Pacific Community
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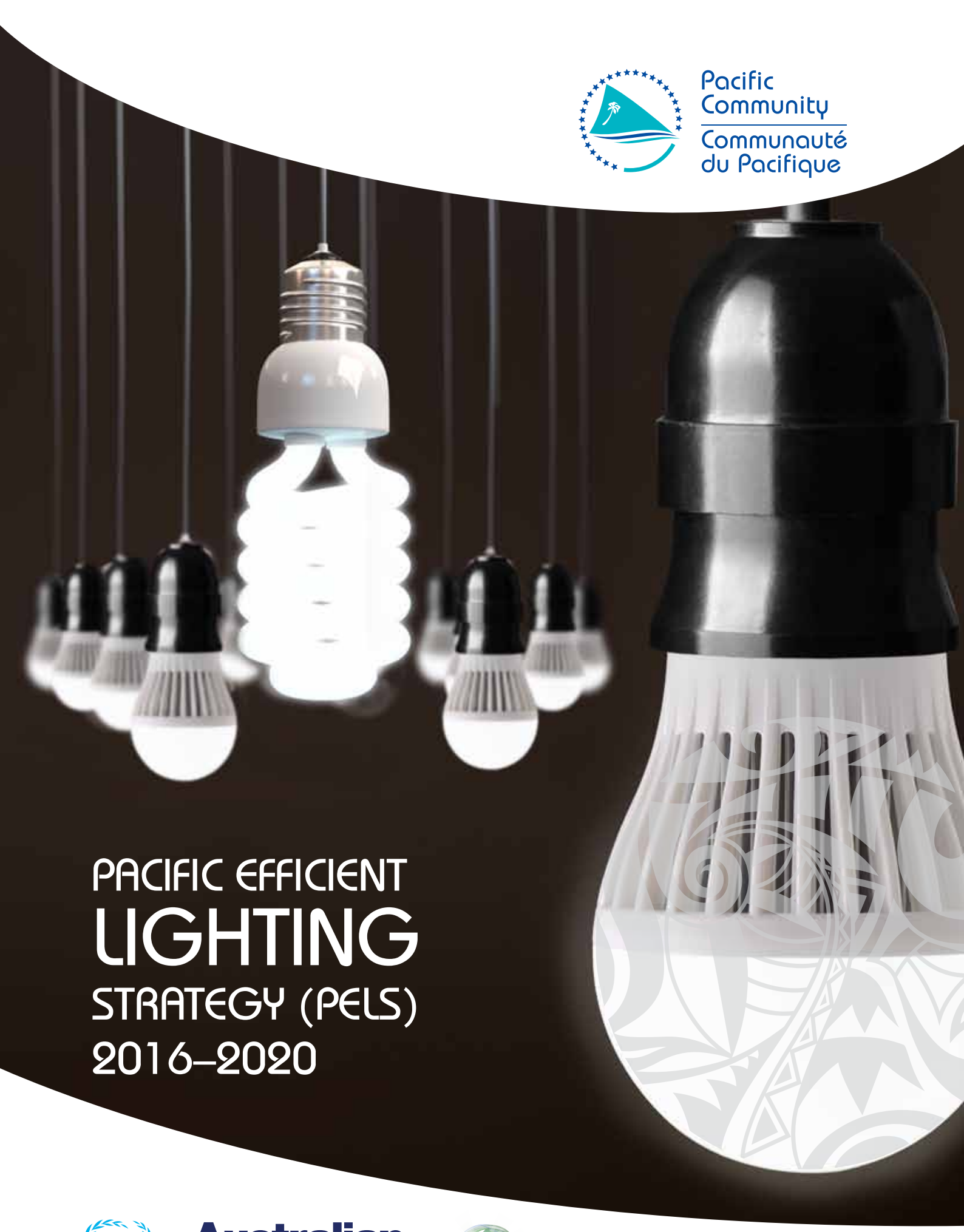

PACIFIC EFFICIENT LIGHTING STRATEGY (PELS) 2016–2020

UNEP

Australian AID

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Disclaimer

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Acronyms and Abbreviations

AS/NZS	Australian and New Zealand standard
Australian Aid	Australian Agency for International Development
CFL	Compact fluorescent lamp
CRI	Colour rendering index
DIIS	Department of Industry, Innovation and Science
ECOWAS	Economic Community of West African States
EEI	Energy efficiency index
ELI	Efficient Lighting Initiative
ESM	Environmentally sound management
EST	Energy Saving Trust
GEF	Global Environment Facility
GHG	Greenhouse gas
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GLS	General lighting service
HID	High intensity discharge
HS	Harmonised system (codes)
IEC	International Electrotechnical Commission
IIEC	International Institute for Energy Conservation
kWh	kilowatt-hour
LED	Light-emitting diode
MEPS	Minimum energy performance standards
MEPSL	Minimum energy performance standards and labelling
MVE	Monitoring, verification and enforcement
M&V	measurement and verification
New Zealand Aid	New Zealand Agency for International Development
NPV	Net present value
OCO	Oceania Customs Organisation
PALS	Pacific Appliance Labelling and Standards
PELS	Pacific Efficient Lighting Strategy
PEEP2	Promoting Energy Efficiency in the Pacific Phase 2
PICTs	Pacific Island countries and territories
SIDS	Small Island developing states
SPC	Pacific Community
SPM	Supporting policies and mechanisms
TWh	terawatt-hour (1012 watt-hour)
UNEP	United Nations Environment Programme
USAID	US Agency for International Development
US EPA	US Environmental Protection Agency

Executive summary

The Pacific Island countries and territories (PICTs) suffer disproportionately from the adverse consequences of climate change. The Intergovernmental Panel on Climate Change (IPCC)'s 5th Assessment Report identifies small Island developing states (SIDS) as among the most vulnerable countries in the world to the impacts of climate change. Rising sea levels, warming ocean temperatures, changing rainfall patterns, and increasing frequency and strength of cyclones are already having an impact on Island livelihoods, freshwater resources, coastal settlements, infrastructure and ecosystems. In particular, sea level rise poses an increasing threat to low-lying coastal areas.

Despite their relatively minor influence on climate change, it is critical that PICTs make a significant effort to reduce their energy use — both to contribute to (and thus encourage) global efforts to stabilise greenhouse gas (GHG) concentrations, and to increase the resilience of the Island communities to the effects of the changing climate by strengthening them economically. One key end-use sector that can address all of these goals is lighting: improving the energy efficiency of lighting used by PICTs will result in measurable GHG emission reductions, consumers' energy cost reductions as well as significant economic and livelihood improvements for vulnerable Island populations.

In PICTs, according to a Regional Status Report (SPC, 2015) commissioned by the Pacific Community (SPC) as part of a joint project with the United Nations Environment Programme (UNEP) en.lighten initiative, lighting accounts for 18% of household electricity consumption, and in many of these scattered Islands electricity generation still relies heavily on petroleum-based fossil fuels. As the PICT governments continue their efforts to provide energy access to underserved communities, the business as usual overall energy use (and associated GHG emissions) will increase, and the absolute amount of energy dedicated to providing lighting services will grow concurrently. The aim of the Pacific Efficient Lighting Strategy (PELS) is to help PICTs significantly reduce the energy needed to provide these increasing lighting services, by designing and implementing policies to phase out inefficient forms of lighting and replace them with more energy-efficient technologies.

The efficient lighting strategy has been demonstrated throughout the world to be one of the quickest, easiest and most cost-effective ways to lower electricity bills for consumers, reduce fuel imports for countries, and reduce CO_2 emissions. For PICTs that are confronted with issues of electricity supply shortages, and constraints in transmission and distribution networks, increasing the energy efficiency of lighting is a cheaper and faster solution than adding more power plants or reinforcing the grid. It also allows grids with limited capacity to provide electricity for more consumers.

GOAL AND OBJECTIVES OF THE PACIFIC EFFICIENT LIGHTING STRATEGY

The goal of PELS is to transform lighting markets in PICTs toward energy-efficient, high-quality and more environmentally sound lighting technologies. The objectives of the strategy are to:

1. Establish policies to phase out the least efficient type of electric lighting — incandescent lamps — from the PICT markets by 2018; and
2. Promote the uptake of advanced, high-quality and more energy-efficient and environmentally friendly lighting technologies.

The expected benefits from the implementation of this efficient lighting strategy include reduced GHG emissions, the reduction of peak electricity consumption, lower electricity bills for consumers, and increased access to high-efficiency and high-quality on-grid and off-grid lighting products while maintaining or improving the quality of lighting services.

BENEFITS OF ENERGY-EFFICIENT LIGHTING IN THE PACIFIC

There are significant opportunities and needs for improvement in lighting services and efficiency in all sectors in PICTs: residential, commercial and government buildings, as well as street and outdoor lighting. A large proportion of the residential lighting in PICTs is provided by conventional technologies (linear fluorescent and incandescent lamps). According to the Regional Status Report (SPC, 2015), there is considerable potential for growth in the consumption of household lighting services in the region through both the acquisition of more lamps and increasing the illuminated space per home. In addition, the data on current lighting technologies used in public and commercial buildings and street and outdoor lighting in the Pacific indicate high potential for saving through utilisation of commercially available energy-efficient lighting technologies, such as T5 fluorescent or light-emitting diode (LED) lighting technologies.

The Regional Status Report (SPC, 2015) estimated potential savings from measures such as replacing incandescent lamps with compact fluorescent lamps (CFLs) or LEDs, replacing standard linear fluorescent lamps with more energy-efficient linear fluorescent lamps and electronic ballasts, and replacing inefficient high-intensity discharge (HID) lamps with more energy-efficient alternatives, in commercial, government and public buildings (street and outdoor lighting included), and residential buildings. Potential savings are as follows:

- The cumulative end-use electricity savings from 2015 to 2030 would be approximately 3.41 terawatt-hours (TWh). The savings in electricity generation would be about 15% higher, due to reductions in transmission and distribution losses, or about 3.92 TWh;
- The avoided fuel costs would be USD 1,019 million;
- Additional financial savings through avoided investment in capital, operation and maintenance would be USD 153 million;
- The net present value (NPV) of the total financial savings from avoided generator fuel, capital investment, and operation and maintenance of the network is USD 626 million[1];
- The savings in fuel imports amount to 1.35 billion litres; and
- The avoided GHG emissions associated with the fuel generation savings amount to 3.72 million tonnes of CO_2.

Achieving these savings will require strategic intervention in the lighting market by PICT government agencies and others. PELS provides practical steps for phasing out inefficient lighting and transitioning to efficient lighting throughout the Pacific region.

[1] *The NPV calculation provides the present (today's) value of the cumulative financial savings over the 15 year analysis period. Future savings in avoided fuel, capital investment and network operation and maintenance are discounted back to the present at 7%. The undiscounted financial savings in nominal terms over this time period are USD 1.46 billion.*

ENERGY-EFFICIENT LIGHTING STRATEGY AND ACTIONS

PELS addresses lighting end-uses in residential, commercial and government buildings as well as street and outdoor lighting. To ensure an effective and self-sustaining transition to efficient lighting in PICTs, a cohesive set of national and regional actions for on-grid and off-grid lighting has been designed for implementation in the region. The actions follow the integrated policy approach recommended by the UNEP en.lighten initiative (see Annex A: Methodology for the development of the Pacific Efficient Lighting Strategy, for more details on the integrated policy approach).

Implementation of PELS is based on the following phased approach:

- During Phase I, PELS will build strong foundations for a lighting transition, through establishment of supporting regulatory frameworks, product registration and database systems, and development of recommended measures for sectoral lighting improvements in each participating country.
- Phase II will focus on the implementation of the efficient lighting activities and measures recommended in Phase I.
- Phase III will focus on efforts to harmonise and enhance the effectiveness of efficient lighting programmes in PICTs.

It is envisaged that there will be an overlapping period of implementation in Phases I and II, as a result of differences in timing of the implementation in different PICTs[2].

The proposed objectives under the four components of the integrated policy approach are summarised in the table below. Key activities to achieve the required outputs and outcomes are described in Section 3 of this proposal.

[2] *PELS categorises PICTs into three tiers based on the status of their regulatory framework and implementation of prior efficient lighting programmes. Details are given in Section 1.2 of this proposal.*

COMPONENT	PROPOSED OBJECTIVES
Minimum energy performance standards (MEPS)	• Ensure adoption of MEPS requirements for on-grid lighting products throughout PICTs • Ensure adoption of MEPS requirements for off-grid lighting products • Strengthen and harmonise MEPS requirements for lighting products
Supporting policies and mechanisms (SPM)	• Enhance consumer awareness about energy-efficient lighting and its benefits • Support end-user investment in energy-efficient lighting through innovative financing mechanisms • Strengthen capacity of policy-makers and policy advocacy groups to design and implement energy-efficient lighting programmes • Stimulate the purchase and use of energy-efficient lighting products in government and public buildings/areas
Monitoring, verification and enforcement (MVE)	• Establish and improve regulatory frameworks to support MVE legislation in PICTs • Enable sharing of lighting product information through the establishmevnt of a regional registration and information sharing system for lighting products in PICTs • Establish a verification process for energy-efficient lighting products in PICTs • Establish an enforcement scheme for energy-efficient lighting products in PICTs
Environmentally sound management (ESM)	• Develop lamp waste management strategies and supporting legal mechanisms • Strengthen implementation of sustainable management models for lamp waste management facilities in PICTs • Minimise the impacts of mercury from lighting products on the environment and population in PICTs

PROPOSED BUDGET

Implementation of PELS at the regional and national levels during the period 2016 to 2020 would require an estimated budget of USD 5.8 million[3], as summarised in the table below. The proposed budget covers technical assistance for relevant preparatory works under each strategy component, training workshops, direct expenses related to travels, production and dissemination of training and marketing tools and materials, and costs of efficient lighting products associated with demonstration projects.

