



**Asia-Pacific
Economic Cooperation**

**APEC LED and *lites.asia* Workshop
Singapore: 1-3 November 2011**

APEC Energy Working Group

February 2012



Australian Government

AusAID



Australian Government

**Department of Climate Change
and Energy Efficiency**

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1 Event Background

The increasing adoption of LEDs for household lighting presents APEC policy makers with a new opportunity to drive through improvements in lighting efficiency and to realise significant energy savings. Presently the quality and efficiency of LED lighting products ranges from excellent to poor. When consumers first adopted compact fluorescent lamps (CFLs), some were very dissatisfied by poor quality products with short lifetimes, insufficient lumen output, flicker, and other performance problems. This consumer dissatisfaction slowed the market uptake of CFLs by many years and delayed substantial energy savings.

Policy makers recognise the importance of ensuring consumers do not have similar negative experiences with LED products as they did with CFLs and are striving to develop standards and other measures to define and support good quality products and protect consumers. As APEC members have committed to move towards harmonisation of standards, this workshop presented an opportunity for participating economies to share information on their development of standards and other LED-related policies. The workshop was also an opportunity to consider regional action in the context of existing international initiatives relating to LED performance and quality.

The overall workshop was split into two sections. 1-2 November 2011 contained the main LED sessions aimed at a wide audience grouping from a variety of backgrounds. The 3 November 2011 session targeted the smaller *lites.asia* grouping of policy and standards makers within the region.

1.1 LED Event Objective

The objectives of the main LED sessions were to:

- 1) Identify the performance criteria that are important for consumer acceptance and energy efficiency of LEDs;
- 2) Share information on test methods and required performance levels that are being developed nationally and internationally for these specific criteria;
- 3) Develop a consensus on areas where there is a potential for harmonisation of testing standards, performance measures, labelling, and enforcement actions within the APEC region.

The *lites.asia* session sought to take the areas of consensus forward and develop more solid plans for national and regional action.

The LED workshop also provided an opportunity for an update on the APEC Street and Outdoor Lighting Project.

2 Event Programmes, Presentations and Outcomes

2.1 Programmes and Outcomes

The programmes for both the LED sessions on 1-2 November 2011, and the *lites.asia* session on 3 November 2011 are provided in Appendix 1. The presentations from all sessions are available at <http://www.lites.asia/downloads/sing2011.html> and on CD-ROM available from the Australian Government's Department of Climate Change and Energy Efficiency (Email: lighting@climatechange.gov.au).

2.2 Communiqué from the LED sessions

The LED workshop was highly successful, resulting in the following communiqué agreed by all participants.

2.2.1 Communiqué

62 representatives from 23 economies participated in the Asia-Pacific Economic Cooperation LED Workshop – Policies to Protect and Educate Consumers, which was held in Singapore on 1-2 November 2011. The Workshop was a part of the Singapore Lighting Energy Efficiency Week, co-sponsored by APEC and the Australian Government, with support from the Asia Lighting Compact.

The participants recognise the widespread adoption of the LEDs has the potential to help the Asian region to address energy efficiency, energy security and climate change concerns. However, low-quality LED lighting products represent a significant barrier to the full adoption of the technology and to the realisation of the consumer and environmental benefits.

The workshop was organized as a mechanism for Asian policy makers to identify the areas of LED quality that may concern consumers, potential solutions to these areas of concerns, and whether these solutions could be harmonised across the Asian region and internationally.

The participants agreed to the following:

On the development of test methods, performance and quality parameters for consumer LED lighting products, the region should seek to:

- Draw lessons from the experiences with compact fluorescent lamps (CFLs);
- Harmonize test methods *and* performance parameters to reduce testing and compliance costs for industry and regulators;
- Harmonize LED and incandescent lamp equivalency claims and ensure all other product claims are made in comparable forms;
- Create regional partnerships on testing and organize round robin tests to build laboratory experience and capacity;
- Develop a 'tropical' standard for the region (incorporating regional specific characteristics such as: high ambient temperature, humidity, voltage fluctuation, salt resistance, etc.);
- Agree on key criteria and develop guidelines for raising awareness of consumers of the benefits of LEDs and how to identify quality products appropriate to their needs.

On policy development on LEDs, the region should seek to:

- Adopt regional rather than national approaches;
- Obtain technical assistance in setting standards;
- Develop training programmes for policy makers and test laboratories;
- Share information for policymakers and consumers on LED lighting technology and applications (via networking, website, telecoms, webinars, etc.);
- Create benchmarks of performance for various applications;
- Harmonize label contents;
- Cooperate on compliance activities;
- Share market monitoring data;
- Share information on industrial development policy.

On communicating with, and participation in, other international fora and processes the region should seek to:

- Contribute a common, agreed upon, regional perspective to international standards process for LED lighting;
- Continue to participate in, and facilitate, International Electrotechnical Commission (IEC) Technical Committee 34 standards development work to hasten publication of LED lighting standards;
- Improve the region's influence on IEC standards, including through the continued physical presence of regional representatives at IEC meetings;
- Provide regional input and feedback to the International Energy Agency (IEA) 4E SSL process.

The participants also called for the following actions:

- Development of a roadmap for consumer LEDs in the region;
- Use the same regional approach, where possible, for ensuring the quality of other lighting applications e.g. street lighting, decorative, commercial, as well as to design guidelines, building codes, etc.;
- To be proactive, start simple, small and build upon these successes;
- Investigation of options to reduce initial LED lighting product costs;
- Wherever possible, use and build on existing regional capacity embodied in organisations such as the Asia Lighting Compact (ALC) to deliver actions and outcomes outlined above.

2.3 *lites.asia* Session and Actions

The *lites.asia* sessions resulted in extensive discussion and a number of actions for individual and groups of participants to pursue to forward the harmonisation agenda. Details are as follows:

2.3.1 IEA 4EAnnex on Solid State Lighting

The participants heard from Marc Fontoynt, Operating Agent of the IEA 4EAnnex on Solid State Lighting who explained the work of the annex and in particular the draft performance parameters for LED lamps which had been released globally for stakeholder comment at the commencement of the APEC workshop. Workshop attendees discussed the proposed performance tiers and how they thought these tiers may apply to the LED market in their economy:

- Tier 0: Minimum Acceptable Performance for Off-Grid Applications;
- Tier 1: Minimum Acceptable Performance for Grid-Connected Applications;
- Tier 2: Performance Required by Established Quality Programs;
- Tier 3: Current Highest Commercially Available Performance.

