Evaluation of *lites.asia* and the UNEP en.lighten initiative *Southeast Asia and the Pacific Monitoring, Verification and Enforcement* Project

Report to the Department of Industry, Innovation and Science
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Background

Electricity for lighting accounts for approximately 15% of global power consumption and 5% of worldwide greenhouse gas emissions.[1] Lighting is a vital energy service in both developed and developing countries, so it concerns economies at all stages of development. Indeed, lighting often accounts for an even higher share of energy in the least developed countries, because other energy services are yet to grow.

There are many technologies which can provide the same light output as the traditional incandescent lamp with less than a quarter of the energy use. The most common alternatives are fluorescent lamps, both single-cap compact types (CFLs) and double-cap linear types (LFLs), which already dominate many markets in Asia and the Pacific. The past decade has seen the introduction of light emitting diode (LED) lamps, which promise to be even more energy-efficient.

However, it is possible (indeed too common) to find products of theoretically energy-efficient technologies that are inefficient from the start, over-state their performance, deteriorate rapidly, give poor quality light, fail early, and pollute the waste stream.

The most effective policies to counter these risks are well known, and have been widely applied to lighting and other products. They include voluntary endorsement labelling for lamps which meet certain criteria, mandatory labelling for all lamps of a given type, minimum energy performance standards and minimum quality standards. In many cases implementation costs are lower if they can be shared between countries. It is more practical to develop basic program elements such as testing standards co-operatively, on a regional if not a global level.

A monitoring, verification and enforcement (MVE) capability is fundamental to the success of any lighting efficiency program, whether voluntary or mandatory. Lamp suppliers are more likely to comply if there is a robust MVE regime in place. This has both national and international dimensions. Each country has a different market and a different range of lighting products available, so market monitoring and sampling must be local. Verification of performance requires testing in a qualified laboratory, which may mean shipping samples to another country. Enforcement and the application of penalties takes place within the legal framework of each country separately, but sharing information on non-compliant products and companies helps all countries.

The Australian government agencies responsible for energy efficiency programs have been aware of the value of a co-ordinated international approach to increasing the efficiency of lighting products since the mid 2000s, even before the “phaseout of inefficient lighting” became government policy in 2007. The then Australian Greenhouse Office (AGO) hosted a special workshop on the harmonisation of CFL standards at the 6th International Conference on Energy Efficient Lighting in Shanghai in May 2005, attended by over 80 representatives from 13 countries. These expressed

[1] http://www.enlighten-initiative.org/

concern at the proliferation of CFL standards world-wide, and endorsed the principles of a "CFL Harmonisation Initiative" (CFLI).

lites.asia and the UNEP en.lighten initiative

In 2009, Australian and United States government agencies sponsored the establishment of a forum to "facilitate policy maker cooperation within the Asia region to:

- Improve knowledge of the standards in force and under development across the region.
- Increase participation of regional economies in the IEC standards development process to ensure resulting test methods and performance standards are appropriate to the region.
- Develop national and regional capacity for compliance in standards and labelling processes."

The forum was named LITES (Lighting Information and Technical Exchange for Standards) and the program came to be called LITES.Asia, then *lites.asia*. The first meeting, in Hong Kong in October 2009, was attended by representatives from Australia, China, India, Indonesia, Philippines, Sri Lanka, Thailand, USA and Vietnam. Forum meetings were then held biennially in various regional capital cities. The primary focus was on the exchange of information between officials, but special workshops with industry stakeholders were regularly scheduled in association with *lites.asia* meetings.

One of the initial objectives of *lites.asia* was to jointly influence the direction of the International Electrotechnical Commission (IEC) standards for the testing and performance of CFL lamps. Member countries requested some changes in test procedure, recognition of special requirements for lamps in developing countries and tropical regions (e.g. the creation of classes of CFLs that were better able to cope with electricity supply fluctuations and harsh physical conditions) and the inclusion of discrete energy performance levels or "tiers". Governments could then adopt minimum energy performance standards (MEPS) levels based on the tiers in the IEC standards, should they wish to do so. The argument that these changes would benefit both suppliers and regulators were finally rejected by the IEC in 2014.

In June 2013 the then Department of Energy, Resources and Tourism (DRET, now the Department of Industry, Innovation and Science, DIIS) secured a UNFCCC Climate Fast Start Finance grant of A$2.8 million for the United Nations Environment Programme – Global Environment Fund *en.lighten* initiative.[2] The UNEP en.lighten initiative Southeast Asia and Pacific Monitoring, Verification and Enforcement Project was to focus on "Securing sustainable climate change benefits of efficient lighting in Southeast Asia and Pacific economies via monitoring, verification and enforcement capacity building activities." Under the grant UNEP en.lighten also took on the management of the *lites.asia* network and meetings. DRET was responsible for "managing the project and the relationship with UNEP."

The UNEP en.lighten grant got under way in early 2014. There was a further grant of A$130,000 in June 2014, to support countries in the broader Asia region to take part in

[2] The grant included an additional A$0.2 million to cover the Department's grant administration costs.

lites.asia meetings and MVE training activities, and for some participants to attend international standards meetings. Due to the delayed start the grant period was extended, without extra funding, to the end of 2015 then extended again to mid-2016. The last *lites.asia* meeting was held in February 2016, in combination with the commencement of the lighting chapter of the ASEAN Standards Harmonization Initiative for Energy (SHINE).

Evaluation

In 2015, DIIS commissioned this evaluation of the UNEP en.lighten initiative Southeast Asia and the Pacific Monitoring, Verification and Enforcement Project to inform DIIS and the Department of Foreign Affairs and Trade (DFAT). The purpose of the evaluation is to:

- *Evaluate and analyse the performance and monitoring material provided by the UNEP en.lighten team;*
- *Identify the difference made by the Project's support to the development of MVE programs and national/regional lighting efficiency;*
- *Evaluate the effectiveness and contributions made to the regional phase-out of inefficient lighting;*
- *Present analyses, conclusions and recommendations to inform the design of similar projects in future;*
- *Make recommendations for increasing the effectiveness of the remainder of the project; and*
- *Consider the case for further funding.*[3]

DIIS requested that the evaluation also cover the period from the inception of *lites.asia* in 2009 to the start of the UNEP en.lighten initiative in 2014. For the purpose of this report, the entire program from 2009 to mid 2016 is called *lites.asia* and the period from 2014 to 2016 is called the UNEP en.lighten SEAP MVE project.

The *lites.asia* and UNEP en.lighten websites[4] hold hundreds of documents, including technical reports, newsletters, press releases and meeting agendas, presentations and communiqués. In addition, DIIS made available several internal reports relating to the approval and funding of the *lites.asia* project, and a master list of over 800 contacts who had attended meetings or participated in *lites.asia* since its inception. As part of this evaluation, the author interviewed 20 of these contacts, selected in consultation with DIIS.

A draft evaluation report was submitted to DIIS at the end of April 2016, and DIIS and UNEP en.lighten comments have been addressed. There is provision for presentation of the findings in a webinar or a workshop in Canberra if required.

[3] This is a summary of the full terms of reference, which are included in the text.
[4] http://www.lites.asia/and http://www.enlighten-initiative.org/

Overview of Activities

The *lites.asia* program and the UNEP en.lighten SEAP MVE project included the following activities:

- Meetings. There were seven formal *lites.asia* meetings prior to, and four during the SEAP MVE project period, in addition to the inception and final meetings. These generally covered the planning and reporting of *lites.asia* activities, country updates, information exchange and procedural agenda items;
- Workshops on technical issues, sometimes held in association with *lites.asia* meetings;
- The preparation of "Best Practice" Guides on aspects of lighting energy policy and MVE. These encapsulate the experience of many experts and established MEPS, labelling and MVE programs, but are not addressed to any particular country or region;
- The preparation of reports on the situation with respect to lighting policy, technology or markets in specific *lites.asia* countries or groups of countries;
- In-field market monitoring and sampling of lighting products available in specific countries, including training of local officials;
- Efficiency and performance testing of lamps, evaluating and enhancing test laboratory capability;
- Missions to specific countries (or groups of countries) to address matters of special interest to them: e.g. the development of the Pacific Efficient Lighting Strategy, which involved members of the Secretariat of the Pacific Community (SPC);
- Engagement with international agencies and key non-government stakeholders (e.g. lighting manufacturers, standards organisations) on behalf of all *lites.asia* participants, and support for their officials to attend IEC meetings;
- The dissemination of the results and outputs of the above activities in the form of reports, newsletters, websites, webinars and presentations at *lites.asia* meetings and special workshops.

These were almost all public activities in that their progress was well publicised through the *lites.asia* and UNEP en.lighten websites, mailing lists, press releases and other communication channels and the outputs are freely downloadable. There were also essential supporting activities: preparing and executing funding agreements, preparing and administering budgets, engaging staff and consultants, managing consultancy and laboratory testing projects, planning meetings, arranging travel and reporting on progress to funding bodies.

General Findings

The *lites.asia* program has been thoroughly documented, since its inception in 2009 and throughout the UNEP en.lighten SEAP MVE project period. It is not likely that the meetings, activities, training workshops, webinars, lamp tests, guides and other written materials would have occurred without the support of *lites.asia* and the SEAP MVE project, so in this respect the projects made a demonstrable difference.

The feedback from meeting participants indicates a high level of satisfaction, and in most cases an *intention* to apply the information gained. The extent to which this

actually occurred and the impact on the participant's country's lighting policies and programs is difficult to judge.

The UNEP en.lighten initiative SEAP MVE project has raised awareness of the importance of MVE in realising the potential benefits of the lighting energy efficiency programs already implemented. The project also gave valuable practical experience to the countries involved in key aspects of implementing MVE.

However, not all outputs were able to be delivered. One example was the "focused, detailed MVE plans" for the nominated ASEAN target countries, which, early on in the project became focused on delivering the Pacific Efficient Lighting Strategy (PELS). In retrospect, the development of MVE plans for the ASEAN target countries, which were not delivered (as a result of the PELS focus) could have helped put their efforts on a more sustainable basis

The one regional lighting efficiency plan completed during the SEAP MVE project, PELS, was completed in November 2015. In this case there was some tension between UNEP's standard "integrated policy approach" (MEPS, MVE, supporting policies and mechanisms and environmentally sound management) and the actual situation of the Pacific countries, which were already well advanced with regard to MEPS.

The question of sustainability should not be seen solely in terms of the outcomes achieved in participating countries strictly during the time period of *lites.asia* (2009-2016) and the UNEP en.lighten initiative SEA MVE project (2014-2016). Key project outputs such as the series of MVE Guidance Notes and short films have only recently been completed, and their influence is likely to grow. Another key outcome of the UNEP en.lighten initiative SEAP MVE project is the ASEAN agreement to harmonise lighting standards, first endorsed at the *lites.asia* meeting in February 2015, adopted as a formal ASEAN proposal in April 2015 and agreed by the ASEAN Energy Efficiency and Conservation Sub Sector Network (EE&C-SSN).

The network of regular meetings and the activities related to increasing lighting efficiency in the Asian region commenced earlier (in 2005) and could well continue, possibly as an adjunct to the ASEAN SHINE – Lighting project. It is likely that this durable (and valued) framework will result in additional and sustainable outcomes in the longer term, but there may need more direct engagement with specific countries, in areas that have been identified by *lites.asia* and the MVE project.

Conclusions regarding *lites.asia*

The *lites.asia* program established in 2009 is well-recognised, highly valued and considered a success by the participating countries. The *lites.asia* meetings provided opportunities for the participating countries to share and learn from each other's experiences, and they did so actively. These exchanges made officials aware of alternative ways to achieve their objectives and helped to avoid some potentially costly and inefficient outcomes.

On balance, it appears that the existence of *lites.asia* was a *necessary* but not *sufficient* condition for the regional phaseout of inefficient lighting. There is no evidence of any country implementing the legislative framework to underpin the phaseout of inefficient

lighting solely as a result of the influence of *lites.asia*. Legislation enabling MEPS and labelling for a range of products was either in place already, or where it was implemented later, participation in *lites.asia* was not the sole driver.

Nevertheless the *lites.asia* project has been of significant benefit to both the region and to Australia's interests, in terms of visible and welcome development aid and in terms of mobilising regional partners with a shared interest in increasing the energy-efficiency of lighting. The *lites.asia* forum has created a network of public and private actors with a common interest in lowering trade barriers and containing the costs of administering and complying with measures to increase efficiency.

One of the key benefits of *lites.asia* is that participation is open to any interested country in the region. While the focus has shifted to ASEAN and Pacific countries during the period of the UNEP en.lighten SEAP MVE project, the continuing involvement of South Asian countries in the network should be encouraged.

It cannot be assumed that this network will continue without some source of funding. This need not come from Australia alone, and indeed the more diverse the funding sources the better. At the same time, there may be value in directing funding to specific countries or groups of countries for projects to establish the basic legislative, administrative and MVE structures to support MEPS and labelling for lighting as well as for other energy-using products of importance to their economies.

Conclusions regarding the UNEP en.lighten initiative SEAP MVE project

The UNEP en.lighten Southeast Asia and Pacific MVE project has raised awareness of the importance of MVE in realising the potential benefits of the lighting energy efficiency programs, whether already implemented or planned.

The project also gave valuable practical experience to the countries involved in key aspect of implementing MVE. None of these activities would have taken place without funding and organisation through the SEAP MVE project. Country participants were of the view that these activities have been well organised and they learned valuable information about their own lighting markets.

Webinars, meetings and workshops were all highly regarded by participants, both in feedback forms at the time and in interviews conducted for this evaluation. Technical guides and documents have also been well received. However, whereas these have all raised awareness and capability, it is not possible to conclude that these have resulted in an increase in MVE strategies or activities beyond those supported by the project.

The UNEP en.lighten team introduced some welcome administrative improvements in their management of the larger *lites.asia* program: e.g. nominating individuals and agencies to act as country focal points, formalising the evaluation of meetings and webinars and maintaining a growing contact list.

However, several stakeholders felt that the SEAP MVE project would have been even more effective if the UNEP en.lighten team had been able to manage it from within the region, rather than from its offices in Paris. There were also some difficulties arising

from changes with UNEP's financial management systems during the course of the project, which resulted in uncertainties regarding funds remaining towards the end.

While the majority of the tasks agreed in the original Plan of Action were successfully completed, at least one potentially valuable output has not been completed: detailed MVE plans for the ASEAN target countries. These would have included Cambodia and Laos, which along with Myanmar form a group of countries at a similar stage of development, which would have benefited from a sub-regional approach, similar to the completed Pacific Efficient Lighting Strategy.

Recommendations

The following recommendations are directed to the Department of Industry, Innovation and Science.

1. Provision should be made for continuation of the *lites.asia* network beyond mid 2016, for a period of not less than three years. This would ensure that the value embodied in the network is preserved. Several major technical studies and reports arising from the UNEP en.lighten initiative SEAP MVE project were published only in late 2015 and early 2016, and continuation of *lites.asia* will ensure that this momentum is maintained, so as many participating countries as possible make good use of those resources and continue to exchange relevant experience.

2. Options for funding the continuation of *lites.asia* should be explored with regional organisations (e.g. ASEAN) as well as international development partners (e.g. UNEP en.lighten, UNEP United for Efficiency (U4E) the Asia Development Bank, Australia and the European Union).

3. The opportunity for the development of a sub-regional project to assist Cambodia, Lao PDR and Myanmar with detailed planning and training for implementation and MVE for energy efficiency programs for efficient lighting and other products should be explored (in consultation with the countries).

4. The opportunity for the development of a sub-regional project to assist Nepal, Bhutan and the Maldives with detailed planning and training for implementation and MVE for energy efficiency programs for efficient lighting and other products should be explored (in consultation with the countries).

5. Options for funding these two sub-regional initiatives should be explored with international development partners (e.g. UNEP EL, GEF, ADB, EU).

6. The energy agencies of the more active participants in *lites.asia*, and appropriate regional organisations should be approached regarding the possibility of managing the *lites.asia* network for a period of, say, 3 years from mid-2016. This may be self-funded (as a contribution in kind) or possibly donor-funded.

7. If *lites.asia* continues, in whatever form, the Department of Industry, Innovation and Science should continue to attend meetings and remain involved in any advisory or steering groups.

8. Before the UNEP en.lighten initiative SEAP MVE project terminates in mid 2016, UNEP en.lighten and DIIS should develop a plan (including provisions for funding) to maintain the *lites.asia* brand and the *lites.asia* website, as a valuable working resource and as a well organised archive of materials.

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Glossary

AGO	Australian Greenhouse Office (former)
APEC	Asia-Pacific Economic Co-operation
APP	Asia-Pacific Partnership
AS	Australian standard
ASEAN	Association of South-East Asian Nations
AusAID	Australian Agency for International Development
BAU	Business as usual
BRESL	Barrier Removal to the Cost Effective Development and Implementation of Energy Efficiency Standards and Labelling
CEM	Clean Energy Ministerial
CFL	Compact fluorescent lamp
CFLI	CFL (Harmonization) Initiative
CIE	Commission Internationale de l'Eclairage (International Commission on Illumination)
CPI	Consumer price index
DCCEE	Department of Climate Change and Energy Efficiency (Australia, former)
DEWHA	Department of Environment, Water, Heritage and the Arts (Australia, former)
DIIS	Department of Industry, Innovation and Science (Australia, current)
DRET	Department of Resources, Energy and Tourism (Australia, former)
E3	Equipment Energy Efficiency (program or committee)
EE&C-SSN	Energy Efficiency & Conservation Sub-Sector Network (ASEAN)
EL	en.lighten (programme of UNEP and GEF)
EU	European Union
GEF	Global Environment Facility
GELC	Global Efficient Lighting Centre (Beijing)
GELP	Global Efficient Lighting Programme (of UNEP en.lighten)
GEMS	Greenhouse Energy Minimum Standards (Act)
GWA	George Wilkenfeld and Associates
HEP	High efficiency product
HID	High intensity discharge (lamp)
IEC	International Electrotechnical Commission
LA	LITES.asia (programme of Australian Government and UNEP)
LED	Light-emitting diode
LFL	Linear fluorescent lamp
MEPS	Minimum energy performance standards
MEPSL	MEPS and Labelling
MVE	Monitoring, Verification and Enforcement
PALS	Pacific Appliance Labelling and Standards
PELS	Pacific Efficient Lighting Strategy
SEA	South east Asia
SEAD	Supper-efficient appliance deployment (programme of CEM)
SEAP MVE	South east Asia and Pacific Monitoring, Verification and Enforcement (project)
SE4All	Sustainable Energy for All
SHINE	Standards Harmonisation Initiative for Energy Efficiency
SPC	Secretariat of the Pacific Community
TC	Technical Committee
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
USAID	United States Agency for International Development
VEESL	Vietnam Energy Efficiency Standards and Labelling

1. Introduction

1.1 The Context for the Evaluation

The efficient use of energy is now an objective of government policy in all advanced and most developing economies. It is widely recognised that the efficient provision of energy services such as heating, cooling, lighting and motive power relies on both energy supply and end-use equipment, and that market forces on their own do not necessarily lead to the optimum balance between the two.