About 65% of the proposed budget is proposed to be sought from international and bilateral donor agencies and development banks, to support technical assistance, direct expenses for regional activities, and seed funds for financial mechanisms and demonstration projects. The remaining 35% of the proposed budget is expected to be in-kind and cash contributions from PICTs for implementation of relevant in-country activities.

Details of the budget are given in Annex G: Details of budget estimation.

COMPONENT	AMOUNT (USD)					TOTAL (USD)
	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	
Minimum energy performance standards (MEPS)	129,500	177,000	51,000	85,500	51,000	494,000
Supporting policies and mechanisms (SPM)	414,500	1,167,500	828,000	309,000	264,000	2,983,000
Monitoring, verification and enforcement (MVE)	576,000	286,500	179,000	135,000	164,000	1,340,500
Environmentally sound management (ESM)	426,500	324,000	132,000	66,000	60,500	1,009,000
Total	**1,546,500**	**1,955,000**	**1,190,000**	**595,500**	**539,500**	**5,826,500**

[3] *The proposed budget covers implementation in tier 1 and 2 countries only.*

1. INTRODUCTION

1.1 BACKGROUND

The phase-out of inefficient lighting is one of the quickest, easiest and most cost-effective ways to combat climate change and save energy. Transforming the lighting markets in Pacific Island countries and territories (PICTs) toward energy-efficient technologies will significantly lower electricity bills for end-users, reduce energy imports, and reduce CO_2 emissions. For countries that face shortages of electricity supply and constraints in transmission and distribution networks, energy-efficient lighting has proven to be a much cheaper and faster solution than building new power plants. As a result, many countries around the world have eliminated or are in the process of phasing out conventional inefficient lighting technologies through the establishment of market transformation programmes that accelerate the transition to energy-efficient lighting.

To support countries in carrying out the transition to efficient lighting, the United Nations Environment Programme (UNEP) and with the Global Environment Facility (GEF) launched the en.lighten initiative in 2010, with the support of the private sector. This public-private partnership 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 and/or regions to develop efficient lighting strategies. The Australian Government, Department of Industry, Innovation and Science (DIIS) is working in partnership with the Pacific Community (SPC) and UNEP to develop a Regional Efficient Lighting Strategy for the 22 PICTs: American Samoa, the Cook Islands, the Federated States of Micronesia, Fiji, French Polynesia, Guam, Kiribati, the Republic of Marshall Islands, Nauru, New Caledonia, Niue, the Northern Mariana Islands, Palau, Papua New Guinea, the Pitcairn Islands, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu, Vanuatu, and Wallis and Futuna.

Several initiatives to promote the use of more energy-efficient lighting have been pursued in PICTs. In 2012, the Australian Government, (DIIS) launched the Pacific Appliance Labelling and Standards (PALS) Programme[4], which covered a range of household appliances including lamps and lighting equipment. The 12 PICTs participating in the PALS programme are the Cook Islands, the Federated States of Micronesia, Fiji, Kiribati, Papua New Guinea, Palau, the Republic of the Marshall Islands, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu.

In early 2014, SPC and the en.lighten initiative agreed to collaborate to achieve a regional transition to efficient lighting within PICTs and to support policy-makers through the development and implementation of the Pacific Efficient Lighting Strategy (PELS) with the financial support of the Australian Government. The development of PELS was endorsed by the Pacific Regional Energy and Transport Ministers' meeting in April 2014. Participation and support for the preparation of PELS was confirmed by the Cook Islands, Kiribati, Palau, the Republic of the Marshall Islands, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu. Fiji has also indicated interest in participating and is awaiting its Cabinet's approval for official confirmation. In addition, several countries in the region — the Federated States of Micronesia, the Cook Islands, Kiribati, Palau, the Republic of the Marshall Islands, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu — have become partners in the UNEP en.lighten initiative.

[4] *PALS is an Australian-funded programme established to assist PICTs to implement MEPS and energy labelling for a range of products, including lighting products. PALS is managed by SPC, working in coordination with PICTs which have agreed to join the PALS programme. More information is available at (http://prdrse4all.spc.int/production/system/files/presentation_unepenlighten_pacific_statusreport.pdf)*

1.2 CLASSIFICATION OF PICTS BASED ON STATUS OF EFFICIENT LIGHTING ACTIVITY

To account for the fact that PICTs are in various stages in terms of the status of their regulatory frameworks and implementation of prior efficient lighting programmes, PELS categorises PICTs into three tiers as followings:

- First tier: countries that are participating in the PALS programme and actively implementing key PALS and other efficient lighting activities;
- Second tier: countries that are participating in the PALS programme, but have not begun implementing (or are in early stages of implementing) the PALS or other efficient lighting activities;
- Third tier: countries that are not participating in the PALS programme and have not implemented any major energy-efficient lighting strategy.

Figure 1.1 shows the countries in each tier and their locations in the Pacific region.

Figure 1.1. Pacific Island countries and territories and their classification by tier for PELS

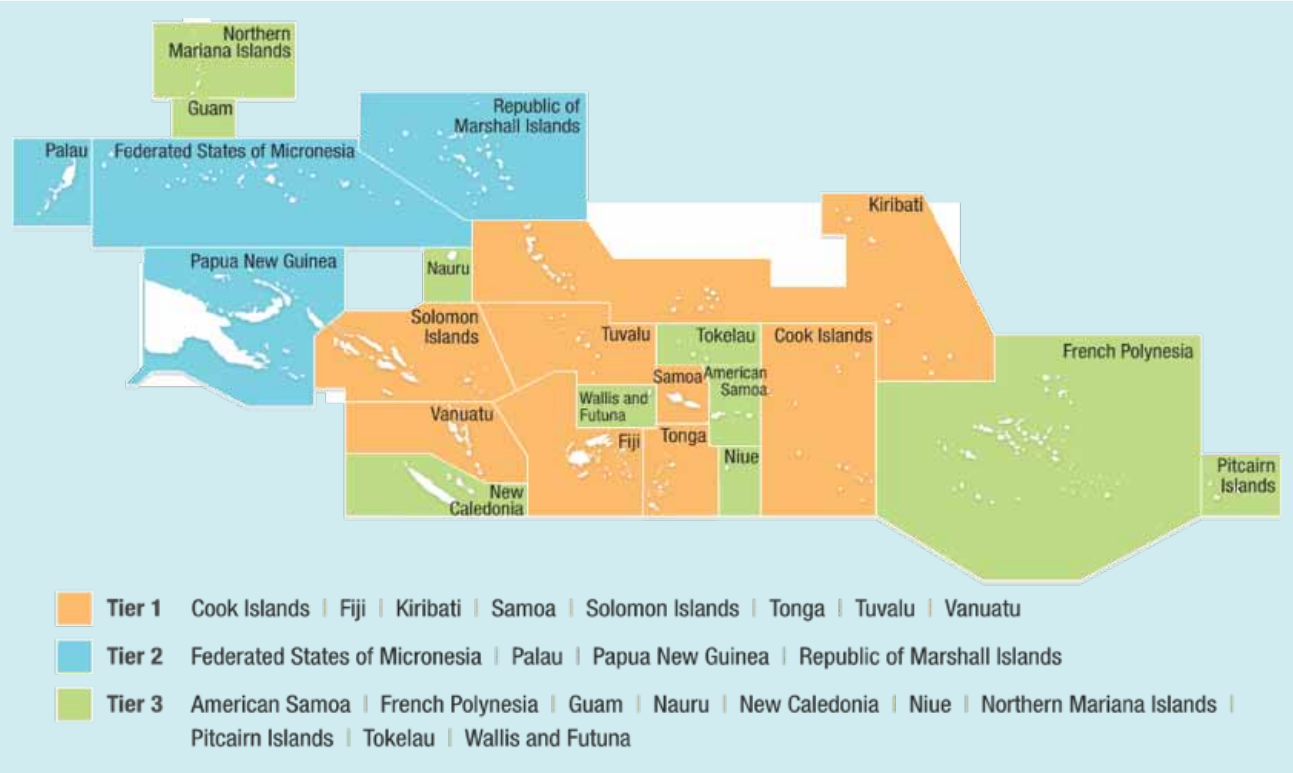


Table 1.1 summarises the status of efficient lighting activities in tier 1 and 2 countries.

COUNTRY	PALS PARTICIPANT?	REGULATION TO SUPPORT LIGHTING MEPS?[5]	PELS PARTICIPANT?	EN.LIGHTEN PARTNER?	PELS CATEGORY
Cook Islands	Yes	In draft	Yes	Yes	Tier 1
Fiji	Yes	No	Pending	No	Tier 1
Federated States of Micronesia	Yes	No	No	Yes	Tier 2
Kiribati	Yes	In draft	Yes	Yes	Tier 1
Palau	Yes	No	Yes	Yes	Tier 2
Papua New Guinea	Yes	No	No	No	Tier 2
Republic of the Marshall Islands	Yes	No	Yes	Yes	Tier 2
Samoa	Yes	In draft	Yes	Yes	Tier 1
Solomon Islands	Yes	In draft	Yes	Yes	Tier 1
Tonga	Yes	In draft	Yes	Yes	Tier 1
Tuvalu	Yes	In draft	Yes	Yes	Tier 1
Vanuatu	Yes	In draft	Yes	Yes	Tier 1

[5] *Not all draft regulations include lighting products, but lighting products can be added to the schedules of regulated products.*

1.3 POTENTIAL BENEFITS OF ENERGY-EFFICIENT LIGHTING IN THE PACIFIC

Although electrification rates, supply systems and generation fuel mix vary among and within PICTs, they nearly all have one attribute in common: diesel electricity generation is used at peak times, and millions of litres of diesel fuel are imported every year. This is true even in PICTs that have significant hydro-electric and other renewable energy resources. Therefore, the potential economic and energy security benefits of increasing energy efficiency in these countries are significant.

The data on current lighting technologies used in public and commercial buildings available from the Promoting Energy Efficiency in the Pacific Phase 2 (PEEP2)[6] countries indicate high potential for savings through substitution with commercially available energy-efficient lighting technologies, such as T5 fluorescent or light-emitting diode (LED) technologies.

A Regional Status Report (SPC, 2015) commissioned by the Pacific Community as part of a joint project with the UNEP en.lighten initiative estimated potential savings from measures[7] such as replacing incandescent lamps with compact fluorescent lamps (CFLs) and LEDs, standard linear fluorescent lamps with more energy-efficient linear fluorescent lamps, standard magnetic ballasts with electronic ballasts, and inefficient high intensity discharge (HID) lamps with more energy-efficient alternatives in commercial, government and public buildings (street and outdoor lighting included), and residential buildings. The potential savings are as follows:

- The cumulative end-use electricity savings from 2015 to 2030 would be approximately 3.41 terawatt-hours (TWh). The savings in electricity generation would be about 15% higher, due to reductions in transmission and distribution losses, or about 3.92 TWh;
- The avoided fuel costs would be USD 1,0196 million;
- Additional financial savings through avoided investment in capital, operation and maintenance would be USD 153 million;
- The net present value (NPV) of the total financial savings from avoided generator fuel, capital investment, and operation and maintenance of the network is USD 626 million[8];
- The savings in fuel imports amount to 1.35 billion litres; and
- The avoided greenhouse gas (GHG) emissions associated with the fuel generation savings amount to 3.72 million tonnes of CO_2.

1.4 GOAL AND OBJECTIVES OF PELS

The goal of PELS is to transform lighting markets in PICTs toward energy-efficient, high-quality and more environmentally sound lighting technologies. The objectives of the strategy are to:

1. Establish policies to phase out the least efficient type of electric lighting — incandescent lamps — from the PICTs markets by 2018, and
2. Promote the uptake of advanced, high-quality and more energy-efficient and environmentally friendly lighting technologies.

The expected benefits from the implementation of this efficient lighting strategy include reduced GHG emissions, the reduction of peak electricity consumption, lower electricity bills for consumers, and increased access to high-efficiency on-grid and off-grid lighting products while maintaining or improving the quality of lighting service.

The goal, objectives and the expected benefits will be realised through implementation of the integrated policy approach as outlined in Annex A: Methodology for the development of the Pacific Efficient Lighting Strategy.

[6] More information on the PEEP2 project is available at www.ee-pacific.net.

[7] Regional Status Report on Efficient Lighting in the Pacific Island Countries and Territories, which was commissioned by SPC as part of the PELS project funded by the Australian Government. More information is available at http://www.spc.int/edd/en/document-download/viewdownload/11-reports/2027-regional-status-report-on-efficient-lighting-in-pacific-Island-countries-and-territories, SPC 2015.