Most economies thought the tiered performance parameters were a useful approach to the challenge of providing guidance for a range of markets. Those economies with off-grid areas such as Sri Lanka appreciated the provision of Tier 0. For on-grid markets, either Tiers 1 and 2 were seen as an appropriate mechanism to help remove bad quality products, with Tier 3 a longer term target. Japan suggested that it was possible to produce Tier 2 and 3 products at a price similar to Tier 0 and 1 and so queried the need for these tiers.

2.3.2 Consumer Education and Guidance

Each economy briefly related their current approach to providing guidance to the consumer (and other policy details) on energy efficient lighting. Initiatives included:

- China – Noted that discussion of both lumens and watts are important (watts still important in relation to safety).
- India – Workshops. LED stimulation programme for business. Facilitating product testing and development of test labs. Current focus on down lights (commercial showrooms), omni-directional, street lighting. In promoting LEDs the focus is on lumens, with no mention of watts.
- Japan – Extensive consumer education and consumer guidelines has resulted in many consumers now understanding the use of lumens to measure light output. LED lamps are subsidised for consumers. Advertising in newspapers and television. The unfortunate tsunami event in March 2011 has lead to a greater push for use of energy efficient products. Manufacturer associations have produced a 70 page guide for consumers. A committee has been established to determine how to educate consumers on LEDs – membership from stores, suppliers and government. Use of special in-store salespeople.
- Korea – Use of energy efficiency label.
- Lao People's Democratic Republic – Currently no energy efficiency policy and no labelling system. Lamps sourced from China and Viet Nam. Currently looking at demand side management with support from the World Bank. Provision of 400,000 CFLs. Economic incentive as with hydro generation, if power is saved, it can be exported.
- Malaysia – Decision to ban incandescent lamps by 2014. Limited communication with the consumer to date.
- Philippines – Providing graphical representations of efficiency for LED and CFLs. Providing courses on efficient lighting design for electrical engineering students and teaching modules for professionals such as architects.
- Republic of the Marshall Islands (RMI) – Use of brochures. Removed import tax on LEDs.
- Samoa – Working with retailers to encourage energy efficient products. Power factor is a concern with CFLs regarding loss in electrical distribution network.
- SPC (Secretariat of the Pacific Community) – Some Pacific economies have doubled the tax on inefficient products.
- Thailand – CFL give-aways. Use of advertisements including television. Energy efficiency label, which uses lumens per watt.
- Tonga – Both cost and quality are issues in a small market. Have conducted a public education campaign to encourage use of CFLs promoting energy savings.
- Viet Nam – Use of endorsement and comparative labels. Development of a roadmap to prevent the import of inefficient lamps. Also hoping to phase-out the production of inefficient lamps.

Draft consumer guidelines were circulated.

Action: Each economy to provide comments on the draft guidelines and to email any consumer material or consumer education websites (facilitated by the lites.asia secretariat).

2.3.3 Key Parameters for an LED standard

While noting the usefulness of the 4E SSL Annex draft performance parameters, attendees noted that there were further parameters of specific interest to tropical economies, including operational temperature range, voltage fluctuations, humidity and corrosion.

Action: A draft 'Tropical Standard' to be prepared for consideration encompassing these additional factors (Steve Coyne).

2.3.4 International Electrotechnical Commission (IEC) - Update

Attendees were provided with a short update on current IEC Technical Committee 34 activities in relation to LED and CFL standards.

While the IEC is preparing useful test and performance parameters for both CFLs and LED products, these standards stop short of specifying minimum performance standards.

Action: As an interim step, an IEC technical paper on CFL performance parameters including minimum levels and tiers will be prepared for submission to TC34 (DCCEE). As a non binding document this may prove more acceptable to TC 34 members. Workshop attendees were encouraged to continue to actively participate in TC34 activities with indications for the chair of TC34 that economies would have to communicate a need for these issues to be included in IEC lighting standards for TC 34 to consider changing its current approach.

Action: A short paper to also be prepared on communicating with TC 34 to expand role to minimum standards and performance tiers – for consideration in relevant ASEAN forum facilitated by Mr Cristobal (with assistance by DCCEE).

2.3.5 Regional Sharing Lighting Product Test Data

Options for sharing lighting product test data were discussed. The meeting heard that the Asia Lighting Compact (ALC) had already commenced establishment of a database that could hold test data provided by regional economies. Thailand had commenced contributing some data, with Australia and the Philippines other likely early contributors.

In developing the data sharing system, consideration will need to be given to how products are identified (some may be public, some anonymous), who will be able to see what level of information and how to deal with products that may have different identifiers in different economies.

The Chinese representatives also explained that a range of test results from China were already available on the internet (the link to this information is http://www.cqc.com.cn/chinese/zscx/A0107index_1.htm. however users should be aware that to view the information it is necessary to go via the Chinese front page, there is no equivalent section on the English pages of the website).

Action: The lites.asia secretariat to circulate further information on the ALC data sharing initiative.

3 Workshop Attendees and Evaluation

A total of 62¹ people attended the LED Workshop on 1-2 November 2011, and 39 people attended the *lites.asia* session on 3 November 2011. Over the three days, attendees were present from 23 economies. Appendix 2 provides a breakdown of attendance at each event, and lists all attendees.

Participants at the LED workshop were asked to complete an evaluation questionnaire, from which 36 responses were received at the end of the event. Both the questionnaire and the resulting analysis are presented in Appendix 3.

¹ Note: In addition, six delegates from Thailand were registered but were unable to attend due to the local flooding.

4 Event Financing

The workshop was co-sponsored by APEC and the Australian Government Department of Climate Change and Energy Efficiency with support from the Asia Lighting Compact.



Attendees of the APEC LED Workshop, Singapore, November 2011

Appendix 1: Workshop Programmes



**Asia-Pacific
Economic Cooperation**



Australian Government
Department of Climate Change
and Energy Efficiency

APEC LED Workshop Policies to Protect and Educate Consumers

**York Hotel, Singapore, 1-2 November 2011
Programme**

08.30	Day 1: Workshop registration	
09.00	Welcome/Introduction <i>Objectives of the day</i>	
	LEDs: Where are we now and where are we going?	
09.40	LEDs – Current state of technology and industry and what the future holds <i>Operation, evolution, current capability pricing and applications Forecast for future improvement in lumen output, efficacy, quality, price and application</i>	Kathryn M Conway <i>Principal LED Consulting/Conway & Silver, Energy Associates LLC</i>
10.20	LED quality and efficiency – What are the challenges? <i>Performance test data, identification of key quality and efficacy issues, including information on regional LED quality from a recent ECO-Asia report.</i>	My Ton <i>Independent Consultant</i>
10.45	Questions	
11.00	Break	
11.20	Discussion – What issues are we facing? <i>What issues are governments and consumers facing with LEDs?</i>	
	Current status of international LED initiatives to protect the consumer	
11.40	International initiatives – Overview of initiatives underway	David Boughey <i>Assistant Director, Lighting and Equipment Energy Efficiency Team Department of Climate Change and Energy Efficiency</i>

