

ASEAN SHINE – Lighting Activity Report

As of June 2018

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1. INTRODUCTION

1.1. Baseline situation

For country members of the Association of Southeast Asia Nations (ASEAN), mitigating climate change, encouraging sustainable growth and improving the standard of life are high priorities. However, as ASEAN countries experience a high growth in their energy demand, national electricity generation capacities fail to keep pace, which creates challenges in energy supply and poses a threat to energy security. In addition, the region's over-reliance on fossil fuels – accounting for over 70% of the energy mix – results in rising greenhouse gas emissions.

High efficiency lighting solutions, including in particular light emitting diode (LED) technology, offer a unique opportunity to significantly reduce energy consumption in the ASEAN region. At the moment, the poor quality and performance of products available in ASEAN countries undermine consumers' confidence in efficient technologies. Meanwhile, the absence of harmonized standards and legislation deprives the private sector of a level playing field, which would drive innovation and increase trade opportunities among countries in the region. Furthermore, the perspective of the ASEAN common market, established at the end of 2015, provides a significant opportunity to advance lighting standards harmonization.

1.2. Commitment for the regional harmonization of efficient lighting standards and policy

The proposed collaboration fits within the framework of the strategic objectives of *ASEAN Plan of Action for Energy Cooperation (APAEC)* and *Action Plans and Initiatives of Sub Sector Networks and Specialized Energy Bodies for the APAEC 2016-2025: Phase I (2016-2020)*. The APAEC is the energy component of the *ASEAN Economic Community Blueprint 2015*, which directs ASEAN towards achieving energy security and sustainability for the region. In the 4th programme area on energy efficiency and conservation, APAEC defines the development of energy efficiency policy and capacity building, as well as awareness raising and dissemination of information as strategic objectives. Ownership for these objectives is allocated to the ASEAN Energy Efficiency and Conservation Sub Sector Network (EE&C-SSN), with the ASEAN Centre for Energy (ACE) as the Secretariat.

In 2012, ASEAN member states approved a proposal for the implementation of the ASEAN Standards Harmonization Initiative for Energy Efficiency (SHINE) for air conditioners. The programme is being implemented over the period 2013-2016 by the International Copper Association, in cooperation with ACE and the United Nations Environment Programme), with funding from the European SWITCH-Asia programme. The experience under ASEAN SHINE for air conditioners sets a precedent and provides a framework for expanding the work to additional appliances.

Since 2009, several ASEAN countries have participated in regional discussion and collaboration on the phase-out of inefficient lighting and the promotion of quality efficient lighting through *lites.asia*, a network of regulators and policymakers supported by the Australian Government. At the occasion of a 11th *lites.asia* regional efficient lighting policy workshop held in Bangkok in February 2015, representatives of ASEAN member countries recognized the benefits and opportunity to harmonize lighting efficiency standards under the ASEAN common market and requested the support of UN Environment en.lighten/United for Efficiency (U4E).

During the 11th annual meeting of the ASEAN EE&C-SSN held in Kuala Lumpur, Malaysia on 28 April 2015, ASEAN countries agreed to proceed with the regional harmonization of efficient lighting standards and policy on the basis of the following programme presented by U4E.

The promotion of efficient lighting, and in particular light emitting diode lamps, is listed as a priority under the ASEAN Plan of Action for Energy Cooperation 2016-2025 (priority No. 4.1).

2. OBJECTIVE AND EXPECTED BENEFITS

2.1. Overall Objective

The overall objective of the programme is to increase energy security and reduce greenhouse gas emissions in ASEAN by means of transforming the lighting market toward high efficiency products.

2.2. Specific Objective

The general objective of the action is to harmonize relevant test and performance standards for lighting products among ASEAN Member States, as well as establish robust monitoring, verification and enforcement and supportive policies.