[8] The NPV calculation provides the present (today's) value of the cumulative financial savings over the 15 year analysis period. Future savings in avoided fuel, capital investment and network operation and maintenance are discounted back to the present at 7%. The undiscounted financial savings in nominal terms over this time period are USD 1.46 billion.

2. PACIFIC REGIONAL LIGHTING MARKET

A review of the status of lighting technologies and markets in the 22 PICTs was carried out, primarily using data from two sources: (1) various donor-funded projects[9] and (2) the Regional Status Report on efficient lighting in PICTs (SPC 2015). Based on these reports, the lighting market assessment examined the following:

- Lighting technologies and energy use in PICTs (type and volume of various lighting technologies being used in the PICT markets; and energy use from installed lighting stock at a national and regional level); and
- Efficient lighting policies and programmes in place at a national and regional level.

[9] *The Asian Development Bank's project Promoting Energy Efficiency in the Pacific Phase 2 (PEEP2), http://www.ee-pacific.net, and the Country Lighting Assessment (CLA) reports funded by UNEP, http://learning.enlighten-initiative.org/countrydata.aspx*

2.1 LIGHTING TECHNOLOGY AND ENERGY USE IN PICTS

The Regional Status Report (SPC, 2015) found that PICTs vary widely in terms of size of their population, income level, level of electrification, and consumption of energy services, including lighting. The total population of all PICTs is over 10 million people, of which more than two-thirds live in Papua New Guinea. About 35% of the PICT population lives in households with access to mains voltage electricity, supplied from either the grid or local generators. Electrification rates across the region vary from nearly 100% in several PICTs to about 12% in Papua New Guinea and Solomon Islands (SPC, 2015).

The Regional Status Report (SPC, 2015) also found that linear fluorescent lamps are the most popular residential lighting type in the region. Table 2.1 summarises the types of lighting technologies used in households in the Cook Islands, Papua New Guinea, Samoa, Tonga and Vanuatu. Use of linear fluorescent lamps ranges from 22% in the Cook Islands to 95% in Papua New Guinea. Inefficient incandescent lamps account for between 2% and 28% of lamps while in contrast, use of the more efficient CFL in households varies from as low as 1% in Papua New Guinea to as high as 48% in the Cook Islands. It is clear that policies and programmes focusing on upgrading commonly used out-of-date residential lighting technologies will be critical to the successful transformation of the lighting markets in PICTs. Furthermore, the promotion of high-quality, more efficient LED lighting products will play an important role in ensuring a sustainable transition to efficient lighting in the Pacific.

Table 2.1. Type of lighting technologies in households in the Cook Islands, Papua New Guinea, Samoa, Tonga and Vanuatu

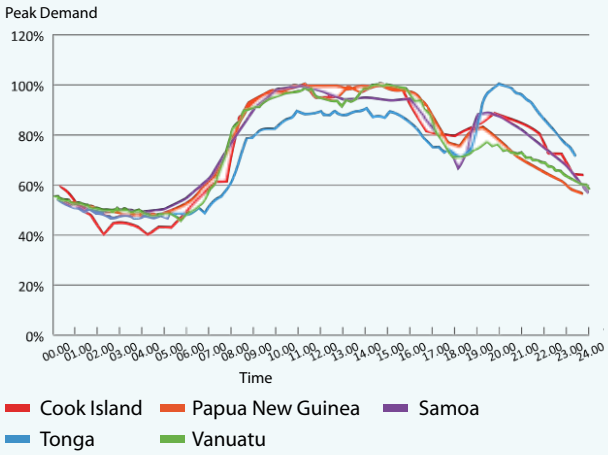
Country	CFLs	Linear fluorescent lamps	Incandescent lamps	Others (less common, e.g. halogen and LED)
Cook Islands	48%	22%	26%	5%
Papua New Guinea	1%	95%	2%	2%
Samoa	23%	70%	7%	N/A
Tonga	22%	50%	28%	N/A
Vanuatu	47%	40%	11%	2%

Source: *PEEP2 household surveys, and Regional Status Report on Efficient Lighting in the Pacific Island Countries and Territories (SPC, 2015).*

Although the current use of incandescent lamps in the Pacific region varies, the market analysis conducted across the 22 PICTs found that there are significant financial, environmental and social benefits to be secured by phasing out incandescent lighting. Discussions at the Pacific Efficient Lighting Strategy inception workshop in Nadi, Fiji in September 2014 reaffirmed this conclusion, and established a target date of 2018 for completing this first objective of PELS.

One of the key benefits of a successful market transformation to energy-efficient lighting in PICTs through implementation of PELS across the region is reduced pressure on the electric utilities during peak hours. Under the PEEP2 project, a review of average weekday electrical load profiles in the Cook Islands, Papua New Guinea, Samoa, Tonga and Vanuatu characterised two peak periods at approximately 09:00-15:00 and 20:00 (see Figure 2.1). Residential household surveys and energy audits in government and commercial buildings revealed that the major contributors to the six-hour daytime load are commercial air-conditioning and lighting, while residential sector activities (primarily lighting and cooking) are the main contributors to the evening peak.

Figure 2.1. Typical weekday demand profiles in the Cook Islands, Papua New Guinea, Samoa, Tonga and Vanuatu



Source: *PEEP2 household surveys, and Regional Status Report on Efficient Lighting in the Pacific Island Countries and Territories (SPC, 2015).*

The Regional Status Report estimates that lighting accounts for over 18% of household electricity use, 14% of non-household electricity use, and nearly 15% of total electricity use in the Pacific region (SPC, 2015). PICT households generally fall into the following lighting categories:

1. Households with access to a distribution network that supplies electricity 24 hours/day (or close to it). These households use mains voltage (220-240 V AC or 110-120 V AC) lighting technologies.
2. Households with access to diesel generators that run for part of the day. These households use mains voltage lights for a more limited period each day (i.e. while the generator is running). At other times, or for areas of their homes not yet wired to carry mains voltage, they may use portable lamps or torches.
3. Households with access to fixed solar photovoltaic systems with battery backup. These households use low voltage lamps that typically operate at 12 V DC. When the battery storage is depleted, or for areas not yet wired, they may use portable lamps or torches.
4. Households entirely dependent on portable lamps and torches. These include lights with small solar cells on the body of the lamp as well as non-electric lights such as kerosene lanterns and candles.

The average number of fixed lamps in electrified (Category 1) households is relatively low. Detailed lighting surveys in the Cook Islands, Papua New Guinea, Samoa, Tonga and Vanuatu suggest a regional average of about seven lamps per electrified household, and annual lighting consumption of 200-300 kWh (outside the French-speaking PICTs, which have much higher average income and electricity use than the others). This represents 16-26% of household electricity use, similar to the share used by refrigerators and freezers (SPC, 2015).

The installed number of lamps found in each household varies significantly among households in the same PICTs. This suggests that there is considerable potential for growth in the residential consumption of lighting services (and thus related energy use) in PICTs, through both the acquisition of more lamps and increasing the illuminated space per home. It is thus extremely important to adopt policies and programmes that promote energy-efficient lighting, to ensure that this growth occurs in an energy-efficient way.

The dominant lamp type in households is linear fluorescent lamps, about equally divided between 2 ft (610 mm) and 4 ft (1220 mm) tubes. In the PICTs where detailed data are available, linear fluorescent lamps and their ballasts account for an estimated 70% of household lighting energy. Since most linear fluorescent lamps have less efficient electromagnetic ballasts rather than electronic ballasts, ballasts make up 16-17% of total household lighting energy use — nearly as much as incandescent lamps, which account for about 18%[10]. CFLs account for 11%. Based on the PEEP2 household surveys, the use of LED tubes, LED lamps and mains voltage halogen lamps in households appears to be negligible.

Lighting use in commercial and government buildings is difficult to estimate, but lighting audits of particular buildings conducted by the PEEP2 project show that linear fluorescent lamps are also the dominant lighting type in these buildings. The data on street and outdoor lighting available from the PEEP2 countries indicate high potential for savings through the substitution of street lighting technologies (primarily HID lamps) with LED technologies.

2.2 STATUS OF LIGHTING POLICIES AND REGULATORY FRAMEWORKS

PICTs are at different stages with regard to the policy and regulatory frameworks needed to support implementation of energy-efficient lighting programmes. At present, Fiji is the only PICT that has regulations in place for any category of energy-using equipment: in 2012, Fiji adopted the Australian and New Zealand standard (AS/NZS) energy-efficiency test methods, minimum energy performance standards (MEPS) and labelling programme for household refrigerators and freezers. Although lighting products are not yet part of Fiji's MEPS and labelling programme, implementation experience and lessons learnt in Fiji are valuable for the PELS preparation.

For PICTs participating in the PALS programme, implementation of energy-efficiency policies and MEPS for lighting products will build upon the foundation work supported by PALS, under which several preparatory activities have already been undertaken. This has included field research of the current status of lighting technologies and use, stakeholder workshops, drafting of regulations where required, and the establishment of administrative frameworks and public information campaigns.

Table 2.2 lists the PICTs that are most advanced in terms of the development of regulatory frameworks to support the implementation of energy-efficiency policies and MEPS for lighting products (and other appliances). In all cases, the draft regulations are proposing to harmonise with AS/NZS for product energy testing, labelling and MEPS. North Pacific countries (the Federated States of Micronesia, the Republic of the Marshall Islands and Palau) have also participated in PALS activities. However, they used different product standards from the South Pacific due to their different voltage requirements and product sources, and have not committed to similar regulatory approaches.

In addition to PALS, several other energy-efficiency initiatives supported by international donor agencies and development banks have demonstrated the viability of energy-efficient technologies, including energy-efficient lighting, in PICTs. These are described in Annex C: Current status of efficient lighting programmes and projects in PICTs.

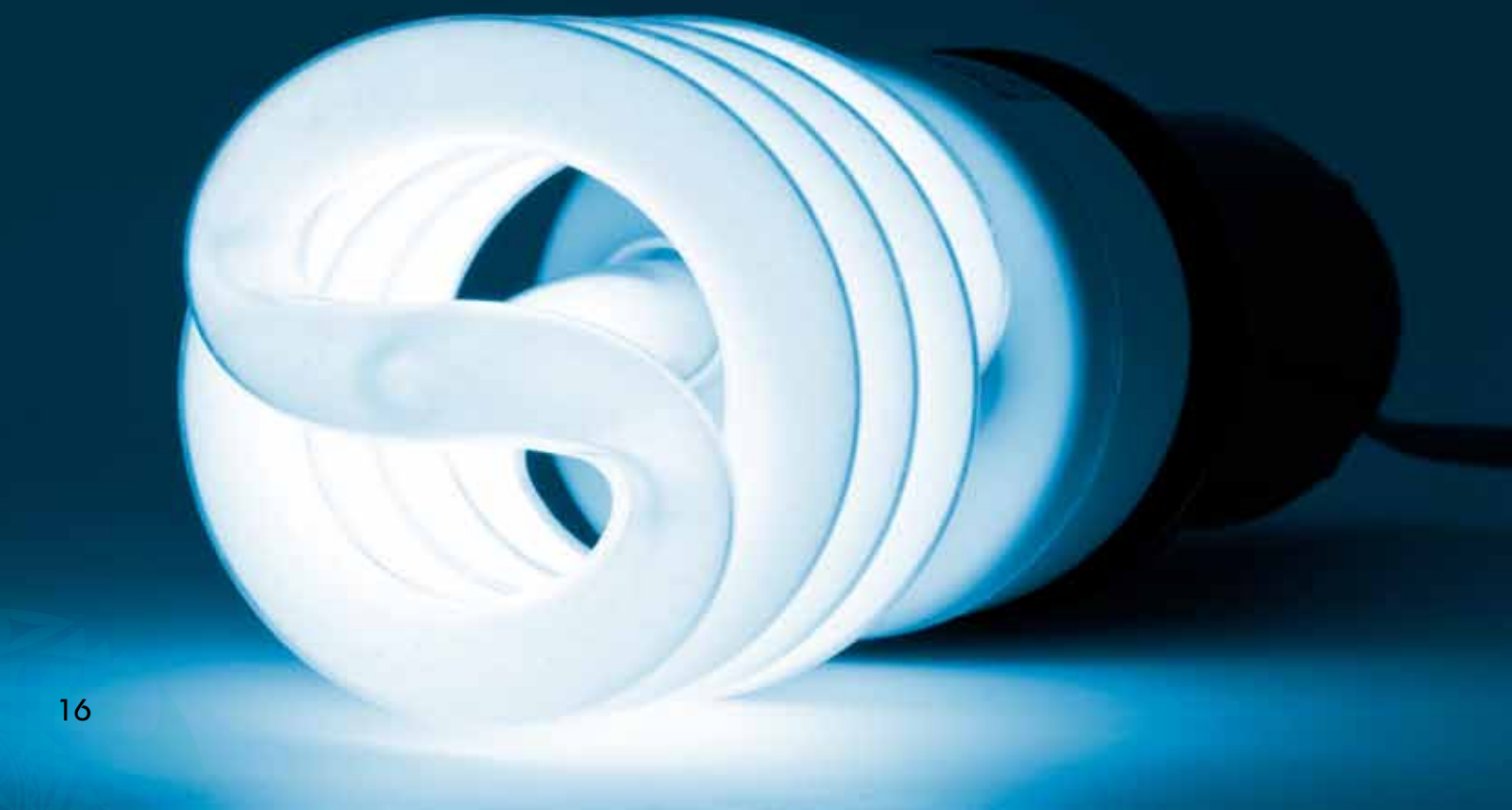
Table 2.2. Current scope of regulatory frameworks developed under the PALS programme1

Country	Status of regulations	Refrigerators and freezers	Air conditioners	Lighting	Other
Cook Islands	Draft	Covered[2]	Covered[2]	Under consideration	Clothes washers
Fiji	Enacted	Covered	Under consideration	Under consideration	Under consideration
Kiribati	Draft	Covered[2]	Covered[2]	Covered[2]	Commercial refrigeration
Samoa	Draft	Covered[2]	Covered[2]	Covered[2]	
Solomon Islands	Draft	Covered[2]	Covered[2]	Covered[2]	
Tonga	Draft	Covered[2]	Covered[2]	Covered[2]	
Tuvalu	Draft	Covered[2]		Covered[2]	
Vanuatu	Draft	Covered[2]	Covered[2]	Covered[2]	

Source: *SPC, 2015*
Notes: *1. This is not a complete list of PICTs participating in PALS. Other participants have not yet confirmed product coverage.*
2. Included in current draft regulations for MEPS and energy labelling.