12.00	The Industry View: Global Lighting Forum's View of LED Developments	Shyam Sujan <i>Secretary General Electric Lamp and Component Manufacturers Association of India (on behalf of the GLF)</i>
12.30	Lunch	
13.30	Overview of the International Energy Agency's 4E Solid State Lighting Annex (IEA)	Marc Fontoyont <i>Operating Agent, IEA-4E Annex on Solid State Lighting</i>
13.40	Overview of the IEC process and the function of the Regional Office	Damien Lee <i>Technical Officer IEC Asia-Pacific Regional Centre</i>
14.10	Current and developing IEC and CIE standards for LEDs	Kay Rauwerdink <i>Standards and Regulations Global Domain Leader: Luminaires Philips Lighting</i>
14.40	LED performance initiatives and Zhaga Consortium	Piet Derks <i>General Manager Lighting R&D China Philips Lighting</i>
15.20	Break	
15.40	Discussion – Working towards international consensus <i>How do these initiatives fit together to produce useful international harmonised testing and performance standards for LED products?</i>	
	LED initiatives within the Asia region	
16.10	LED Standards in India	Vandana Thakur P. K. Mukherjee <i>Consultant, CLASP India</i>
16.40	National Case Study – Japan	Masanori Sasaki <i>Assistant Director, Information and Communication Electronics Division, Ministry of Economy, Trade and Industry</i>
17.10	Discussion – What initiatives are underway in other APEC economies? What issues are generic to APEC economies? What are the key lessons we can learn? <i>Seeking a consensus on what might be important issues for standards, policies, enforcement, testing and whether there are opportunities to harmonise and/or share skills/ resources</i>	
17.40	Close	
19.00	Conference Dinner	

8.30	Day 2: Arrival	
	Key actions for APEC economies	
9.00	LEDs – What performance criteria and information might be important to the consumer? <i>What are the performance criteria that will make LEDs acceptable to the consumer? What critical information do they need to make appropriate choices</i>	Kathryn M Conway <i>Principal LED Consulting/Conway & Silver, Energy Associates LLC</i>
9.30	Performance standards – Parameters <i>Overview of possible key performance parameters and concept of a tiered approach</i>	Steve Coyne <i>Director Light Naturally</i>
10.00	Steps towards a harmonised test methodology <i>Short overview of key issues relating to methodology, round robin testing, accreditation</i>	My Ton <i>Independent Consultant</i>
10.20	Discussion -- Parameters - finding a consensus	
11.00	Break	
	Immediate steps	
11.20	Working with stakeholders <i>Communicating with consumers, industry, test laboratories and other stakeholders.</i>	Nils Borg <i>Director Borg & Co</i>
11.40	Potential interim steps for national and regional action <i>What options are available at the local and regional level to protect the consumer before the arrival of international standards without falling into the same trap of regional divergence. Some ideas on performance guidelines, truth in claim, labels, voluntary standards, cooperation on testing and enforcement.</i>	Raquel Huliganga <i>Director Department of Energy, Philippines</i>
12.10	Discussion – How to engage stakeholders locally and regionally? What other capacity constraints exist? What constraints are restricting policy makers? <i>Facilitated discussion to establish how participants are engaging stakeholders, testing capacity is available, what national enforcement actions are happening if any. What barriers are in place, and are there any local/regional solutions?</i>	
12.40	Lunch	
	Reaching a consensus	
13.40	LED Quality – Proposals for Collaboration on Testing and Compliance <i>Proposals for working together on Monitoring and Compliance (options for APEC region initiatives to share information on LED quality)</i>	Melanie Slade <i>Director, Lighting and Equipment Energy Efficiency Team Department of Climate Change and Energy Efficiency</i>
14.10	Discussion – Regional cooperation on monitoring and compliance	

14.30	Developing communiqué <i>What have we agreed?</i>	
15.10	Break	
	<i>Street and outdoor lighting: An update</i>	
15.30	APEC SOLLIA (Street and Outdoor LED Lighting Initiative – Asia) – Survey Findings <i>Presentation of information from APEC commissioned research and survey, including best practices for purchase, installation and maintenance of street lighting and other public outdoor lighting; and current status on LED street and outdoor lighting standards in APEC member economies.</i>	David Morgado <i>Environment and Energy Specialist International Institute for Energy Conservation (IIEC)</i>
16.10	Questions	
16.30	Concluding discussions	
17.10	Close	

lites.asia - Session

York Hotel, Singapore, 3 November 2011

Programme

08.30 Registration

Progressing Asia Region Action on LED Quality and Efficiency

<p>09.00 Review of the APEC Communiqué – <i>Identifying immediate steps for action and cooperation Communicating outcomes to regional and international stakeholders Input to international action.</i></p>	<p>Melanie Slade <i>Director, Lighting and Equipment Energy Efficiency Team Department of Climate Change and Energy Efficiency</i></p>
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<p>09.30 IEA 4E Solid State Lighting Annex <i>Opportunity for further discussion of the SSL Annex work and questions answered by SSL Annex Operating Agent Prof. Marc Fontoynt</i></p>	<p>Marc Fontoynt <i>Operating Agent, IEA-4E Annex on Solid State Lighting</i></p>
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Assisting the Consumer – Next Steps

<p>10.00 Information for the consumer – Lessons from previous initiatives <i>What consumer awareness and promotional campaigns have been under taken, particular related to changing consumer expectations of lighting products. For example:</i></p> <ul style="list-style-type: none"> • <i>Understanding the change from Watts to Lumens as defining lighting measure</i> • <i>Promotion of recycling</i> • <i>What were they aims, how were they implemented and how successful?</i> 	<p>Nils Borg <i>Director Borg & Co</i></p>
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10.30 Break