2.3. Target Groups

The stakeholder groups which will benefit from this plan of action include Ministries in charge of energy, as well as trade and industry, national standard making bodies, market compliance and enforcement authorities, national testing laboratories, lamp manufacturers and distributors, electric utilities and end-users.

2.4. Expected benefits

The UN Environment -GEF en.lighten initiative U4E has estimated the potential savings that could be achieved through market transformation to efficient lighting in the ASEAN region. The estimates below are modelled on a minimum energy performance standard (MEPS) scenario where new modest lighting regulations are adopted in 2020 and a best available technology (BAT) scenario which switches shipments to highly-efficient LED technology in 2020.

- 16.0 - 44.4 TWh of electricity.
- Over US\$ 1.8 - 5 billion saved to users in avoided electricity bills.
- Over 8.9 - 25.2 million tonnes of CO₂ emissions.

In addition, the implementation of the action will contribute to:

- Increasing regional market integration and removal of trade barriers.
- Intensifying energy productivity and limiting energy demand.
- Improving energy security, while limiting greenhouse gases emissions.
- Improved quality and efficacy of efficient lighting and increased consumer confidence and uptake of these products.

The programme is in line with the ASEAN Plan of Action for Energy Cooperation 2016-2025, which aims to harmonize EE standards of appliances such as air-conditioners and lighting, which are expected to help improve energy efficiency especially in the residential sector by a range of 5-10%.

3. OVERALL ACTIVITY FRAMEWORK

The activities are being conducted in relation to seven Work Packages as described in Box 1 below.

Box 1: Work Packages

- **Work Package 1:** ASEAN Regional Lighting Market Assessment
- **Work Package 2:** Harmonized Performance and Test Method Standards for Selected Lighting Products
- **Work Package 3:** ASEAN Regional Policy Roadmap
- **Work Package 4:** National Lighting Roadmaps and capacity building activities for Policy Makers
- **Work Package 5:** Capacity Building on monitoring, verification and enforcement for Compliance and Enforcement Authorities
- **Work Package 6:** Capacity Building for Local Lighting Manufacturers
- **Work Package 7:** Supporting policies, Awareness Raising Campaigns and Activities

As of June 2018, activities have been focused on Work Packages 1 – 3. The implementation of activities under Work Packages 4 - 7 is pending agreement with the ASEAN Centre for Energy (ACE).

4. Activities already carried out

A narrative of the activities already conducted is provided hereafter. The narrative includes a description of the outputs produced under each work packages already initiated.

4.1. Work Package 1 – ASEAN Regional Lighting Market Assessment

Introduction:

An ASEAN regional lighting market assessment was conducted over the 2016 – 2017 period. It serves as a quantitative, well-documented benchmark from which standards and policy can be developed, refined, improvements can be measured, and progress against goals can be tracked.

In order to conduct this assessment, regional and national market data have been gathered and analyzed, in order to help regulators consider potential standards levels and forecast how these levels would impact the stakeholders in the supply chain. The data was collated in a report (Annex 2: Regional Market Assessment Report).

Sub-Activities:

- Act 1.1 Develop terms of reference for the regional market assessment
- Act 1.2 Identify experienced organization or individual to collect and analyse regional and national market data and draft the report
- Act 1.3 Research and collate existing data on lamp shipping estimates, lamp type availability, lighting supply chains in countries and household electricity consumption for lighting – data sources will include import/export data, U4E country lighting assessments, product performance test results, and relevant national reports and surveys
- Act 1.4 Gather additional data through remote interview and field research
- Act 1.5 Develop a market forecasting tool that incorporates multiple scenarios
- Act 1.6 Use the market data to develop options for standards levels
- Act 1.7 Collate and analyse data in regional market assessment report highlighting main conclusions and recommendations
- Act 1.8 Present and discuss the analysis and recommendations at the regional level (during the LWG meeting and subsequent participation in the SSN meeting): the results were presented in meetings 1 and 2 of the LWG and in the 20th SSN Meeting organized in May 2016 in Nay Phi Taw, in Myanmar.