The common market failures which lead to sub-optimal outcomes include a lack of reliable information on the comparative energy consumption and running costs of alternative products and technologies, and principal-agent issues where the party specifying or purchasing energy using products (whether lights, appliances or buildings) does not bear the running costs, so selects the cheapest option rather than the one with least lifetime costs.

Among lower-income consumers there is a further barrier of capital constraint. Even if consumers are made aware of the relative efficiencies of alternative products, and wish to purchase the one with the lowest life cycle cost, they may not be able to afford it if the initial purchase price is too high.

The most effective policy instruments for addressing these issues are well understood: energy labelling and minimum energy performance standards (MEPS). One or both of these measures have now been applied in over 80 countries (EES 2014). The principles are:

- Energy labelling (whether physically attached to a product, printed on its packaging or including in supplementary material such as advertising or brochures) indicates the relative energy efficiency of a product or its estimated energy consumption or running cost, based on a standard performance test. This form of labelling is usually mandatory, so that poor performers also have to be labelled;

- MEPS sets a minimum level of energy efficiency which all products of a given type must meet, otherwise they may not be lawfully imported or sold. The measurement of energy efficiency is almost always based on the same standard performance test as used for energy labelling.

- High efficiency product (HEP) or endorsement labelling, to indicate that the product meets a high level of energy efficiency, as determined in a published standard or by a government or other agency. As there is no obligation on suppliers to label, participation is voluntary. However, suppliers who use such designations or labels agree to be bound by the rules, which usually include the right of the controlling agency to verify the claims;

Once MEPS, HEP and/or energy labelling are in place, they provide a basis for other "complementary" activities as well. Governments, aid agencies or energy utilities can support the supply and demand for energy-efficient products, by subsidising those

which meet higher efficiency levels. The distribution of free compact fluorescent lamps (CFLs) is one example.

As the commercial incentives for meeting MEPS, gaining high energy label ratings or qualifying for HEP designation increase, suppliers may be tempted to achieve these by compromising other aspects of product performance (e.g. how well it carries out its basic functions), durability (e.g. how long it lasts), electrical safety or environmental impact (e.g. whether it contains toxic or hazardous materials). Therefore energy tests are often linked to other performance tests to ensure that minimum quality standards are maintained, for the protection of consumers and the environment.

While the principles are clear, the details of implementation can vary significantly from product to product and from country to country (even within trading blocs which ostensibly use the same rules). Countries often use different energy tests for the same product – sometimes local variants of the tests published by global organisations such as the International Electrotechnical Commission (IEC) or the International Standards Organization (ISO). This imposes costs on manufacturers, because they must get separate tests for each market. In many cases there are also differences in laboratory accreditation, registration rules and other administrative procedures.

Irrespective of what rules are adopted, unless they are enforced some suppliers will not comply, either deliberately, through carelessness or simply because they are unaware of the requirements. Monitoring, verification and enforcement (MVE) are therefore essential to make any MEPS and labelling programs effective, whether participation is voluntary or mandatory. Enforcement of a requirement backed by legislation may lead to fines and ultimately the withdrawal of the legal right to supply a non-compliant product. In voluntary programs, where suppliers choose to participate in return for some commercial advantage such as the rights to use an endorsement label, non-compliance usually results in forfeiting those rights.

A significant technical, legal and administrative infrastructure is necessary to support a workable MEPS and labelling program. Developing countries coming later to MEPS and energy labelling have the advantage of being able to draw on the experience and in some cases the financial and logistical support of countries such as Australia, which have operated MEPS and labelling programs for many decades. On the other hand their resources are often limited, and essential program building blocks such as appropriate legal frameworks and reliable testing laboratories may not be present.

The Australian government has been promoting MEPS and labelling in developing countries since 1995, when the then Department of Environment, Sport and Territories funded a study on the benefits of adopting the Australian energy labelling system in the countries of the Pacific Islands Forum (Goldberg 1995). More recently, the former Department of Climate Change and Energy Efficiency, later the Department of Industry, obtained AusAID funding for MEPS and labelling projects in Vietnam, other south east Asian (SEA) countries and the Pacific region.

These projects have generally been consistent with the objectives of Australia's development assistance and foreign policy – to increase economic efficiency, reduce oil-dependence and greenhouse gas emissions and increase Australian engagement in the target regions. There have also been benefits to Australia's domestic energy

efficiency policies through raising technical standard in the countries exporting products to Australia and increasing the size of the regional market for efficient products.

At the same time, the Australian government departments responsible for the national MEPS and labelling program[5] have participated in several international and regional activities aimed at increasing the efficiency and cost-effectiveness of such programs globally and regionally. These activities have been conducted in partnership with formal global and regional organisations, international standards bodies and ad-hoc groups of countries with aligned interests. Examples include:

- Supporting the participation of Australian experts in the International Electrotechnical Commission (IEC) and International Standards Organization (ISO) technical committees responsible for energy test standards for the products covered by the Australian MEPS and labelling program, to ensure that those standards are suitable for use in Australia, with the aim of making the development and maintenance of local standards unnecessary;

- Working with regulators and the standards bodies in the countries which are the main source of product imports (e.g. China), to try to ensure that their test standards and procedures accommodate Australian requirements where possible;

- Working with global agencies such as the International Energy Agency (IEA, including the Implementing Agreement for a Co-operative Programme on Efficient End-Use Equipment, 4E) and the various programs of the United Nations (United Nations Environment Programme (UNEP), United Nations Development Programme (UNDP), the UN Sustainable Energy for All (SE4All) initiative, etc.);

- Working with other governments and the European Commission in the Clean Energy Ministerial (CEM) and the Super-Efficient Appliance Deployment (SEAD) Initiative;

- Working with regional bodies such as the Asia-Pacific Economic Co-operation (APEC) and the Association of South-East Asian Nations (ASEAN, of which Australia is not a member but has a formal Strategic Partnership);

- Working with the other members of the Asia Pacific Partnership (APP) on Clean Development and Climate (which operated between 2005 and 2011); and

- Working with global non-government organisations (NGOs) active in energy efficiency, and MEPS and labelling in particular, such as the Cooperative Labelling and Standards Program (CLASP) and the International Copper Association (ICA).

[5] Currently called the Equipment Energy Efficiency (E3) programme, jointly managed by the Commonwealth, State, Territory and New Zealand governments.

Lighting initiatives in the Asian region

One of the most popular targets of the many joint programs is lighting energy use. There are many reasons for this. UNEP estimates that lighting accounts for 15% of global electricity consumption.[6] Lighting is a vital energy service in both developed and developing countries, so it concerns economies at all stages of development. Indeed, lighting often accounts for an even higher share of energy in the least developed countries, because other energy services are yet to grow.

Unlike heating and cooling, which vary considerably with climate and building construction, lighting is understood in much the same way across the world (even though local preferences for lighting styles, types and technologies vary significantly). Finally, lamps are globally produced and traded on a massive scale, so differences in design, test standards and performance assume global importance.

Australia introduced MEPS for fluorescent lamp ballasts in 2003 and for double-cap linear fluorescent lamps (LFLs) in 2005. Attention then turned to single-cap general lighting service (GLS) applications, particularly compact fluorescent lamps (CFLs), which by 2005 had reached about 12% of lamp imports (Beletich 2007). The then Australian Greenhouse Office (AGO), in association with the Lighting Council of Australia, published a "Greenlight Australia" strategy covering the period 2005-15, which included MEPS for CFLs, halogen and reflector lamps, luminaires and high intensity discharge (HID) lamps. The strategy noted:

> "MEPS and endorsement labels for CFLs exist in many other countries and there is considerable interest in the harmonisation of CFL standards between China, USA, Europe, Brazil and other countries. Australian CFL standards AS60969 and AS60901 already exist, and are technically equivalent to the standards used in Europe and China (IEC 60969 and IEC 60901). It is intended that Australian MEPS and High Efficiency levels will match the equivalent existing Chinese standards for self-ballasted CFLs" (Greenlight 2005).

As part of this strategy the AGO hosted a special workshop on the harmonisation of CFL standards at the 6th International Conference on Energy Efficient Lighting ("Right Light 6") held in Shanghai in May 2005. At the AGO workshop over 80 representatives from 13 countries expressed concern at the proliferation of CFL standards world-wide, and endorsed the principles of a "CFL Harmonisation Initiative (CFLI)", which focussed on four main areas of alignment:[7]

- Performance specifications (i.e. ratings, performance tiers, marking systems);
- Test protocols (i.e. develop an internationally accepted test protocol and "encourage adoption of this testing protocol by key market actors and facilitate the submission of this protocol for formal recognition by IEC");
- Verification testing (establish a network of laboratories and undertake comparison tests to verify the proposed testing protocol); and

[6] http://www.enlighten-initiative.org/
[7] http://www.lites.asia/files/otherfiles/0000/0061/1-14_lessons_learned_from_CFLi_harmonisation_initiative_-_My_Ton.pdf

- Compliance (enforcement of policy actions, mutual recognition and information sharing).

Initial funding for the CFLI came from the AGO, with later contributions from the UK Market Transformation Programme. In 2006 additional funding became available through Australia's membership of the APP. The USAID Eco-Asia Clean Development and Climate Program also supported the CFLI.

Another international conference, "Phase-out 2008", was held in Shanghai in May 2008. It was sponsored by the Australian Government, the GEF and the China Association of Lighting Industries. The conference included a one day workshop on the formulation of the GEF-UNEP Project to phase-out inefficient lighting in GEF beneficiary countries.

In June 2008, at a meeting in Manila, the world's four largest lighting companies, Philips, OSRAM, General Electric, and Havells Sylvania signed the "Manila Compact" to establish standards for CFLs in an effort to rid the Asian market of poor quality products. The lighting councils and associations of India, Indonesia, the Philippines and Australia also signed, as did Zhongshan Opple Lighting, which accounted for a large share of Chinese CFL production including lamps sold under the major brands.

Supporting organisations signing the Manila Compact included the Australian Department of Environment, Water, Heritage and the Arts (DEWHA), the USAID ECO-Asia Clean Development and Climate Program, the Efficient Lighting Initiative, and the International CFL Harmonisation Initiative (USAID 2009).

The US and Australia also jointly supported the establishment of the Asia Lighting Compact (ALC), an "independent, non-profit organization dedicated to reducing greenhouse gas emissions by improving the quality of lighting products and encouraging the adoption of energy-efficient lighting in Asia." The members included Philips, GE Lighting, Danson Electronics, Underwriters Laboratory, the Philippine Lighting Industry Association and the Pakistan Engineering Council. The ALC developed a work program concentrating on LEDs, and held several board meetings before it was wound up by the industry participants in 2012.[8]

Even before the Manila Compact, however, the lighting energy policy emphasis in many countries shifted to "phasing out inefficient lighting" which in effect meant eliminating tungsten filament incandescent lamps. In February 2007 the Australian Minister for Environment announced the government's intention to phase out inefficient lamps.[9] In that same year, the AGO set out a proposal to both phase out most types of incandescent lamps and to set minimum quality standards for CFLs (Beletich 2007).

lites.asia

In 2009, Australian and U.S. government agencies sponsored the establishment of a forum to "facilitate policy maker cooperation within the Asia region to:

[8] The only remaining trace of the ALC is at http://community.joomla.org/showcase/sites/government-and-nonprofit/non-profit-organizations/asia-lighting-compact.html

[9] http://www.energyrating.gov.au/document/press-release-world-first-australia-slashes-greenhouse-gases-inefficient-lighting

- Improve knowledge of the standards in force and under development across the region.
- Increase participation of regional economies in the IEC standards development process to ensure resulting test methods and performance standards are appropriate to the region.
- Develop national and regional capacity for compliance in standards and labelling processes."[10]

The forum was named LITES ("Lighting Information and Technical Exchange for Standards") and the program came to be called LITES.Asia, and then *lites.asia*. The first meeting, in Hong Kong in October 2009, was attended by representatives from Australia, China, India, Indonesia, Philippines, Sri Lanka, Thailand, USA and Vietnam. The meeting released a Communiqué with a ten-point plan:

1. "The work done during the meeting should be continued through a network of interested stakeholders with the objective of working collaboratively on developments on lighting standards covered by IEC TC34 and also national standards – the network should be known as LITES Asia;
2. Communications should be based on Email alerts indicating "what's on" with TC34 relating to CFLs, Mercury and LEDs - Email alert titles should be clear e.g. 'CFLs, Mercury, CFLs – Performance' so that they can be screened easily;
3. A website should be developed where the TC34 work-plan and meeting schedule can be published as far in advance as possible covering each of the relevant subordinate working groups - this is to allow stakeholders time to budget for travel;
4. The website should give National IEC committee contacts for each country both at a high level and at the TC34 level;
5. The website should publish a description of the national standards processes for each participating country;
6. The website should host a list of national stakeholders, organisations and areas of expertise for each participating country;
7. Twice yearly face to face meetings should be held to develop the network (held alongside relevant meetings) with meetings by web-conference on issues that arise in between meetings;
8. Participating countries should be encouraged to share information on national standards developments relating to lighting;
9. Outreach should be made to the IEC to ensure their understanding and assistance with the network; and
10. A project manager should be funded to establish the network and facilitate its first two years of operation."

The focus was on co-ordinated action to influence the direction of the IEC CFL standards, in the interests of both lamp producers and regulators in the Asian region, i.e. a continuation of a core objectives of CFLI. A second objective was to establish a durable framework for Asian nations to exchange information on and support efficient lighting programs.

[10] http://www.lites.asia/

Between October 2009 and April 2013 there were 7 *lites.asia* meetings, as well as several technical and stakeholder workshops (see Figure 1). The *lites.asia* secretariat supported the attendance of representatives from Asian countries, initially with funding from the USAID ECO-Asia program and the Australian Government, as part of the APP. The APP concluded in April 2011, after which the Australian Government supported *lites.asia* through AusAID Fast Start funding. Jeffcott Associates were engaged as the *lites.asia* operating agent from September 2011 to January 2014.

There were between 20 and 40 attendees at each meeting, and 16 countries participated in one or more *lites.asia* meetings. Although the initial focus was on CFLs, other lighting technologies were also covered. In November 2011 for example, *lites.asia* meeting 4 was held immediately after an APEC workshop on LED lighting.[11] It was agreed that the many of the same standards harmonisation, testing and policy principles adopted for CFLs in the first *lites.asia* communiqué should be applied to LEDs, with the advantage that LEDs were at an earlier stage of the product and market development cycle and not yet subject to conflicting national standards.

UNEP en.lighten initiative

The en.lighten initiative was established in 2009 by the United Nations Environment Programme (UNEP) and the Global Environment Facility (GEF) "to accelerate a global market transformation to environmentally sustainable, energy efficient lighting technologies, as well as to develop strategies to phase-out inefficient incandescent lamps to reduce CO_2 emissions and the release of mercury from fossil fuel combustion."[12]

The initiative is a "public/private partnership" in that it also involves OSRAM and Philips Lighting. The National Lighting Test Centre (NLTC) of China became a partner in 2011, jointly launching (with UNEP) the Global Efficient Lighting Centre (GELC) in Beijing. The en.lighten initiative "serves as a platform to build synergies among international stakeholders; identify global best practices and share this knowledge and information; create policy and regulatory frameworks; address technical and quality issues; and encourage countries to develop national and/or regional efficient lighting strategies."

The UN Secretary General's Sustainable Energy for All (SE4All) initiative, launched in September 2011, identified advanced lighting as a "High Opportunity Area" and UNEP en.lighten was selected to lead this international effort.

Countries can join the en.lighten initiative directly by participating in the Global Efficient Lighting Partnership (GELP) or can participate through a regional economic forum, or both. At present there are 66 developing and emerging economies enrolled in the GELP.[13] In 2011 the en.lighten initiative published regional lighting reports for groups of countries in Sub-Saharan Africa, Latin America and the Caribbean, South-east Asia and the Middle East and North Africa. The South-east Asia report, covering

[11] http://www.lites.asia/files/otherfiles/0000/0012/APEC_LED_Workshop_Communique_Nov_2011.pdf
[12] http://www.enlighten-initiative.org/About.aspx
[13] http://www.enlighten-initiative.org/CountryActivities/GlobalEfficientLightingPartnershipProgrammeme.aspx

the 10 ASEAN members and Timor Leste, prepared by the *lites.asia* operating agent, envisaged that the ASEAN countries would benefit from participating in the GELP.

The UNEP en.lighten Southeast Asia and Pacific Monitoring, Verification and Enforcement Project

The link between *lites.asia* and the UNEP en.lighten initiative was formalised in June 2013, when the then Department of Energy, Resources and Tourism (DRET, now DIIS) secured a A$2.8 million Climate Fast Start finance grant from Australian Aid, for the UNEP en.lighten initiative.[14] The UNEP en.lighten Southeast Asia And Pacific Monitoring, Verification and Enforcement (SEAP MVE) Project was to focus on ''Securing sustainable climate change benefits of efficient lighting in Southeast Asia and Pacific economies via monitoring, verification and enforcement capacity building activities.'' Under the grant UNEP en.lighten team also took on the management of the *lites.asia* network and meetings. DRET was responsible for oversight of the project and for managing the relationship with UNEP.