<p>10.50 Consumers guides <i>Discussion of draft LED consumer guide material to be circulated in advance of the meeting and how to further progress and distribute</i></p>	<p>My Ton <i>Independent Consultant</i></p>
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<p>11.20 Existing labelling programmes for lighting in Asia <i>What do they tell the consumer and why? How are they administered? How are they enforced? How successful have they been?</i></p>	<p>Open Discussion</p>
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12.05	Asia region cooperation on labelling for LEDs? <i>Building on the LED discussion from the previous two day, could a regional approach to labelling of LEDs assist in improving quality and consumer understanding? Discussion</i>	Melanie Slade <i>Director, Lighting and Equipment Energy Efficiency Team</i>
12.40	Lunch	
13.40	Key parameters for an initial LED standard <i>Following on from last lites.asia meeting – what parameters could be included in an interim regional standard? Residential illumination and decorative lighting</i>	Steve Coyne <i>Director Light Naturally</i>
Update on Developments at the IEC		
14.25	IEC and Asian Standards – Current status and development processes <i>Update on recent IEC meeting outcome and items on future meeting agendas – identify what issues are important to the group and how should we respond Update on any recently updated standards in participating countries (including summary of details of China’s phase-out plan and associated standards</i>	David Boughey <i>Assistant Director, Lighting and Equipment Energy Efficiency Team Department of Climate Change and Energy Efficiency</i> Roberto Cristobal <i>President Philippine National Committee of the IEC</i>
15.15	Break	
Progressing Regional Cooperation		
15.35	Cooperation on regional training for test laboratories <i>Outcomes of lites.asia survey and discussion on next steps</i>	Open Discussion
16.05	Sharing data <i>Proposal for sharing test data and discussion.</i>	David Boughey <i>Assistant Director, Lighting and Equipment Energy Efficiency Team</i>
16.35	Lites.asia looking forward <i>Lites.asia has secured funding through to June 2012. Delegates are invited to discuss:</i> <ul style="list-style-type: none"> • <i>Ongoing priorities for action</i> • <i>Dates/venues for future meetings</i> 	Open Discussion
17.10	Summary and close	Melanie Slade <i>Director, Lighting and Equipment Energy Efficiency Team</i>

Appendix 2: Attendee Listing and Analysis

Number, Gender and Organisation Type of Attendees

A total of 62 people attended the LED Workshop on 1-2 November 2011, and 39 people attended the *lites.asia* session on 3 November 2011. Over the three days, attendees were present from 23 economies (Appendix 2 lists all attendees to each event)².

Figure 1 and Figure 2 give the breakdown of attendees at each event by type of organisation in which the participants are employed. Figure 3 and Figure 4 give a breakdown of the attendees by gender.

Figure 1: LED Session Attendees by Type (total attendees = 62)

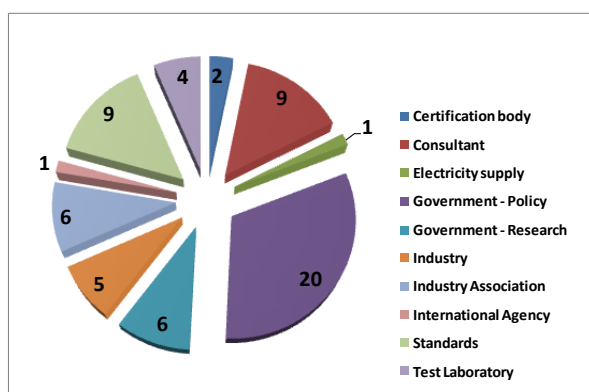


Figure 2: *lites.asia* Session Attendees by Type (total attendees = 39)

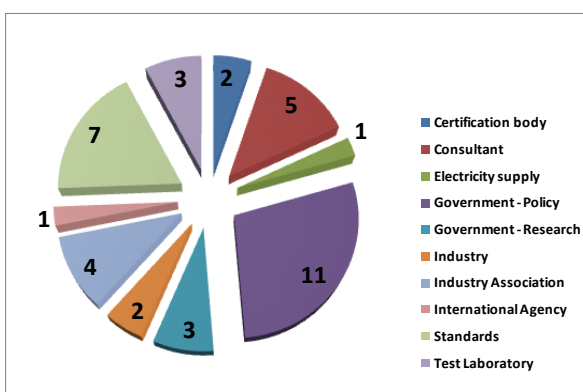


Figure 1: Gender Breakdown of LED Session)

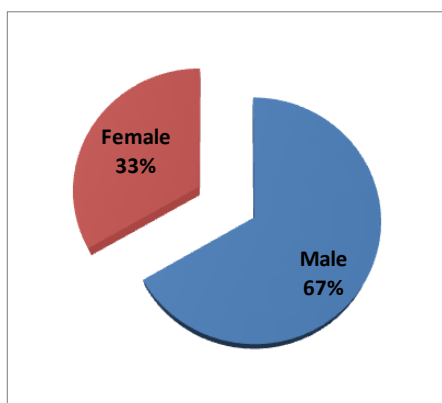
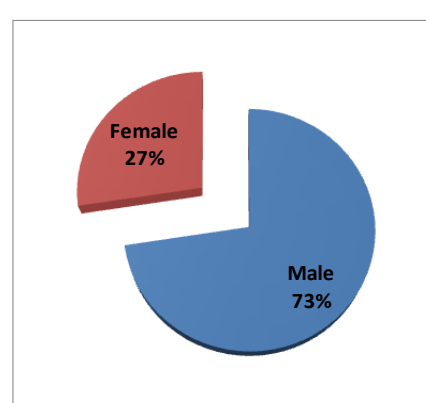


Figure 2: Gender Breakdown of *lites.asia* Session)



² Note: In addition, six delegates from Thailand were registered but were unable to attend due to the local flooding.

Listing of Attendees

LED Workshop Attendee	<i>lites.asia</i> Attendee	Title	Family Name	Other Names	Position	Organisation	Type of Organisation	Country
Yes	Yes	Mr	Coyne	Steven John	Director	Light Naturally	Consultant	Australia
Yes	Yes	Mr	David	Boughey	Assistant Director, Lighting and Equipment Energy Efficiency Team	Department of Climate Change and Energy Efficiency	Government - Policy	Australia
Yes	Yes	Ms	Slade	Melanie	Director, Lighting and Equipment Energy Efficiency Team	Department of Climate Change and Energy Efficiency	Government - Policy	Australia
Yes	Yes	Mr	Matin	Md. Abdul	Director (Physical)	Bangladesh Standards & testing Institution (BSTI)	Test Laboratory	Bangladesh
Yes	Yes	Mr	Chen	Song	Manager	China Quality Certification Centre (CQC)	Certification body	China
Yes	Yes	Mr	Derks	Piet	General Manager Lighting R&D China	Philips	Industry	China
Yes		Ms	Liu	Qian	Director of Project Department	National Lighting Testing Center (NLTC)	Standards	China
Yes	Yes	Mr	Thavanathan	Sujendan	Director	Danson Electronics Ltd (A member of Danson Group)	Industry	China
Yes	Yes	Ms.	Wang	Zhuo	Vice-Secretary-General	China Association of Lighting Industry	Industry Association	China
Yes	Yes	Ms.	Xia	Yu Juan	Research Associate	China National Institute of Standardisation (CNIS)	Standards	China