[10]*Based on the PEEP2 household surveys, householders indicated that incandescent lamps are in the low usage areas of the homes.*

3. IMPLEMENTING THE STRATEGY



3.1 OVERALL APPROACH

PELS covers lighting in residential, commercial and government buildings, as well as street and outdoor lighting. To ensure an effective and self-sustaining transition to efficient lighting in PICTs, a cohesive set of national and regional actions for on-grid and off-grid lighting has been designed for implementation in the region. The actions follow the integrated policy approach recommended by the UNEP en.lighten initiative. This approach employs the following four policy components to increase the likelihood of a rapid and successful transition to efficient lighting:

- Minimum energy performance standards (MEPS);
- Monitoring, verification and enforcement (MVE);
- Supporting policies and mechanisms (SPM); and
- Environmentally sound management (ESM).

For more details on the integrated policy approach see Annex A: Methodology for the development of the Pacific Efficient Lighting Strategy.

It is envisaged that the regional goal and objectives will be collectively achieved through national and regional energy-efficient lighting programmes/projects, under SPC's coordination. This project approach was designed to address the lack of existing infrastructure and resources (e.g. regulatory frameworks and test facilities) to support the transition to efficient lighting within the region. The success of the project approach relies on the integrated implementation of all four policy components.

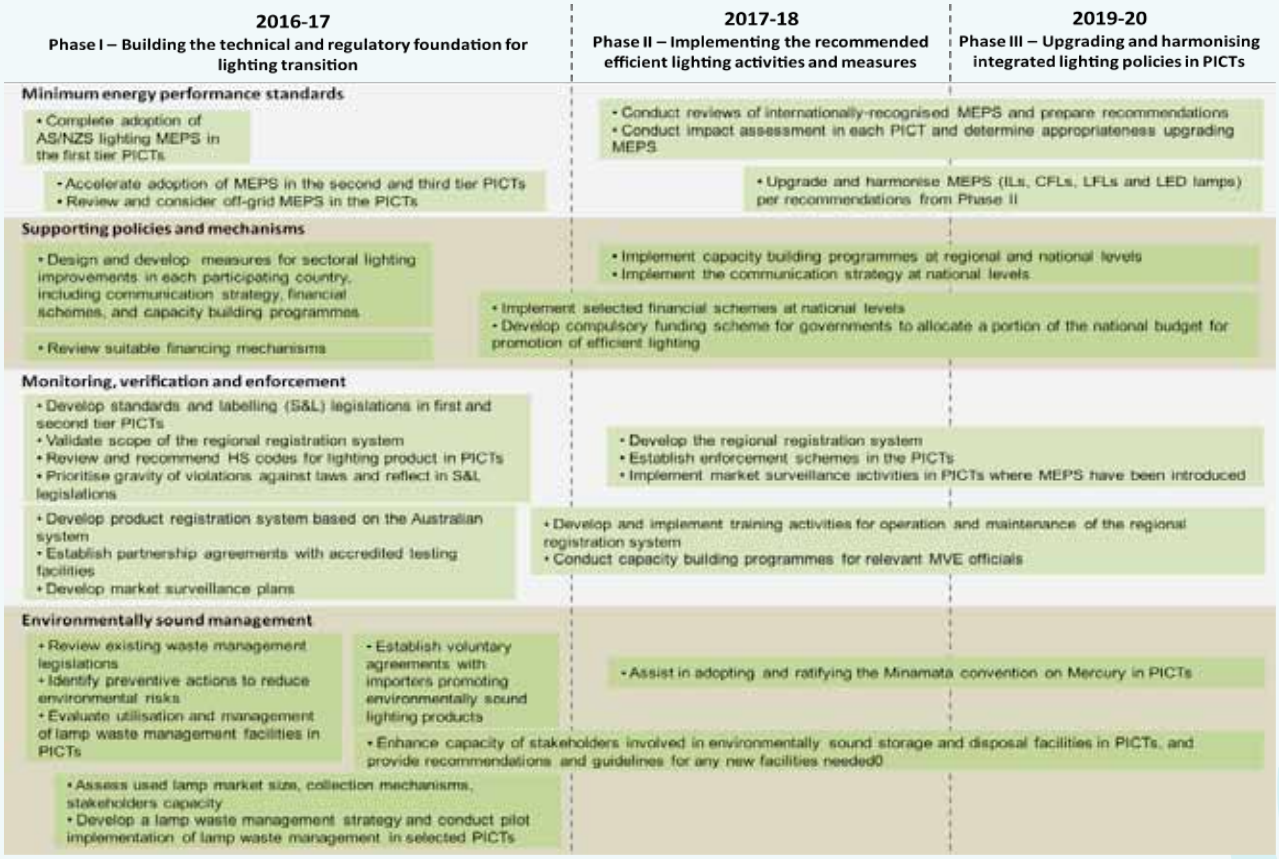
The following phased approach is recommended for the implementation of PELS, due to the uneven development status of institutional and regulatory frameworks required to support efforts to phase out incandescent lamps and promote efficient lighting in each participating country:

- Phase I (2016-2017) — Building the technical and regulatory foundation for lighting transition;
- Phase II (2017-2018) — Implementing the recommended efficient lighting activities and measures;
- Phase III (2019-2020) — Upgrading and harmonising integrated lighting policies in PICTs.

During phase I, PELS will build strong foundations for a lighting transition through establishment of supporting regulatory frameworks, product registration and database systems, and development of recommended measures for sectoral lighting improvements in each participating country. Phase II will focus on the implementation of the efficient lighting activities and measures recommended in phase I. Phase III will focus on efforts to harmonise and enhance the effectiveness of efficient lighting programmes in PICTs.

Key proposed activities in each policy component under each phase are captured in Figure 3.1.

Figure 3.1. Overall approach of the Pacific Efficient Lighting Strategy



3.2 COMPONENT 1 — MINIMUM ENERGY PERFORMANCE STANDARDS

3.2.1 CURRENT SITUATION

As highlighted in Section 2.2 (status of lighting policies and regulatory frameworks), the first tier countries (the Cook Islands, Fiji, Kiribati, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu) have already agreed to adopt the AS/NZS MEPS requirements for incandescent lamps, CFLs, linear fluorescent lamps and ballasts, and aim to approve the MEPS requirements for these on-grid lighting products by 2016. The AS/NZS MEPS requirements are detailed in Annex B: Technical information for the minimum energy performance standards component (note that AS/NZS MEPS are currently under review and are likely to be updated with consideration to also extend to LED lighting). The second tier countries have not yet committed to adopting regulatory frameworks that include MEPS requirements.

3.2.2 IMPLEMENTATION STRATEGY FOR COMPONENT 1

The MEPS policy component aims at ensuring the efficiency and quality of lighting products purchased and used in PICTs. Considering that the MEPS requirements in the first tier countries are in the final review and approval process, the second and third tier countries should aim to adopt similar MEPS requirements. Depending on the success of these efforts, regional harmonisation of MEPS for on-grid lighting products could be considered in 2018.

The specific objectives of the MEPS strategy component are:

- Objective 1.1: Ensure adoption of MEPS requirements for on-grid lighting products throughout PICTs;
- Objective 1.2: Ensure adoption of MEPS requirements for off-grid lighting products;
- Objective 1.3: Strengthen and harmonise MEPS requirements for lighting products.

These objectives will be accomplished through implementation of the following priority activities.

Objective 1.1: Ensure adoption of MEPS requirements for on-grid lighting products throughout PICTs

Activity 1.1.1: Accelerate adoption of MEPS in the second and third tier countries

a. Commitments from the recent PALS meetings have led to progress in the development of regulatory frameworks (including some MEPS requirements) in the first tier countries. In February 2015, participants in the PELS working group meeting agreed in principle to adopt the AS/NZS MEPS for on-grid lighting products; it was agreed that it would be practical for the second and third tier countries to then adopt the MEPS requirements set by the first tier countries.
b. The experiences of the first tier countries in implementing the MEPS requirements will be documented and widely disseminated within the PICTs region. Information regarding the successes of and barriers to implementation, as well as on economic benefits to key stakeholders (e.g. suppliers/retailers, end-users and utilities) and society as a whole will be disseminated in conjunction with national and regional events on energy efficiency. Status reports on the implementation of energy-efficient lighting in all of the PICTs will be provided annually at high-level regional meetings.

Objective 1.2: Ensure adoption of MEPS requirements for off-grid lighting products

Activity 1.2.1: Review potential MEPS for off-grid lighting product categories in PICTs

a. The Lighting Global programme has verified and certified several categories of off-grid lighting products, including single light point, multiple light points, portable, inbuilt solar panels and separate solar panels. (For more information, see www.lightingglobal.org/products/?view=grid.) Building on this foundation, importer and store surveys will be conducted in Papua New Guinea, Solomon Islands, Tonga and Vanuatu to identify the major categories and efficiency levels of off-grid lighting products available, so that appropriate performance parameters can be identified and referenced.
b. MEPS for off-grid lighting products are being drafted by the Economic Community of West African States (ECOWAS). The progress of these developments will be tracked, and reviews of published standards (including IEC 62257-9-5 Ed.2.0) will be reviewed. The relevant standards will be incorporated into the PICTs' regulatory frameworks once they are in place.

Objective 1.3: Strengthen and harmonise MEPS requirements for lighting products

Activity 1.3.1: Conduct reviews of internationally recognised MEPS requirements for lighting products

a. Lighting technology is continually being improved, and policy-makers need to review and periodically update the MEPS requirements for lighting products to respond to these evolving technologies and changes in the market. PICTs will keep track of these developments, and monitor the on-grid lighting product MEPS requirements adopted by the Australian and New Zealand Governments for the countries with 220-240 V mains power and those of the United States Government for those countries with 120 V mains power. Harmonising MEPS requirements with these major economies will save energy, expand consumer choice, lower retail prices, and improve compliance rates in the PICTs lighting markets.

Activity 1.3.2: Conduct impact assessment in each PICT and determine appropriateness for upgrading of MEPS requirements

a. Within 12 months of the upgrading of lighting MEPS issued by Australia, New Zealand and/or the United States, an impact assessment will be prepared to estimate economic benefits and other impacts of new and/or updated MEPS requirements in each PICT. The guideline document published by the UNEP en.lighten programme[11] (UNEP, 2015) will be reviewed and referenced as appropriate. The lighting market data obtained from the verification process (see objective 3.3 under the MVE component) will also be utilised in the impact assessment exercises.
b. Each PICT will organise a meeting to review and endorse results of the impact assessment. The meeting participants will identify opportunities for harnessing these new and/or updated MEPS requirements to transform lighting markets in their own country.

Activity 1.3.3: Upgrade and harmonise MEPS for on-grid lighting products to facilitate the transition to efficient lighting technology in PICTs

a. Recommendations on new and/or updated lighting MEPS issued by Australia, New Zealand and/or the United States will be prepared and circulated to all PICT policy-makers for review and endorsement. In this way, PICT governments will be empowered to consider revising/updating their lighting MEPS within a reasonable timeframe, and ideally will schedule revisions to coincide with these major economies. The timelines for adoption and enforcement of any new or updated MEPS requirements for lighting products in each PICT will depend on each country's regulatory framework.