Outputs produced:

- Out 1.1 ASEAN Policy Status report (Annex 1)
- Out 1.2 Regional market assessment report (Annex 2)
- Out 1.3 Market forecast modelling tool (Policy Analysis Modeling Tool – PAMA) – (Annex 3)
- Out 1.4 User’s Guide for Policy Analysis Modeling Tool (Annex 4)
- Out 1.5 Presentations and materials of the 1st LWG Meeting – 05 May 2016 (Annex 5)
- Out 1.6 Presentations and materials for the 20th SSN Meeting – 06 May 2016 (Annex 6)
- Out 1.7 Presentations and materials of the 2nd LWG Meeting – 26 July 2016 (Annex 7)

Impact:

This activity has confirmed the benefits of adopting MEPS and related MVE at ASEAN regional level. In addition, it has allowed to formulate initial recommendations on the technology scope.

4.2. Work Package 2 – Harmonized Performance and Test Method Standards for Selected Lighting Products

Introduction:

Under this work package a Lighting Policy and Technical Working Group has been formed to discuss and decide on appropriate Test Methods and MEPS levels for the region. A Technology Scoping Paper (Annex 9: Lighting Technology Scoping Paper) has been developed to support the LWG in their recommendations.

The Lighting Policy and Technical Working Group (LWG) has thereby been able to develop recommendations on the technologies to be included in the scope of the regional regulation, as well as on the harmonized test standards for the selected lighting products across ASEAN.

Sub-Activities:

- Act 2.1 Develop terms of reference and confirm ASEAN SHINE - Lighting Steering Committee (EE&C-SSN) and ASEAN SHINE - Lighting Policy and Technical Working Group
- Act 2.2 Review status of existing lighting MEPS and performance and test standards in ASEAN, as well as some other relevant schemes globally and collate in a status report
- Act 2.3 Develop Lighting Technology Scoping Paper which includes:
 - Summary of ASEAN lighting market trend and forecasts
 - Analysis of current ASEAN country MEPS and standards
 - Proposed lighting products to develop harmonized MEPS
- Act 2.4 Develop scope of lighting products for harmonized standards and MEPS
- Act 2.5 Review current ASEAN countries performance and test method standards for in-scope products and identify aspects for alignment

Outputs produced:

- Out 2.1 Terms of reference for ASEAN SHINE - Lighting Steering Committee and Policy and Technical Working Group (Annex 8)
- Out 2.2 Lighting Technology Scoping Paper (Annex 9)
- Out 2.3 Definition of in-scope lighting products for this program, including comparative analysis of existing performance and test method standards for in-scope lighting products in ASEAN countries and recommendations for pathway to alignment (as part of the technology scoping paper)
- Out 2.4 Presentations and materials for the 3rd LWG Meeting – 11 October 2016 (Annex 10)
- Out 2.5 Agenda of the sub-Regional Meeting for LMC – 12 October 2016 (Annex 11)
- Out 2.6 Presentations and materials for the 4th LWG Meeting – 04 April 2017 (Annex 12)
- Out 2.7 Agenda of the sub-Regional Meeting for LMC – 05 April 2017 (Annex 13)
- Out 2.8 Presentations and materials for the 21st SSN Meeting – 05 May 2017 (Annex 14)

Impact:

The LWG has agreed on in-scope lighting products and associated performance and test method standards. The agreed scope is to include (i) non directional LEDs; (ii) Linear Fluorescent Lamps; and Linear LEDs. The testing methods have been agreed as follows:

- CIE S025 and IEC 62612 for non-directional Light Emitting Diode lamps
- CIE 84 and IEC 60081 for Linear Fluorescent Lamps
- CIE S025 for Linear LED lamps

4.3. Work Package 3 - ASEAN Regional Policy Roadmap

Introduction:

The regional policy roadmap is to constitute the policy framework to achieve the ASEAN's region transition to energy efficient lighting.