The UNEP en.lighten SEAP MVE project rationale was explained as follows:

> "The success of an efficient lighting transition strategy depends heavily on a well-functioning system of monitoring, control and testing facilities capable of ensuring enforcement and full compliance with minimum energy performance standards.…The aim of compliance activities is to protect users from products that fail to perform as declared, and, to ensure that government regulators and the private sector can fulfil the objectives of efficient lighting policies, namely, to deliver climate change mitigation benefits and to deliver reliable and satisfactory lighting services. Compliance activities also protect suppliers by ensuring that each is subject to transparent and fair market entry conditions." (*Plan of Action* 3 December 2013)

The UNEP en.lighten imitative SEAP MVE grant was intended to run from July 2013 to June 2015, but because of administrative delays did not get fully under way until early 2014. Due to the delayed start it was extended, without extra funding, to the end of 2015 then extended again to mid-2016.

The last *lites.asia* meeting was held in February 2016, in combination with the recently established ASEAN SHINE – Lighting Chapter. ASEAN SHINE was originally established in 2013, with European Union funding, to promote harmonisation of standards for energy-efficient air conditioners.[15] The ASEAN SHINE platform was recently extended to include lighting with funding from the EU SWITCH-Asia Regional Policy Support Component. The ASEAN SHINE platform is seeking to extend to other household appliances, electric motors, distribution transformers and renewable energy technology.

According to the UNEP en.lighten initiative Southeast Asia and the Pacific Monitoring, Verification and Enforcement project's *Plan of Action*:

[14] The total allocation was $3m, with $200,000 allocated to the Department to cover its administrative costs.
[15] http://aseanshine.org/index.php/about?lang=en

> "UNEP is working in close consultation with the Australian Department of Industry and Science with target countries in South Asia, Southeast Asia and the Pacific to identify, develop and deliver MVE resources to support a rapid transition to energy efficient lighting and help to secure the related energy savings and GHG emission reductions for the region. In particular, UNEP is focusing on six target countries (Cambodia, Indonesia, Lao PDR, The Philippines, Thailand and Vietnam) and one region, represented by the Secretariat of the Pacific Community. The scope of technology covered in this effort is: single-base, omnidirectional lamps for general service, indoor applications."

A second donor agreement for A$130,000 was concluded in June 2014 between UNEP and the Australia Department of Industry (now DIIS) to provide support to stakeholders from the broader Asia region (including Pakistan, Nepal, Bangladesh, India and Sri Lanka) to attend *lites.asia* meetings, and for *lites.asia* network members to attend international standards meetings.

Figure 1 illustrates the timelines of *lites.asia*, the UNEP en.lighten SEAP MVE project and related events and activities. Although *lites.asia* did not formally commence until October 2009, it was in many ways a continuation of activities that commenced in May 2005. The *lites.asia* program proceeded in two stages – up to mid 2013, when UNEP en.lighten took over the administration, and then to mid 2016. The continuation of the structure and activities of *lites.asia* is currently uncertain, although some elements may continue within the framework of ASEAN SHINE, but this has yet to be determined.

Figure 1 also notes the inception in late 2011 of the Pacific Appliance Labelling and Standards (PALS) program, funded by Fast Start Finance and co-ordinated by the Secretariat of the Pacific Community (SPC) in partnership with DIIS. PALS, which is due to continue until June 2017, became the platform for the Pacific region's formal participation in the UNEP en.lighten Southeast Asia and Pacific MVE project, although *lites.asia* had sponsored some officials from Pacific to attend *lites.asia* meetings before. In September 2014, work commenced on the development of a Pacific Efficient Lighting Strategy (PELS), which like PALS was co-ordinated by the SPC.

Figure 1 Key date and milestones – *lites.asia* and UNEP en.lighten Southeast Asia and Pacific MVE Project

	lites.asia	Related events	UNEP en.lighten initiative
2005		May - Rightlights Shanghai - CFLHi July - APP announced	
2006		Jan - APP launched	
2007			
2008		May - Phaseout 2008 - Shanghai June - Manila Compact on CFLs	
2009		Asia Lighting Compact established	Sept UNEP-GEF en.lighten initaitive established
	Oct - Hong Kong - LA launched (10 pt pla	Asia Lighting Compact launched	
2010	June - LA1, Beijing December - LA2, Bangkok	Jan - Sri Lanka meeting	
2011	June - LA3, Sydney Nov 3, LA4, Singapore	April - APP concluded Nov 1-2, Singapore, APEC LED Workshop Dec - first PALS workshop, Noumea	Sub-Sahara Africa Regional Report Aug - Latin America & Caribbean report Nov - South east Asia report Nov - Middle East & North Africa report
2012	June - LA5, Hanoi Oct - LA6, New Delhi	IEC TC34 report Oct - Informing the Supplier, New Delhi	Oct - GELC Beijing launched
2013	April - LA7, Jakarta Oct - LA8, Manila	April - Stakeholder workshop, Jakarta Oct - Stakeholder workshop, Manila	June - Grant for SEAP MVE Project signed
2014	April - LA9, Kuala Lumpur (MVE focus - f Aug - LA10, Jakarta (MVE focus)	May - PELS prelim, Nadi Aug - Govt-Ind Workshop, Jakarta Sept - PELS1, Nadi; test lamps to GELC Nov - Global Efficient Lighting Forum, Beijing	South east Asia MVE report South Asia report Pacific Report SEAP off-grid lighting report
2015	Feb - LA 11, Bangkok (MVE focus)	Feb - Govt-Ind Workshop, Bangkok Feb - PELS2, Canberra Feb - Myanmar Policy Workshop Aug - PELS3, Nadi	
2016	Feb - last LA meeting (combined) June - LA Concludes	Feb - first ASEAN SHINE - Lighting Meeting	Guidebooks and other materials completed

1.2 The Evaluation

Terms of reference

In 2015 the Australian Department of Industry Innovation and Science (DIIS) commissioned this evaluation of the UNEP en.lighten SEAP MVE project to inform DIIS, the Department of Foreign Affairs and Trade (DFAT) and other stakeholders. The purpose of the evaluation is to:

- *Evaluate and analyse the performance and monitoring material provided by the UNEP en.lighten team, including quarterly reports, participant activity evaluation surveys, and other evidence submitted by UNEP regarding demonstrated differences.*
- *Present a contribution analyses to identify the difference made by the Project's support to the development of MVE programs and national/regional lighting efficiency plans and provide conclusions of the efficiency, effectiveness and impact of the UNEP en.lighten Asia-Pacific project to date, and the sustainability of these outcomes in the future;*
- *Evaluate the effectiveness and contributions made by the lites.asia network, workshops and website from 2009 to date to the regional phase-out of inefficient lighting, including:*
  - *Accumulation and sharing of lighting efficiency program knowledge, practice and experience;*
  - *Evidence of success in strengthening policy and regulatory initiatives in the field of lighting energy efficiency in the Asia region;*
  - *Improvement of regional understanding of and engagement with international standards organisations and processes in relation to standards for lighting energy efficiency and quality.*
  - *Do the lites.asia participants see value in the lites.asia forum network and associated support continuing post June 2015?*
- *Present analyses, conclusions and recommendations to inform the design of similar programs in future and/or the identification of further steps to promote and enable the uptake of energy efficiency lighting in the region;*
- *Make recommendations for increasing the effectiveness of the remainder of the UNEP en.lighten Initiative, beyond the completion of the present Australian funding commitment; and*
- *Consider the case for further funding.*

Evaluation methodology and sources

As evident from the preceding sections, the *lites.asia* and the en.lighten initiative SEAP MVE project coexisted with a number of other Australian, regional and international programs and activities targeting lighting energy use and lamp efficiency. Therefore it is necessary to start with a "hypothesis of change" to try to isolate the impacts of the programs.*lites.asia*. There are several mechanisms by which they could have contributed to outcomes, including:

- Convincing or supporting national policy-makers to undertake formal energy-efficiency programs for the first time, with lighting as the initial targeted end use;
- Enrolling local policy-makers in global objectives such as "phasing out inefficient lighting" or excluding/restricting the sale of conventional incandescent lamps and encouraging the use of quality efficient lighting;
- Assisting countries to incorporate lighting products into pre-existing energy labelling and MEPS programs;
- Providing general illustrative material on program costs, benefits and delivery strategies (including monitoring, verification and evaluation);
- Providing or supporting regional- and country-specific analyses on existing lighting markets and on program costs, benefits and delivery strategies;
- Building a framework for sharing regional resources and experience with regard to program design, delivery and MVE;
- Helping with institutional capacity building and training of officials, particularly in terms of monitoring, verification and enforcement activities, including product check testing;
- Providing specific technical support, such as access to lamp testing facilities; and
- Building support for harmonising technical standards and engaging countries in global standardisation processes, and use of international standards.

While this evaluation concentrates on the MVE aspects, it is difficult to separate these from the overall dynamics and structure of lighting programs. For example, a full understanding of MVE implications is required in order to decide whether to have a mandatory approach, and then the MVE processes need to be anticipated and specified in any legislation. The UNEP en.lighten SEAP MVE project may be the sole or the main driver for these developments in some countries, but for others there may be a range of other drivers, including pre-existing national policy initiatives and participation in other regional and global programs.

The main sources of information used in addressing the terms of reference and in testing these hypotheses of change are published documents, unpublished documents, interviews with stakeholders and observation of meetings.

The *lites.asia* and en.lighten websites hold hundreds of documents, including technical reports, newsletters, press releases and meeting agendas, presentations and communiqués. These are referenced by website location where appropriate, and the most significant are listed in Appendix 2 as Key Published Documents. In addition, DIIS made available several internal reports relating to the approval and funding of the *lites.asia* project. The most significant are listed in Appendix 2 as Unpublished Documents. Relevant reports and documents from other sources are listed in the general References.

DIIS made available the master list of over 800 contacts who had attended *lites.asia* and related meetings or had participated in *lites.asia* in some way since its inception in October 2009. In consultation with DIIS, the author selected 30 contacts for interview, covering the most actively engaged ASEAN countries, a selection of Pacific countries and officials and consultants. DIIS sent introductory emails to the ASEAN contacts requesting their co-operation. The author then sent a follow-up email to request a telephone or skype interview, enclosing a list of questions as a basis for discussion (see Appendix 1). At least two reminders were sent to each contact. In the end the author

was able to interview 20 people, mostly from the agreed list of 30 but in some cases alternates from the same country or organisation.

The final source of information was attendance and observation of *lites.asia*-related meetings. The author attended the first ASEAN SHINE - Lighting meeting in Bangkok, Thailand (which was also the final *lites.asia* meeting) in order to conduct as many face to face interviews as possible. Unfortunately some of the key national participants in *lites.asia* were not at the meeting, either because they had changed jobs or due to a scheduling clash.[16]

The author also attended several meetings related to the development of the Pacific Efficient Lighting Strategy.

As required under its contract with DIIS, the UNEP en.lighten team prepared an evaluation plan for the UNEP en.lighten Southeast Asia and Pacific MVE in May 2015 (Lane 2015). The document was framed – as is appropriate – in relation to the specific activities which the UNEP team contracted to undertake within the agreed timeframe. However, it is clear that the UNEP en.lighten SEAP MVE is set within the larger context of *lites.asia*, with multiple objectives evolving over a longer time frame. This is better captured in the DIIS's terms of reference (see above), so this report is structured around these rather than the classic evaluation headings of relevance, efficacy, efficiency, impact and sustainability. Nevertheless, all of these issues are addressed in this report.

Reporting

This evaluation was initiated in March 2015, with the intention of completing it around the time of the end of the UNEP en.lighten SEAP MVE project, then envisaged for June 30 2015. When the contract between DIIS and UNEP was extended to mid 2016, the evaluation timing was adjusted accordingly. An evaluation work plan was submitted for DIIS approval in July 2015, and the interviews were conducted between August 2015 and February 2016.

Interviewees have not been quoted in the report itself, and any interpretation of their views is the responsibility of the author.

A draft report was submitted to DIIS at the end of April 2016, and DIIS and UNEP en.lighten comments have been addressed. There is provision for presentation of the findings in a webinar or a workshop in Canberra if required.

[16] The ASEAN Centre for Energy (ACE), which was involved in the scheduling of the ASEAN SHINE meeting in Bangkok, had also arranged a separate energy-related meeting in Manila at the same time.

2. The UNEP en.lighten initiative Southeast Asia and Pacific Monitoring, Verification and Enforcement Project

2.1 MEPS and labelling implementation and MVE status

Existing Programs

A central objective of the UNEP en.lighten Southeast Asia and Pacific MVE project to "identify, develop and deliver MVE resources" in participating countries. The relevance of such resources depends on whether the country has, or is planning to implement MEPS and/or energy labelling (whether voluntary or mandatory: MVE is equally applicable to maintaining the integrity of voluntary programmes).

In the following analyses, economies and participants are grouped as follows:

- The group of 6 ASEAN countries targeted by the UNEP en.lighten SEAP MVE project;
- Other ASEAN countries which have participated in *lites.asia* since its inception in 2009;
- Countries in the Pacific region, covered by the UNEP en.lighten SEAP MVE project;
- South Asian countries which UNEP en.lighten assisted to attend *lites.asia* meetings (under the 2014 agreement with DIIS); and
- Other countries and international agencies (including Australia) – these have generally been involved in servicing the programs as donors, administrators or in providing technical support.

Changes over MVE Project Period

One of the threshold questions in the evaluation is what difference the SEAP MVE project made. As it happens, the UNEP en.lighten initiative undertook comprehensive surveys of the lighting energy efficiency policies and programs, including MVE activities, of 6 ASEAN countries in late 2013 and of 10 ASEAN countries in late 2015. The same formats and questions were used, so the responses can be directly compared.

The findings are summarised in Table 1, with changes highlighted. In three cases a "yes" had been changed to a "no" indicating that the earlier answer had been incorrect (there is one instance of a genuine program rollback, discussed below). The main areas of progress noted were the implementation of a market surveillance program in Indonesia and transition from voluntary to mandatory product registration in Vietnam (where the separate Australian-funded Vietnam Energy Efficiency Standards and Labelling program was also active over the same period).

However, there are indications that *lites.asia* and the UNEP en.lighten SEAP MVE project have been and will continue to be influential over a longer time frame, on non-ASEAN as well as ASEAN countries:

- According to the *lites.asia* managers, the representative from Pakistan developed and submitted a lighting and appliance efficiency proposal to his government, following a *lites.asia* meeting.[17]
- Cambodia, the Lao PDR and Myanmar have become active participants in *lites.asia* meetings. Cambodia and Lao PDR have taken part in UNEP en.lighten SEAP MVE lamp sampling and testing exercises (Table 7) and Myanmar hosted a LED policy workshop in February 2015. This indicates that UNEP en.lighten SEAP MVE project participation will have a strong influence on future policy development in those countries.
- Alongside the 10th *lites.asia* meeting in Jakarta in August 2014, UNEP and DIIS officials were requested to meet with Indonesian government agencies, and also with local lighting suppliers and their industry associations, to present the case for CFL MEPS in Indonesia.
- Outside the formal *lites.asia* framework, DIIS has responded to requests for advice and assistance from Hong Kong, Malaysia, Singapore and Brunei. This included attending meetings in Brunei and Malaysia.

The assessment of *lites.asia*'s influence on Singapore and Malaysia is complicated by the fact that these countries, like Thailand, already had active MEPS and labelling programs for other product types.

Table 2 summarises the type of lighting products subject to MEPS and energy labelling in each ASEAN country. Over time, several countries have made their MEPS and labelling programs more extensive (covering more lighting products) or intensive (moving from voluntary to mandatory measures, or increasing MEPS levels).

In some cases progress has been reversed. Indonesia is considering removing its mandatory CFL standards because local lamp manufacturers have trouble meeting them. In the Philippines, different government agencies are responsible for MEPS and for MVE, and there have been difficulties in co-ordination. A direct approach from UNEP EL to help resolve these difficulties is under consideration.

Some of the outcomes achieved in the latter part of the UNEP en.lighten SEAP MVE project are likely to impact on lighting programmes in the target countries in the coming years. The series of MVE Guidance Notes has only recently been completed, and their influence is likely to grow. Another key outcome of the UNEP en.lighten initiative SEAP MVE project is the ASEAN agreement to harmonise lighting standards, first endorsed at the *lites.asia* meeting in February 2015, adopted as a formal ASEAN proposal in April 2015 and agreed by the ASEAN Energy Efficiency and Conservation Sub Sector Network (EE&C-SSN).

The overall impression is that while *lites.asia* and the UNEP en.lighten SEAP MVE project have been influential in assisting countries, they could neither bring about the implementation of MEPSL measures on their own, nor prevent the reversal or dilution of such measures. Participating officials are of course representatives of sovereign governments, and many other factors help determine local policy with regard to lighting efficiency.

