



**Asia-Pacific
Economic Cooperation**

Asia-Pacific Building Codes Forum Workshop Outcomes

Singapore, 7 July 2017

*A Contribution to the APEC Incubator for Enhancing Building
Energy Performance Project*

APEC Energy Working Group

July 2017

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Produced by:

The Global Buildings Performance Network (GBPN) in collaboration with the Centre for Urban Transitions, Swinburne University of Technology, Melbourne Australia.

Authors:

Professor Peter Graham, Executive Director GBPN and Deputy Director of the Centre for Urban Transitions, Swinburne University of Technology pmgraham@swin.edu.au

Jennifer Witheridge, Centre for Urban Transitions, Swinburne University of Technology

Dr. Sean McNelis, Centre for Urban Transitions, Swinburne University of Technology

This Paper has been produced for:

Asia-Pacific Economic Cooperation Secretariat
35 Heng Mui Keng Terrace
Singapore 119616
Tel: (65) 68919 600
Fax: (65) 68919 690
Email: info@apec.org Website: www.apec.org

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1. OVERVIEW

APEC economies account for about 60% of global energy demand, much of which is being driven by urbanization and increasing wealth in the emerging economies of South East Asia. Energy demand from the building sector is increasing across APEC economies. Yet building energy demand is projected to increase by about 50% by 2033, driven substantially by growth in energy demand for space cooling (GABC 2016). Reducing energy demand in the building sector, which contributes about 30% of global energy-related GHG emissions, is therefore critical to meeting the Paris Climate Agreement goal of keeping greenhouse gas emissions well below 2°C.

If the Paris Agreement goal of keeping global warming well below 2°C is to be achieved, the projected growth in building energy demand must be entirely avoided and limited to 2013 levels by 2030. This can be achieved through mainstreaming building energy codes that require near or net zero energy or positive energy buildings for new construction, and significantly increasing deep energy saving renovations of existing building stock (IPCC 2014; GABC 2016).

The economic, social and environmental benefits of ambitious, well implemented building energy codes and supporting policies are well documented. This may account for the high-level of awareness and policy activity on building energy performance in local, regional and national economies (GABC, 2016). APEC economies continue to engage positively in the development and implementation of building energy codes as a key policy strategy for achieving energy savings and reducing greenhouse gas emissions. Despite the high level of engagement however, the potential for building energy codes to achieve their energy savings potential is often undermined by a range of common issues such as:

- Not aligning codes with supporting policies such as energy performance certificates, incentives and voluntary rating schemes
- Poor code implementation, enforcement, revision planning and compliance.
- Lack of local industry capability to design and/or construct compliant buildings
- Lack of monitoring and data gathering to verify building energy performance during operation.

In contributing to the Zero Carbon Incubator for Buildings, a project led by Climate Works Australia and partly funded by APEC, the Global Buildings Performance Network (GBPN) in association with Swinburne University of Technology have been engaged to support development of an Asia-Pacific Building Code Forum. This Forum aims to support the improved design, implementation and impact of building energy codes in APEC economies from the Asia-Pacific region by creating a forum for exchange of best-practices and peer to peer sharing of knowledge and experience.

A workshop was held in Singapore on Friday 7th July 2017, at the Novotel Clark Quay in conjunction with the International Energy Agency Energy Efficiency Training Week. The workshop facilitated discussions about the need for such a regional Building Codes Forum, and determined next steps and follow up actions. The final agenda, and attendees list is included in Appendix 2.

A discussion paper on the status of building energy codes among eight participating APEC economies, regional best practices, and key issues and opportunities for knowledge exchange and collaboration was circulated prior to the workshop and presented on the day to support discussions. The key findings of this discussion paper, particularly on common issues faced by participating APEC economies, and priorities for collaboration were used to

frame the workshop agenda, and inform discussions. These are included in Appendix one of this report.

1.1 Workshop Attendance

Eight APEC economies participated in the development of the discussion paper that supported discussions at this workshop. They were Australia, China, Indonesia, Malaysia, Singapore, Thailand, The Philippines and Vietnam (Figure 1). Twenty-five policy makers from jurisdictions in all economies except Australia and China¹. Representatives came from national and subnational governments, NGO's, International Organisations and Cities (Figure 2). Five of the twenty-five attendees were female (Figure 3).