[11] *A guidance note for policy makers focusing on the development and implementation of minimum energy performance standards (MEPS) for energy efficient lighting available for download at http://www.enlighten-initiative.org/portals/0/documents/Resources/publications/Developing%20MEPS%20for%20Lighting%20Products_web.pdf*

Table 3.1. Implementation strategy matrix for the minimum energy performance standards component

Objective/Outcome/Output/Activity		Indicative timeline				Implementing parties
		2016	2017	2018	2019-2020	
Objective 1.1: Ensure adoption of MEPS requirements for on-grid lighting products throughout PICTs						
Expected outcome 1.1: Overall electricity savings in implemented countries and region realised						
Output 1.1: Adoption of regionally harmonised MEPS for on-grid lighting products in the Pacific region						
Priority activities	Activity 1.1.1: Accelerate adoption of MEPS in the second and third tier countries	■	■			Energy Departments/ consultants
Objective 1.2: Ensure adoption of MEPS requirements for off-grid lighting products						
Expected outcome 1.2: Adoption of regionally harmonised MEPS for common off-grid lighting products in the Pacific region						
Output 1.2: Recommendations for off-grid lighting product categories and their respective MEPS requirements						
Priority activities	Activity 1.2.1: Review potential MEPS for off-grid lighting product categories in PICTs	■	■	■	■	Consultants, Papua New Guinea, Solomon Island, Tonga, Vanuatu
Objective 1.3: Strengthen and harmonise MEPS requirements for lighting products						
Expected outcome 1.3: MEPS for lighting products enforced, upgraded and harmonised with international requirements						
Output 1.3: Reports on economic benefits of energy efficient lighting market transformation at national levels, and recommendations on new and/or updated MEPS for lighting products						
Priority activities	Activity 1.3.1: Conduct reviews of internationally recognised MEPS requirements for lighting products		■	■	■	Consultants/ Energy Departments in PICTs/SPC
	Activity 1.3.2: Conduct impact assessment in each PICT and determine appropriateness for upgrading of MEPS requirements		■	■	■	
	Activity 1.3.3: Upgrade and harmonise MEPS for on-grid lighting products to facilitate the transition to efficient lighting technology in PICTs			■	■	

3.2.3 INDICATORS FOR PROGRESS EVALUATION

The key indicators for tracking implementation progress of the MEPS strategy component at the output and activity level are summarised in Table 3.2.

Table 3.2. Indicators for progress evaluation of the minimum energy performance standards component

Indicator	Target date
At least eight countries approve regulatory frameworks that have MEPS requirements	30 December 2016
Off-grid lighting product categories identified	30 June 2017
Reviews of lighting capability in each local market conducted	30 December 2017
Recommendations on new and updated MEPS for lighting products in PICTs	30 December 2018
Harmonisation of MEPS requirement within the PICTs commenced	30 June 2019
MEPS for off-grid lighting products adopted in the PICTs region	30 December 2019

3.3 COMPONENT 2 — SUPPORTING POLICIES AND MECHANISMS

Phasing out incandescent lamps in PICTs through mandatory approaches requires the development of appropriate regulatory frameworks in each country. The PICTs participating in the design of PELS recognise that the development of regulatory frameworks is a challenging and time-consuming process. To accelerate the phasing out of incandescent lamps and the transition to energy-efficient lighting while regulatory frameworks are under development, various supporting policies and mechanisms (SPM) were proposed and discussed during the PELS inception workshop. The complementary policies and measures that can be implemented to enhance effectiveness of energy-efficient lighting market transformation include:

- Economic and market-based instruments: market mechanisms that are often initiated and promoted by regulatory incentives but can contain elements of voluntary action or participation, e.g. cooperative (bulk) procurement, on-bill financing, bank loans and energy service performance contracting;
- Fiscal instruments and incentives: mechanisms that impact prices for end-users, such as tax incentives for purchasing efficient equipment (or disincentives for purchasing inefficient equipment), or rebate programmes to overcome initial cost differences;
- Information and voluntary action: initiatives that persuade end-users to change or modify their behaviour by providing information about efficient lighting and its benefits.

These supporting policies are expected to facilitate the market transformation goal by promoting energy-efficient lighting and discouraging the use of incandescent lamps over time. To ensure their effectiveness, PELS aims to overcome the challenges such as limited financial and human resources and lack of experience in design and implementation that have constrained the success of similar efforts in the past.

3.3.1 CURRENT SITUATION

As part of broader energy efficiency programmes funded by a variety of donor agencies (see Section 2), a number of efforts have been undertaken (or are ongoing) to implement supporting policies and mechanisms to promote energy-efficient lighting and to discourage the use of incandescent lamps in PICTs. These policies and mechanisms have generally focused on consumer awareness activities that provide information on the benefits of using energy-efficient lighting instead of inefficient lighting, e.g. CFLs and T5 linear fluorescent lamps instead of incandescent lamps and T8 linear fluorescent lamps, respectively. In addition, some countries have launched supporting financial programmes; examples are presented in Annex C: Current status of efficient lighting programmes and projects in PICTs. PELS can serve to guide and identify priority areas for any future support.

3.3.2 IMPLEMENTATION STRATEGY FOR COMPONENT 2

In consultation with the PELS countries (the Cook Islands, Kiribati, Palau, the Republic of the Marshall Islands, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu), the supporting policies and mechanisms to promote energy-efficient lighting and to phase out incandescent lamps will be designed based on past and ongoing relevant implementation experience in PICTs. These supporting actions will also be synchronised with activities under the other integrated policy components. There is general agreement among the PELS countries that the key supporting policies and mechanisms will focus on consumer awareness and communication campaigns, financial incentives and disincentives, and capacity building.

Although establishment of a voluntary regional labelling programme for lighting products in PICTs was discussed (in the PELS working group workshop held in Canberra in February 2015) as a possible strategy during the PELS development process, small market sizes and dispersed geographical locations of PICTs were identified as challenges in securing support from the lighting industry for such an initiative. Therefore, a voluntary regional labelling programme for lighting products is not considered as a priority action in the supporting policies and mechanisms component.

Considering the current situation in PICTs as well as the goal and objectives of PELS, the proposed immediate and long-term objectives for the supporting policies and mechanisms component are:

- Objective 2.1: Enhance consumer awareness about energy-efficient lighting and its benefits;
- Objective 2.2: Support end-user investment in energy-efficient lighting through innovative financing mechanisms;
- Objective 2.3: Strengthen capacity of policy-makers, policy advocacy groups and the private sector to design and implement energy-efficient lighting programmes; and
- Objective 2.4: Stimulate the purchase and use of energy-efficient lighting products in government and public buildings/areas.

These objectives will be accomplished through implementation of the following priority activities.

Objective 2.1: Enhance consumer awareness about energy-efficient lighting and its benefits

Activity 2.1.1: Design a communication strategy on energy-efficient lighting

a. A communication strategy for enhancing awareness of target audiences in the residential, commercial and government sectors about energy-efficient lighting will be prepared by a consultant or SPC. UNEP's Energy Efficient Lighting Toolkit (UNEP, 2012) and other existing resources will be reviewed and referenced as appropriate.
b. The communication strategy will develop key messages tailored for each target audience, addressing the economic implications of energy-efficient versus -inefficient lighting, the environmental and social benefits of energy-efficient lighting, and issues associated with end-of-life management of lamp wastes.
c. Effective communication channels in the PICT context will be identified and selected for each target audience segment. Possible channels include mass media (radio, TV, mobile), online and social media, electricity bill inserts, supply chain (e.g. point-of-sales) communications, and national educational systems (e.g. schools and colleges). Communication opportunities related to national and international events (e.g. Earth Day and World Environment Day) will also be leveraged.
d. Cost-effective quantitative and qualitative evaluation techniques will be included in the proposed communication strategy, together with templates and tools for data collection.

Activity 2.1.2: Develop national communication and awareness campaigns

a. Each PICT will develop a national communication and awareness campaign based on the communication strategy prepared in Activity 2.1.1. Because the type, timeline and intensity of communication activities will depend on available human and financial resources, the characteristics and milestones of communication activities amongst PICTs may not be fully synchronised.
b. Relevant national stakeholders will be engaged during the development phase to establish strategic alliances in the communication strategy for energy-efficient lighting. For example, electric utilities will be engaged to arrange electricity bill inserts, and the Ministry of Education will be a key partner in school programmes on energy-efficient lighting.

Activity 2.1.3: Implement the communication strategy at national levels

a. The implementation phase of the communication strategy on energy-efficient lighting will be carried out by the responsible agency or agencies in each PICT. To facilitate cross-pollination, sharing of lessons learned, and optimal use of resources (e.g. communication materials and tools) amongst PICTs, information sharing services and networking opportunities for participating government agencies and other project stakeholders will be enabled through an online regional registration system (to be established under the monitoring, verification and enforcement component) and/or facilitation by SPC.
b. As appropriate, the communication activities will reference existing data on baseline activities as well as planned measures; these data will be collected before commencement of the communication activities.

Objective 2.2: Support end-user investment in energy-efficient lighting through innovative financing mechanisms

Activity 2.2.1: Review and assess suitable financing mechanisms to support efficient indoor and street lighting technologies

a. A consultant or SPC will review applicable financing mechanisms, such as tax incentive policies (e.g. those implemented in Fiji and the Republic of the Marshall Islands) and interest subsidies for energy-efficient products (e.g. those implemented in Palau), and will evaluate the micro- (e.g. household) and macro-level benefits of these mechanisms. Other financing mechanisms that will be reviewed include:
    i. Utility-supported on-bill financing of energy-efficient indoor and street lighting technologies;
    ii. Establishment of energy service companies for efficient indoor and street lighting through international funding and creation of revolving funds;
    iii. Tax disincentives for purchase of incandescent lamps; and
    iv. Tax incentives for purchase of efficient lighting technologies.
b. Detailed guidelines providing steps for implementation will be prepared for PICTs. UNEP's Energy Efficient Lighting Toolkit and other existing guidance materials will be reviewed and referenced as appropriate.

Activity 2.2.2: Implement selected financing mechanisms at national levels

a. Based on the assessment results and the detailed implementation guidelines, the responsible implementing agency in each PICT will consult with relevant stakeholders, e.g. the Customs Office and the Ministry of Finance, to finalise the design and approve the appropriate financing mechanisms to support end-user investment in energy-efficient lighting.

Activity 2.2.3: Develop compulsory funding schemes/ obligation for government and/or financial institutions to allocate a portion of the national budget or local commitment for promotion of efficient lighting

a. The transition to an efficient lighting strategy will require a substantial amount of funding. To ensure a sustainable supply of locally based funds, PELS proposes to develop compulsory financing schemes in each participating country to cover the upfront cost of on-grid and off-grid lighting products. The schemes will require close collaboration between the Energy Department (or related bureau) and the Department of Finance in each PICT in order to allocate/manage local budgets, as well as funding from international donor agencies for each proposed activity. In addition, the scheme will collect money from the increased price of inefficient lighting technologies.

Objective 2.3: Strengthen capacity of policy-makers, policy advocacy groups and the private sector to design and implement energy-efficient lighting programmes

Activity 2.3.1: Design capacity building programmes for policy-makers, policy advocacy groups and lamp importers

a. The training needs of policy-makers, different policy advocacy groups[12] and lamp importers in PICTs will be assessed in order to understand specific requirements of each group in terms of design and implementation of energy-efficient lighting programmes.
b. It is envisaged that the capacity building programmes will comprise different training modules, each of which will be designed to address the specific training needs (e.g. energy-efficient-lighting-related technologies, standards, financial options) of each target group (e.g. government authorities, electric utilities, lighting suppliers). Designs of the capacity building programmes will be carried out in collaboration with other similar ongoing and/or planned capacity building initiatives, for example the PacTVET project[13].
c. Formats of training delivery and evaluation approaches will be clearly specified in the capacity building programme design. These capacity building programmes will be designed as regional training programmes. Each PICT should be able to adopt and implement these programmes without major modifications.

Activity 2.3.2: Design and develop training tools and materials

a. Training tools and materials, such as energy-efficient lighting technology demonstration kits and energy efficiency policy impact analysis tools, will be prepared and integrated into the capacity building programmes. Available training tools and materials developed by other energy-efficient lighting initiatives will be reviewed and utilised as appropriate.

Activity 2.3.3: Implement capacity building programmes at regional and national levels

a. Implementation of the capacity building programmes at the regional level will be designed to be carried out in conjunction with ongoing and future energy efficiency related initiatives in PICTs. At the national level, programme implementation will depend on the resources available and committed by each PICT. In general, priority for regional and national capacity building activities will be given to the second and third tier countries where no energy-efficient lighting policies and regulatory frameworks are currently planned.

Objective 2.4: Stimulate the purchase and use of energy-efficient lighting products in government and public buildings/areas

Activity 2.4.1: Establish efficient lighting procurement policies/guidelines for municipal and national government agencies and electric utilities

a. Putting in place energy-efficient product procurement policies can result in significant energy, environmental and economic benefits. By ensuring that all purchases of energy-using products meet energy efficiency criteria, these policies/guidelines improve the efficiency of government and municipal facilities and operations and/or encourage energy efficiency improvements in the residential, commercial and industrial sectors. In the Pacific, electric utilities are the key stakeholders for promotion of energy-efficient lighting products in public areas, since they are responsible for design, implementation and maintenance of street and outdoor lighting in most PICTs.
b. The policies/guidelines developed under PELS will incorporate any suitable existing procurement policies/guidelines, and will mandate efficient specifications for lighting products to be purchased, including general lighting service lamps, street lights and outdoor lights. In addition to meeting the criteria set for energy efficiency, the products that comply with the purchasing guidelines will also be higher than average in terms of efficacy and light quality compared with standard lights in local markets. The efficient lighting procurement policies/guidelines are required to be updated within three to five years to account for the volatility in prices of goods and rapid development of new technologies.