[17] At the time of writing, voluntary MEPS and labelling for CFLs, LFLs and ballasts were said to be under development in Pakistan – see www.clasponleine.org

Table 1 MVE regulations and activities related to lighting in ASEAN Countries, 2013 and 2015

	Entry requirements		Registration scheme		Product performance database		Market surveillance		Verification programme		Enforcement framework	
	2014(a)	2016(b)	2014(a)	2016(b)	2014(a)	2016(b)	2014(a)	2016(b)	2014(a)	2016(b)	2014(a)	2016(b)
Cambodia	Yes (c)	Yes	Yes (V)	Yes (V)	No	No	No	No	No	No	Yes	**No**
Indonesia	Yes	Yes	Yes	Yes	No	No	No	**Yes**	No	No	No	No
Lao PDR	No (d)	No	No	No	No	No	Yes	**No**	No	No	No	No
Philippines	Yes	Yes	Yes (V)	Yes (V)	Yes	Yes	Yes	Yes	No	No	Yes	**No**
Thailand	Yes	Yes	Yes (V)	Yes (V)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vietnam	Yes	Yes	Yes (V)	**Yes (M)**	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Brunei		NA		NA		NA		NA		NA		NA
Malaysia		Yes		Yes (M)		Yes		Yes		Yes		Yes
Myanmar		No		No		No		No		No		No
Singapore		Yes		Yes		Yes		Yes		Yes		Yes
Pacific												

(a) Mathers 2014 (b) ASEAN SHINE - Lighting 2016 (c) Safety only (d) Listed as NA – "No" inferred from 2016 response. **Changes highlighted**

Table 2 MEPS and Energy Labelling for lighting products, ASEAN Countries 2015

	MEPS (with year of introduction)(a)						Labelling (with year of introduction)						IL phaseout	Label survey(b)	Test Labs(c)
	Incand-escent	CFL	LFL	LED	Ballast	HID	Incand-escent	CFL	LFL	LED	Ballast	HID			
Cambodia															0
Indonesia		2013(M)		Planned	Planned			2013(M)		Planned	Planned				6
Lao PDR															0
Philippines		2002(M)	2010(M)	Planned				2002(M)	(M)		2003(M)			Yes	3
Thailand		2006(E)	2006(E)	Planned	2004(V)			2006(V)	(V)	(V)	2013(V)			Yes	2
Vietnam	2013(M)	2008(M)	2009(M)		2008(M)	2009(M)		2013(V)	2013(V)		2013(V)		Yes	Yes	3
Brunei															
Malaysia	2012(M)	2015(M)	2015(M)	(M)	1996(M)		(M)	(M)		(M)	(M)		Yes		
Myanmar															
Singapore	2015(M)	2015(M)		2015(M)			2015(M)	2015(M)		2015(M)			Yes		

(a) ASEAN SHINE 2016; years of introduction from EES 2014 and internet research. (b) Ellis 2014 (c) Mathers 2014. M = Mandatory, V= Voluntary E = electrical safety/compatibility only (in 2015). In some cases measures were originally voluntary but have become mandatory, and/or MEPS stringency has been raised since introduction. For Indonesia, mandatory MEPS for CFLs may be abandoned.

2.2 Activities and Outputs

Overview of activities

The *lites.asia* and UNEP en.lighten initiative Southeast Asia and the Pacific Monitoring, Verification and Enforcement (SEAP MVE) Project included the following activities:

- Meetings. There were seven formal *lites.asia* meetings during Stage 1 and four during the SEAP MVE project period. These generally covered the planning and reporting of *lites.asia* activities, country updates, information exchange and procedural agenda items;
- Workshops on technical issues, sometimes held in association with *lites.asia* meetings;
- The preparation of "Best Practice" Guides on aspects of lighting energy policy and MVE. These encapsulate the experience of many experts and established MEPS, labelling and MVE programs, but are not addressed to any particular country or region;
- The preparation of reports on the situation with respect to lighting policy, technology or markets in specific *lites.asia* countries or groups of countries;
- In-field market monitoring and sampling of lighting products available in specific countries, including training of local officials;
- Efficiency and performance testing of lamps, evaluating and enhancing test laboratory capability;
- Missions to specific countries (or groups of countries) to address matters of special interest to them: e.g. the development of the Pacific Efficient Lighting Strategy, which involved members of the Secretariat of the Pacific Community (SPC);
- Engagement with international agencies and key non-government stakeholders (e.g. lighting manufacturers, standards organisations) on behalf of all *lites.asia* participants, and support for their officials to attend IEC meeting;
- The dissemination of the results and outputs of the above activities: e.g. in the form of reports, newsletters, websites, webinars and presentations at *lites.asia* meetings and special workshops.

These were almost all public activities in that their progress was well publicised through the *lites.asia* and UNEP en.lighten websites, mailing lists, press releases and other communication channels and the outputs are freely downloadable. There were also essential supporting activities: preparing and executing funding agreements, preparing and administering budgets, engaging staff and consultants, managing consultancy and laboratory testing projects, planning meetings, arranging travel and reporting on progress to funding bodies.

lites.asia meetings

The efficient organisation of regular meetings has underpinned the effectiveness of *lites.asia.* Respondents indicated that one of the most valuable aspects of their participation in *lites.asia* was the network of contacts which they established at meetings, and maintained by attending subsequent meetings. The timing of the 13 officially designated *lites.asia* meetings (including the inception and final meetings) is illustrated in Figure 1, and Table 2 and Figure 2 presents the numbers and nationalities of attendees.[18]

Attendance at *lites.asia* meetings averaged 39 over the period, with the lowest at 15 (for LA3 in Sydney – understandable due to the location) peaking at 74 in Bangkok for LA11. Attendance fell away somewhat for LA9, the first meeting organised by UNEP en.lighten under the SEAP MVE project contract, because travel assistance was no longer available to south Asian countries, but then recovered.

The *lites.asia* programme supported the travel of a limited number of participants from selected countries, but additional delegates from those countries were able to attend at their own cost. Thailand and Indonesia usually sent additional delegates, indicating that they valued participation in *lites.asia* meetings. Meeting venues were rotated partly to assist self-funded participation, which naturally tended to be highest from the host country. There was no difficulty in getting countries to offer to host meetings.

Meetings were open to participants from other countries as well, and a total of 43 developed and developing countries were represented at one or more meetings. The Pacific countries have mostly been represented by a delegate from the SPC, but countries have attended in their own right from time to time (notably Tonga, before the Pacific Efficient Lighting Strategy was initiated).

Another notable feature is the engagement of participants from China. This is both welcome and essential, given China's dominant roles in lamp design, manufacture and testing. Chinese government agencies and manufacturers were involved in *lites.asia* from the beginning, and China's participation in *lites.asia* was further reinforced by the partnership agreement between UNEP en.lighten and the Global Efficient Lighting Facility in Beijing.

There was also regular attendance by nominees of lighting industry associations in India, Indonesia and the Global Lighting Association. Two meetings were attended by a representative of the International Commission on Illumination (CIE).

The 10th *lites.asia* meeting is the first for which participant evaluations are available. UNEP en.lighten sought participant feedback with an online survey after the meeting. After that, questionnaires were given out at the meetings, greatly increasing the response rates (Table 4). Over 90% of respondents said they were satisfied with the *lites.asia* and then ASEAN SHINE – Lighting meetings and 72-80% said that it met their objectives.

[18] There was also a meeting described as lites.asia in Sri Lanka in January 2010 with more than 40 participants, but LA has not included this in the meeting series numbering.

Table 3 Participation in *lites.asia* meetings, 2009-2015

	Hong Kong 2009	Meeting 1 Beijing	Meeting 2 Bangkok	Meeting 3 Sydney	Meeting 4 Singapore	Meeting 5 Hanoi	Meeting 6 Delhi	Meeting 7 Jakarta	Meeting 8 Manila	Mtg 9 Kuala Lumpur	Mtg 10 Jakarta	Mtg 11 Bangkok
Cambodia	0	0	0	0	0	0	0	0	1	2	1	3
Indonesia (a)(b)	5	4	1	1	2	3	4	20	3	3	10	3
Lao PDR	0	0	0	0	1	0	0	1	1	2	2	2
Philippines (a) (b)	4	5	2	1	2	3	2	1	13	2	1	1
Thailand (a) (b)	4	3	8	1	6	4	2	2	5	3	4	34
Vietnam (b)	4	2	1	1	2	8	1	1	1	0	2	2
ASEAN Target Countries	17	14	12	4	13	18	9	25	24	12	20	45
Brunei	0	0	0	0	0	0	0	0	0	0	0	0
Myanmar (a)	0	0	0	0	0	0	0	0	0	0	1	2
Singapore	0	1	3	1	2	1	0	1	1	2	0	1
Malaysia	0	0	0	0	1	0	0	0	0	8	0	0
Total Other ASEAN	0	1	3	1	3	1	0	1	1	10	1	3
Total Pacific (c)	0	0	0	0	3	1	1	0	2	1	1	1
Bangladesh (b)	0	1	0	0	1	0	1	0	0	0	0	2
Bhutan	0	0	0	0	0	0	0	0	0	0	1	2
India	4	2	2	3	2	1	6	0	0	4	1	1
Maldives	0	0	0	0	0	0	0	0	0	0	1	2
Nepal	0	0	0	0	0	0	0	0	0	1	1	2
Pakistan (b)	0	1	0	0	0	1	0	2	2	1	1	2
Sri Lanka	2	2	0	1	2	0	3	3	2	0	3	0
Total South Asia	6	6	2	4	5	2	10	5	4	6	8	11
Australia	2	4	2	4	3	3	3	3	5	4	2	4
China (b), Japan, Korea	4	9	3	1	11	3	1	3	5	1	0	3
Other	7	11	6	4	14	5	4	3	6	3	3	7
Total attendance	36	45	28	18	51(d)	33	28	41	46	37	35	74
Excluding host country	32	36	20	14	49	15	22	21	33	29	25	40

Host countries for each meeting shown shaded. (a) Member of UNEP en.lighten Global Efficient Lighting Partnership (GELP) Programme (b) Members of BRESL (Barrier Removal to the Cost Effective Development and Implementation of Energy Efficiency Standards and Labelling). (c) Tonga, Vanuatu are GELP members. (d) Attendance was higher than usual due to availability of travel support for associated APEC LED workshop and UNEP en.lighten meeting.

Figure 2 Participation in *lites.asia* meetings, 2009-2015

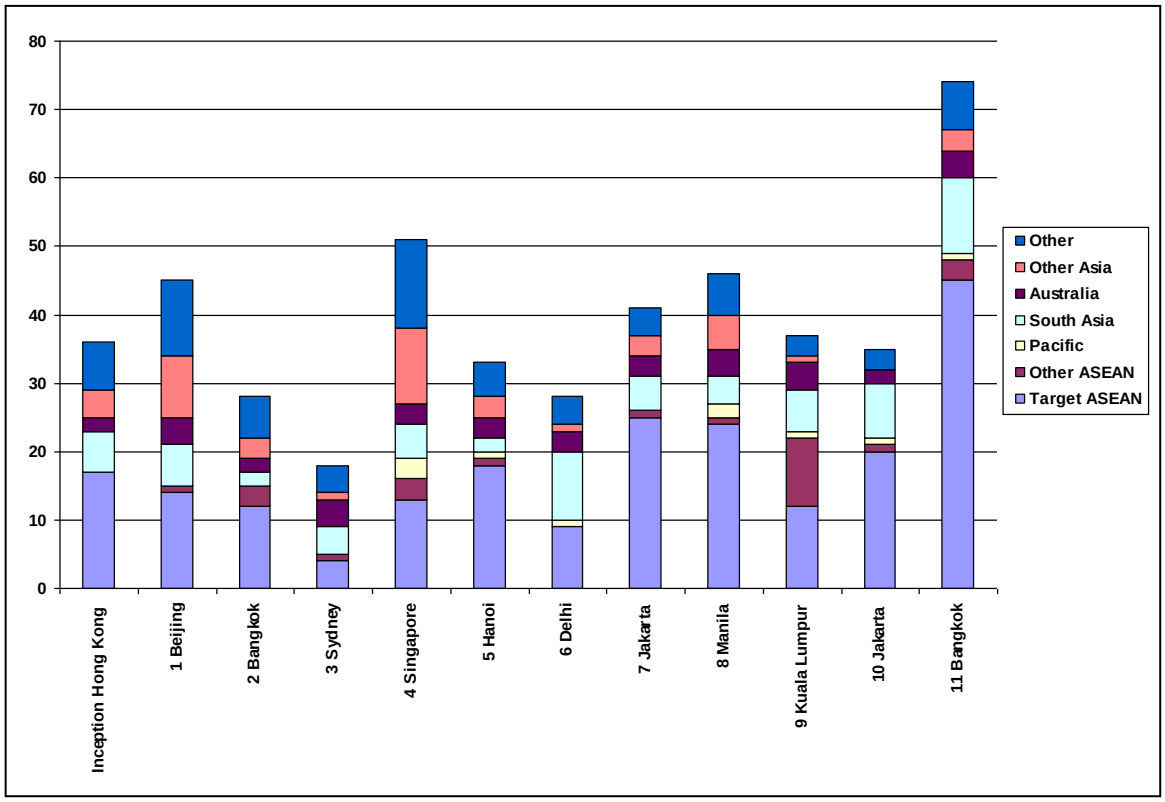

Table 4 Meeting evaluations, 2011-2016

	LA10 Jakarta 19-21 Aug 2014	LA11 Bangkok 3-4 Feb 2015	ASEAN SHINE Bangkok 2-3 Feb 2016	Singapore LED workshop 1-2 Nov 2011	Delhi Informing the supplier 4 Oct 2012	Bangkok Laboratory training 5 Feb 2015	Bangkok Govt-Industry Workshop 6 Feb 2015	Myanmar Policy Workshop 16 Feb 2015	Beijing Lab training 22-24 Apr 2015
Evaluation responses	10	40	32	35	18	18	19	17	16
Satisfied	9	37	30	30	8	10	12	13	16
Met objectives	8	N/A	N/A	29	13	14	12	12	15
Would attend similar	N/A	N/A	N/A	N/A	N/A	12	12	16	14
% attendees responding	29%	56%	N/A	56%	N/A	N/A	N/A	N/A	N/A
% of these satisfied	90%	93%	94%	91%	50%(b)	56%	63%	76%	100%
% met objectives	80%	72%(a)	N/A	83%	76%(b)	78%	63%	71%	94%

Calculated by author from data provided by UNEP en.lighten. (a) Average of responses to 9 separate questions. (b) Of those answering this question

Technical workshops

Workshops held in association with *lites.asia* meetings provided opportunities to involve manufacturers and other industry stakeholders, and to cover technical issues in more detail. The following meetings were held:

- APEC LED Workshop in Singapore, 1-2 November 2011, held in association with *lites.asia* meeting 4. Attendance was 35 people.

- "Informing the Supplier" workshops specifically designed to inform manufacturers about the lighting standards and mandatory and voluntary labelling requirements of Asian countries. The first of these was held in New Delhi in October 2012, in association with *lites.asia* meeting 6 and *Light India 2012*, the first Indian international lighting exhibition.

- "Informing the Supplier" workshop in Jakarta on 24 April 2013, in association with *lites.asia* meeting 7. Attendance was 40 people.

- Stakeholder Workshop in Manila, 4 October 2013, in association with *lites.asia* meeting 8. Attendance was 51 people.

- Laboratory training workshop in Beijing, 22-24 April 2015, hosted by GELC and attended by 17 testing laboratory representatives from Indonesia, Malaysia, Philippines, Thailand and Vietnam. Also Laboratory training workshops in Jakarta (August 2014) and Bangkok (February 2015);

- Stakeholder Workshop in Bangkok, 6 February 2015, in association with *lites.asia* meeting 11.

- Workshop for government policy makers in Myanmar, 16 February 2015.

Systematic evaluation of special workshops started with the Singapore LED Workshop on November 2011. The survey questions varied because they related to the technical content of each workshop, and the responses were also more variable. Satisfaction rates ranged from 100% to 50%, and between 73% and 94% said that the event met their objectives (Table 4).

Guides, studies, reports

The UNEP en.lighten and *lites.asia* programmes have produced dozens of studies, guides and reports. Many of these are listed on both *lites.asia* and UNEP en.lighten websites. The *lites.asia* website lists publications under the following headings:[19]

- Monitoring, Verification and Enforcement Guidance Notes – 6 substantial technical documents, all published February 2016, co-branded UNEP and Australian Aid, and acknowledging funding from the Southeast Asia and Pacific MVE project:

[19] http://www.lites.asia/southeastasiaandpacificmveproject/mve-project-materials at the sub-heading *SE Asia and Pacific MVE Project\Project Materials,* accessed 18 March 2016.

- *Developing Lighting Product Registration Systems (60pp)*
- *Efficient Lighting Market Baselines and Assessment (64pp)*
- *Enforcing Efficient Lighting Regulations (48pp)*
- *Good Practices for Photometric Laboratories (64pp)*
- *Performance Testing of Lighting Products (56pp)*
- *Product Selection and Procurement for Lamp Performance Testing (60pp)*

- Webinar presentations:
  - PowerPoint presentations and audio recording for 11 webinars delivered between July 2014 and July 2015, mostly covering same topics as the Guidance Notes;
- Compact fluorescent and light emitting diode lamp sampling and testing exercise
  - 3 documents: Reports 1,5 and 6 in Table 7;
- Inter-laboratory comparison testing exercise for LED lamps;
  - 1 document: Report 4 in Table 7;
- Monitoring, verification and enforcement policy status report for six Southeast Asia countries: (Mathers 2014, referenced in Table 1 and Table 2);
- Regional Status Report on Efficient Lighting in the Pacific Island Countries and Territories (PICTs);[20]
- Report on the Off-grid Lighting Status for Southeast Asia and the Pacific
  - 3 documents: the report and two annexes (essentially summaries of the report);
- In-country laboratory and policy training:
  - presentations from Jakarta (August 2014), Bangkok (February 2015) and Myanmar (February 2015);
- Survey of lamp energy labelling; LED tropical performance specification, LED buyers' guide and laboratory capacity surveys.

The reports and documents appear to be of high technical quality, relevant to the subject and the production and presentation is appropriate to the intended audience. Together they comprise both a valuable body of technical literature and a record of the progress of *lites.asia* in general and the UNEP en.lighten SEAP MVE project in particular.

Websites and newsletters

The en.lighten and *lites.asia* websites have a number of functions:

- As a "front window" for the programs;
- Presenting news and relevant developments;
- Alerting stakeholders to meetings and events to come;
- As a record of past meetings and events; and
- As a repository for materials and publications to be downloaded as required, including materials produced by and for *lites.asia* as well as relevant materials from other sources.