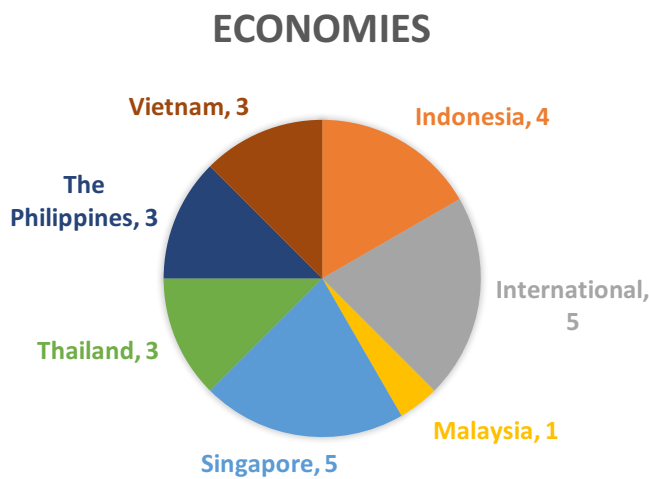


Figure 1: Economies Attending



Figure 2: Jurisdictions Attending A full list attendees is included in Appendix 3.

¹ The Chinese delegate had to cancel at the last minute due to visa problems. Australia did not send a delegate.

GENDER BALANCE

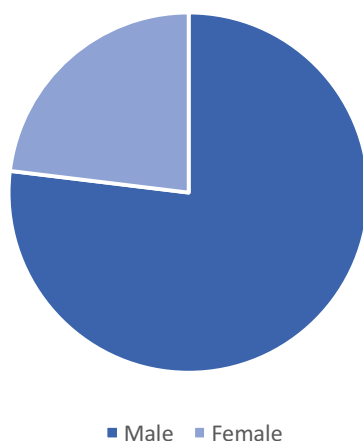


Figure 3: Gender Balance

2. WORKSHOP – OBJECTIVES & KEY OUTCOMES

The workshop was structured in to three sessions and designed to achieve the following four objectives:

- Current Status & best-practices in building energy codes in APEC
- Common issues: influencing code development & implementation

Session 1

- Priorities for collaboration: and preferred methods of collaboration

Session 2

- Next Steps: How do we take action?

Session 3

2.1 Outcomes of Session 1 – Common Issues

The aim of session one was to develop deeper engagement & insight into common issues affecting implementation of building energy codes as a basis for collaboration through an Asia-Pacific Building Codes Forum. Participants were presented with the common issues identified for, and included in the discussion paper. They then participated in a facilitated working session to discuss these findings in more detail and add new, or more refined issues that could be considered as potential areas for collaboration. Participants were arranged across four tables of six, with seating allocated to ensure a mix of countries and jurisdictions. The overall results from session one highlighted the following eight issues, organised according to the common challenges identified in the discussion paper (see Appendix 3):

Code design and governance

- Pathways to net zero energy high-rise buildings in tropics
- Business cases for high performance

- Stakeholder engagement in code development

Structural coverage of codes

- Costs & Uncertainties for extending code coverage to small buildings
- How to calculate the costs & benefits of increasing code stringency

Implementation and compliance

- Linking National Codes to regional & local implementation
- Data bases for building stock, policy impact monitoring and evaluation
- Training & Capacity Building - compliance & enforcement

The economies participating in this workshop are at very different stages of building energy code development and implementation. Challenges faced by advanced jurisdictions such as Singapore and Jakarta Province concern how to develop policy pathways that could achieve near or net zero commercial buildings in tropical climates in the future. They are interested in understanding how to make a business case for mandating very high-performance, and where there may be points of diminishing returns with regard to policy impacts on energy savings, greenhouse gas emissions, construction costs and property values.

All participating economies have building energy code coverage of large commercial office buildings (typically above a gross floor area of 2000m²). However, it was recognised that this does not capture the large potential energy savings in smaller buildings which make up the majority of building activity in most economies. The key issue then is how to develop and implement strategies for extending the coverage of mandatory energy performance requirements to these building types.

As reflected in the issues raised during this session, developing a policy pathway that could eventually see the regulation of the majority of building energy use, raises related issues of:

- Understanding a jurisdiction's building stock and the energy demand of different building types
- Having reliable building stock data to use for analysing code stringency scenarios,
- Being able to communicate potential benefits and costs to stakeholders, and provide an evidence base for stakeholder engagement, training and awareness raising, and decision-making.