LED Workshop Attendee	<i>lites.asia</i> Attendee	Title	Family Name	Other Names	Position	Organisation	Type of Organisation	Country
Yes	Yes	Ms	Xu	Wenshen	Certification Engineer	China Quality Certification Centre (CQC)	Certification body	China
Yes	Yes	Dr	Yan	Xiaoling	APR Lighting Standardization and Regulation Director	Philips (China) Investment Co. Ltd.	Industry	China
Yes		Mr	Zeng	Lei	Director of China Programs	Collaborative Labeling and Appliance Standards Program (CLASP)	Consultant	China
Yes	Yes	Prof	Fontoynt	Marc	Operating Agent, IEA-4E Annex on Solid State Lighting	Danish Building Research Institute, Aslborg University	Standards	France
Yes	Yes	Ms	Lau	Iris	Engineer	Electrical and Mechanical Services Dept, Government of Hong Kong SAR	Government - Policy	Hong Kong, China
Yes		Mr	Mukherjee	Pradeep Kumar	Consultant	Collaborative Labeling and Appliance Standards Program (CLASP)	Consultant	India
Yes	Yes	Mr	Shyam	Sujan	Secretary General	Electric Lamp & Component Manufactures Association of India	Industry Association	India
Yes		Mr	Ardi	Moeharyoso		Ailki (Indonesia Luminaire and Electricity Association)	Industry Association	Indonesia
Yes	Yes	Mr.	Buwana	Evan	Head Assistant of Mechanical, Electrical and Construction Division on Development Standard	National Standardization Agency of Indonesia (BSN)	Standards	Indonesia
Yes	Yes	Mr	Riyadi	Awang	Head of Section of Energy Efficiency Technology Application	Directorate of Energy Conservation, Directorate General of New Renewable Energy and Energy Conservation, MEMR	Government - Policy	Indonesia

LED Workshop Attendee	<i>lites.asia</i> Attendee	Title	Family Name	Other Names	Position	Organisation	Type of Organisation	Country
Yes		Ms	Setiowati	Ratna Juli	Development Manager	PT Panosonic Lighting (Indonesia)	Industry	Indonesia
Yes		Mr	Widarmanto	Lukman	Engineering General Manager	PT Panosonic Lighting (Indonesia)	Industry	Indonesia
Yes	Yes	Mr.	Doro	Masanori	Executive Managing Director	Japan Luminaires Association	Industry Association	Japan
Yes	Yes	Dr.	Ozaki	Norihiko	Research Fellow	Japan Electrical Safety & Environment Technology Laboratories	Test Laboratory	Japan
Yes	Yes	Mr.	Sasaki	Masanori	Assistant Director	Ministry of Economy, Trade and Industry	Government - Policy	Japan
Yes	Yes	Mr	Hur	Seongkuk	Principal Engineer	Korea Institute of Lighting Technology	Government - Policy	Korea
Yes	Yes	Mr.	Chantha	Viengsay	Government Technical Staff (Electrical Engineer)	Ministry of Energy and Mines; Department of Electricity	Government - Research	Lao People's Democratic Republic
Yes	Yes	Ms	Yob	Hafiza	Senior Executive	Energy Commission	Government - Policy	Malaysia
Yes	Yes	Mr.	Cristobal	Roberto C.	President	Philippine National Committee of the IEC	Standards	Philippines
Yes	Yes	Ms.	Huliganga	Raquel	Director	Department of Energy	Government - Policy	Philippines
Yes	Yes	Ms	Gonelevu	Arieta	Energy Specialist	Secretariat of the Pacific Community (SPC)	International Agency	Republic of the Marshall Islands (RMI)

LED Workshop Attendee	<i>lites.asia</i> Attendee	Title	Family Name	Other Names	Position	Organisation	Type of Organisation	Country
Yes	Yes	Mr	Myazoe	Walter Jr.	RMI Energy Officer	Ministry of Resources & Development - Energy Planning Division	Government - Research	Republic of the Marshall Islands (RMI)
Yes	Yes	Mrs	Schuster	Raema	Electrical Engineer	Electric Power Corporation	Electricity supply	Samoa
Yes		Ms	Arora	Jag	Managing Director	Asia Lighting Compact	Industry Association	Singapore
Yes		Mr	Cheong	Wah Onn, Adrian	Deputy Director, MES	Land Transport Authority	Government - Policy	Singapore
Yes		Mr	Chew	Dennis	Regional Director	IEC Asia-Pacific Regional Centre	Government - Policy	Singapore
Yes		Mr	Chua	Lin Tiam	Deputy Manager, RIM	Land Transport Authority	Government - Policy	Singapore
Yes		Mr	Foo	Kiat Boon, Frankie	Engineer	National Environment Agency	Government - Policy	Singapore
Yes		Mr	Heng	Kian Ping, Jerry	Executive Engineer, RIM	Land Transport Authority	Government - Policy	Singapore
Yes		Mr	Huang	Xuebo	Senior Metrologist & Lab Lead	National Metrology Centre	Test Laboratory	Singapore
Yes	Yes	Miss	Koh	Eunice	Engineer	National Environment Agency	Government - Policy	Singapore
Yes		Mr	Lee	Damien	Technical Officer	IEC Asia-Pacific Regional Centre	Standards	Singapore
Yes		Mrs	Leong	Suet Mui	Principal Technical Executive	SPRING Singapore	Government - Research	Singapore

LED Workshop Attendee	<i>lites.asia</i> Attendee	Title	Family Name	Other Names	Position	Organisation	Type of Organisation	Country
Yes		Mr	Lim	Joo Yak	Higher Engineering Officer, RIM	Land Transport Authority	Government - Policy	Singapore
Yes		Mr	Liu	Yuanjie	Senior Metrologist	National Metrology Centre	Government - Research	Singapore
Yes		Mr	Long	Lian Ming	Senior Engineer	National Environment Agency	Government - Policy	Singapore
	Yes	Mr	Ram	Bhaskar	Director, Energy Efficiency & Conservation Department	National Environment Agency	Government - Policy	Singapore
Yes		Mr	Tan	Guan Qun	Engineer	National Environment Agency	Government - Policy	Singapore
Yes		Mr	Thong	Tuck Loong, Melvyn	Director, E&M (TEL)	Land Transport Authority	Government - Research	Singapore
Yes		Mr	Wijaya	Hadi	Deputy Manager, MES	Land Transport Authority	Government - Policy	Singapore
Yes	Yes	Dr.	Attalage	Rahula Anura	Vice President SLEMA/Professor of Mechanical Engineering	Sri Lanka Energy Managers Association (SLEMA)	Industry Association	Sri Lanka
Yes	Yes	Mr	Jayasekera	Koswatta Gamage Chamila	Head (Energy Efficient System)	Sri Lanka Sustainable Energy Authority	Government - Policy	Sri Lanka
Yes		Mr	Borg	Nils	Director	Borg & Co	Consultant	Sweden
Yes	Yes	Mr.	Asawutmangkul	Asawin	Senior Engineer	Department of Alternative Energy Development and Efficiency	Government - Research	Thailand