The first *lites.asia* newsletter was published in April 2012, just after the appointment of Jeffcott Associates as operations manager. There were six newsletters during 2012, three in 2013, three in 2014 (after UNEP en.lighten took over management), four in 2015 and one (so far) in 2016. The newsletter is emailed to all members of the *lites.asia*

[20] However there is no link to the referenced document , which is at http://www.spc.int/edd/fr/document-download/viewdownload/11-reports/2027-regional-status-report-on-efficient-lighting-in-pacific-island-countries-and-territories-

network. Several interviewees mentioned the newsletter as a valuable source of information, but it was not possible to collect quantitative data on their use and usefulness.

The two websites overlap in many respect, in that many of the guides, studies and reports listed above can also be accessed on the en.lighten website.[21] It was found that *lites.asia* stakeholders were aware of both, but tended to develop a habit of using one or the other by preference.

Neither website is entirely clear in its structure or its navigation. For example, on the *lites.asia* website, a user who does not understand the relationship between the UNEP en.lighten initiative in general, *lites.asia* and the "SA Asia and Pacific MVE Project" (a relationship which requires some clarification, as evidenced in the present report) would not naturally know whether to search for materials of interest under the *lites.asia Resources* heading, or the *SE Asia and Pacific MVE Project\Project Material* sub-heading. In fact, while there is some overlap between the content, some key documents can only be accessed by one route.

Navigation of the en.lighten website not entirely straightforward either, although it does have more ground to cover given its global scope and the number of regions and participating countries. However, the route to the technical publications is easier to access and the classification and arrangement of documents is clearer than on *lites.asia* website:

- Toolkits and Guides – on the development of global, regional and national lighting strategies (currently lists 6 documents)
- Monitoring, Verification and Enforcement - the same 6 Guidance Notes as on the *lites.asia* website
- Off-Grid Lighting – 6 documents, including the Report on the Off-grid Lighting Status for Southeast Asia and the Pacific
- LED Street lighting – one document
- Technical reports – the same reports as on the *lites.asia* website (see Table 7).
- Regional reports.

Webinars

A webinar is a seminar run over the internet, in which participants log on to a website and can hear the speaker and see the presentations streamed through their computer (the *lites.asia* webinars also offered a telephone link for the audio stream).

The first *lites.asia* webinars were mainly concerned with following up matters raised at *lites.asia* meetings, particularly progress with the IEC standards which were central to the *lites.asia* work program at the time. Webinars were hosted in April, June and November 2012 by the then Australian Department of Climate Change and Energy Efficiency.

[21] Although at the time of writing some of the links on the EL website were incorrect, and did led to a different document from the title next to the link. The lites.asia website also has a 'communications library' of examples of education and communication material from Australia and some other countries as well as some other relevant reports including from the earlier APP work undertaken by the US-funded EcoASIA program.

In July 2014 webinars were reintroduced for a more general audience. The UNEP en.lighten SEAP MVE project organised 11 webinars between July 2014 and August 2015. They were scheduled for one hour each. A presenter/moderator introduced the speakers and monitored questions which could be submitted online by participants. Many of the topics were based on the MVE Guidance Notes, and together the webinars constituted a short course on lighting technology, testing, MEPSL and MVE. The topics were:

1. Benchmarking
2. Legislation
3. Lumen maintenance
4. Registration systems
5. Evaluation indicators
6. Product testing
7. Supply chain communications
8. CIE test method
9. Enforcing lighting regulations
10. Market baselines
11. Creating a product registry

Each required the engagement of speakers (usually two per webinar) and advance publicity to the en.lighten/*lites.asia* email contact list (the *lites.asia* contact lists alone comprised around 800 names by the end of the project). The first email invited registrations, and then the webinar link and reminders were sent to registrants.

UNEP en.lighten kept a record of invitees and participants, and from Webinar 4 evaluation forms were emailed to participants. The participant data and evaluation results are summarised in Table 5 and Table 6. Some 284 individuals took part in the 11 webinars, 203 of whom attended only one. The other 81 participants attended an average of 4.7 webinars each. The most popular webinar topics by far were related to testing and the CIE test method.

About a third of participants returned evaluations. Among other things these revealed that 25-30% of participants in Webinars 4 and 5 had taken part with at least one other person present, but from then participants were on their own. The survey respondents rated the webinars highly: 85% thought them well organised, 85% thought that the content was clear and 94% said they would use what they had learned.

The webinars were advertised to the entire *lites.asia* mailing list. Approximately 50% of the individuals came from economies which were regular *lites.asia* participants (ASEAN, South and other Asia, China, Pacific and Australia), 42% from other countries (mainly in Europe). A further 8% had email addresses without country information. The regions with the highest repeat participation rates were ASEAN and other Asia (but not China). The lowest rates of repeat participation were from Australia, Pacific, the Americas and the "Not Known" group.

As webinars have a global audience, and the speakers and organisers may be located in more than one time zone, scheduling is always difficult. Times that are very late in the

day in the Pacific fall around the end of the working day in Asia, work well in Europe but are too early for South America and western USA.[22]

The webinars were recorded, and both the presentations and the audio files may be streamed or downloaded from the *lites.asia* website. The audio files are large (of the order of 40MB) and may be difficult to access in countries with slow internet (as in some of the Pacific) or through email accounts which restrict file size (as is the case with many government agencies in developing countries, although many officials use Gmail accounts).
Despite the positive survey feedback, the UNEP en.lighten team were generally of the view they were not an efficient use of resources, because:

- It was difficult to engage some of the target audiences due to the timing issues;
- Although there was a significant audience from the non-target regions, it was not enough to compensate; and
- Organising the webinars was time-intensive.

While the topics of the webinars constituted a short course on lighting technology, testing, MEPSL and MVE, it appears that few participants used them this way. Most tuned in for a single topic of interest to them and did not return (Table 6).

[22] The author took part in four webinars, all of which started at 6pm or 7pm Eastern Australian time.

Table 5 Webinar participation and evaluation survey responses

	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	Total/ wtd(a)
Number registered	61	50	108	91	114	112	71	177	109	91	62	1046
Number attended	37	19	45	31	51	54	38	87	37	32	32	463
Proportion attended/registered (%)	61%	38%	42%	34%	45%	48%	54%	49%	34%	35%	52%	44%
Number of survey responses	N/A	N/A	N/A	12	29	9	13	51	10	10	15	149
Survey / Attendance ratio (%)	N/A	N/A	N/A	39%	57%	17%	34%	59%	27%	31%	47%	32%
Shared announcement with others				42%	59%	78%	69%	67%	30%	70%	53%	60%
Watched alone				75%	69%	100%	100%	100%	100%	100%	100%	92%
Watched with others (2-5 people)				25%	31%	0%	0%	0%	0%	0%	0%	8%
Thought webinar was well organised				50%	81%	89%	77%	90%	90%	100%	93%	85%
Thought it was not well organised				42%	0%	0%	0%	4%	10%	0%	0%	5%
Thought the content was clear				50%	79%	89%	77%	90%	90%	100%	93%	85%
Likely to use what they learned				92%	97%	100%	92%	96%	90%	100%	100%	96%
Will use what they learned				67%	97%	100%	92%	96%	90%	100%	100%	94%
Thought no need to improve				42%	34%	57%	38%	61%	56%	50%	80%	53%
Thought could increase content				17%	52%	14%	8%	20%	22%	10%	13%	23%

(a) Evaluation results are weighted by number of respondents

Table 6 Location of participants, webinars 1 to 11

	Attendances	Share of attendances	Individuals	Share of individuals	Attendances/ person	Attended one webinar only	Attended two or more	Attended one webinar only	Attended two or more
ASEAN	77	17%	46	16%	1.7	30	16	65%	35%
South Asia	46	10%	34	12%	1.4	26	8	76%	24%
Australia	39	8%	22	8%	1.8	18	4	82%	18%
Pacific	7	2%	6	2%	1.2	5	1	83%	17%
China, HK	47	10%	30	11%	1.6	22	8	73%	27%
Other Asia	7	2%	2	1%	3.5	1	1	50%	50%
Western Europe	122	26%	68	24%	1.8	44	24	65%	35%
Eastern Europe	30	7%	15	5%	2.0	10	5	67%	33%
Africa	22	5%	16	6%	1.4	11	5	69%	31%
Middle East	18	4%	12	4%	1.5	8	4	67%	33%
Americas	19	4%	11	4%	1.7	9	2	82%	18%
Not Known	27	6%	22	8%	1.2	19	3	86%	14%
Total	461	100%	284	100%	1.6	203	81	71%	29%

Monitoring, sampling and testing studies and reports

The practical application of MVE in any country involves the exercise of a number of skills by officials, authorized persons or test laboratory personnel:

- Planning an MVE program and activities appropriate to the local regulatory requirements (whether MEPS, mandatory labelling, voluntary labelling or other);
- Visiting lamp retail outlets to monitor and record the products available and to check compliance with energy labelling regulations (where those exist);
- Visiting lamp retail outlets to select and purchase lamp samples for testing, to verify that the products meet MEPS levels and, where there is labelling, perform as indicated on the label;
- Where there is a requirements for product registration, setting up a register and a process by which lamp suppliers can register products (whether using paper forms, online systems or other);
- Testing products to the level of accuracy necessary to support enforcement (i.e. carrying out the test to the required standard, with high confidence that the results can be replicated in another laboratory).

The *lites.asia* program has supported a number of projects aimed at developing these skills in participating countries. These are listed as Projects 1 to 6 in Table 7. Project 1 consisted of collecting samples of CFL lamps from retail outlets in 11 countries, packing them and sending them to GELC in Beijing for testing to IEC 60698, IEC 60969 and IEC 62554. This project was started by UNEP before the UNEP en.lighten SEAP MVE project commenced in mid-2013, although the final report was published in November 2014. None of the 10 participating countries were in Asia. Tonga took part by virtue of its direct membership of en.lighten – the Pacific Efficient Lighting Strategy component of the UNEP en.lighten SEAP MVE project did not commence until 2014.

The lamp collection process, which took place between April and June 2013, was generally smooth, but highlighted a number of practical issues relevant to developing countries, e.g. that there were relatively few large retail outlets, and the stock holdings in smaller ones were not always enough to satisfy the sampling requirements. Some customs issues with sending lamps to GELC also arose.

Project 2 also started before the UNEP en.lighten SEAP MVE project commenced. . It was targeted at the relatively few countries that had mandatory or voluntary energy labelling requirements for lighting products, and was not limited to the ASEAN target countries – although it did cover Philippines, Thailand and Vietnam. Australia also reported survey results, although it is not clear whether the surveys were undertaken specifically for this project or as part of on-going compliance activities.[23] The project aimed to repeat the surveys after providing feedback to suppliers, to see whether compliance improved, but no country (other than Australia) undertook a second round of surveys within the timescale of the project.

[23] In fact all countries other than Vietnam reported significantly higher compliance rates than Australia, and while Australian compliance rates improved on the second survey, they still lagged most countries. This may have reflected the fact that the programs outside Australia were voluntary, so did not cover the suppliers who had incentive to either fail to label or mis-state performance, as is the case in a mandatory scheme.

Project 3, initiated after the UNEP en.lighten SEAP MVE project commenced, targeted ASEAN countries only. In effect this replicated the sampling, packaging and shipping (to GELC) tasks of Project 1 in a more structured way, while at the same time using the store visits to gather information about the products on the market in each country. These activities took place in the last quarter of 2014. Several lamp types were sampled and sent to GELC for testing: CFLs, LFLs and some LEDs.

Project 4 targeted the development of the technical capability for LED lamp verification testing in those ASEAN countries with lighting test laboratories. GELC tested multiple samples of three LED lamp models – one 12V DC and two 230V AC. The same samples were then sent to 6 laboratories in 4 countries for retesting, then returned to GELC for repeat testing. The results were analysed by GELC, which made recommendations regarding the test methods and instrumentation in the other laboratories. The results for electrical properties were fairly consistent, but not the results of the photometric tests (e.g. colour temperature). Project 5 and Project 6 report on the testing of the CFLs and LEDs collected in Project 3.

The reports on lamp testing and inter-laboratory comparisons were prepared by GELC. While these appear to be of a high technical quality, it is understood that considerable effort was required by UNEP en.lighten staff and others to work with GELC to get the text of the reports to a stage that was suitable for publication. This, and a high workload, may account for the length of time between receipt of lamps by GELC and the publication of the reports (around 18 months). Given the rapid rate of technical development in LED lighting in particular, the market may have changed considerably by the time the results were published.

Table 7 Reports on monitoring and testing projects undertaken during LA period

		ASEAN Countries involved										
Project	Author and date	Brunei	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philip-pines	Singapore	Thailand	Vietnam	Other
1. CFL lamp sampling and testing	GELC, Nov 2014											Tonga and 9 non-Asia countries
2. Label display survey	Ellis, April 2014							✓	✓		✓	Australia, India, Sri Lanka (a)
3. CFL & LED lamp sampling	IIEC, May 2015		✓	✓	✓			✓		✓	✓	
4. Inter-laboratory LED testing	GELC Nov 2015			✓				✓		✓	✓	China (GELC)
5. CFL testing	GELC Jan 2016		✓	✓	✓			✓		✓	✓	China (GELC)
6. LED testing	GELC Jan 2016		✓	✓	✓			✓		✓	✓	China (GELC)

These reports are available at http://www.enlighten-initiative.org/ResourcesTools/Publications.aspx (a) Pakistan also agreed to participate, but was not able to implement energy labelling in time and so withdrew.

2.3 Specific Issues

Engagement with standards organisations

The main objective behind Australia's sponsorship of the CFL Harmonization Initiative in May 2005 and one of the main objectives of *lites.asia*, as expressed in the October 2009 communique, was to influence global lighting standards, in particular the CFL standards controlled by IEC committee TC34.[24] There were sound policy reasons for this:

- CFLs were at the time the most widely promoted form of energy-efficient single-cap lighting (a role now being assumed by LEDs);
- They were manufactured in many countries and widely traded (although China dominated global production then, as now);
- Lamp performance and quality varied widely, especially in the more challenging electricity supply conditions and physical environments of developing countries;
- The prevalence of low-quality CFLs in many markets was giving the technology a bad name with consumers; and
- Several Asian countries had MEPS, energy labelling and other programs targeting CFLs and needed to adopt testing and performance standards.

These issues could be best addressed through the widespread adoption of suitable global standards rather than a proliferation of national standards, provided the global standards met the following criteria:

1. They contained repeatable and reproducible tests of the photometric, electrical, safety and environmental (i.e. toxic and hazardous materials) characteristics of lamps;
2. They contained tests of lumen maintenance and longevity, to address the problems which consumers commonly encountered (short life and rapid dimming);
3. They contained a limited number of performance levels (or "tiers") which could be adopted as MEPS or HEPS levels by various countries. This would make it easier for manufacturers to comply with different national MEPS levels, and also for countries to move to higher MEPS levels (and presumably more expensive lamps) as their circumstances changed; and
4. They provided for classes of products suited to the more challenging environments of developing countries, e.g. lamps designed with greater resistance to voltage and frequency fluctuations and to marine and corrosive environments.

The IEC CFL standards partly met the first and second of these criteria, but not the others. The CFLI developed a proposal with three performance levels (later revised to four) along with other proposals for improving the reliability of the photometric and other tests. In September 2006, the Australian representative on TC34 submitted the suggestions for revisions to IEC60969 on behalf of the CFLI, with the understanding that the proposals for performance levels would come later.

[24] http://www.lites.asia/files/otherfiles/0000/0074/01_Communique.pdf
As with other IEC Technical Committees, there are several subcommittees and working groups, but for brevity TC34 is used here to mean the subcommittee for the relevant lighting technology.

TC34 adopted the proposed test revisions with modifications, but when Australia submitted the proposals for performance levels in 2008, these were rejected on the grounds that they were outside the TC's remit.

It was considered that the members of the CFLI would be better able to influence the standards if more of them joined TC34 and participated actively in its work. Most Asian countries depend on IEC standards because (unlike Australia) they do not have the resources to write their own, so they have a strong interest in ensuring that the IEC standards are suitable. The establishment of LA provided the opportunity to give Asian countries technical and financial assistance to participate in TC34.

Since 2009, LA has supported travel to TC34 meetings by representatives from China, India, Indonesia, Philippines and Vietnam (China now continues to participate at its own cost). Nevertheless, TC34 has continued to resist the inclusion of performance levels and special lamp classes in the CFL standards. The objections include resistance to inclusion of any performance levels at all, on the grounds that they might become automatically mandatory in some countries.
Alternatively, some were prepared to accept a single, stringent performance level but not multiple levels, even though IEC standards for some other products adopted this approach. Too high a single level for CFLs could push up the price of compliant products beyond what consumers in developing countries could afford.

To address these objections the Australian-led group suggested that the tiers could be included in an annex to the standard. After this was rejected, it was suggested that Australian could develop a proposal for a separate IEC Technical Specification, which would not have the status of standards and so would not impact on any legislation invoking the standard. However, regulators wishing to invoke performance tiers could refer to the Technical Specification.[25]

Formal development of a Technical Specification cannot begin until the project is approved as a New Work Proposal by the relevant committee. The vote was lost in May 2014, despite the fact that several *lites.asia* member countries had joined TC34 by then, and *lites.asia* had resolved to support changes to the standards. According to interviewees, the main reason was entrenched opposition by the global lighting companies, who were able to influence the views and the votes of several (non-Asian) country representatives.

Given the centrality of this objective to CFLI and then to lites.asia, and the nearly 8 years of effort, it must be said that this outcome represented a major failure of the lites.asia project, and was identified as such by several interviewees. Nevertheless, there are lasting benefits in terms of technical capacity building through greater engagement in IEC by several Asian countries, including the transition to full voting membership of TC34 by Indonesia and the Philippines.