Activity 2.4.2: Demonstrate benefits of compliance with efficient lighting procurement policies/guidelines in PICTs

a. To demonstrate the benefits of compliance with the energy-efficient lighting procurement policies/guidelines, PELS will support demonstrations of energy-efficient lighting procurement policies/guidelines in government and municipal facilities and public lighting areas. It is expected that at least one large demonstration project will be implemented in each of the PELS countries to showcase energy and cost savings and to raise the visibility of energy-efficient lighting amongst the general public. The demonstration site (e.g. government/municipal facility or main street/public park) will be selected by each country. Internationally recognised measurement and verification (M&V) protocols will be referenced in determining results of each demonstration project. The energy and cost savings resulting from compliance with the procurement policies/guidelines will be well publicised in order to encourage replication within PICTs other than the PELS member countries.

[12] Policy advocacy groups are stakeholders other than government officials that play an important part in the development of efficient lighting strategy. In the PICTs, policy advocacy groups include consumer protection organisations, electric utilities, tourism organisations and other related NGOs (e.g. energy efficiency advocacy organisations).

[13] The EU-funded Pacific Technical and Vocational Education and Training on Sustainable Energy and Climate Change Adaptation (PacTVET) project is implemented by SPC in partnership with the University of the South Pacific (USP), starting in 2014 with an overall budget of 6.1 million euros.

The implementation strategy matrix for supporting policies and mechanisms is shown in Table 3.3.

Table 3.3. Implementation strategy matrix for the supporting policies and mechanisms component

Objective/Outcome/Output/Activity		Indicative timeline				Implementing parties
		2016	2017	2018	2019-2020	
Objective 2.1: Enhance consumer awareness about energy-efficient lighting and its benefits						
Expected outcome 2.1: More awareness of energy-efficient lighting products among the identified target audiences						
Output 2.1: Implementation of communication activities for different groups of target audiences						
Priority activities	Activity 2.1.1: Design a communication strategy on energy-efficient lighting	■				Consultants/SPC
	Activity 2.1.2: Develop national communication and awareness campaigns	■	■			PELS countries
	Activity 2.1.3: Implement the communication strategy at national levels		■	■	■	PELS countries
Objective 2.2: Support end-user investment in energy-efficient lighting through innovative financing mechanisms						
Expected outcome 2.2: Financial incentive and disincentive mechanisms designed, adopted and implemented in PICTs						
Output 2.2: Pragmatic financial incentive and disincentive mechanisms that can be applied to support energy-efficient lighting						
Priority activities	Activity 2.2.1: Review and assess suitable financing mechanisms to support efficient indoor and street lighting technologies	■				Consultants/SPC
	Activity 2.2.2: Implement selected financing mechanisms at national levels		■	■	■	PELS countries
	Activity 2.2.3: Develop compulsory funding schemes/obligation for government and/or financial institutions to allocate a portion of the national budget or local commitment for promotion of efficient lighting		■	■	■	SPC/PELS countries
Objective 2.3: Strengthen capacity of policy-makers, policy advocacy groups and the private sector to design and implement energy-efficient lighting programmes						
Expected outcome 2.3 Enhanced capacity among policy-makers and policy advocacy groups to design and implement supporting policies and mechanisms for energy-efficient lighting						
Output 2.3: Policy-makers, policy advocacy groups, and private sector entities get better understanding and autonomously implement energy-efficient lighting programmes						
Priority activities	Activity 2.3.1 Design capacity building programmes for policy-makers, policy advocacy groups and lamp importers	■				Consultants/SPC/ PELS countries
	Activity 2.3.2: Design and develop training tools and materials	■	■			
	Activity 2.3.3: Implement capacity building programmes at regional and national levels		■	■	■	
Objective 2.4: Stimulate the purchase and use of energy-efficient lighting products in government and public buildings/areas						
Expected outcome 2.4 Transparent and effective government procurement system						
Output 2.4: Energy-efficient procurement policies/guidelines						
Priority activities	Activity 2.4.1 Establish efficient lighting procurement policies/guidelines for municipal and national government agencies and electric utilities	■				Consultants/SPC/ Energy Departments
	Activity 2.4.2: Demonstrate compliance with efficient lighting procurement policies/ guidelines in PICTs		■	■		

3.3.3 INDICATORS FOR PROGRESS EVALUATION

The key indicators for tracking implementation progress of the supporting policies and mechanisms component at the output and activity level are summarised in Table 3.4.

Table 3.4. Indicators for progress evaluation of the supporting policies and mechanisms component

Indicator	Target date
Energy-efficient lighting procurement policies/guidelines adopted by at least two countries	30 June 2016
Design of communication strategy on energy-efficient lighting completed and endorsed by PELS countries	30 December 2016
Evaluations of the national campaigns implemented and results published	2017-2020 (annually)
Guidelines on implementation of financial mechanisms to support energy-efficient lighting prepared and shared among PICTs	30 December 2016
Design of capacity building programmes for policy-makers and policy advocacy groups completed and endorsed by PELS countries	30 December 2016
National communication and awareness campaigns in PELS and other PICTs designed based on the communication strategy developed	30 June 2017
Training tools and materials prepared and distributed to PICTs	30 June 2017
Policy-makers and policy advocacy groups for energy-efficient lighting policies trained and supported in each PICT	30 June 2017
Financial incentive policies prepared and approved by at least two PELS countries	30 December 2017
At least two energy-efficient lighting demonstration projects implemented	30 December 2018

3.4 COMPONENT 3 — MONITORING, VERIFICATION AND ENFORCEMENT

Demonstrating the success of an energy-efficient lighting market transformation programme depends on a well-functioning system of market monitoring. In the case of mandatory MEPS or labelling requirements, there are particular requirements for compliance, verification and enforcement of the regulations on lighting products. In addition to the requirements related to energy efficiency, it is critical that requirements addressing overall product quality are also enforced. Unless effective and timely market surveillance systems are engaged, substandard products will continue to enter national markets leading to end-users' dissatisfaction and disappointment in energy-efficient lighting products. Lack of enforcement also undermines the commitment of responsible companies to lighting MEPS.

Effective monitoring, verification and enforcement (MVE) systems help protect end-users from products that fail to perform as expected. Additionally, they ensure that government regulators fulfil the objectives of their efficient lighting initiatives. The same activities also protect suppliers by ensuring that each manufacturer is subject to the same programme entry conditions. MVE activities encompass a wide range of actions, including:

- Monitoring: the collection and analysis of data using agreed test methods to give an accurate picture of programme progress and compliance;
- Verification: the measurement process through which declarations of conformance (e.g. with energy efficiency and safety guidelines) by lighting suppliers are confirmed; and
- Enforcement: the action taken by programme administrators or other responsible parties against suppliers of non-compliant products.

Ensuring the effectiveness of MVE systems for energy-efficient lighting requires coordination among multiple agencies and other stakeholders to carry out all of the various key MVE elements, including product entry requirements, product registration systems, product performance databases, market surveillance, the verification process, the enforcement scheme, and product testing.

3.4.1 CURRENT SITUATION

Fiji is the only country among PICTs with experience in implementing an energy standards and labelling programme for appliances, launched in 2011. Although only household refrigerators have been included in the programme to date, Fiji's MVE experience is valuable to the PELS development. Apart from Fiji, all other PICTs are constrained by limited infrastructure and professional capacity, which has prevented them from establishing effective MVE systems for energy-efficient lighting. PICTs have identified a need for support in the development of such systems, including capacity building and knowledge sharing on MVE for policy-makers and staff to ensure that the institutional knowledge and experience are maintained over the long term.

Reviews of lighting retailer surveys conducted during the preparation of this strategy document, and reports on technical analysis of appliance markets in PALS countries conducted by the International Institute for Energy Conservation (IIEC) in 2012, indicate that the suppliers of CFLs and linear fluorescent lamps in PICTs are primarily Chinese (IIEC, 2012). The surveys also reveal that the popular wattages for CFLs in Fiji, Solomon Islands, Tonga, Tuvalu and Vanuatu are 11 W, 15 W, 18 W and 20 W, and the popular linear fluorescent lamps are T8 linear fluorescent lamps 18 W and 36 W. The fact that these common products are found across the various key markets of the PICTs supports the concept of establishing a centralised (regional) product registration system that would enable lighting suppliers to register once and enable the products to be recognised by all participating countries.

3.4.2 IMPLEMENTATION STRATEGY FOR COMPONENT 3

The MVE strategy will focus on the preparation of a regional MVE framework that PICTs can choose to adopt for implementation at national levels as appropriate. The immediate and long-term objectives for the MVE component are:

- Objective 3.1: Establish and improve regulatory frameworks to support MVE legislation in PICTs;
- Objective 3.2: Enable sharing of lighting product information through the establishment of a common regional registration and information sharing system for lighting products in PICTs;
- Objective 3.3: Establish a verification process for energy-efficient lighting products in PICTs; and
- Objective 3.4: Establish an enforcement scheme for energy-efficient lighting products in PICTs.

These objectives will be accomplished through implementation of various activities in a phased-step manner as described below.

Objective 3.1: Establish and improve regulatory frameworks to support MVE legislation in PICTs

Activity 3.1.1: Ensure extensive dissemination and understanding of the regulatory frameworks development guideline prepared by PALS and ensure the MVE component is incorporated in the country regulatory frameworks

a. PALS produced a guide to legislation and regulation for minimum energy performance standards and labelling (MEPSL) for appliances and lighting in September 2015 (SPC, 2015). The guide provides information on effective structures, key provisions and recommended procedures for administration of and compliance with standards and labelling programmes. These elements are crucial for the MVE element of energy-efficient lighting implementation. SPC will ensure extensive distribution of the guide to all PICTs.
b. A training programme will be conducted for legal experts in each PICT to highlight the importance of legislation for the implementation of effective MVE schemes and to assist with the transcription of the key provisions of the guideline described above in their respective national legal frameworks.

Activity 3.1.2: Develop and improve regulatory frameworks for supporting MVE schemes in PICTs

a. The following elements are recommended for inclusion in the regulatory frameworks for supporting MVE schemes in PICTs:
    ii. Parties affected and their obligations;
    iii. Powers of the regulator and appointed officials;
    iv. Administrative procedures;
    v. Compliance and penalties.

    Additional details for each of the above are provided in Annex D: Supporting information for the monitoring, verification and enforcement (MVE) component. Based on the abovementioned elements, a comprehensive review of regulatory frameworks in PICTs will be conducted. For first tier countries where draft regulatory structures are in place, the review will identify potential areas for improvement, ensuring the framework allows for future upgrading of MEPS requirements and MVE schemes (e.g. verification processes, designated government bureau, criteria for violations and penalties). For the second and third tier countries where regulatory frameworks and criteria for non-compliance and violations do not exist, the review will determine whether existing regulatory frameworks can be utilised for the MVE schemes or additional regulatory documents should be developed.
b. Each PICT government will review the MVE schemes to ensure that they are practical to their national context. It should be noted that informal enforcement actions may not be specified in the relevant legal document, and each PICT may define informal enforcement actions differently in accordance with their local market situations. Considering this, each PICT needs to ensure that a comprehensive list of informal enforcement actions (see Annex D, Section 5.4.3, Enforcement process, for examples of violations and penalties) will be discussed with local stakeholders, and integrated into the enforcement scheme. A plan to support development and/or improvement of regulatory frameworks for lighting MEPS and MVE in each PICT will be prepared in collaboration with the responsible agency or agencies (e.g. the Energy Department, Customs Department, Council of State or Office of the Attorney General), and other key stakeholders (suppliers, retailers and the general public).
c. The lead energy efficiency agency in each PICT will ensure execution of the plan in a timely manner, and will incorporate the MVE frameworks in their respective national legal frameworks for implementation of efficient lighting. Progress of development and adoption of the MVE frameworks in each PICT shall be discussed in regional meetings of PICT energy regulators, regularly organised as part of the regional cooperation on energy.

Objective 3.2: Enable sharing of lighting product information through the establishment of a regional registration and information sharing system for lighting products in PICTs

Activity 3.2.1: Validate scope and key features of the regional registration system

a. It is proposed that the regional registration system for lighting products in PICTs be developed as an integral part of the online product registration system that is under development for PALS countries. Based on the report on the Pacific Registration Dataset Project[14] (DIIS, 2015), the regional registration and information sharing system shall be an online system, hosted in the region (under supervision of SPC) to provide maximum level of control and autonomy over the system and its future development.
b. The scope and features of the online registration system recommended by the Pacific Registration Dataset Project (DIIS, 2015), such as electronic online data entry via an internet based system, and automated generation of approval certificates once a regulator approves an application, will be reviewed and validated by all participating countries prior to the system development.

Activity 3.2.2: Develop the regional registration system modelled on the Australian online product registration system

a. The system architecture and design of the regional registration system will be developed based on the Australian online product registration system, with consideration to some offline data entry features for some PICTs where internet is slow and unstable. For the lighting section of the registration system, all features identified and validated through the consultative process described above shall be integrated to ensure meaningful data sharing across PICTs.