The need for further support and knowledge sharing on improving energy code enforcement and compliance was common among all participating economies. Many economies require the cooperation of multiple layers of government in order to effectively develop and implement energy codes. Vertical integration of policy implementation between national, provincial and municipal government agencies was considered an important factor influencing implementation, as was communicating the link between energy savings achieved through energy code enforcement and national climate change goals such as Nationally Determined Contributions (NDCs).

2.2 Outcomes of Session 2 – Priorities for Collaboration

The objectives of session 2 were to discuss the areas of collaboration identified as most valuable in the discussion report, and incorporate any new ideas for priorities for collaboration generated from the issues raised in session one.

To provide context, participants were presented with a range of priority issues, forms and objectives for collaboration identified through a number of recent international surveys of countries and building sector stakeholders. They were then offered the chance to move

tables or form new groups to work on one of the priority areas identified in the APEC discussion paper, namely:

- Code design, implementation, compliance and stakeholder engagement;
- Support for setting long term policy goals and performance targets
- Support for developing or expanding energy performance rating, labelling and disclosure
- Support for developing or extending building energy codes and standards, introducing mandatory codes, and improving stakeholder engagement.

The majority of participants elected to stay in the same table groups formed in session one. Using formatted feedback sheets, participants were asked to discuss priorities and suggest

- More specific ideas for collaboration
- Forms of collaboration that could be effective
- Who should be involved in the collaboration
- Who could lead the collaboration; and
- Immediate next steps.

The outcomes ranged from specific project ideas, to support for on-going fora or initiatives to enable APEC economies to continue to exchange knowledge and experience in addressing specific challenges to development and implementation of building energy codes. The specific suggestions for collaboration are summarised below according to the working groups on each table during the workshop. The representatives on each table are noted in appendix 3.

Table 1: Support for setting long term policy goals and performance targets

Priority for Collaboration	What form of collaboration could work?	Who should be involved?	Who could lead?	Immediate next steps?
<p>Develop 'HOW TO' guidance on Investment Grade Policy Planning including processes for setting goals and targets adaptable to local market conditions.</p>	<p>A regional forum to develop a Policy Investment Plan including roadmaps, benchmarks, mapping of expertise & organizations;</p> <p>Focus Groups, Case Studies on developing policy strategies & plans, technical working groups; regional forum where banks and private sector can join & help roadmap policies. Have a series of subject specific training programs.</p>	<p><i>Public Sector:</i> Regional & local Governments</p> <p><i>Private Sector:</i> Industry, Developers & Banks</p> <p><i>Local NGOs:</i> Eg. GBCs</p> <p><i>Third Party Moderators:</i> e.g.BCA-CSB, IFC, ASEAN, APEC</p>	<p>U.N. Environment Regional Office for Asia Pacific</p>	<p>Establish Advisory, Steering & Working Groups:</p> <p>Create a planning template using existing tools; develop training modules & mapping available experts</p>

Table 2: Code design, implementation, compliance and stakeholder engagement

Priority for Collaboration	What form of collaboration could work?	Who should be involved?	Who could lead?	Immediate next steps?
<p>Forum on ongoing code design, compliance, & stakeholder engagement</p>	<p>An on-line data base of policies in each country for sharing current work; Best-Practices and Case-Studies of what does and doesn't work;</p> <p>Updating the database yearly;</p> <p>Extend to database for</p>	<p>APEC & ASEAN Participating Economies</p>	<p>Facilitated by a core team of:</p> <p>GBPN, APEC & ASEAN</p>	<p>Find a local champion who can translate local resources;</p> <p>Determine an appropriate revenue model & Membership;</p>

	energy data including common metrics & open data; Lists of national & sub-national and regional targets. Ensure countries can learn from each other on training & education best-practices. Piggy-back on existing forums with codes specific streams.			Conduct a Training Needs Assessment.
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Table 3: Support for developing or expanding energy performance rating, labelling & disclosure

Priority for Collaboration	What form of collaboration could work?	Who should be involved?	Who could lead?	Immediate next steps?
Introduction of building energy labelling in Vietnam & other countries	Project-Based Collaboration: Regional workshop including local governments to share experience and best-practices in designing & implementing building energy rating and labelling schemes. Work together to develop/share benchmarks for building energy consumption that underpin a rating and labelling program.	World Bank, IFC, UN Environment Thailand, Indonesia, Vietnam, Australia/NSW, GBPN	Ministry of Energy Vietnam	Develop a project concept note; Find a potential donor, Contact IFC office in Vietnam; Check on outcomes of current UNDP project – see if this project can build on that. Share IPEEC BEET5 Report with the Forum.