LED Workshop Attendee	<i>lites.asia</i> Attendee	Title	Family Name	Other Names	Position	Organisation	Type of Organisation	Country
Yes		Mr	Morgado	David	Environment and Energy Specialist	International Institute for Energy Conservation (IIEC)	Consultant	Thailand
Yes		Mr.	Phon-Amnuaisuk	Somma	Senior Project Manager	International Institute for Energy Conservation (IIEC), Asia Regional Office	Consultant	Thailand
Yes		Mr	Rauwerdink	Kay	Standards & Regulations Global Domain Leader Luminaires	Philips Lighting	Standards	The Netherlands
Yes	Yes	Mr	Sefana	Ofa Kiolohau	Energy Planner	Energy Division, Ministry of Environment and Climate Change	Government - Policy	Tonga
Yes	Yes	Mr	Jeffcott	Stuart	Principal	Jeffcott Associates Ltd	Consultant	United Kingdom
Yes	Yes	Ms	Conway	Kathryn M	Principal	LED Consulting/Conway & Silver, Energy Associates LLC	Consultant	USA
Yes	Yes	Ms.	Curry	Ku'uipo	Program Associate	IEA 4E SSL Annex	Standards	USA
Yes	Yes	Mr	Ton	My	Technical Advisor	ALC	Consultant	USA
Yes	Yes	Ms	Bui	Ngoc Bich	Head of Division	Viet Nam Standards and Quality Institute	Standards	Viet Nam
Yes	Yes	Mr	Nguyen	Danh Hoa	Head of Electrical - Electronic testing laboratory	Quality Assurance and Testing center number 1 (Quatest 1)	Test Laboratory	Viet Nam

Appendix 3: Event Evaluation

Participants at the LED workshop were asked to complete an evaluation questionnaire, from which 36 responses were received at the end of the event. The questionnaire used is presented on the following page, followed by the resulting analysis of the 36 responses received.

APEC LED Workshop

Policies to Protect and Educate Consumers

EVALUATION FORM

Please place a check mark "√" in the box that best reflects your answer to each question below:

Your Overall Assessment

How well did the meeting meet <i>your</i> objectives?	not well ← → very well					Comments
	1	2	3	4	5	
How well did the meeting meet its objectives?						
Did the event provide you with sufficient information on options to implement LED quality measures in your country?						

Most Useful Topic Areas

Which topic areas were the most interesting to you in your job?	not of interest ← → of interest					Comments
	1	2	3	4	5	
The current and anticipated state of LED technology?						
Current international activities to develop LED standards?						
Current regional activities to develop standards?						
Communicating with and information consumers?						
Plans for regional cooperation?						
What key topic areas were missing or not investigated in sufficient detail?						

Most Useful Elements

What were the most useful elements of the event for you?	not useful ← → very useful					Comments
	1	2	3	4	5	
The information provided by the presentations?						
The information gained in the discussion sessions?						
The interactions and discussions with other delegates from <i>your own country</i> ?						
The interactions and discussions with other delegates from <i>other countries</i> ?						

What action(s) do you intend to take on LEDs when you return to your home country?

Meeting Organization

How efficient was the organization of the meeting?	not good ← → good					Comments
	1	2	3	4	5	
Informing you of the event and enabling your registration and other pre-event preparation						
The support given to you during the event						
What could or should have been done better?						

How would you best describe your Organization?				
National Government	<input type="checkbox"/>		Utility	<input type="checkbox"/>
Local/Regional Government	<input type="checkbox"/>		Manufacturer	<input type="checkbox"/>
Certification Body	<input type="checkbox"/>		Industry Association	<input type="checkbox"/>
Testing Organization	<input type="checkbox"/>		NGO	<input type="checkbox"/>
Standards/Labeling organization	<input type="checkbox"/>		International Agency	<input type="checkbox"/>
Financier	<input type="checkbox"/>			<input type="checkbox"/>
Other (please explain):				

Thank you!

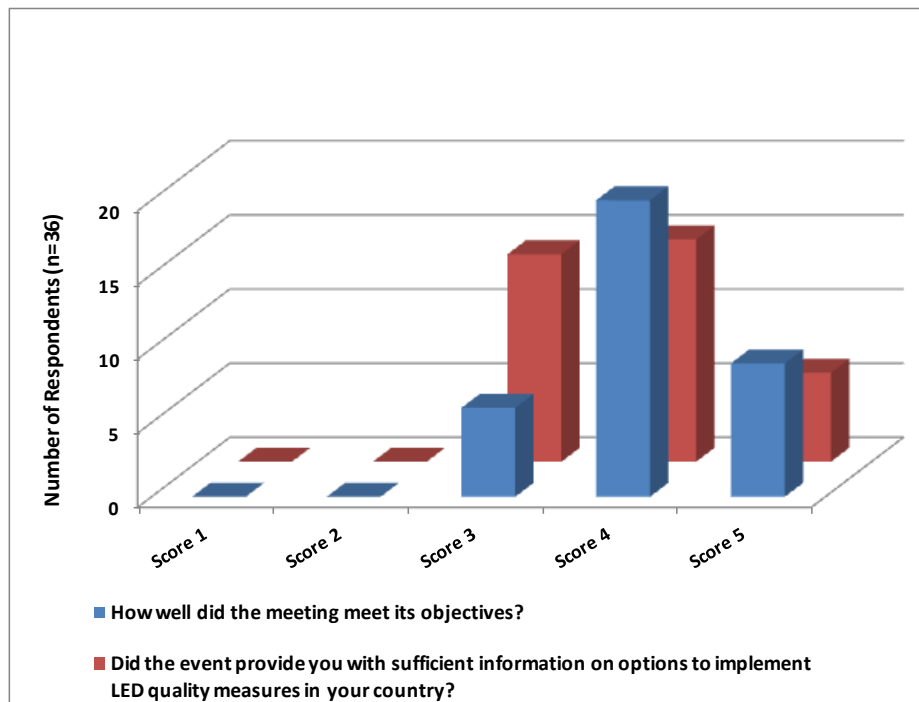
(Please return this Evaluation Form to the Organiser before you leave the meeting venue!)