Activity 3.2.3: Develop and implement training activities for operation and maintenance of the regional lighting registration system

a. Following the completion of the system (by the end of 2016), a training programme will be prepared for system administrators and general users, including hands-on exercises. It is envisaged that the training programme will be hosted where the regional registration system is located. An outline of the training programme will be circulated to all participating countries for comments and input before its finalisation. Customs officials, regulators and officials from the Energy Department (or other related departments) are the primary target groups to receive the training on the registration system.
b. Training tools and materials, such as demonstration and instruction videos, will be prepared and utilised in the training sessions as appropriate. It is recommended that the training programmes be divided into two phases. The first phase will comprise a regional training for trainers programme; trainees should have strong IT backgrounds and be capable of transferring knowledge to others. The second phase will be the national training programmes and will utilise trainers from the first phase. Each PICT may also develop other formats (different languages, graphics, etc.) once the training materials are available.

Activity 3.2.4: Review and recommend Harmonised System (HS) codes for lighting products in PICTs

a. HS codes used for identification of different types of lighting products vary from country to country. To enable consistency in data compilation and sharing in the region, it is proposed that all PICTs reference the same set of HS codes for lighting products and use them in the regional registration system. Specific HS codes for lighting products, particularly LED lighting, have been discussed in Europe and also in Southeast Asia. Findings and recommendations from these discussions shall be reviewed and the appropriate coding systems will be discussed amongst PICTs. The Oceania Customs Organisation (OCO) secretariat which actively provides support to customs officials within the region shall also be engaged in discussion and conclusion of the HS codes for lighting products in the Pacific.

[14] *Pacific Registration Dataset Project, November 2015 prepared by Energy Efficient Strategies P/L. The report summarises findings from the questionnaire surveys in tier 1 countries.*

Objective 3.3: Establish a verification process for energy-efficient lighting products in PICTs

Activity 3.3.1: Establish partnership/cooperation agreements with accredited testing facilities

a. Participants in the PELS working group discussion workshop held in Canberra in February 2015 agreed in principle that establishment of a testing facility for lighting products within the region would not be economically viable. Instead, partnerships with third party accredited testing laboratories will be established. A list of accredited testing facilities for lighting products (and their testing fee schedules) in Australia and New Zealand, as well as in nearby Asian countries, will be developed. Based on a selection process involving all of the participating PICTs, and on interest of the testing labs, partnership/ cooperation agreements will be established with some of these testing facilities.

Activity 3.3.2: Develop market surveillance guidelines and a verification testing plan for PICTs

a. The verification testing plan for PICTs will outline market surveillance activities ranging from basic visual inspections to complex product sampling and testing. The UNEP en.lighten initiative, supported by the Australian Government, is preparing a set of guidance documents for lighting market verification, which can serve as a model for development of check testing guidelines for lighting products in PICTs.
b. Following the finalisation of the verification testing plan, a training programme will be developed and organised for the appointed staff in each participating PICT. Field activities will be included as the key components in the training programme. The training programme will also elaborate how to interpret test reports delivered by testing facilities.
c. Market surveillance and check testing schemes will be developed. The basic guidelines for compliance check testing are provided in Annex D.

Activity 3.3.3: Implement market surveillance activities in PICTs (ad hoc and periodic) where MEPS have been introduced

a. Implementation of market surveillance systems will be focused on the first tier countries, and PICTs where labelling for lighting products are in common (including those that recognise labels issued overseas). Results of market surveillance activities in one PICT should be shared with other PICTs to minimise the MVE costs for the region and enhance the level of compliance in the region.

Objective 3.4: Establish an enforcement scheme for energy-efficient lighting products in PICTs

Activity 3.4.1: Prioritise gravity of violations against the imposed regulations for lighting products in PICTs

a. Criteria regarding the gravity of violations against lighting regulations will be determined in order to support the activities of enforcement officials. The criteria will apply to incidents of non-compliance stated in the final imposed PALS legislation (a list of these non-compliance acts is provided in Annex D), and will be coupled with a progressive action plan for applications depending on severity of the non-compliance.

Activity 3.4.2: Match prioritised violations to a range of penalties

a. A range of penalties will be defined, based on the gravity of the violations. Penalties will escalate with repeated non-compliance.

Activity 3.4.3: Develop and implement training programmes supporting the enforcement schemes in PICTs

a. Training programmes focusing on compliance check-testing and enforcing penalties will be developed and implemented for relevant staff of ministries, customs agencies, and trade agencies.

Activity 3.4.4: Apply the enforcement schemes in PICTs

a. Based on findings from the monitoring and verification activities in each PICT, enforcement systems will be put in place. It is envisaged that implementation of the enforcement scheme will be a collaboration amongst responsible stakeholders, including Customs Departments and Energy Departments. Experience in implementation of the enforcment schemes in each PICT will be documented and resulting data integrated into the online registration system to enable information sharing among PICTs.

The implementation strategy matrix for MVE is shown in Table 3.5.

Table 3.5. Implementation strategy matrix for the monitoring, verification and enforcement component

Objective/Outcome/Output/Activity		Indicative timeline				Implementing parties
		2016	2017	2018	2019-2020	
Objective 3.1: Establish and improve regulatory frameworks to support MVE legislation in PICTs						
Expected outcome 3.1: Effective in-country regulatory frameworks to support implementation of mandatory MEPS approved in PICTs						
Output 3.1: Energy efficiency regulatory frameworks established in PICTs						
Priority activities	Activity 3.1.1: Ensure extensive dissemination and understanding of the regulatory frameworks development guideline prepared by PALS and ensure the MVE component is incorporated in the country regulatory frameworks	■				Consultants/SPC/ Energy Departments
	Activity 3.1.2: Develop and improve regulatory frameworks for supporting MVE schemes in PICTs	■	■	■	■	
Objective 3.2: Enable sharing of lighting product information through the establishment of a regional registration and information sharing system for lighting products in PICTs						
Expected outcome 3.2: Online lighting product database facilitating transition to energy-efficient lighting and phasing out of incandescent lamps in PICTs						
Output 3.2.1: A regional registration system for lighting products established						
Priority activities	Activity 3.2.1: Validate scope and key features of the regional registration system	■				Consultants/SPC
	Activity 3.2.2: Develop the regional registration system modelled on the Australian online product registration system	■	■			PELS countries
	Activity 3.2.3: Develop and implement training activities for operation and maintenance of the regional lighting registration system		■	■	■	SPC/PELS countries
Output 3.2.2: Recommendations on specific harmonised system (HS) codes for lighting products for registration and customs purposes						
Priority activities	**Activity 3.2.4: Review and recommend HS codes for lighting products in PICTs**	■				**Consultants/ Customs Offices**
Objective 3.3: Establish a verification process for energy-efficient lighting products in PICTs						
Expected outcome 3.3: Appropriate national verification frameworks established in PICTs; quality lighting products sold in markets						
Output 3.3: Development and implementation of market surveillance systems for PICTs						
Priority activities	**Activity 3.3.1: Establish partnership/cooperation agreements with accredited testing facilities**	■	■			**SPC/Energy Departments**
	Activity 3.3.2: Develop market surveillance guidelines and a verification testing plan for PICTs	■	■			**Consultants/Energy Departments**
	Activity 3.3.3: Implement market surveillance activities in PICTs (ad hoc and periodic) where MEPS have been introduced			■	■	**Energy Departments**
Objective 3.4: Establish an enforcement scheme for energy-efficient lighting products in PICTs						
Expected outcome 3.4: Fair, level playing field among manufacturers; efficient lighting products sold in markets						
Output 3.4: Escalating set of counter violation measures and corrective actions						
Priority activities	**Activity 3.4.1: Prioritise gravity of violations against the imposed regulations for lighting products in PICTs**	■				**Energy Departments/legal advisors**
	Activity 3.4.2: Match prioritised violations to a range of penalties	■	■			
	Activity 3.4.3: Develop and implement training programmes supporting the enforcement schemes in PICTs	■	■	■	■	
	Activity 3.4.4: Apply the enforcement schemes in PICTs			■	■	

3.4.3 INDICATORS FOR PROGRESS EVALUATION

The key indicators for tracking implementation progress of the MVE component at the output and activity level are summarised in Table 3.6.

Table 3.6. Indicators for progress evaluation of the monitoring, verification and enforcement component

Indicator	Target date
Regulatory frameworks incorporating MVE schemes approved in first tier countries	30 December 2016
Partnership/cooperation agreements with accredited testing facilities established	30 June 2017
Market surveillance guidelines for PICTs developed and endorsed	30 June 2017
Market surveillance activities implemented in PICTs where MEPS and labelling for lighting products are in place	2017-2020 (annually)
Regional product registration system established	30 December 2017
Harmonised system codes for lighting products adopted by customs offices	30 December 2017
Regulatory frameworks incorporating MVE schemes approved in second tier countries	30 December 2018
Enforcement actions implemented in PICTs	Commencing in 2018
Responsible personnel assigned by each PICT capable of updating and managing the product registration data	30 December 2018

3.5 Component 4 — Environmentally sound management

A number of international agreements are in place that address hazardous waste. These include the *Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal*[15], and the Waigani Convention[16], a treaty that bans the export of hazardous or radioactive waste to Pacific Islands Forum countries and prohibits Forum countries from importing such waste. In addition, the *Minamata Convention on Mercury*[17] is a global treaty to protect human health and the environment from the adverse effects of mercury. Article 4 of the Minamata Convention[18] states that each Party shall not allow the manufacture, import or export of mercury-added products, and the following linear fluorescent lamps and CFLs are included on the list:

- CFLs that are ≤30 W with a mercury content exceeding 5 mg per lamp burner;
- Linear fluorescent lamps for general lighting purposes: triband phosphor <60 W with a mercury content exceeding 5 mg per lamp; halophosphate phosphor ≤40 W with a mercury content exceeding 10 mg per lamp.

Energy efficiency programmes that include lighting installation thus need to consider the long-term implications of promoting different types of lighting products, and need to include plans for managing the disposal of the inefficient lamps being replaced as well as the efficient lighting products when they come out of service. The average durability of lamps increased with the introduction of energy-efficient lamps; this should be considered in the end-of-life management plans under consideration. For linear fluorescent lamps and CFLs, most lamps have at least a five-year lifespan. Because many lamps installed prior to the institution of the international initiatives discussed above do not fall under their hazardous substance restrictions, these products may require additional considerations for disposal management. Outreach activities are needed to educate the public on their responsibilities to not only install, but also to manage the disposal of their lamps. Even in the case of CFLs, electronic ballasts and LED lighting, there will be implications relating to the management and disposal of electronic waste.

[15] http://www.basel.int/portals/4/basel%20convention/docs/text/baselconventiontext-e.pdf
[16] http://www.forumsec.org/resources/uploads/attachments/documents/Waigani%20Convention%20Text1.pdf
[17] http://www.mercuryconvention.org/
[18] http://www.mercuryconvention.org/Portals/11/documents/conventionText/Minamata%20Convention%20on%20Mercury_e.pdf

The environmentally sound management (ESM) strategy component aims to assist PICTs in addressing the management of mercury and other hazardous substances from lighting products. ESM of lighting products is a particularly challenging policy area in PICTs because it requires coordination of multiple in-country agencies; in addition, lamp waste has very little or no value but has substantial public health and environmental impacts if not properly managed. The widespread geographical locations of the PICTs and differences in their respective lighting market sizes add additional challenges in terms of costs associated with logistics and the development of required ESM infrastructures.

3.5.1 CURRENT SITUATION

The two main types of lighting products commonly used in PICTs, i.e. linear fluorescent lamps and CFLs, contain mercury which can be harmful to the environment and human health when not appropriately managed. Some PICTs already have in place basic regulatory frameworks related to environment and waste management, for example:

- Fiji — Environment Management Act, 2005;
- Tonga — Environment Management Act, 2005; Environment Management Act, 2010; Hazardous Waste and Chemical Act, 2010;
- Vanuatu — Waste Management Act, 2014.

PELS takes these current frameworks into account in formulating recommendations for additional ESM design and implementation.

3.5.2 IMPLEMENTATION STRATEGY FOR COMPONENT 4

The ESM strategy component has the following objectives:

- Objective 4.1: Develop lamp waste management strategies and supporting legal mechanisms;
- Objective 4.2: Strengthen implementation of sustainable management models for lamp waste management facilities in PICTs; and
- Objective 4.3: Minimise the impacts of mercury from lighting products on the environment and population in PICTs.

These objectives will be accomplished through implementation of the priority activities described below.

Objective 4.1: Develop lamp waste management strategies and supporting legal mechanisms

Activity 4.1.1: Assess the volume of used lamps, existing collection mechanisms, and capacity of stakeholders to support environmentally sound lamp waste management

a. To develop a suitable and sustainable lamp waste management strategy at the national and regional levels, PELS will assess the volume/quantity of used lamps, existing collection mechanisms, and abilities of waste management agencies and other stakeholders (in terms human and financial resources) to support environmentally sound lamp waste management.