Table 4: Support for developing or extending building energy codes and standards, introducing mandatory codes, and improving stakeholder engagement.

Priority for Collaboration	What form of collaboration could work?	Who should be involved?	Who could lead?	Immediate next steps?
1 - Develop Data Evaluation Protocols & Building Stock Modelling – Common metrics, reference values, data sharing.	Project Cooperation Agreements for data-sharing, adopting common metrics and shared reference values for energy performance.	Philippines, IFC, GBPN, Common Carbon Metric 2.0, Thailand, BCA Singapore & Jakarta	Jakarta Province - Partners GBPN/IFC & APEC governments	Partner economies to find any previous projects on this topic. Follow up meeting on 8 th August in Jakarta
2 - Training & Capacity Building on Compliance & Enforcement for professionals	Professional training programs Peer to Peer learning (learning from the best) Best-Practice Sharing	Philippines, IFC, GBPN, Common Carbon Metric 2.0, Thailand, BCA Singapore & Jakarta	The Philippines Department of Public Works & Highways	Start a working group to develop training packages

2.3 Outcomes of Session 3 – Next Step & Taking Action

Priorities for Collaboration

Overall the outcomes of session two demonstrated a desire by participating economies to continue to collaborate on improving building energy codes and supporting policies, and extend regional knowledge and data sharing, and learning from best-practices. It was clear from table discussions that support is required to provide data to quantify the energy and cost-savings potentials of extending building energy code coverage. Given the similar climate zones, and a shared need to curb growth in cooling energy demand, it was acknowledged that some countries and programs have experience, and data that could be useful to develop an initial case for introducing more best-practice policies. For example, table three suggested developing new energy rating & labelling programs, for which data protocols and metrics are required.

Table four suggested facilitating a program to share data and adopt common metrics and performance values for common building types. Tables one and two expressed a desire to collaborate on the development of guidelines or insights into ‘what-works’ for economies in the region. These guidelines and ‘what works’ insights could also be components of a common training and capacity building curriculum that draws on existing and new resources, and could eventually be translated into regional languages other than English.

Forms of Collaboration

Analysis of the and forms of collaboration suggested in session two demonstrates a desire for the facilitation of continued exchange between policy makers involved in the design and implementation of building energy codes. Tables one and two both proposed forums for facilitating collaboration on their chosen themes. Table one proposed a forum to bring stakeholders together to create a ‘How to Guide’ for developing and implementing investment grade policies; Table two proposes a forum facilitated on-line that draws from predominantly existing resources to present ‘what works (and doesn’t work)’ in building energy code design & implementation.

Table three suggests developing working groups to support Vietnam in developing a building energy rating & labelling program. The group were keen to share lessons learned by Thailand, and alternative approaches to monitoring operational compliance with building energy codes that are in use in Singapore and Malaysia. Table four suggests a program for sharing data, metrics, experience and best-practices. While not explicit in their outcomes, such harmonisation activities are most effective when conducted through expert working groups. There is therefore a clear need for an independent convener or facilitator in order to take action on these areas of collaboration.

Next Steps

A number of immediate next steps were suggested to move ahead on collaboration with the lead to be taken as follows:

Project 1: ‘How-to Guide’ for developing Investment Grade Building Energy Policies

U.N. Environment ROAP to establish a project advisory, steering group and working groups and convene a follow up meeting with participating economies and organisations to develop a scope of work.

Project 2: Forum on ongoing code design, compliance, & stakeholder engagement

APEC, ASEAN and GBPN to meet to develop a scope of work for mapping existing on-line building energy code resources, expertise and data-bases, appropriate revenue models, and to conduct a training needs assessment with participating economies.

Project 3: Introduction of building energy labelling in Vietnam & other countries

The Vietnam Ministry of Energy will follow up with IFC, World Bank and UNDP country offices to map existing and recent activities on this topic. Based on these investigations, a project concept note will be drafted and refined through a review process with project partners. Vietnam MoE would need assistance in facilitating the project development process from APEC and/or other multi-lateral organisations.