The next best approach to standards harmonisation is to pursue it at the regional rather the global level. This is the principle of the ASEAN SHINE - Lighting project, the

[25] This would have been an interim strategy, since an IEC Technical Specification has a 5 year life from the time of adoption and can be renewed for only one further 5 year period. After that it lapses unless the relevant TC votes to adopt it as a full standard.

submission for which was prepared by UNEP en.lighten as part of the LA MVE project following a resolution at the 11th LA meeting in February 2015. A commitment to regional harmonisation of lighting standards and policy was made at the 19th annual meeting of the ASEAN Energy Efficiency & Conservation Sub-Sector Network (EE&C-SSN), in Kuala Lumpur in April 2015, organized by the ASEAN Center for Energy (ACE):

> "The agreed ASEAN plan outlines a six-step approach to regional harmonisation of lighting standards and policy – from assessment of the regional market and development of a regional roadmap, through national implementation of the roadmap, to awareness-raising campaigns and activities for end-users – and a model for a working group and steering committee infrastructure to implement the plan.
>
> By agreeing on this proposal, EE&C-SSN members have committed to work towards national implementation of the roadmap by early 2018, under the leadership of ACE, in partnership with the UNEP en.lighten initiative."

It was the view of the UNEP en.lighten initiative and ACE that ASEAN SHINE - Lighting, as part of an established ASEAN standards harmonisation process, was best suited to progress the regional harmonisation of lighting standards.

Although this initiative originated during the period of the UNEP en.lighten SEAP MVE project, and is consistent with the original objectives, it does not represent a continuation of *lites.asia*. One key difference is that ASEAN SHINE is restricted to regulators from ASEAN countries, whereas *lites.asia* was open to all Asian countries and to lighting industry associations as well. The possibility of maintaining a wider *lites.asia* network alongside ASEAN SHINE - Lighting – perhaps by holding some adjacent meetings – is being explored.

Administrative efficiency

The *lites.asia* program has been funded from a number of sources over the years. It is estimated that the cost to Australia of operating *lites.asia* from its inception at the end of 2009 to the start of the UNEP en.lighten SEAP MVE project phase in early 2014 was about A$1.2 million. About A$0.45 m came from the APP, and in 2011 the then Department of Climate Change and Energy Efficiency obtained a further A$0.75 m Australian Aid Climate Fast Start Finance grant. Fast Start funding was also obtained for the Pacific Appliance Labelling and Standards (PALS) and the Vietnam Energy Efficiency Standards and Labelling (VEESL) programs.

Once the original Fast Start funding for *lites.asia* ran out, the Department secured a further Australian Aid Fast Start grant of A$2.8 million for the UNEP en.lighten SEAP MVE project (with an additional $0.20 M allocated to DIIS for administrative costs). Therefore the total operating cost to Australia for the entire *lites.asia* program, including the UNEP en.lighten SEAP MVE project, will have been about A$4.2 million, or roughly A$0.5 million per year. This does not include funding contributions to *lites.asia* from U.S. government agencies and contributions in kind from countries hosting meetings.

The main expenditures have been for meetings costs, delegate travel, consultants to prepare guides, studies and reports, lamp testing costs and administration. The first *lites.asia* operating agent was US ECOAsia with Beletich Associates, followed by Jeffcott Associates and then UNEP en.lighten.

There is no indication that any of the expenditure has been excessive or inefficient. However, the middle stages of the UNEP en.lighten SEAP MVE project coincided with a major review of the UNEP's internal administrative processes, causing considerable delay and difficulty to all parties. There were also uncertainties regarding funds remaining towards the end of the project, and the status of some of the outcomes originally agreed.

Furthermore, several stakeholders (including UNEP en.lighten staff) conceded that running the programme with staff based at UNEP headquarters in Paris was inefficient, and that an Asian base would have been preferable. It is noted that UNEP en.lighten is implementing ASEAN SHINE - Lighting with staff based in Bangkok.

Nevertheless, interviewees were generally satisfied with UNEP en.lighten's performance in terms of keeping stakeholders informed and arranging meetings and delegate travel. The UNEP en.lighten initiative's nomination of focal point contact persons in each country also helped co-ordination when multiple government agencies and lighting industry bodies were involved.

In some cases the funding rules prevented travel assistance to various groups (e.g. non-ASEAN countries) but the momentum and inclusiveness of the *lites.asia* meetings was generally maintained.

Pacific Efficient Lighting Strategy (PELS)

In early 2014, the UNEP en.lighten team began work with the SPC on the development of a Pacific Regional Lighting Strategy, as required under the terms of its grant. UNEP en.lighten was made aware of the pre-existing Pacific Appliance Labelling and Standards (PALS) program, which had been initiated with Climate Fast Start finance in late 2011. The objective of PALS is to establish the regulatory and administrative framework for mandatory MEPS and energy labelling in Pacific Island Countries (PICs), using the same AS/NZS standards as are used in Australia and New Zealand.[26]

There were obvious synergies between PALS and what came to be known as the Pacific Efficient Lighting Strategy:

- Both projects operated through the SPC;
- Many of the same PICs formally joined both programs, and in many cases the same local officials acted as the contacts;
- Each had a regular schedule of meetings, so they could be efficiently attached; and
- Both PALS and PELS recognised the importance of MEPS.

[26] At the time of writing the following PICs had obtained cabinet approval and had drafted the necessary legislation and regulations: Fiji (which had committed to MEPS and labelling for refrigerators and freezers before PALS), Solomon Islands (partially enacted January 2016), Cook Islands, Vanuatu (enacted in April 2016), Tonga, Samoa, Kiribati and Tuvalu (enacted April 2016). PALS is funded to mid-2017.

PALS had concentrated on establishing a robust regulatory framework that could enforce MEPS and energy labelling for any electrical product, although the initial focus was on refrigeration, which analyses had shown were the largest users of electricity in PICs. The next priority was to be air conditioning. Following the initiation of PELS, lighting products were added to the group of target appliances.[27]

UNEP en.lighten EL approached PELS on the basis of its "integrated policy approach" which consists of four elements:

1. Minimum energy performance and quality standards for lighting products;
2. Supporting policies and mechanisms, including regulations, economic and market-based instruments, fiscal instruments such as taxes and information and voluntary action;
3. Monitoring, verification and enforcement systems; and
4. Environmentally sound management of lighting products, including safe and disposal at the end of life.[28]

However, PALS countries had already committed to implementing general regulations to support MEPS and (where appropriate) mandatory energy labelling, so it was not necessary to build a case. Furthermore, the countries which had drafted regulations had already decided in principle to adopt Australian and New Zealand standards as the basis for testing, labelling and MEPS for all regulated product, for reasons of administrative efficiency, product trade flows and consumer awareness.

Despite this, the PELS development workshops spent considerable time discussing options which were already settled. As the energy efficiency policy resources of Pacific countries are already over-stretched, often with the same official responsible for both PALS and PELS, this introduced unnecessary duplication, inefficiency and confusion.

UNEP en.lighten had made the prior assumption that "The scope of technology covered in this effort is: single-base, omnidirectional lamps for general service, indoor applications." (SEAP MVE project's *Plan of Action*). The process continued to focus on the elimination of single-cap tungsten filament incandescent lamps and on the promotion of CFLs and LEDs, even after research revealed that by far the most common form of lighting in Pacific households is linear fluorescent lamps.[29]

The research also indicated that lighting demand in the Pacific was grossly under-served, in that most households could afford fewer lamps, and to run them for fewer hours per night, than they wished. Many non-residential buildings (especially government offices) were also under-lit due to missing LFLs and poor maintenance of luminaires. Therefore a large share of any improvements in efficacy would most likely be taken as increased illumination rather than energy savings. While this is equally valuable, it means that lighting energy savings projections for the Pacific, and probably

[27] At present most PICs are planning a phased introduction – refrigerators and freezers first, then air conditioners, then lighting products – to avoid overloading the administrative processes and resources.
[28] http://www.enlighten-initiative.org/portals/0/documents/Resources/publications/en.lighten%20Brochure%20PDF.pdf
[29] http://www.spc.int/edd/en/document-download/viewdownload/11-reports/2027-regional-status-report-on-efficient-lighting-in-pacific-island-countries-and-territories-

other countries at similar levels of income and stages of development, tend to be greatly over-stated.

The development of PELS was undertaken by consultants engaged by the SPC. The UNEP en.lighten team worked closely with the consultants and the SPC, but less closely with Australian officials, despite the fact that Australia was funding both PALS and PELS and had an obvious interest in ensuring that the two programs remained aligned and that the consultants achieved their agreed milestones. This was rectified in due course, and co-ordination between the parties improved.

The PELS, endorsed (or "validated") by PIC representatives in August 2015 "presents a cohesive set of national and regional actions for on-grid and off-grid lighting, targeting lighting end-uses in residential, commercial and government buildings, as well as street and outdoor lighting. It recommends a structured, three-phase approach, which takes into account the uneven development status of the institutional and regulatory frameworks required to support efforts to phase out incandescent lamps and promote efficient lighting in each participating country."[30]

The final PELS document estimates the resources and budgets required to implement the four elements of the "integrated policy approach" (IIEC 2015a). At present the only elements resourced relate to regulation, MEPS and product registration, and only because those aspects are covered by PALS.

To sum up, the development of the Pacific Efficient Lighting Strategy represented the first application within the UNEP en.lighten SEAP MVE project of the UNEP en.lighten "integrated policy approach". Prior to that, *lites.asia* had worked with participating countries to develop their efficient lighting policies using less prescriptive approaches. PELS demonstrated the possibilities as well as the limitations of the integrated policy approach. It is a useful starting point where there is no pre-existing framework, but should be more flexible and responsive where local circumstances require. Nevertheless the PELS document has been useful in its own right, with some Pacific countries are using it as a basis for funding proposals to potential aid donors.

[30] http://www.lites.asia/news-and-events/newsletters/november-2015

3. Conclusions

3.1 Objectives

The activity of increasing lighting efficiency is continuous and endless. It is rare for any lighting technology to completely disappear, although the demand for some products can be constrained though a mix of natural market forces and government policy, and after a point it becomes uneconomic to produce them (for example: T12 LFLs and GLS incandescent lamps).

If the often-stated objective of "phasing out inefficient lighting" is taken literally, then it is largely unattainable. It is possible (indeed too common) to find products of theoretically energy-efficient technologies that are inefficient from the start, fall off rapidly in their lm/W output, give poor quality light, fail early, and pollute the waste stream. There is no end point when it can be said that this objective has been achieved – all impacts are relative, not absolute.

A more realistic statement of the objective would be "to reduce the market share of less efficient and lower quality lighting (of all technology types), and increase the share of more efficient and higher quality lighting products, compared to what normal market forces would achieve."

There is a range of both regulatory and non-regulatory policy options available to governments to work towards this objective. These include voluntary endorsement labelling for lamps which meet certain criteria, mandatory labelling for all lamps of a given type, minimum energy performance standards and minimum quality standards. Implementation costs are lower if they can be shared with other countries. Indeed, it is only practical to develop such basic program elements as testing standards co-operatively, on a regional if not a global level.

A monitoring, verification and enforcement capability is fundamental to the success of any lighting efficiency program, whether voluntary or mandatory. Some suppliers will always try to comply and some will always try to gain an unfair advantage, but many more will comply if they know there is a robust MVE regime in place. This has both a national and an international dimension. Each country has a different market and a different range of lighting products available, so market monitoring and sampling must be local. Verification of performance requires testing in a qualified laboratory, which may mean shipping samples to another country. Enforcement and the application of penalties takes place within the legal framework of each country separately, but sharing information on non-compliant products and companies helps all countries.

Therefore a restatement of the central objectives of *lites.asia* and the UNEP en.lighten SEAP MVE project from the viewpoint of the Australian government might be as follows:

- Establish a framework conducive to maximising the objectives: to reduce the market share of less efficient and lower quality lighting (of all technology types), and increase the share of more efficient and higher quality lighting products, compared to what normal market forces would achieve;

- Ensure that the measures necessary to underpin the objectives (especially harmonisation of standards and (MVE) are implemented efficiently and effectively;

- Ensure that the measures become self-sustaining so that Australian support can be reduced over time; and

- Ensure that benefits for Australia are maximised (in terms of enhancing the efficiency and quality of the local lighting market, and gaining recognition and building influence with regional and global partners).

Achievement of these objectives requires long-term engagement, and this has indeed been the case. The regional lighting initiatives that continue to the present day originated with the domestic Greenlights program and then the Australian-sponsored workshops on the harmonisation of CFL standards at the conferences in Shanghai in May 2005 and May 2008. The initiatives assumed a tighter geographical focus with the establishment of lites.asia in Hong Kong in October 2009. In mid-2013 UNEP en.lighten became the operating agent, while at the same time refocussing lites.asia activities on MVE.

However, many of the overall objectives remain, and the origins of the activity can still be clearly traced back to 2005. Indeed, the original objective of standardisation has re-emerged with a different emphasis in the new ASEAN SHINE - Lighting process, most likely focusing on regional harmonisation of test standards for LFLs and GLS LEDs within ASEAN countries, rather than global harmonisation of CFL standards through engagement with the IEC, which was the one of the original objectives of lites.asia.

While this report focuses primarily on the objectives, activities and achievements of *lites.asia* and the UNEP en.lighten SEAP MVE project from the end of 2009 to mid 2016, the preceding and subsequent activities also need to be kept in mind.

3.2 Findings on terms of reference

- *Evaluate and analyse the performance and monitoring material provided by the UNEP en.lighten team, including quarterly reports, participant activity evaluation surveys, and other evidence submitted by UNEP regarding demonstrated differences.*

The *lites.asia* program has been thoroughly documented, since its inception in 2009 and throughout the UNEP en.lighten SEAP MVE project period. The main sources of information used for this evaluation are the meeting reports prepared by the *lites.asia* operating agent, the UNEP en.lighten quarterly reports to DIIS and the meeting evaluation forms sent by UNEP EL to participants in *lites.asia* meetings, special workshops and webinars. This was supplemented with direct interviews (see Appendix 1).

The feedback from meeting participants indicates a high level of satisfaction, and in most cases an *intention* to apply the information gained. The extent to which this

actually occurred and the impact on the participant's country's lighting policies and programs is difficult to judge.

It is not likely that the meetings, activities, training workshops, webinars, lamp tests, guides and other written materials would have occurred without support, so in this respect the projects made a demonstrable difference.

- *Present a contribution analyses to identify the difference made by the Project's support to the development of MVE programs and national/regional lighting efficiency plans and provide conclusions of the efficiency, effectiveness and impact of the UNEP en.lighten Asia-Pacific project to date, and the sustainability of these outcomes in the future*

The UNEP en.lighten SEAP MVE project has raised awareness of the importance of MVE in realising the potential benefits of the lighting energy efficiency programs already implemented. The project also gave valuable practical experience to the countries involved in key aspect of implementing MVE:

- Monitoring the lighting market and checking label compliance through store surveys in 2014 (covering 3 ASEAN and 3 south Asian countries)
- Collecting lamp samples and forwarding them to GELC for testing in 2013 (47 CFL models from 10 countries; one of which was from the Asia-Pacific);
- Collecting lamp samples, documenting and forwarding them to GELC for testing in 2015 (100 CFL and LED models from 6 ASEAN countries);
- Check testing by GELC;
- Inter-laboratory comparisons (GELC, and laboratories in 4 ASEAN countries).

None of these activities would have taken place without funding and organisation through lites.asia and the UNEP en.lighten SEAP MVE project. Country participants were of the view that these activities have been well organised and they learned valuable information about their own lighting markets.

Webinars, meetings and workshops were all highly regarded by participants, both in feedback forms at the time and in interviews conducted for this evaluation. Technical guides and documents have also been well received. However, whereas these have all raised awareness and capability, it is not possible to conclude that these have resulted in an increase in MVE strategies or activities beyond those supported by the project.

The one *national/regional lighting efficiency* plan completed during the MVE project period was the Pacific Efficient Lighting Strategy completed in November 2015. In this case there was some tension between UNEP's standard "integrated approach" (MEPS, MVE, supporting policies and mechanisms and environmentally sound management) and the actual situation of the Pacific countries, which were already well advanced with regard to MEPS.[31] One the other hand the PELS document has been useful in its own

[31] The countries participating in the PELS programme via the SPC had already committed to adopting the Australian and New Zealand MEPSL standards for a range of products, including lighting. (In fact, the Pacific countries have already solved the problem of regional harmonisation of standards which the ASEAN Shine project is now attempting to address for ASEAN). Given these circumstances the UNEP EL secretariat's insistence on reopening the question of which lighting MEPS to adopt was not helpful.

right, with some Pacific countries are using it as a basis for funding proposals to potential aid donors.

The question of sustainability should not be seen in terms of the outcomes achieved in participating countries during the strict time period of *lites.asia* (2009-2016). The network of regular meetings and the activities related to increasing lighting efficiency in the Asian region could continue, possibly as an adjunct to the ASEAN SHINE – Lighting project. It is likely that this durable (and valued) framework will result in additional and sustainable outcomes in the longer term, but these may need more direct engagement with specific countries, in areas that have been identified by the UNEP en.lighten SEAP MVE project..

However, not all the outputs agreed at the start of the project could be delivered. One example was the "focused, detailed MVE plans" for nominated ASEAN target countries. In retrospect, the development of MVE plans for the ASEAN target countries, which were not delivered as a result of the shift of focus to PELS, could have helped put the efforts of those countries on a more sustainable basis

The UNEP en.lighten involvement has contributed to the continuation of efficient lighting activities through support for the development of country and regional bids for additional funding. Efficient lighting projects in Indonesia, Myanmar and Pakistan are due to be submitted for funding, with UNEP en.lighten support, by mid 2016.[32] Projects in Cambodia, Tonga and the Pacific region are also in preparation. Another key outcome with long-term implications is the ASEAN SHINE – Lighting project.

- *Evaluate the effectiveness and contributions made by the lites.asia network, workshops and website from 2009 to date to the regional phase-out of inefficient lighting, including:*

The *lites.asia* meetings provided opportunities for the participating countries to share and learn from each other's experiences, and according to the reports of the meetings they did so actively. These exchanges made officials aware of alternative ways to achieve their objectives and helped to avoid some potentially costly and inefficient outcomes, such as restricting testing to government laboratories or establishing new test laboratories where there was already sufficient testing capacity.

