the quality of live/work conditions. Among the expected results of the study are as follows: 1) the actual energy and water consumption of GBI-certified and conventional buildings based on energy and water analysis; 2) the actual indoor air quality, thermal and visual comfort performances of GBI-certified and conventional buildings based on building monitoring; 3) Insight into the issues of building maintenance and operation which can have a significant impact on building performance; 4) Insight into the current knowledge of people occupying the buildings and highlighting areas where further education is needed; and 5) Recommendations to enhance the operation of the MS1525, DOSH and ASHRAE guidelines, and GBI rating tools that are producing green buildings to ensure they are living up to their high expectations.

Proposed by both Group 1 and Group 2 during the Business Matching Session.

12 To develop and determine performance of envelope and structural elements for improved thermal storage.

There is a significant need for envelope-based design strategies and technologies that will flatten the cooling load profiles in a building, to minimize peak energy demands. Research is needed to develop new systems and materials with reliable, durable solutions for passive storage of energy in buildings; to evaluate performance in terms of the thermal insulation and storage characteristics of various building envelope choices; and to identify optimal systems for cooling load flattening and control specific to the Malaysian climate.

Proposed by Group 1 during the Business Matching Session.

13 To evaluate the effectiveness of reflective/emissive roofing, vegetated/green roofs, and rooftop PV on cooling load reduction.

A building's rooftop can contribute significantly to the building's cooling load. Research is needed on the thermal performance of advanced roof technologies, such as cool (reflective) roofs, green roofs, and rooftop PV or solar thermal arrays. Performance of these design strategies and technologies should be evaluated for local wet vs. dry conditions. Activities within this topic would: 1) characterize roofing and cladding materials for their cooling load reduction capabilities; 2) characterize emissive roofing materials' effect on local air temperatures; 3) develop design guidelines for appropriate application of green roofs; and 4) develop assembly guidelines for rooftop PV panels.

Proposed by Group 2 during the Business Matching Session.

14 To develop green design guidelines for the development of affordable housing

(i.e. housing that are 30% lower than market price, which currently lingers around the range of RM250,000 to RM500,000).

Proposed by Group 2 during the Business Matching Session.

15 To develop integrated assessment methodologies and standard metrics for the selection of materials that optimise building performance and minimize environmental, ecological and human health impacts.

Research is needed to refine SIRIM's building materials' carbon footprint assessment methodology by taking into account other impact areas than carbon emission (e.g. other greenhouse gases, indoor air quality, land use and water use). New initiatives to address these research needs should be created in partnership with SIRIM and international team. The partnership can also help to ensure that results of the international efforts support needs of users in Malaysia to the maximum possible extent. Generally, the study will support current efforts and initiate new projects that work toward the development of a transparent, rigorous, national standard for life-cycle assessment (LCA) in the built environment.

Proposed by Group 2 during the Business Matching Session.

16 To analyse the Building Information Modeling (BIM) for comprehensive coverage of environmentally sustainable design, construction, and operation processes and practices.

There is a need to identify gaps and opportunities specifically related to sustainability; these may include life-cycle assessment (LCA) for building materials and structural assemblies, energy modeling, daylighting and other indoor environmental quality issues, water use, and site impact. Technical requirements and integration standards for linking BIM files with sustainable building design, construction and operation tools must also be defined and created.

Proposed by Group 2 during the Business Matching Session.

17 Advance technology transfer.

Widespread adoption of green building approaches, strategies, and technologies will be vastly enhanced when we can point to documented performance improvements and environmental benefits. One of the key barriers to adoption of green buildings in today's market is the question of how much benefit is obtained and at what cost.

Proposed by Group 2 during the Business Matching Session.

18 Advance technology transfer.

Determine the most effective methods to parlay research results into industry practice. Widespread adoption of new technology and knowledge in the marketplace is critical for achieving sustainability goals, and thus must be planned and implemented in step with research for prompt market uptake.