Project 4: Develop Data Evaluation Protocols & Building Stock Modelling

Jakarta Provincial Government to investigate existing or recent projects on this topic in the region and convene a meeting of potential project partners in Jakarta during the APEC Energy Efficient Buildings Incubator Forum on 8th August to develop the project concept and scope.

Project 5: Training & Capacity Building on Compliance & Enforcement

The Philippines Department of Public Works and Highways will be assisted by APEC to convene a working group of project partners to identify existing training resources and activities, and assess training needs (perhaps in conjunction with Project 2).

On-Going Role of APEC as a Convener of a Regional Building Energy Codes Forum

The outcomes of the APEC building energy codes forum conducted on 7th July in Singapore demonstrated that there is a demand among participating countries to continue to come together to support improved building energy code development and implementation. While it is appropriate that all collaboration project ideas have selected a country to lead the next steps, all initiatives need support from a secretariat in order to help facilitate the collaboration. The potential for alignment of buildings & climate activities among regional programs of APEC, ASEAN and UN Environment to play this role could be explored. Based on the outcomes of the working sessions held on the 7th July, participating economies see the value of a neutral platform for exchanging knowledge, experience and best-practices but see this as a means of facilitating an action-oriented agenda for collaboration.

The upcoming APEC EEB Incubator Forum to be held in Jakarta on 8th August offers an opportunity to reconvene participating economies to follow up on the outcomes of the Singapore forum. A schedule of other regional meetings being planned by ASEAN and U.N. Environment for the remainder of 2017 should also be shared in order to identify other opportunities for convening working groups and progressing the collaboration agenda described in this report.

Current Status and Best Practices

APEC economies are in different stages of building energy code development. Below is an overview of how participating economies are currently performing in terms of the best practices for building energy codes identified by the Global Buildings Performance Network (GBPN). These findings are discussed in more detail in Section 3 in relation to five best-practice criteria:

- Holistic approach;
- Dynamic process;
- Implementation;
- Technical requirements;
- Overall performance.

Holistic approach

Best practice codes include a package of measures designed to support and reinforce mandatory requirements. All eight participating economies have developed policy packages including mandatory energy performance requirements in their building codes aligned with voluntary and market-based measures such as green building standards and certification programs. Both performance and prescriptive approaches are commonly available as compliance pathways in APEC economies. Major renovations and extensions are often included in best-practice energy codes, but for many of the APEC participating economies, meeting energy code requirements in renovations is currently voluntary, or the code only applies to buildings above a certain size or energy usage, thus excluding a large proportion of the existing building stock.

Dynamic process

Globally, setting jurisdictional targets to achieve zero net energy or positive energy buildings using mandatory codes is best practice. Among participating APEC economies, only Singapore is working towards putting in place a plan for progress to net zero energy buildings. Among all APEC economies Japan has zero energy targets for public and commercial buildings, and Canada has targets for new residential buildings. The United States has goals for all federal buildings to be zero energy, and some states have more wide-reaching zero energy or decarbonisation goals. Most APEC economies have energy performance requirements either incorporated into building codes, or as separate codes or laws. The use of voluntary rating programs is also widespread. However, scheduling regular revisions of energy performance requirements is not common. This hinders capacity building for, and investment in, very low-energy buildings.

Implementation & Enforcement

Best practice in building energy code implementation includes robust enforcement and compliance systems, such as mandatory certification and disclosure of energy performance, and policy packages that support code enforcement including voluntary rating programs, financial incentives, capacity building and training and demonstration projects. Commercial buildings are covered by mandatory energy performance requirements in 14 APEC economies and by voluntary requirements in 4 economies.

Energy performance requirements are mandatory for residential buildings in 9 economies and voluntary in 10 economies. These requirements are applied predominantly to new construction. Expanding energy performance requirements to residential buildings and building renovations is not yet common and needs to be supported. All participating APEC economies support voluntary rating schemes that include comprehensive environmental performance measures. This is an important step towards implementing more comprehensive energy uses and functions in mandatory building codes. Mandatory building energy rating schemes are yet to be fully implemented in most participating APEC economies.