The regional policy roadmap follows an integrated policy approach, including regionally harmonized MEPS levels, the recommended establishment of regional MVE tools, and coordinated supporting policies. The roadmap development process has been developed in a transparent and consultative manner, with various stakeholders involved. The final draft of the regional policy roadmap is proposed for approval by the ASEAN Ministers on Energy Meeting. This document is to serve as a basis for subsequent national policies formulation and implementation.

Sub-Activities:

- Act 3.1 Review the status of existing lighting policy and standards in ASEAN, as well as existing MEPS and MVE schemes globally in line with the policy status report developed under work package 1
- Act 3.2 Launch roadmap development
- Agree on policy roadmap's objectives and scope and timeline
 - Review market data and discuss additional data gathering needs
 - Discuss standards and policy options based on market assessment
- Act 3.3 Develop regional policy roadmap following a consultative process (remote and physical consultation of the technical working group), to include:
- Harmonized MEPS levels
 - Regional MVE tools (product registry, mutual recognition agreements between government laboratories, coordinated legal framework, etc.)
 - Coordinated supporting policies (tariff regimes, labelling scheme, etc.)
 - Differentiated timeline for implementation
- Act 3.4 Organize technical validation of the regional policy roadmap
- Act 3.5 Submit final policy roadmap for approval by EE&C-SSN and ASEAN Senior Officials Meeting on Energy

Outputs produced:

- Out 3.1 Presentations and materials for the 5th LWG Meeting – 24 January 2018 (Annex 15)

- Out 3.2 Implementation and results of the benchmarking exercise (2017-2018) – (Annex 16)
- Out 3.3 Presentations and materials for the regional phone conference on MEPS levels selection – 05 April 2018 (Annex 17)
- Out 3.4 Presentations and materials for the 22nd SSN Meeting – 19 April 2018 (Annex 18)
- Out 3.5 Proposed ASEAN Regional Policy Roadmap (final) – (Annex 19)

Impact:

The draft roadmap provides a basis for initiating MEPS harmonization and the development of regional tools for MVE in ASEAN. The proposed MEPS level is 80 lumen per watt for non-directional LEDs, linear LEDs, and linear fluorescent lamps. It is proposed that countries adopt this MEPS level by 2023, with revisions at least every five years.

5. Remaining work packages and proposed approach

A description of the remaining work packages is provided below. The implementation of these work packages is pending agreement between UN Environment / U4E and the ASEAN Centre for Energy.

5.1. Work Package 4 – National Lighting Policy Roadmaps and capacity building activities for Policy Makers (pending agreement with the ASEAN Centre for Energy)

<i>Objective</i>	The objective of Work Package 4 is to support each country in the establishing the required legal and administrative framework to implement the regionally agreed test methods, MEPS and support policies.
<i>Approach</i>	ASEAN countries being at very different stages of economic development, national policies will have their own objectives and specificities, while sharing common goals and adopting similar measures as defined in the regional policy roadmap.
<i>Activities</i>	<p>The activities described below will be implemented in each of the targeted ASEAN countries, but depending on the countries' situation, their intensities will be differentiated.</p> <p>Act 4.1 Form ASEAN SHINE - Lighting National Steering Committee, composed of representatives of: Ministry of Energy, Ministry of Industry, Ministry of Trade, national standards organization, national testing laboratories, lighting supply chain, consumer organizations, and technical working groups as relevant</p> <p>Act 4.2 Gather national market data as needed (regional market assessment will help in this effort)</p> <p>Act 4.3 Identify existing relevant policies, strategies, programmes and regulations</p> <p>Act 4.4 Hold national steering committee meeting to determine objectives, scope and methodology for national policy roadmap development and identify policy makers training needs</p> <p>Act 4.5 Identify government representative or consultant to draft the national policy roadmap document</p> <p>Act 4.6 Hold national stakeholder consultation to discuss components of the national policy roadmap</p> <p>Act 4.7 Hold capacity building activities for policy makers</p> <p>Act 4.8 Develop national policy roadmap with input from stakeholder consultations</p> <p>Act 4.9 Organize technical validation of national policy roadmap</p> <p>Act 4.10 Adopt national policy roadmap</p>
<i>Outputs</i>	<p>Out 4.1 Terms of reference for National Steering Committees</p> <p>Out 4.2 National Country Guidance Document and Components example</p> <p>Out 4.3 Stakeholder Matrix document</p> <p>Out 4.4 National Steering Committee meetings (needs based, tentatively every two months)</p> <p>Out 4.5 National stakeholder consultations (needs based, tentatively three per country)</p> <p>Out 4.6 National policy roadmaps for efficient lighting in each ASEAN country</p>