Event Evaluation

Meeting Delegate Objectives and Providing Sufficient Information for Action

As Figure 3 illustrates, the vast majority of respondents felt the meeting meet their objectives for attendance and, to the greater extent, the event provided sufficient information to implement at least some of the proposed activities in the home economy.

Figure 3: Meeting Objectives and Providing Sufficient Information (score 1 = not well, score 5 = very well)



In addition, a number of positive individual comments were made including:

- It has been an eye opener meeting and important to build on this knowledge/information sharing in future, especially with the pacific region.
- Yes, it met our objectives well.
- Objectives were met very well with lots of information from other countries.
- Yes, the objectives were fully met.
- Yes, information fund from other countries was very useful.

There were also some comments that are valuable in forming future programmes:

- Elements related to policy establishment identified. Bit more time on policy guidelines would have been better.
- The way forward was well planned, but we need more tools, particularly on applications.

- There was enough information for now. However, we need more tools for realise is international standards and lab capabilities. Our concern is how we can make standard and give some intensive or improve lab capabilities.

Topics of Most Interest to Delegates

Figures 4 to 8, indicate the areas of the programme of most interest to respondents. These illustrate that on average respondents felt all topic areas featured in the programme were of interest. Respondents reported that the international standards were of most importance (average score 4.2, where 5 is of most interest), with all other topic areas of approximately equal relevance (average score all between 3.9 and 4.0).

Figure 4: Current and Anticipated State of LED Technology (score 1 = not of interest, score 5 = of interest)

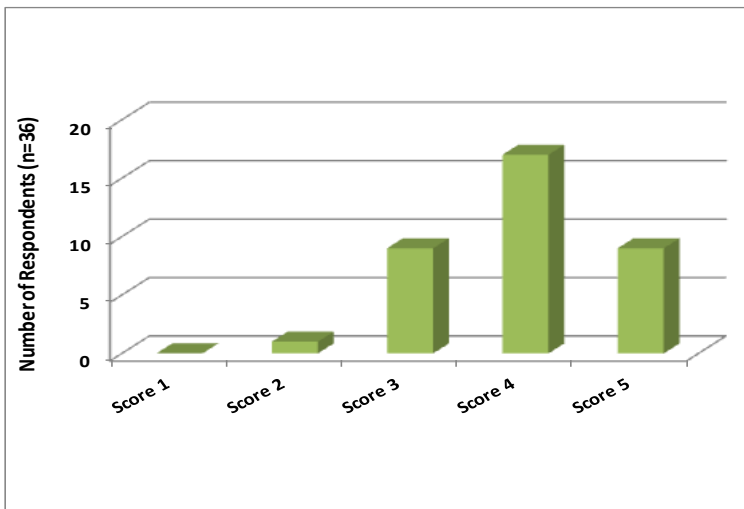


Figure 5: Current International Activities to Develop LED Standards (score 1 = not of interest, score 5 = of interest)

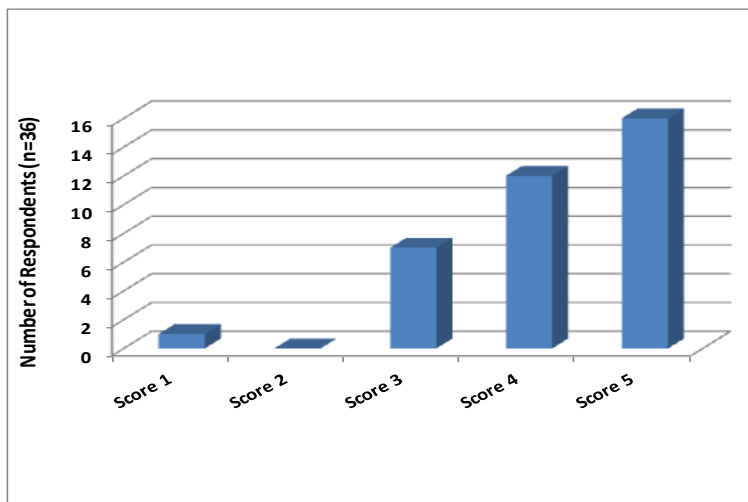


Figure 6: Current Regional Activities to Develop LED Standards
 (score 1 = not of interest, score 5 = of interest)

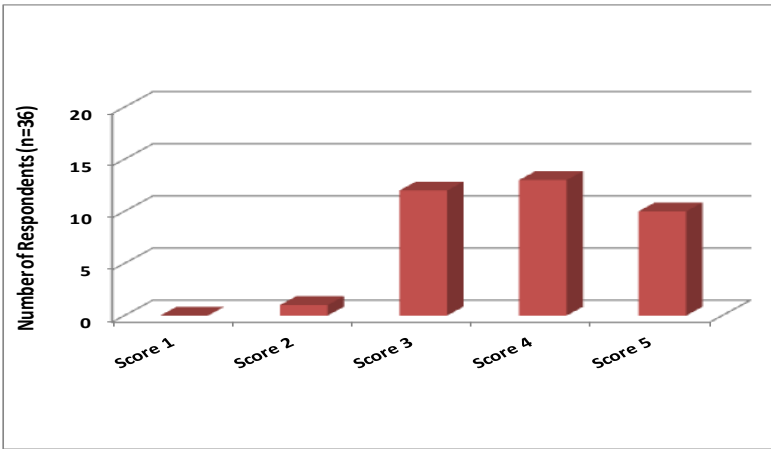


Figure 7: Communicating with, and Informing Consumers
 (score 1 = not of interest, score 5 = of interest)