Effective compliance with and enforcement of energy provisions of building codes remains a common challenge in participating economies. Compliance checking is very common at design and construction phases of new building projects. However, pre- occupancy and post-occupancy compliance checking is still not common among participating APEC economies. This hampers the monitoring of actual performance and the ability to evaluate the impact of building energy codes on building energy demand and energy savings. More training and capacity building is also required to help participating economies develop roadmaps for future changes in codes, and to support local officials to improve code enforcement and compliance.

Technical requirements

The technical requirements commonly covered in building energy codes within APEC include the building envelope, energy efficiency, HVAC and lighting. Codes adopted in some US States, Singapore and China include additional measures. Many APEC economies also include voluntary implementation pathways for additional measures within their codes, or support voluntary rating schemes that include comprehensive measures. The structural coverage of building codes in APEC economies often includes a number of building categories that represent a greater diversity of building types, particularly for residential buildings, or industrial buildings. Auditing or documenting existing building stock is crucial for determining structural coverage and monitoring operational energy performance, and may reveal traditional green building forms and practices which have potential to be included in future code development. Auditing and monitoring is still not common in most APEC economies, and less so for traditional and residential buildings.

Overall performance

The impact of building energy codes on actual energy performance of buildings should be monitored and reported regularly. Indicators such as on-site energy demand, primary energy demand and GHG emissions should be measured to determine whether the code is being effective in reducing building energy use, improving energy efficiency and reducing climate change impacts of the building sector.

This is generally poorly covered internationally. Among APEC participating economies Singapore includes post-occupancy energy auditing within their compliance checking approaches and Australia has adopted a mandatory energy performance disclosure program for commercial buildings. Jakarta Indonesia is including post occupancy energy audits in its Green Building Code.

Common Issues and Opportunities for Collaboration

The responses by participating countries to questions of challenges and priorities for collaboration to improving codes reinforce the findings of previous studies into priorities for international collaboration. The research found the following common issues need to be addressed in participating economies:

- Developing strategies for regular code upgrading including regular schedules for code reviews and increasing energy performance requirements towards very low, net zero or positive energy buildings;
- Extending the structural coverage codes to more comprehensively encompass residential building energy performance, and renovation projects;
- Post occupancy evaluation or auditing of operational building energy performance and integration of this into rating and disclosure policies, and
- Enforcement of and compliance with building energy code requirements, including the use of incentives and penalties.

In terms of frequency of response, respondents from economies prioritised the following issues for collaboration (in rank order):

1. Support for setting long term policy goals and performance targets.
2. Training and capacity building in code design, implementation, compliance and stakeholder engagement.
3. Support for developing or extending building energy codes and standards.
4. Support for developing or expanding energy performance rating, labelling and disclosure.
5. Support for introducing mandatory codes, improving stakeholder engagement and collecting compliance data.

APPENDIX 2: FINAL WORKSHOP AGENDA AND PARTICIPANTS LIST



Asia-Pacific Economic Cooperation

Final Agenda APEC Building Energy Codes Forum Workshop

Friday 7th July, 2017
Novotel Clark Quay, Singapore

Schedule	Activity	Facilitator
08:30	Registration	
09:00 - 09:05	Welcome by ClimateWorks Australia – Project Context	Eli Court, CWA
09:05 - 09:10	Introduction to Meeting Objectives, Agenda and Facilitation	Peter Graham, GBPN/Swinburne
09:10 - 09:30	Tour of Room – first responses to the need for an Asia Pacific Building Energy Codes Forum	
09:30 - 10:00	Presentation 1: Status & Best Practices in Building Energy Codes	Peter Graham, GBPN/Swinburne
10:00 - 10:15	Q & A	
10:30 - 10:45	<i>Coffee/Tea Break</i>	
10:45 - 12:30	Working Session 1: Common Challenges	Peter Graham, Eli Court & Brian Dean, IEA
12:00 - 12:15	Table by Table Reporting Back	
12:15 - 12:30	Synthesis of Common Challenges	Peter Graham
12:30 - 13:30	<i>LUNCH</i>	
13:45 - 14:15	Presentation 2: Priorities for Collaboration/Most valuable Forms of collaboration	Peter Graham, GBPN/Swinburne
14:15 - 14:30	Q & A	
14:30 - 15:45	Working Session 2: Priorities & Forms of Collaboration	Peter Graham, Eli Court & Brian Dean, IEA
15:00 - 15:15	<i>Coffee/Tea Break</i>	
15:30 - 15:45	Table by Table Reporting Back	
15:45 - 16:00	Synthesis of priorities for, and forms of Collaboration	Peter Graham, GBPN/Swinburne
16:00 - 16:15	Next Steps & Meeting Close	Eli Court, CWA
16:15	Group Photo	All