Proposed by Group 1 during the Business Matching Session.

5.0 The Way Forward

The 2015 MU-IGBC Symposium is the first symposium of its kind organised by the Education Committee of the Malaysia Green Building Confederation (MGBC). During the event, various research areas that are undertaken in the academia setting and research needed by the industry have been determined. However, it is pertinent for researchers in one field of study to be connected to the relevant industry players (and vice versa) in order for the research to have strong value propositions and to be industry relevant.

Therefore, for the 2016 MU-IGBC Symposium to be held in April 2016, the aim is to foster 'real' research partnership between researchers at universities and their relevant counterparts in the industrial setting. By creating a different format of the next symposium's programme, it is hoped that the symposium will foster a conducive ecosystem for this strategic collaborative research to nurture and grow; hence, creating a vibrant and resilient green building industry in Malaysia. It is expected that these continuous series of MU-IGBC Symposium will be the catalysts for expanded, effective and creatively collaborative research for green buildings in Malaysia. Furthermore, it is hoped the symposiums will attract more academicians and students to join the MGBC membership in general, and Education Committee in particular, to drive green building and sustainability research and education forward and help making the difference our world needs.

Appendix Opening Speech Texts

Delivered by Y.Bhg. Datuk Harjeet Singh a/l Hardev Singh, the Deputy Secretary-General of the Ministry of Energy, Green Technology and Water.

Ladies and Gentlemen,

Good morning and welcome to the opening of the auspicious 2015 Malaysia University-Industry Green Building Collaboration Symposium.

Most human activities that impact on the environment have backwards or forward linkages to the construction industry and their impact can be mitigated through changes in the practices of the construction industry. In light of the severe environmental degradation experienced in our country, the construction industry cannot continue to ignore the environment. The industry's environmental impact is the most measurable, but its socio-economic impact should not be negated.

The Malaysian government recognises that climate change and the adverse consequences arising from it are real and has taken positive policy actions to address climate change. A comprehensive ecosystem for a sustainable development framework has been proposed to protect the environmental quality of life and caring for the planet while pursuing economic growth as well as development towards a high income nation status.

Mitigating the impact of the construction industry is like treating a disease by reducing the symptoms. Ultimately, if a cure is to be found, it will be necessary to address the root cause of the disease. Thus, while we are doing damage control, it is crucial that we start thinking about alternatives to current practices and technologies that will steer the way we build and live towards a more sustainable model. The research in this regard is long term, with long turnaround times in investment, and it requires skills and resources that may not readily available in our country. Nonetheless, if these problems can be addressed, these technologies can become an important driver for the future economic growth of developing countries.

One of the most critical barriers to sustainable construction in developing countries in general, and Malaysia in particular, is that much of the research in building technologies and planning is not done in a holistic manner. The research institutions, development agencies and other organisations address each issue individually and independently of other issues to which it is linked. For instance, agencies involved with building technologies focus on specific technologies as isolated elements, while others deal with pollution, transport planning, environment or social issues. Co-ordination and cross-sectoral work between these agencies is lacking and thus development activities related to the design and management of human settlements do not take place in a holistic manner. Holistic research projects, instead of projects focusing on one specific aspect such as energy efficiency, are highly recommended.

In many countries, research has already been done on aspects related to sustainable built environment. However, for a number of reasons, it is very difficult for researchers to widely disseminate the knowledge and information that has been developed. Often even researchers working in the same country remain unaware of each other's work, and the available information is not packaged in a way that is accessible and useful to industry and the broader public. For sustainable construction practices to become widely accepted, the sharing of knowledge has to happen between researchers themselves; between researchers and universities; between researchers and the industry; and between researchers and the decision-makers (governments, developers, and the public).

It is crucial that knowledge and tools for sustainable construction be transferred to the people who have to use them. However, it is also crucial that the people who have to use these tools are involved in the development of tools and technologies. It is therefore necessary to establish partnerships with industries, local governments, communities and other possible end-users of a product in the development of that product. Linking research to identified problems within a specific industry or community can also strengthen the interaction between researchers and implementers.