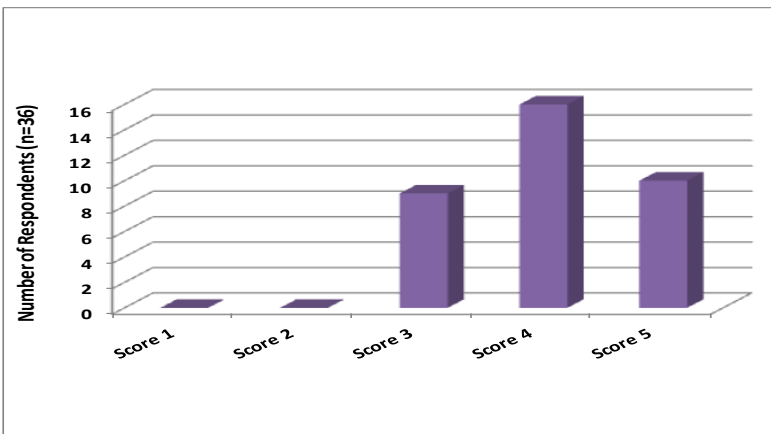
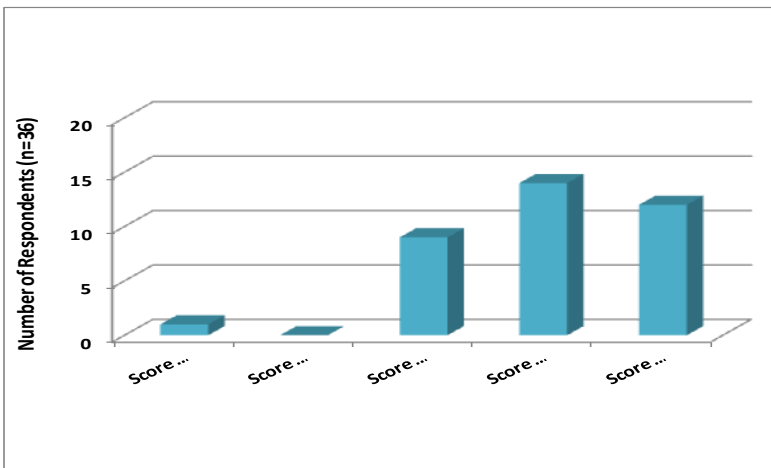


Figure 8: Plans for Regional Cooperation
 (score 1 = not of interest, score 5 = of interest)



Key individual comments related to areas not addressed in sufficient detail included:

- Cost of LEDs and appropriateness/economics of various applications.
- Need to educate importers *as well as* consumers.

Most Useful Elements of the Event

Delegates were asked which overall elements of the event were of most *useful*, i.e. the presentations and discussion sessions, and/or the interactions with other delegates from their own country and elsewhere. Interestingly, as can be seen from Figures 9 and 10, although three people suggested that the interactions with other delegates was not useful, in general, most delegates consider interactions with other delegates the most useful element of the event. 31 of the 36 respondents rated interactions with delegates from other countries as a 4 or 5 (most useful), and 30 respondents rated interactions with delegates from their own countries as most useful. Ratings for presentations and discussions were only slightly lower averaging a score of 4 and 3.9 respectively.

Figure 9: Perceived Usefulness of Presentations and Discussions (score 1 = least useful, score 5 = most useful)

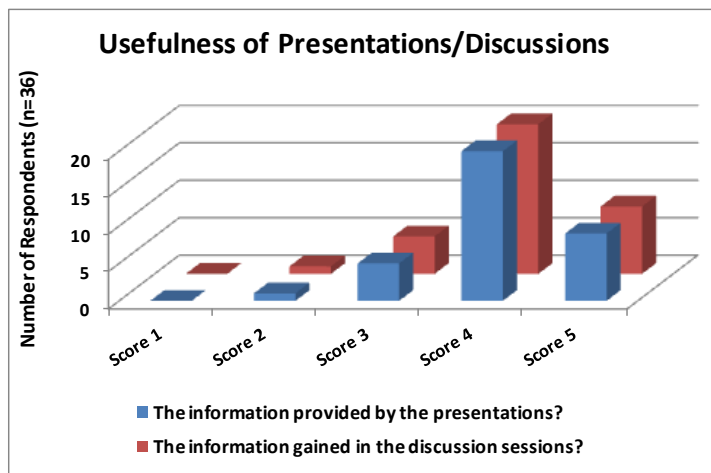
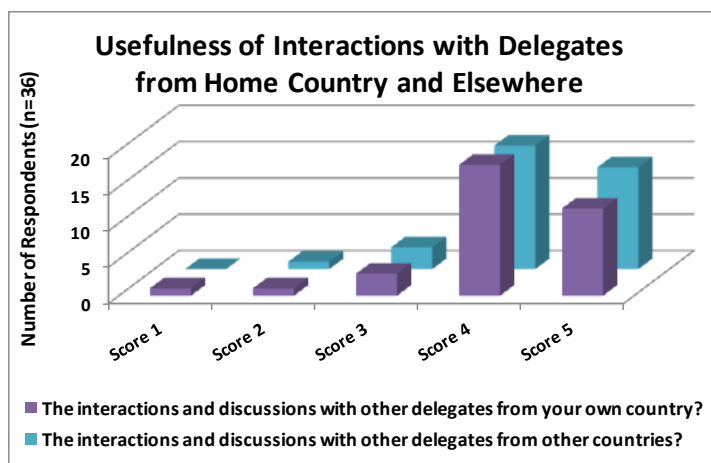


Figure 10: Perceived Usefulness of Interactions with Other Delegates (score 1 = least useful, score 5 = most useful)



Actions Participants Expect to Take on Their Return to Home Country

To provide as much information as possible, all feedback provided by respondents on the actions they will take on return to their home country is reproduced below:

- As a manufacturer we are happy to see:
 - 1) Meaningful policy
 - 2) Meaningful standards
 - 3) Meaningful test methodsAnd once these are implemented, proper regulation!
- Promote advantages of LED lighting.
- Consumer information, knowledge sharing, development of MEPS in Asia Pacific Countries.
- 1) Formulate LED standard 2). LED awareness programme. 3. LED test facilities created
- Establish standard. Information sharing. Keep international organisations in close contact to follow up market and the industry.
- Awareness among other members of my organisation. Provide impetus to work towards LED related standards establishment.
- Encourage retailers to learn more about LED before importing them. Set a national lighting standard within government organisations.
- Collect international standards and conduct analysis of parameters. Trace the progress of new indicators for substituting CRI and CCT.
- Collect more information for LED standard and tell it to division for next step to make recommendation. Create a forum with relevant institution and tech committee who are responsible for lamps to obtain input.
- Plan to investigate more on its advantages over CFLs before making a bold move on choose street light type (suitable). Selection based on payback, lifetime, quality PF/harmonics and lumens.
- Confirm the standards.
- Think about a tropical specification to ensure LEDs work in Asia.
- Following up closely with the development.
- Disseminate all gathering information to relevant people. Report to higher level of management.
- Will have seminar about international consensus of LED lighting.
- Propose to consider establishing a country LED roadmap.
- Create an appropriate certification programme.

Efficiency of Event Organisation

Delegates reported high levels of satisfaction with the event organisation before and during the event as shown in Figure 4

Figure 4: Satisfaction with Organisation Before and During the Event (score 1 = not good, score 5 = good)