Outcomes Adoption by all ASEAN country of a national policy roadmap reflecting the core components of the regional policy roadmap

- Resources*
- UN Environment en.lighten guide to developing a national efficient lighting strategy
 - Existing national strategies, framework and action plans
 - *lites.asia* regional position paper on current status, opportunities and constraints

5.2. Work Package 5 – Capacity Building on monitoring, verification and enforcement for Compliance and Enforcement Authorities (pending agreement with the ASEAN Centre for Energy)

<i>Objective</i>	Effective monitoring, verification and enforcement (MVE) is essential for ensuring the compliance of lighting products available in the national markets with the regional MEPS and policies. This work package is aimed at building the capacity of compliance officials to implement the regionally agreed MEPS scheme.
<i>Approach</i>	This package will build upon the considerable resources already developed under the UN Environment en.lighten Southeast Asia and Pacific MVE Project, including an MVE status report, laboratory training and MVE training manuals. Capacity building and training needs on compliance will be identified and reviewed with agencies in charge of market control policy and implementation, test laboratory personnel, customs and enforcement authorities. Experts shall develop any further training modules necessary and deliver training in person and remotely to clearly explain processes, equipment, budget, institutions required for effective MVE. Training will be delivered for laboratory personnel. Opportunities for regional cooperation on MVE will be identified and put forward.
<i>Activities</i>	<p>Act 5.1 Revise and expand the Southeast Asia monitoring, verification and enforcement policy status report including identifying training needs in countries via interviews with stakeholders – it is assumed that needs vary from one country to the other</p> <p>Act 5.2 Develop training curriculum addressing needs of all countries including: physical training sessions, remote training sessions, and development of any additional training resources, material and guidance as relevant</p> <p>Act 5.3 Circulate draft among technical working group and laboratories in countries</p> <p>Act 5.4 Identify qualified expert to deliver capacity building activities</p> <p>Act 5.5 Develop any additional training tools and deliver training sessions</p>
<i>Outputs</i>	<p>Out 5.1 Needs analysis report</p> <p>Out 5.2 Training curriculum</p> <p>Out 5.3 Training resources including presentations, guidance notes, templates, videos and others as relevant.</p> <p>Out 5.4 Training sessions in-house – two to four per country</p> <p>Out 5.5 Training session on testing – two or three days each</p> <p>Out 5.6 Online training sessions (webinars) – up to five</p> <p>Out 5.7 Monitoring reports</p>
<i>Outcomes</i>	Increased capacity of compliance institutions in ASEAN member states to develop and implement the MVE scheme, and of laboratories to check efficiency of lighting products
<i>Resources</i>	Resources developed under the 2013-2015 UN Environment Southeast Asia and Pacific MVE Project including: needs assessment, status report, training materials and modules

5.3. Work Package 6 – Capacity Building for Local Lighting Manufacturers (pending agreement with the ASEAN Centre for Energy)