The ASEAN countries with formal commitments to phase out inefficient incandescent lighting are Malaysia, Singapore and Vietnam (Table 1). Malaysia and Singapore already had pre-existing MEPS and labelling programs for other products, but extended coverage to lighting products with the support of *lites.asia*. In 2012 Vietnam announced a comprehensive MEPS and labelling program covering a range of products, including lamps, and was assisted in its implementation by a separate Australian government-funded project. In the Pacific the Australian Government also supported the development of MEPS and labelling policies, legislation and programs targeting a range of products, to which lighting was added as a result of the Pacific Efficient Lighting Strategy. While *lites.asia* network has certainly contributed to the overall progress toward *regional phase-out of inefficient lighting* other initiatives have also made significant contributions.

[32] U4E-en.lighten_Projects_Ongoing&hard-pipeline_March2016_Master

With respect to regulations underpinning the *regional phaseout of inefficient lighting*, it appears that the existence of *lites.asia* was a necessary but not sufficient condition. There is no evidence of any country implementing the legislative framework to underpin the phaseout of inefficient lighting solely as a result of the influence of *lites.asia*. Legislation enabling MEPS and labelling for a range of products was either in place already, or where it was implemented later, participation in *lites.asia* was not the sole driver. In fact it could be argued that other, more targeted assistance (to Vietnam and the Pacific countries) made at least as great a contribution.

However, the *lites.asia* program ensured that lighting was on the list of products to be covered by the MEPS programs of participating countries, sooner than would otherwise have been the case.

- *Accumulation and sharing of lighting efficiency program knowledge, practice and experience;*

The technical information and access to others' experience gained from participation in *lites.asia* meetings and technical workshops was valued by participants, and may well have informed the drafting of regulations and the adoption of standards related to lighting.

The publication of the six MVE guides and project reports represents a significant and lasting accumulation of the knowledge and experience of many experts, officials, laboratory technicians and other practitioners. The webinars helped disseminate this information to those who took part, but the audience was limited and although the material is still available it is in a less accessible form.

For those documents available on both websites, the UNEP en.lighten website is currently easier to navigate. Common descriptions and subject headings for documents across the two sites would help. Newsletters, meeting presentations and other materials produced prior to UNEP en.lighten involvement are only available on the *lites.asia* website. The end of the UNEP en.lighten SEAP MVE project in mid 2016 provides an opportunity to review the structure and long term management strategy for the *lites.asia* website. Other means of sharing information, such as the CLASP and U4E websites, can be and are being used.

Australia has over 30 years' practical experience in managing MEPS and labelling. The lites.asia program in general gave the opportunity to share that experience with other countries in the region, and this was acknowledged and appreciated by participants. SEAP MVE project brought the involvement of UNEP en.lighten as a partner, and established working relationships and the sharing of experience with DIIS.

- *Evidence of success in strengthening policy and regulatory initiatives in the field of lighting energy efficiency in the Asia region;*

The regulatory initiatives that pre-dated *lites.asia*, and those that began during the period (such as VEESL and PALS), were most likely strengthened by the existence and support of the UNEP en.lighten SEAP MVE project.. Participation in *lites.asia* raised the profile of efficient lighting in countries with MEPS and labelling programs, and accelerated the incorporation of lighting products.

The building blocks of regulatory initiatives are workable test standards and the capacity and capability to monitor the market and to test products for compliance with the standard. In both areas the LA programme has achieved some success. The UNEP en.lighten Southeast Asia and Pacific MVE project has held several workshops on product testing, conducted in-country lamp sampling exercises, published lamp test results and worked to enhance lighting test laboratory capabilities in participating countries.

The successes with regard to standards are summarised below. Although this involved a change of direction after the approach to IEC did not succeed, this was evidence of one of the strengths of the *lites.asia* programme - its flexibility. The ability to change direction and refocus was noted as one of the strengths of programmes funded by Australia, as distinct from the more rigid approach of some other funding bodies.

- *Improvement of regional understanding of and engagement with international standards organisations and processes in relation to standards for lighting energy efficiency and quality;*

One of the main objectives of *lites.asia* (as expressed in the "10–point plan" in the initial communique) was to mobilise countries in the Asia-Pacific region so that regional requirements could be reflected in the relevant IEC lighting product standards. A unified regional approach was attained and communicated to the relevant IEC technical committees, and *lites.asia* helped support countries to engage in the IEC process. However, the changes proposed were not accepted by the IEC.

lites.asia's funding support for regional attendees increased the region's presence at international standards meetings, brought the region's needs to the attention of the IEC and enabled standards processes and improved the understanding of those processes by countries in the region. This gave them the opportunity to engage if they wished, and led to some countries changing their status from Observer to Participant.

The February 2015 resolution by *lites.asia* participants in to work towards regional harmonisation of standards, consistent with ASEAN leaders' commitment to a single market for good as services, was a significant policy achievement.

- *Do the lites.asia participants see value in the lites.asia forum network and associated support continuing post June 2015 [now June 2016]?*

All participants interviewed indicated that they considered the *lites.asia* network, and the regular meetings, to be very important and most expressed their hope that it would continue. They valued the ability to meet and exchange views with other regulators as highly as the access to technical information. The high participation in the first meeting of ASEAN SHINE - Lighting confirms the value which participants place on continuing the network in some form.

- *Present analyses, conclusions and recommendations to inform the design of similar programs in future and/or the identification of further steps to promote and enable the uptake of energy efficiency lighting in the region;*

The feedback from those *lites.asia* participants which are at an earlier stage in their development of lighting policies and programs is that, while the forum is a valuable source of information, it would be very helpful to have more targeted assistance with actual implementation. This may require more in-country engagement, and over a longer period (as, for example, was the case with Vietnam) and, in the case of smaller countries, direct funding of personnel, because administrative resources are already over-stretched.

UNEP en.lighten officials held a workshop for government policy makers from Cambodia, Lao PDR and Myanmar, in Myanmar in February 2015 as part of the UNEP en.lighten SEAP MVE project. While no sub-regional programs were developed during the period of the project, it is understood that these will be developed as part of ASEAN Shine – Lighting, on the basis of experience gained during the SEAP MVE project.

There were some structural issues with UNEP en.lighten's delivery of the SEAP MVE project. Due to delays in finalisation the project did not get up to speed for about 6 months after the agreement was signed. UNEP underwent a major review of administrative and financial systems during 2015. This caused significant problems, delaying meetings and contracts, and contributed to the two no cost extensions, first to December 2015 and then to June 2016.

UNEP agreed that it would have been more efficient to base the SEAP MVE project management in the region rather than in Paris. UNEP tends to operate at a regional level, so if *lites.asia*'s successor programs do call for closer local engagement, working from offices in each country may be more effective. Alternatively, if local assistance could be provided direct from Australian government agencies, then PALS might be a suitable models.

While *lites.asia* has sought and obtained the co-operation of the lighting industry through engagement with national associations and individual firms in meetings and special workshops, it did not involve private partners in the direction of the program. This was deliberate as the *lites.asia* forum focussed on interchange between governments. The nature of the meetings would have been very different and less open and collegiate if they were open to all lighting companies (both from within and outside the region).

The meetings were not however closed to industry, and representatives of industry associations attended and reported back to their members. Stakeholder workshops for industry were also held on several occasions. The original APEC project that led to the creation of *lites.asia* also set up the Asia Lighting Compact, which was incorporated in Singapore as a regional industry forum (similar to the European Lighting Council), with a part time employee. There was some friction with the European-based lighting industry in its establishment and the ALC's industry members later decided to wind it up.

Based on this experience, the arm's length relationship between the *lites.asia* forum and the lighting industry was appropriate. However, the global lighting companies were already formal partners in UNEP en.lighten when it became administrator of *lites.asia*, and this may have caused some conflict and delays in approving the content of program material related to testing and MVE.

While the participants valued the technical information which the private partners made available, the lites.asia forum offered a more appropriate balance, giving participating countries access to highly qualified independent experts, with less risk of commercial conflict of interest.

- *Make recommendations for increasing effectiveness beyond the completion of the present Australian funding commitment;*

The policies, programs and administrative structures underpinning the promotion of more efficient lighting are equally applicable to other products. Indeed, the ASEAN SHINE programme is now applying similar approaches and objectives – regional harmonisation of standards – to other products, as well as lighting. It may be more effective to fund regional energy efficiency activities which cover a range of product types rather than lighting only, so experience can be shared not only between countries but across product types. At the same time, temporary task forces could be set up when required to achieve a common goal, such as influencing the content of international standards.

At the same time, the regional focus on Asian and Pacific countries should continue. While APEC covers many of the same countries, and has similar forums and parallel activities, the countries that need assistance most are not APEC members. In Asia generally, and even within ASEAN there are countries at different stages of development with regard to energy efficiency (e.g. Cambodia, Lao PDR and Myanmar are at an earlier stage than Thailand or Singapore). The Pacific countries also have special limitations and resource constraints due to their small size.

From this point onward, working with countries individually would be more effective. This would mean addressing the individual needs of countries directly with those countries alone, or in small sub-groups with similar needs. There has been some tendency for the UNEP technical materials to grow in length and complexity to cover each country's and region's requirements. This makes the materials comprehensive, so they are potentially applicable anywhere, but conversely they are less directly relevant to any one country's situation.

This evaluation comes near the end of the UNEP en.lighten MVE project, after which no further *lites.asia* activities are currently planned. If there were sufficient funding, then *lites.asia* should be continued as a forum and a network, with a wider geographical scope than ASEAN Shine – embracing South Asia and the Pacific – and a broader policy remit than regional harmonisation standards, important though that is. However, if funding is limited, then projects working with specific countries or small groups of countries should now take precedence.

- *Consider the case for further funding.*

The *lites.asia* project as a whole has been of benefit to the region and to Australia's interests, both in terms of visible and welcome development aid and in terms of mobilising regional partners with a shared interest in increasing the energy-efficiency of lighting. The *lites.asia* forum has created a network of public and private actors with a common interest in lowering trade barriers and containing the costs of administering and complying with measures to increase efficiency.

It cannot be assumed that this network will continue without some source of funding. This need not come from Australia alone, and indeed the more diverse the funding sources the less vulnerable the activity. From 2005 to 2009 the regional lighting initiatives which paved the way for *lites.asia* received funding from the U.S. and the U.K. as well as Australia. From 2009 to 2011 *lites.asia* was funded jointly by AusAID and USAID. Since then it has been funded mainly by Australia.

The ASEAN Shine - Lighting program, funded by the EU SWITCH-Asia Regional Policy Support Component, ensures the continuation of some of the work commenced within *lites.asia*, at least for a while (it is understood that the EU funding is currently only assured for one year, even though a work program has been developed to 2020). The work program included a Work Package "Capacity building for compliance and enforcement authorities" which is intended to build on the UNEP en.lighten SEAP MVE project.

Australian officials and experts have much to contribute to these activities, so at the very least the Australian government should consider funding their participation in ASEAN SHINE (not just lighting, but also the other products covered by ASEAN SHINE).

At the same time, there may be value in directing funding to specific countries or groups of countries for projects of particular interest to them at their particular stages of development. For example, a program similar to the Pacific Appliance Labelling and Standards (PALS) program to help the less developed ASEAN countries (Cambodia, Lao PDR and Myanmar) to establish the basic legislative, administrative and MVE structures to support mandatory MEPSL for lighting as well as for other energy-using products of importance to their economies.

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4. Recommendations

4.1 Program activities

Continuation of lites.asia

The *lites.asia* network has provided a necessary platform for co-ordination and co-operation in the development of efficient lighting strategies and programs in Asia and the Pacific. The *lites.asia* program in its current form managed by UNEP en.lighten is due to be completed in mid-2016. ASEAN SHINE - Lighting will continue to work toward some of the original objectives of LA (the harmonisation of testing standards and MEPS levels) and with many of the same participants and with the involvement of UNEP EL.

However, ASEAN SHINE - Lighting is not a direct substitute for *lites.asia*: it is narrower in both coverage (ASEAN counties only, whereas *lites.asia* covered south Asia and the Pacific as well) and scope (standards harmonisation, rather than wider MVE activities or lighting efficiency programs in general). Furthermore, ASL only has a year of assured funding at this stage.

The following recommendations are directed to the Department of Industry, Innovation and Science.

Recommendation 1

1. Provision should be made for continuation of the *lites.asia* network beyond mid 2016, for a period of not less than three years. This would ensure that the value embodied in the network is preserved. Several major technical studies and reports arising from the UNEP en.lighten initiative SEAP MVE project were published only in late 2015 and early 2016, and continuation of *lites.asia* will ensure that this momentum is maintained, so as many participating countries as possible make good use of those resources and continue to exchange relevant experience.

Recommendation 2

Options for funding the continuation of *lites.asia* should be explored with regional organisations (e.g. ASEAN) as well as international development partners (e.g. UNEP en.lighten, UNEP United for Efficiency (U4E) the Asia Development Bank, Australia and the European Union).

Targeted regional projects

Participants have engaged with the network at different times and in different ways according to their stage of development and with lighting programs and with energy efficiency policies in general. For some countries, this has supported activities already under way, but for others, targeted support is essential given their current stage of development. These countries require special support, not necessarily individually but as part of regional programs.

The countries in this position are those which are least developed with regard to capacity and capability: in Southeast Asia these include Cambodia, Lao PDR and Myanmar, and in South Asia Nepal, Bhutan and the Maldives.

Recommendation 3

The opportunity for the development of a sub-regional project to assist Cambodia, Lao PDR and Myanmar with detailed planning and training for implementation and MVE for energy efficiency programs for efficient lighting and other products should be explored (in consultation with the countries).

Recommendation 4

4. The opportunity for the development of a sub-regional project to assist Nepal, Bhutan and the Maldives with detailed planning and training for implementation and MVE for energy efficiency programs for efficient lighting and other products should be explored (in consultation with the countries).

Recommendation 5

Options for funding these two sub-regional initiatives should be explored with international development partners (e.g. UNEP EL, GEF, ADB, EU).

4.2 Program structures and supports

Management resources

The *lites.asia* network may continue to operate at a lower level of activity than in previous years, if the ASL project focuses on the standards harmonisation task and if, as recommended, separate regional projects are set up in Southeast Asia and South Asia. For examples, meeting could be held annually rather than biennially. Even so, there will need to be a dedicated manager and focal point. This would not necessarily be a full time task.

Recommendation 6

The energy agencies of the more active participants in *lites.asia*, and appropriate regional organisations should be approached regarding the possibility of managing the *lites.asia* network for a period of, say, 3 years from mid-2016. This may be self-funded (as a contribution in kind) or possibly donor-funded.

Recommendation 7

If *lites.asia* continues, in whatever form, the Department of Industry, Innovation and Science should continue to attend meetings and remain involved in any advisory or steering groups.

Websites

Now that the *lites.asia* program is near complete and all significant projects have been completed, there is a need to review the functions, organisation and ongoing maintenance of the *lites.asia* website. It could be adapted to be the portal for ASEAN Shine – Lighting (at present http://www.aseanshine.org/ only has limited technical content, and only for air conditioners). This would have the benefit of maintaining the *lites.asia* brand and continuing its value as a focal point and a regional information exchange on lighting policy and MVE.

Recommendation 8

Before the UNEP en.lighten initiative SEAP MVE project terminates in mid 2016, UNEP en.lighten and DIIS should develop a plan (including provisions for funding) to maintain the *lites.asia* brand and the *lites.asia* website, as a valuable working resource and as a well organised archive of materials.

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GWA & EES (1996) *Electrical Appliance Energy Labelling and Minimum Energy Performance Standards for Pacific Island Nations: Baseline Study*, George Wilkenfeld and Associates and Energy Efficient Strategies, for the Forum Secretariat Energy Division, December 1996

Mathers (2014) *Status report on lighting, monitoring, verification and enforcement activities and programmes in Cambodia, Indonesia, Lao PDR, the Philippines, Thailand and Vietnam*, Moira Mathers 2014 [Policy Status Report Lighting MVE Southeast Asia.pdf]

USAID (2009) *Phasing in Quality: Harmonizing CFLs to Help Asia Address Climate Change*, USAID, March 2009

VEESL (2012) *Vietnam Energy Efficiency Standards and Labelling Programme: Australian Government support project – Inception Report*, Department of Climate Change and Energy Efficiency, January 2012

Appendix 1 Interviews

Persons Interviewed

Mr Asawin Asawutmangkul, Department of Alternative Energy Development and Efficiency (DEDE), Thailand (interviewed by telephone, 24 December 2015)

Mr David Boughey, Department of Industry, Innovation and Science (interviewed by telephone. 24 March 2016)

Ms Kathryn Conway, former staff member, UNEP en.lighten (interviewed by telephone. 3 November 2015)

Mr Dang Hai Dung, Vice Director, Science and Technology Department
Ministry of Industry and Trade, Vietnam (interviewed by email, 19 February 2016)

Mr Jonathan Duwyn, Project manager, en.lighten initiative, United for Efficiency, U4E (Interviewed by telephone, 23 December 2015)

Mr Stuart Jeffcott, former CFLI co-ordinator and *lites.asia* operating agent (interviewed Bangkok, 4 February 2016).

Ms Marie Leroy, Asia Coordinator, UNEP en.lighten (interviewed Nadi, 5 August 2015).

Ms Naing Naing Linn, Energy Efficiency & Conservation Division, Directorate of Industrial Collaboration, Ministry of Industry, Myanmar (interviewed Bangkok, 3 February 2015)

Ms Makereta Lomaloma, Energy Efficiency Adviser/PALS Project Manager/PELS Project Manager, Economic Development Division, Secretariat of the Pacific Community (SPC) - Suva Regional Office (Interviewed Kiribati, 11 February 2016).