However, sustainable development and construction is the responsibility not only of researchers. It requires concerted action by all stakeholders involved in the creation and use of the built environment. Clients need to demand a more sustainable built environment, professionals need to adopt and promote sustainable construction practices through their work, the construction industry needs to commit to following sustainable construction processes, and regulatory bodies need to encourage, enable and enforce sustainable construction. If all these stakeholders are to fulfil their roles, the educational sector has to provide them with the necessary training and with educators who themselves are committed to sustainability. These educators will need the knowledge that is being developed by the researchers as part of the proposed R&D agenda. For the researchers to develop this new knowledge, they will need the participation and support of clients, contractors, professionals, governments and regulators.

Therefore, sustainable construction can happen only if all the necessary elements – both technological and contextual enablers, as well as stakeholders – are developed and work together at local, national, regional and international levels. This collaboration is essential in ensuring that the next generations will inherit a place that is not only fit for human habitation, but also conducive for future growth and prosperity.

Ladies and Gentlemen,

Research and education does not happen in a vacuum. There is a direct circle of influence between research, education, industry, government and community that has to be considered when introducing change. The establishment of partnerships and practical cooperation between these sectors is essential to the success of the R&D agenda and plays an important role in introducing meaningful change.

The fact that sustainable construction is such a new concept means that everyone is still learning. The urgency of the matter means that opportunities for learning have to be innovatively pursued. Establishing research and education partnerships with industry sectors, non-governmental organisations (NGOs) and government increases these opportunities for learning and places them directly at the coalface, thus ensuring that research remains relevant to the local context, and that sustainability becomes a central driver for other development. Research organisations and universities can also act as the laboratories for industry and government, as well as provide independent monitoring and evaluation services.

There are several ways in which the private sector can partner with the universities. The private sector can work with the universities to adapt or replace existing practices to achieve greater efficiency and improve sustainability. A partnership between universities and the private sector can also assist with the commercialisation of new products and processes developed in the universities.

Client groups can form partnerships with universities to help them identify the possible benefits of sustainable construction for their specific operations, and to identify and develop ways of leveraging funding to cover the additional costs. Similarly, partnerships must be developed with universities to assist clients in educating themselves on the need for and requirements of sustainable construction.

Ladies and Gentlemen,

To initiate any research partnerships and collaboration, access to research funding is obviously a critical issue. While there may be limited funding available for large research projects between developing country partners, there is internal government funding available for local projects such as funding from the Ministry of Education (MOE), the Ministry of Science, Technology and Innovation (MOSTI), as well as funding from individual universities. Partnerships with industry may also open further funding streams. Universities need to find out what funding is available within the country, and identify the funding processes of international funding agencies.

The private sector is one of the key avenues for research funding. While most of this funding is directly related the competitiveness of the organisation that has provided the funding, a certain amount of funding is also required for research that is for the common good, but will not have a direct impact on the organisation's profit margins. It is therefore important for a percentage of the organisational budget for corporate social responsibility to be earmarked for this kind of general research.

Therefore, Ladies and Gentlemen, I believe 2015 MU-IGBC Symposium is a good initiative as it opens up opportunities for knowledge sharing between researchers and between researchers and the industry. The Symposium also offers a platform for both universities and the industry to initiate partnerships and collaboration in research related to green design, construction and development, which in turn would help closing the gap between the academia and industry. In fact, the Symposium itself is realised based on supports from the private sector and a close collaboration between an NGO (i.e. MGBC) and a research institution (HRC, UPM). This initiative is highly commendable.

I would like to thank the Faculty of Engineering, UPM for generously hosting us today. Finally, it remains for me to thank and congratulate all the organising teams from both MGBC and HRC, UPM who worked hard to put on this symposium. Thank you all for being here and I now proclaim the 2015 MU-IGBC Symposium well and truly open!