<i>Objective</i>	Several ASEAN member countries manufacture lighting products locally. However, many manufacturers find it difficult to compete against overseas manufacturers (who supply the market with high efficiency products). Not all regional manufacturers know how to design their lighting products to meet the highest energy performance standards. This situation will become more critical once new policies are adopted, calling for increased energy performance over time, which will lead to the significantly reduced regional and global demand for some inefficient lighting technologies currently manufactured in the region. While the technology solutions are widely and publicly available, local lighting manufacturers need to be exposed to the latest technology advancement and have their capacity built in order to improve the design of their lighting products to meet the highest energy performance standards.
<i>Approach</i>	<p>Capacity building activities will be delivered to ASEAN-based lighting producers in order to assist with the upgrade of manufacturing capacity for the design and production of high efficiency lighting systems. Specifically, manufacturers will receive support to develop business transformation plans to shift from the production of compact fluorescent lamps to the production of high quality, high performance lamps, and access funding from national funding institutions.</p> <p>The delivery of this work package will start with a detailed needs analysis. Such needs analysis will be conducted through on-site visits by experts to define needs specific to each manufacturer, and define tailored training programmes. The training will be organized through: 1) general training workshops with targeted manufacturers for basic knowledge, and 2) in-house training in each manufacturer.</p>
<i>Activities</i>	<p>Act 6.1 Map lighting manufacturers presence in ASEAN countries, including lighting associations</p> <p>Act 6.2 Conduct detailed needs analyses through on-site visits by experts to selected manufacturers</p> <p>Act 6.3 Develop training curriculum and tools in consultation with each manufacturer</p> <p>Act 6.4 Conduct training workshops and coaching</p> <p>Act 6.5 Provide feedback on draft business transformation plans</p> <p>Act 6.6 Provide support and advice on sourcing of industry transition funding</p> <p>Act 6.7 Monitor ASEAN domestic production of high efficiency lighting products, through site visits to manufacturers to gather first-hand data and market surveys</p>
<i>Outputs</i>	<p>Out 6.1 Mapping of ASEAN lighting manufacturers (report)</p> <p>Out 6.2 Site visits to selected manufacturers</p> <p>Out 6.3 Six to eight training workshops, two days each, 80 participants in total</p> <p>Out 6.4 Review of draft business transformation plans</p> <p>Out 6.5 Drafting support for applications for industry transition funding</p> <p>Out 6.6 Monitoring report</p>

Outcomes Improved and increased commercialization of high efficiency lighting products from ASEAN-based manufacturers

- Resources*
- Training modules from UN Environment Vietnam Lighting Project
 - Knowledge and industry contacts developed through *lites.asia* network

5.4. Work Package 7 – Supporting policies, Awareness Raising Campaigns and Activities (pending agreement with the ASEAN Centre for Energy)

<i>Objective</i>	Consumers are the decision-makers when it comes to selecting/purchasing lighting products. Consumers need to be educated through public campaigns on the economic benefits of higher efficiency products. Consumers also need to be educated on how to transition from inefficient lighting and select efficient lighting product suitable to their needs.
<i>Approach</i>	<p>The approach to changing consumers’ behavior is based on convincing them of the economic benefits of efficient lighting products. The strategy to achieve this is based on the following:</p> <ul style="list-style-type: none">○ Direct communications to consumers through consumer awareness campaigns and demonstration projects○ Indirect communications to consumers through retailer training working in department stores , as they play a key role in advising consumers on their purchasing choices○ Education and training of retail staff, trades and professionals that advise consumers or select lighting products for commercial or industrial applications○ Working with electric utilities to develop communications campaigns
<i>Activities</i>	<p>Act 7.1 Conduct analysis on local conditions, perceptions of lighting products, purchasing habits, and review of previous experiences and education campaigns, through stakeholder consultations</p> <p>Act 7.2 Select project partners in each country to coordinate and deliver the campaigns (or update existing campaigns)</p> <p>Act 7.3 Conduct training of selected partners on consumer awareness campaigns, to equip them with the necessary skills and techniques to efficiently supervise and coordinate the design and implementation of consumer awareness campaigns</p> <p>Act 7.4 Design or update campaigns for each country based on results of analysis</p> <p>Act 7.5 Develop promotional materials (leaflets, posters, spots, mobile apps as appropriate, demonstration projects)</p> <p>Act 7.6 Organize and deliver training of sales personnel: identify sales channel in each country, develop training curriculum, organize training workshop</p> <p>Act 7.7 Deliver consumer awareness campaign, including national conferences in each country, with press release and high level government representatives</p> <p>Act 7.8 Conduct consumer surveys to monitor the impact of awareness campaigns</p>