Participant	Economy	Organisation
Mr Oswar Mungkasa	Indonesia	Government of Jakarta Province
Mrs Riana Faiza	Indonesia	Government of Jakarta Province
Professor Idrus Alhamid	Indonesia	Universitas Indonesia
Mr Le Cong Anh	Viet Nam	City of Da Nang
Mr Tran Van Nam	Viet Nam	City of Da Nang
Mr Nguyen Cong THINH	Viet Nam	Department of Science, Technology and Environment, Ministry of Construction
Attorney Johnson Domingo	The Philippines	Department of Public Works and Highways
Ms Erlinda Creencia	The Philippines	City Government of Santa Rosa
Mr Christopher de la Cruz	The Philippines	Philippines Green Building Council
Ms Grace Cheok-Chan	Singapore	Singapore Building and Construction Authority
Mr Zurkinain Md Nor	Malaysia	Iskandar Service Centre
Mr. Komol Buakate	Thailand	Department of Alternative Energy Development and Efficiency
Mr Natthaphon Roonprasang	Thailand	Department of Alternative Energy Development and Efficiency
Dr. Ekkapong Cheevitsopon	Thailand	King Mongkut's Institute of Technology Ladkrabang
Mr Autif Sayyed	Indonesia	International Finance Corporation
Mr Rio Silitonga	Indonesia	ASEAN Centre for Energy
Mr Brian Dean	France	International Energy Agency
Mr Jeffery Neng	Singapore	Singapore Building and Construction Authority
Ms Joelle Chen	Singapore	World Green Building Council
Ms Tunnie Srisakulchairak	Thailand	United Nations Environment Programme (UNEP)
Mr Eddy Susilo*	Singapore	Singapore Building and Construction Authority
Ms Giselle Seow*	Singapore	Singapore Building and Construction Authority
Mr Eli Court	Australia	Climate Works Australia
Professor Peter Graham	Australia	Global Buildings Performance Network
Penelope Howarth	APEC	APEC Secretariat
Magel Ordonez	APEC	APEC Secretariat

APPENDIX 3: DETAILED OUTCOMES OF SESSION 1: COMMON ISSUES

TABLE 1:

City of Santa Rosa, The Philippines; Iskandar Service Centre, Malaysia; International Finance Corporation; World Green Building Council Singapore; U.N. Environment Regional Office for Asia Pacific.

- Linking city-level energy efficiency with the requirements of the national building code
- Developing business cases for higher performance buildings
- Awareness & capacity building

TABLE 2:

Government of Jakarta Province, Indonesia; City of Da Nang, Vietnam; Philippines Green Building Council; Department of Alternative Energy Development & Efficiency, Thailand; ASEAN Centre for Energy, Indonesia; Climate Works Australia.

- Stakeholder engagement in code development
- Reducing separation between code developers and implementers
- Training of practitioners to establish a common understanding of code requirements
- Data-base for proper monitoring and performance reviews of:
 - o Implementation & code compliance
 - o Ensuring building owners collect the correct data
- How to determine the costs and benefits of extending the coverage and ambition of codes
 - o Risk assessment – how do we know we can afford it? vs market transformation goals?

TABLE 3:

Government of Jakarta Province, Indonesia; Department of Science, Technology and Environment, Ministry of Construction, Vietnam; Department of Alternative Energy Development & Efficiency, Thailand; International Energy Agency; Singapore Building & Construction Authority;

- Lack of capacity for compliance
- Translation of national codes requirements to the local level
- Extending energy codes to cover smaller buildings
- Tracking impacts of the code and policy impacts in energy savings

TABLE 4:

Universitas Indonesia; Department of Public Works & Highways, The Philippines; Singapore Building & Construction Authority; King Mongkut's Institute of technology, Thailand;

- Establishing a building stock data-base
- Better coordination between jurisdictions
- How to cost increasing the stringency of codes
- How to establish policy and technology pathways to net zero energy buildings in the tropics.
- Identifying the most resource effective implementation strategies e.g. best mix of penalties and incentives
- Capacity building for practitioners.
- Develop a common template for how to calculate 'green' premiums for high-performance buildings.

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