Ms Emily McQualter, former Senior Policy Officer, Consumer Appliance Team, Appliance Energy Efficiency Branch, Energy Division, Department of Industry and Science (interviewed by telephone, 2 December 2015)

Ms Kritika Rasisuddhi, Electricity Generating Authority of Thailand (EGAT) (interviewed by telephone, 24 December 2015)

Ms Khlok Vichet Ratha, Deputy Director, Department of Climate Change, Ministry of Environment, Cambodia (interviewed Bangkok, 3 February 2015)

Mr Ofa Sefana, Energy Planner, Energy Division, Ministry of Environment and Climate Change, Kingdom of Tonga (Interviewed Nuku'Alofa, 11 November 2015)

Ms Mel Slade, former Chair of *lites.asia* (interviewed Bangkok, 3 February 2016).

Mr Supriyadi, Head of Energy Efficiency Technology Implementation, Directorate of Energy Conservation, Ministry of Mineral Resources of the Republic of Indonesia (interviewed Bangkok, 3 February 2015)

Mr Khanvixay Thavixay, Electrical Engineer, Energy Enterprises Management Division, Ministry of Energy and Mines, Lao PDR (interviewed Bangkok, 3 February 2015)

Mr My Ton, former Team Leader, Energy Efficient Lighting, USAID Regional Development Mission for Asia (interviewed Bangkok, 4 February 2016).

Mr Zulfiklee Umar, Head of Demand Side Management Unit, Energy Commission, Malaysia (interviewed Bangkok, 3 February 2015)

Mr Lieng Vuthy, Deputy Director, Department of New and Renewable Energy, Ministry of Mines and Energy, Cambodia (interviewed Bangkok, 3 February 2015)

Ms Farida Zed, Director of Energy Conservation, Ministry of Mineral Resources of the Republic of Indonesia (interviewed Bangkok, 2 February 2015)

Questionnaire for national participants in lites.asia / en.lighten program

1. What Agency do you work for?

2. What is your professional background and your current position?

3. What is your role (may be more than one role - e.g. energy efficiency policy, energy efficiency programme regulation, monitoring and compliance, standards development, test lab, other)?

4. How long have you been involved with lites.asia (LA) and the United Nations Environment Programme (UNEP) en.lighten (EL) programme? (As the distinction between LA and EL activities and events is not always be clear, we will label them 'LA/EL' in the following questions, unless they relate specifically to one or the other).

5. What is your role with regard to LA and EL?

6. What events have you personally, or others in your country, participated in?
   - LA meetings?
   - LA / EL special workshops?
   - LA / EL events in your country (e.g. test lab training, store surveys, monitoring, meetings with industry and government policy makers)?
   - LA / EL webinars?
   - LA / EL lighten supported attendance at IEC meetings and workshops?
   - Other?

7. How useful do you (and others) think these have been?
   - LA meetings
   - LA / EL workshops
   - LA / EL events in your country (which?)
   - LA/ EL webinars
   - LA website (www.lites.asia)
   - LA newsletter
   - EL website (www.enlighten-initiative.org)
   - LA / EL in country store surveys
   - LA / EL lamp testing and inter laboratory comparison
   - IEC meetings and workshops
   - Other documents and resources from LA or EL
   - Other

8. What was the situation in your country before your participation in LA / EL?
   - Was there an appliance/lighting energy standards and/or labelling programme in place?
   - If so, what products did it cover?
   - Were there any monitoring, verification or enforcement activities (if so what did they involve e.g. store surveys, product check testing etc.)?
   - What was the level of knowledge with regard to lighting energy use and technology?

- Were there programmes to improve lighting efficiency?
- Is there any manufacture of lighting products in your country?
- Was there any lighting products test capability (Government- or industry-owned?)
- Was your country aware of/working with international agencies or standards bodies and/or using international lighting standards?

9. What difference has participation in LA / EL made for your country, with regard to:
   - Government awareness and involvement in lighting energy issues (including legislation, national standards and MEPS, range of products covered)?
   - Industry, utility and household sector involvement in lighting energy issues?
   - Public information on efficient lighting?
   - Understanding of and involvement in international and regional lighting standard development?
   - Establishment or strengthening of MVE programmes?
   - Sharing of information with other countries and international agencies?
   - Lighting energy use, and the cost and quality of lighting?
   - Other factors?

10. If your country had NOT participated in LA / EL, would these outcomes have occurred at all, or more slowly?

11. Have the resources (time and budget) that you have devoted to participation in LA / EL been worthwhile?

12. What is your view of the performance of the following agents involved in LA / EL:
   - The LA secretariat?
   - The UNEP en.lighten secretariat?
   - (For the Pacific – SPC)?
   - Australian Government departments and their officials?
   - The test laboratories?
   - The technical consultants?
   - Other?

13. What do you think are the strengths and advantages of the LA / EL programme in general, and its MVE component in particular?

14. What do you think are the weakness and disadvantages of the LA /EL programme in general, and its MVE component in particular?

15. Any other points you would like to make?

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Questionnaire for officials and consultants involved in program delivery

Note: As the distinction between lites.asia (LA) and United Nations Environment Programme (UNEP) en.lighten (EL) programmes, activities and events is not always clear to participating countries/economies, we are calling them "LA/EL'' in our interviews with national participants. For officials and consultants involved in the delivery of the programmes we are interested in the demarcation of EL and LA and their distinct roles.

1. What is the role of your organisation in LA /EL?

2. What is your personal role in the organisation and in LA / EL?

3. What proportion of your time and work is involved with LA / EL?

4. What is your view of:
   - The structure of the programme (Is Figure 1 an accurate representation?)
   - The objectives and scope of the programme
   - The role of the various agencies
   - The budget and resources

5. What LA / EL events has your organisation, and you personally, been involved with? What was your role?
   - Administration of the programme
   - LA meetings
   - LA / EL workshops
   - LA / EL events or studies in specific countries (which?)
   - LA / EL webinars
   - IEC meetings and workshops
   - Other

6. How useful do you think these have been?
   - LA meetings
   - LA / EL workshops
   - LA / EL events or studies in specific countries (which?)
   - LA / EL webinars
   - LA website (www.lites.asia)
   - LA newsletter
   - EL website (www.enlighten-initiative.org)
   - LA / EL in country store surveys
   - LA / EL lamp testing and inter laboratory comparison
   - IEC meetings and workshops
   - Other documents and resources from LA or EL
   - Other

7. In your opinion, what are the most effective aspect of the programme?
   - Introducing countries to the principles of MEPS, Standards and Labelling
   - Providing a focus on lighting

- Encouraging the phase-out of inefficient lighting and the promotion of quality efficient lighting.
- Building expertise and capability within official circles
- Improving technical expertise in the countries
- Establishing or improving domestic MVE systems to support efficient lighting programmes
- Establishing regional MVE and product testing systems and networks
- Creating opportunities for countries to participate in lighting standards development at the international and regional level.
- Establishing a legislative basis for lighting efficiency programmes
- Other

8. In your opinion, what are the least effective aspects of the programme?

9. How do you rate the participation of the following countries?
- Thailand
- Myanmar
- Cambodia
- Indonesia
- Lao PDR
- Vietnam
- Philippines
- Tonga
- FSM
- Fiji
- PNG
- Others (include those with outstandingly good or outstandingly poor contributions)

10. Have the resources (time and budget) that you have devoted to participation in LA / EL been worthwhile?

11. What is your view of the performance of the following agents involved in LA / EL:
- The LA secretariat?
- The UNEP en.lighten secretariat?
- SPC?
- ASEAN?
- The Australian Government and its officials?
- The technical consultants?
- The test laboratories?
- The national co-ordinators and points of contact?
- Other?

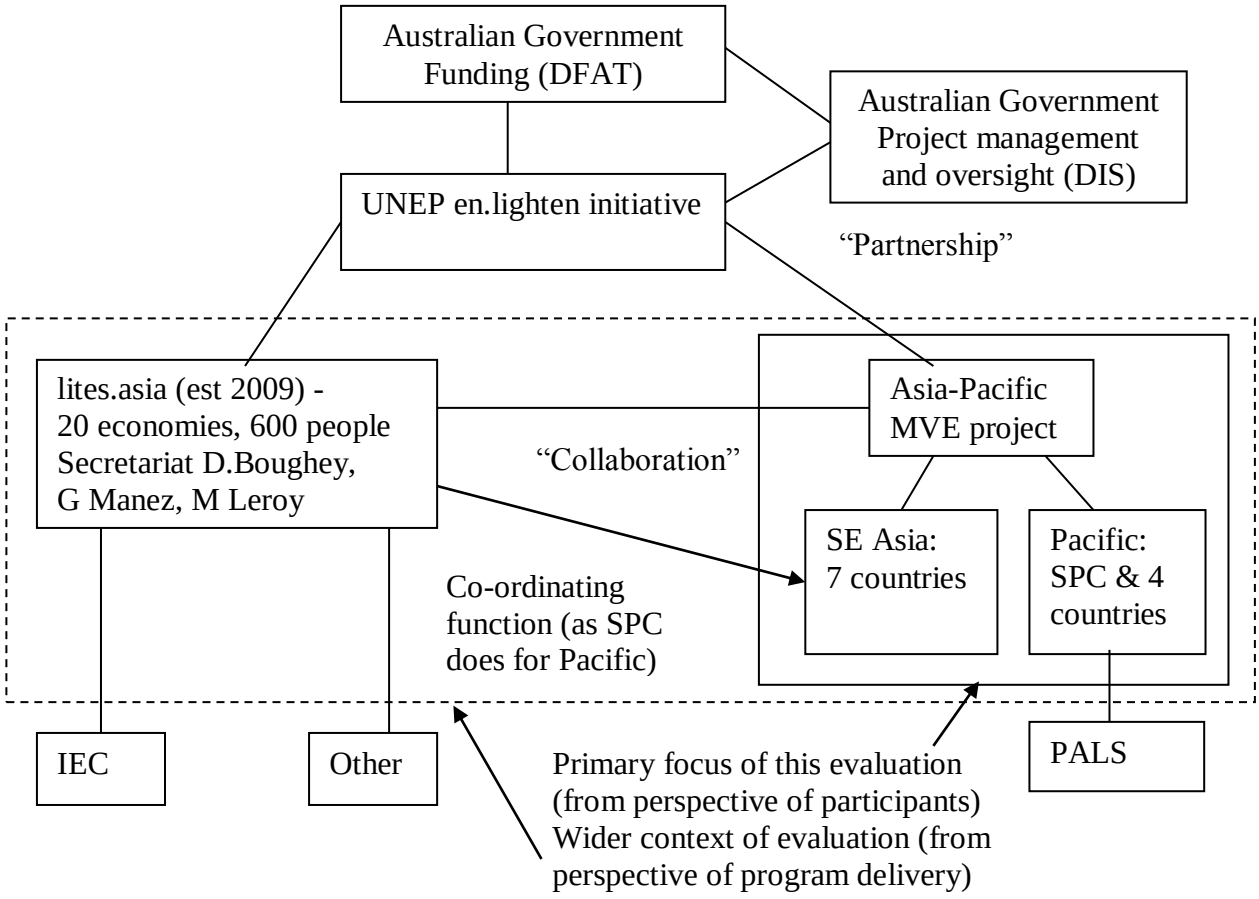
12. What do you think are the strengths and advantages of the LA /EL programme in general, and its MVE component in particular?

13. What do you think are the weakness and disadvantages of the LA programme in general, and its MVE component in particular?

14. What are the main lessons (positive and negative) that should be learned from the project?

15. Any other points you would like to make?

Figure 1 Program structure and links



Appendix 2 lites.asia and en.lighten documents and resources

Websites

http://www.lites.asia/

http://www.enlighten-initiative.org/

http://www.se4all.org/

http://aseanshine.org/

Key Public Documents

Efficient Lighting Policy and Standards in ASEAN: Regional Status Report, ASEAN/SHINE Working Draft version 1.2, 24 January 2016

IEC 60968: Self-ballasted lamps for general lighting services—Safety requirements

IEC 60969 Self-ballasted lamps for general lighting services—Performance requirements

IEC 62554—Sample preparation for measurement of mercury level in fluorescent lamps

IEC 62321— Electrotechnical products - Determination of levels of six regulated substances (lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls, polybrominated diphenyl ethers)

IEC/PAS 62612— Self-ballasted LED-lamps for general lighting services -Performance requirements

IESNA LM79—Electrical and Photometric Measurements of Solid-State Lighting Products

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Compact Fluorescent Lamp Check Test Results and Analysis Report Prepared by the Global Efficient Lighting Centre for the United Nations Environment Programme November 2014 (covering Azerbaijan, Chile, Costa Rica, Dominican Republic, Guinea-Bissau, Lebanon, Panama, Tonga, Tunisia and Uruguay)
[Compact Fluorescent Lamps Check Test Results and Analysis Report.pdf]

Southeast Asia Compact Fluorescent Lamp Performance and Mercury Content Testing Report and Analysis Prepared for UNEP by GELC, January 2016 (covering Cambodia, Indonesia, Lao PDR, Philippines, Thailand, Vietnam)
http://www.lites.asia/files/otherfiles/0000/0459/CFL_Lamps_Performance_Testing_and_Analysis_Report_final_web.pdf

Southeast Asia Compact Light Emitting Diode Lamps Performance Testing Report and Analysis Prepared for UNEP by GELC, January 2016 (covering Cambodia, Indonesia, Lao PDR, Philippines, Thailand, Vietnam)
http://www.lites.asia/files/otherfiles/0000/0459/CFL_Lamps_Performance_Testing_and_Analysis_Report_final_web.pdf

Interlaboratory Comparison of Light Emitting Diode (LED) Lamps: Final Report. Prepared for UNEP by GELC, November 2015 (covering GELC and 6 laboratories in Indonesia, Philippines, Thailand and Vietnam)
[Inter-laboratory Comparison Testing of LED Lamps_final for web_anonymise.pdf]

Other documents

[Annex 8-Lighting MVE Activity Calendar 1 November 2014.pdf]

Reporting, Monitoring and Evaluation Matrix: lites.asia / Regional support for lighting efficiency and harmonised lighting efficiency standards [lites asiareporting August 21 2013.docx]

Plan of Action: United Nations Environment Programme en.lighten initiative: Securing sustainable climate change benefits of efficient lighting in Southeast Asia and Pacific economies via monitoring, verification and enforcement capacity building activities, 3 December 2013. [AusAid MVE SE Asia Plan of Action FINAL.docx]

Quality at Implementation Final Report for United Nations Environment Programme (UNEP) en.lighten Imitative (approved by Department of Foreign Affairs and Trade, 13 March 2014). [QaI-Final_enlighten_signed 140313.pdf]

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Period 1 July – 31 Dec 2013
[en.lighten SEA&P MVE Project progress report #1_7.2.2014.pdf]
Period 1 April – 30 June 2014
[en.lighten MVE Q2 2014 Progress report #3 rev 30.10.2014.pdf]
Period 1 July 2014 – 30 Sept 2014
[en.lighten MVE Q3 2014 Progress Report #4 30.10.2014.pdf, en.lighten MVE 2014 Q4 Progress Report revised 2Dec2014.pdf]
Period 1 April 2015 – 31 August 2015
[MVE Progress Report _7 Q2+3 2015_draft for review]

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[Compact Fluorescent Lamps Check Test Results and Analysis Report_Tonga.pdf]

[lites.asia_resolution_CFL_performance_tiers.pdf]

Background to IEC TC34 Committee PNW 34A-1754: Self-ballasted compact fluorescent lamps for general lighting services – Performance limits
[CFL TS background April 2014.pdf]

Appendix 3 ASEAN SHINE – Lighting Chapter

The ASEAN SHINE programme 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 2010, the International Copper Association Southeast Asia Ltd (ICA) signed a Memorandum of Understanding with the United Nations Environment Programme (UNEP) Division of Technology, Industry and Economics (DTIE) to collaborate on climate change mitigation and technology transfer issues. In this context, UNEP and ICA conducted a series of assessments and stakeholder consultations in Southeast Asia to promote energy efficient appliances. As a result, ICA and UNEP were given the mandate by the EE&C-SSN to lead and coordinate the harmonisation of energy performance standards for air conditioners in ASEAN. Both organizations agreed to mobilize resources to support the implementation of harmonization process, and in 2013, the European Commission SWITCH-Asia programme approved a project proposal on the promotion and deployment of energy efficient air conditioners in ASEAN submitted by the European Copper Institute in which UNEP is a partner.

ASEAN SHINE was formed as part of this project. The ASEAN SHINE – Air Conditioners programme is being implemented over the period 2013-2016 by the International Copper Association, in cooperation with ASEAN Centre for Energy (ACE) and UNEP. 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 the *lites.asia* network of regulators and policymakers supported by the Australian Government.

At the occasion of a 11th *lites.asia* regional efficient lighting policy workshop organised by the UNEP en.lighten initiative, 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 UNEP en.lighten initiative.

During the 11th annual meeting of the ASEAN Energy Efficiency and Conservation Sub Sector Network (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 based on a framework presented to them by UNEP en.lighten initiative.

The UNEP en.lighten initiative was successful in receiving fund from the EU SWITCH-Asia Regional Policy Support Component to expand ASEAN SHINE to cover lighting products in late 2015. On the 1 February 2016, the ASEAN EE&C-SSN, in its function of Steering Committee of ASEAN SHINE, formally agreed to integrate lighting as the next product under ASEAN SHINE. An initial workshop to launch ASEAN SHINE - Lighting was held on the 2-3 February 2016 in Bangkok, Thailand, in collaboration with the final meeting of the *lites.asia* network under the administration of the UNEP en.lighten initiative. During this meeting participants agreed to establish the ASEAN SHINE - Lighting Policy and Technical Working Group (LWG).

The first meeting of the ASEAN SHINE - Lighting LWG was held on the 5th May 2016, in Naypyidaw, Myanmar. The LWG decided to prioritise harmonisation of LED non-direction lamps and Linear Fluorescent Lamps. Recommendations made by the LWG were endorsed by the EE&C-SSN on the 6th May 2016 at the 20th ASEAN EE&C-SSN Annual Meeting.