Outputs Out 7.1 Communication plan
 Out 7.2 Promotional materials
 Out 7.3 Training materials for retail staff and trades and professions
 Out 7.4 One public event for consumers per country
 Out 7.5 Three to six training workshops (2-3 hours each) for sales persons per country
 Out 7.6 One press release per country
 Out 7.7 One impact assessment survey per country

Outcomes Increased consumer awareness on the benefits of the regional roadmap and of high efficiency lighting products to promote change in purchasing behaviors

Resources *lites.asia* Communications Materials Library

6. Summary of progress status and follow-up plans

A summary of the programme’s progress is presented in Table 1 below. It is now critical to secure the approval of the regional roadmap by the EE&C-SSN and the SOME/AMEM by the end of the current year (2018). This milestone will greatly facilitate the development of national policy roadmaps in each ASEAN country, as well as the conduct of supporting capacity building and awareness development activities.

Table 1: Summary of progress and follow-up plan

Work Packages	Status
WP1: ASEAN Regional Lighting Market Assessment	Complete
WP2: Harmonized Performance and Test Method Standards for Selected Lighting Products	Complete
WP3: ASEAN Regional Policy Roadmap	Pending EE&C SSN and SOME/AMEM approval
WP4: National Lighting Roadmaps and capacity building activities for Policy Makers	Proposed next focus (2018-2019)
WP5: Capacity Building on monitoring, verification and enforcement for Compliance and Enforcement Authorities	Not started – to be tentatively initiated in 2019
WP6: Capacity Building for Local Lighting Manufacturers	Not started – to be tentatively initiated in 2019
WP7: Supporting policies, Awareness Raising Campaigns and Activities	Not started – to be tentatively initiated in 2020

7. List of annexes:

The annexes include all the outputs produced so far under the programme. These annexes are shared with the ASEAN Centre for Energy.

Annex 1: ASEAN Policy Status report

Annex 2: Regional Market Assessment Report

Annex 3: Policy Analysis Modeling Tool (PAMA)

Annex 4: User's Guide for Policy Analysis Modeling Tool

Annex 5: Presentations and materials of the 1st LWG Meeting – 05 May 2016

Annex 6: Presentations and materials of the 20th SSN – 06 May 2016

Annex 7: Presentations and materials of the 2nd LWG Meeting – 26 July 2016

Annex 8: Terms of Reference of the Lighting Working Group (Technical and Policy)

Annex 9: Lighting Technology Scoping Paper

Annex 10: Presentations and materials for the 3rd LWG Meeting – 11 October 2016

Annex 11: Agenda of the sub-Regional meeting for LMC - 12 October 2016

Annex 12: Presentations and materials for the 4th LWG Meeting – 04 April 2017

Annex 13: Agenda of the sub-Regional meeting for LMC - 05 April 2017

Annex 14: Presentations and materials of the 21st SSN Meeting - 05 May 2017

Annex 15: Presentations and materials of the 5th LWG Meeting - 24 January 2018

Annex 16: Implementation and results of the benchmarking exercise 2017-2018

Annex 17: Presentations and materials of the regional phone conference for finalization of MEPS levels - 05 April 2018

Annex 18: Presentations and materials for the 22nd SSN Meeting - 19 April 2018

Annex 19: Proposed ASEAN Regional Policy Roadmap