Activity 4.1.2: Review existing legal frameworks for waste management in PICTs

a. To develop a proper lamp waste management strategy, a comprehensive review of existing legal frameworks related to waste management in PICTs will be conducted. The aim of this review will be to understand how lamp waste management can best be integrated into the existing legal frameworks and what additional supporting mechanisms would be required to ensure effective and safe management of lamp wastes. In general, lamp wastes are considerably different from all other electrical and electronic wastes in terms of collection and recycling due to their fragility and low weight, the high volume of lamps put on the market every year, the fact that they have no residual value at end of life, and the need to comply with hazardous regulations.

Activity 4.1.3: Identify preventive actions to reduce environmental risks from lighting products

a. The lamp waste management strategy must involve an assessment of risks posed by various options for the the collection, disposal or recyling activities, e.g. transportation of used lamps, handling and storage of metallic mercury and electronic wastes.
b. Electronic ballasts for CFLs and linear fluorescent lamps have printed circuit boards and other electronic components. At the end of product life, these electronic ballasts and LED lamps are considered as electronic waste (IEA, 2014). Therefore, the lamp waste management strategy must involve an assessment of risks caused by these end-of-life lighting products and identify a set of preventive actions.
c. Poorly designed public lighting can cause orientating problems to migratory species, especially nocturnal flying species, e.g. birds and insects. Thus, a photobiological safety assessment should be carried out for all public lighting devices using the joint CIE S009/IEC 62471 standard[19].

Activity 4.1.4: Develop a lamp waste management strategy, and conduct pilot implementation of lamp waste management in selected PICTs

a. Based on the assessment results, PELS will consider the potential for utilising two common approaches for managing lamp wastes: a conventional waste collection[20] approach and an extended producer responsibility[21] approach. Since each PICT may assess the benefits and risks of each type of programme differently, it is recommended that a specific national lamp waste management strategy for each PICT be developed. The national lamp waste management strategy will recommend appropriate approaches to effectively manage lamp wastes from different end-use sectors (such as public and commercial buildings, and households). The lamp waste management strategy shall address both mercury-containing lamps and electronic wastes, and also integrate options for sustainable management of lamp waste management facilities in PICTs. The working group will organise a focused discussion among the participating PICTs to ensure general agreement on a standard lamp waste management strategy. The strategy will include provisions to facilitate cooperation between government, the distribution chain and producers, and sufficient financial support.
b. Once agreement is reached on the standard lamp waste management strategy, pilot implementations will be undertaken to verify the feasibility of the proposed strategy. The pilot implementations will likely focus on the public and commercial building sectors in one selected PICT and on the residential sector in another PICT. Lessons learnt from the pilot implementations will be reviewed and incorporated into the final recommendations of the lamp waste management strategy for PICTs.

[19] *The standard is available for download at: http://www.lightingeurope.org/uploads/files/CELMA_LED(FR)003A_Annex_A_Photobiological_Safety_Guide_LED_Standards_Nov2009_FINAL-1.pdf*

[20] *Conventional waste collection is usually managed by government and financed by taxes imposed on the consumers; typical collection systems include waste collection stations or drop-off depots, collection at public places or shops, or collection at households by collectors.*

[21] *Extended producer responsibility is defined as an environmental policy approach in which a producer's responsibility (physical and/or financial) for a product is extended to the post-consumer period, usually by add-up costs of lamps. For example, lamp manufacturers or traders are responsible for lamp collection, disposal or recycling. (See Basel convention for more details.)*

Activity 4.1.5: Develop and implement supporting legal mechanisms for lamp waste management

a. Since lamp wastes are different from other wastes, specific legal mechanisms and operational solutions are required to ensure the effectiveness of lamp waste management. Under PELS, supporting legal mechanisms for lamp waste management in PICTs will be designed to enable appropriate agencies or organisations to execute and enforce the lamp waste management activities.

Objective 4.2: Strengthen implementation of sustainable management models for lamp waste management facilities in PICTs

Activity 4.2.1: Evaluate costs of operation of lamp waste management facilities in PICTs and overseas

a. Two potential environmentally sound approaches for disposal of lamp wastes are domestic lamp waste crushing using lamp crushers[22], storage and safe disposal in engineered landfills[23]; and overseas lamp waste recycle and disposal[24]. Financial comparisons of these two disposal systems are provided in Annex F: Comparison of lamp waste management costs in PICTs and overseas. In addition to carrying out an economic analysis for each PICT, the capacity of the responsible agency for managing this system will be assessed.

Activity 4.2.2: Identify strategy options for sustainable operation of lamp crusher facilities, storage and disposal of crushed lamps in PICTs

a. Based on findings from the evaluation, various strategy options for sustainable management of the lamp crushing facilities will be considered. An environmentally sound storage[25] area will be sought and the collection method will be finalised. If a domestic lamp waste management facility is preferred, the following shall be defined: a well-ventilated confined area for collecting contaminated lamp waste, logistics of this contaminated waste, and construction cost of appropriate secure landfill. The strategy options for storage and disposal of crushed lamps shall be applicable also for electronic waste (electronic ballasts and LED lamps).

b. The strategies will incorporate a communication and awareness component that focuses on health and environmental impacts from used CFLs and linear fluorescent lamps. This will support the overall communication strategy under Component 2, supporting policies and mechanisms.

Activity 4.2.3: Enhance capacity of stakeholders involved in environmentally sound storage and disposal facilities in PICTs

a. Capacity building programmes focusing on environmentally sound storage will be carried out in conjunction with development of strategy options for sustainable management of lamp crusher facilities in PICTs. Implementation of the capacity building programmes will be conducted at the regional level to enable the sharing of success and lessons learnt from utilisation and management of lamp crusher, storage and disposal facilities in the PEEP2 countries. Implementation of the capacity building programmes at the national level will depend on the resources available and committed by each PICT.

[22] Lamp waste disposal facilities (lamp crushers) were procured under the PEEP2 project and have been in operation to support the PEEP2 energy-efficient lighting projects in the Cook Islands, Papua New Guinea, Samoa, Tonga and Vanuatu. The machine is neither endorsed nor discouraged by the US Environmental Protection Agency. (More details of lamp crushers are provided in Annex E.)

[23] According to the Basel Convention Technical Guidelines on Specially Engineered Landfill (D5), a landfill site can be engineered to be environmentally safe subject to appropriate siting, proper precautions and efficient management.

[24] The overseas lamp waste recycle and disposal approach would employ a professional waste management firm in Australia or New Zealand to handle all lamp waste disposal activities. Waste lamps would be shipped from PICTs and disposed of, neutralised and/or recycled in these countries.

[25] Environmentally sound storage in this context means utilisation of well-designed containers for waste containing mercury (e.g. crushed lamps). The containers are placed in a specific collection station to avoid mixing with other wastes.

Objective 4.3: Minimise the impacts of mercury from lighting products on the environment and population in PICTs

Activity 4.3.1: Assist in adopting and ratifying the Minamata Convention on Mercury in PICTs

a. A sub-regional workshop to support the ratification and early implementation of the Minamata Convention in PICTs took place in Samoa in January 2015. The objective of the workshop was to enhance participants' knowledge of the Minamata Convention and the processes for its ratification and early implementation. Initial national roadmaps for the ratification and early implementation of the Convention in the Cook Islands, the Federated States of Micronesia, Kiribati, the Republic of the Marshall Islands, Nauru, Palau, Papua New Guinea, Samoa[26], Tonga and Vanuatu were prepared and presented at the workshop. During the PELS implementation, the status of these roadmaps specifically for the issues relevant to lighting products will be explored, and information on available sources of support will be made available to help PICTs accelerate the adoption and ratification of the Convention.

Activity 4.3.2: Establish and implement voluntary agreements with importers and distributors to promote environmentally sound lighting products

a. PELS will work with lamp distributors and electric utilities and agencies to develop materials for inclusion with all new lamps being distributed about the responsibilities of consumers, retailers and waste managers to ensure environmentally sound management (ESM) of end-of-life energy-efficient lighting.
b. This activity is a cost-effective approach to help reduce the effects of mercury on the environment and populations in PICTs, and it can be carried out in parallel with the effort to promote adoption and ratification of the Minamata Convention in PICTs and the binding agreement, i.e. the extended producer responsibility programme. A draft voluntary agreement to promote environmentally sound lighting products will be developed in collaboration with major importers/retailers of lighting products in PICTs, and relevant promotional activities under the supporting policies and mechanisms component will be integrated into the voluntary agreement to stimulate the interest and participation of importers/retailers.

[26] *Samoa ratified as a party to the Minamata Convention on Mercury in 2015, and is the first PICT to participate in this treaty.*

able 3.7 outlines the strategy implementation matrix for the environmentally sound management (ESM) component.

Table 3.7. Implementation strategy matrix for the environmentally sound management component

Objective/Outcome/Output/Activity		Indicative timeline				Implementing parties
		2016	2017	2018	2019-2020	
Objective 4.1: Develop lamp waste management strategies and supporting legal mechanisms						
Expected outcome 4.1: Adoption of a lamp waste management strategy and legal frameworks						
Output 4.1.1: Recommendations on an appropriate lamp waste management strategy for PICTs						
Priority activities	Activity 4.1.1: Assess the volume of used lamps, existing collection mechanisms, and capacity of stakeholders to support environmentally sound lamp waste management	■	■			Consultants/Energy and Environmental Department
	Activity 4.1.2: Review existing legal frameworks for waste management in PICTs	■				
	Activity 4.1.3: Identify preventive actions to reduce environmental risks from lighting products	■				
Output 4.1.2: Specific legal mechanisms to support lamp waste management developed and approved in PICTs						
Priority activities	Activity 4.1.4: Develop a lamp waste management strategy, and conduct pilot implementation of lamp waste management in selected PICTs	■	■			Consultants/Energy and Environmental Department
	Activity 4.1.5: Develop and implement supporting legal mechanisms for lamp waste management		■	■	■	
Objective 4.2: Strengthen implementation of sustainable management models for lamp waste management facilities in PICTs						
Expected outcome 4.2: Improved operation of lamp waste management facilities in PICTs						
Output 4.2: Recommendations on options for sustainable management of lamp waste management facilities in PICTs						
Priority activities	**Activity 4.2.1: Evaluate costs of operation of lamp waste management facilities in PICTs and overseas**	■				Consultants/ Disposal facilities/ Energy and Environmental Department
	Activity 4.2.2: Identify strategy options for sustainable operation of lamp crusher facilities, storage and disposal of crushed lamps in PICTs	■	■			
	Activity 4.2.3: Enhance capacity of stakeholders involved in environmentally sound storage and disposal facilities in PICTs		■	■	■	
Objective 4.3: Minimise the impacts of mercury from lighting products on the environment and population in PICTs						
Expected outcome 4.3: Environmentally sound societies; minimal toxic lamp waste						
Output 4.3: Acceptance of the Minamata Convention in PICTs and agreement with lamp importers						
Priority activities	**Activity 4.3.1: Assist in adopting and ratifying the Minamata Convention on Mercury in PICTs**			■	■	**Consultants/ Environmental Department**
	Activity 4.3.2: Establish and implement voluntary agreements with importers and distributors to promote environmentally sound lighting products		■			

3.5.3 INDICATORS FOR PROGRESS EVALUATION

The key indicators for tracking implementation progress of the environmentally sound management component at the output and activity level are summarised in Table 3.8.

Table 3.8. Indicators for progress evaluation of the environmentally sound management component

Indicator	Target date
Review of existing legal framework for waste management in PICTs completed	30 December 2016
Voluntary agreement with importers established	Commencing 2017
Assessment of volume of used lamps, existing collection mechanisms, and capacity of stakeholders to support lamp waste management completed	30 June 2017
A standard lamp waste management strategy prepared and endorsed by PICTs	30 December 2017
Specific legal mechanisms to support lamp waste management developed and approved in at least one PICT	30 June 2018
Pilot implementations of lamp waste management (collections and disposals) completed and lessons learnt compiled	30 December 2018
Ratification of the Minamata Convention on Mercury in PICTs	2018-2020

4. PROPOSED BUDGET FOR IMPLEMENTATION

Implementation of priority activities under PELS at the regional and national levels during the period of 2016–2020 would require a budget of around USD 5.8 million. Table 4.1 shows the proposed budget for implementation of priority activities under each strategy component. The largest component under PELS in terms of budget requirement is the supporting policies and mechanisms component which accounts for about 51% of the proposed budget. This is due to the significant budget allocation for implementation of communication campaigns for efficient lighting in 12 PICTs, seed funding for implementation of financial mechanisms to support investment of efficient lighting, and implementation of demonstration projects.

Table 4.1. Summary of proposed budget for PELS implementation

Activities	Annual budget (USD)					Total (USD)
	Year 1	Year 2	Year 3	Year 4	Year 5	
MINIMUM ENERGY PERFORMANCE STANDARDS (MEPS)						
Activity 1.1.1: Accelerate adoption of MEPS in the second and third tier countries	35,000	0	0	0	0	35,000
Activity 1.2.1: Review potential MEPS for off-grid lighting product categories in PICTs	94,500	91,500	0	0	0	186,000
Activity 1.3.1: Conduct reviews of internationally recognised MEPS requirements for lighting products	0	16,500	0	16,500	0	33,000
Activity 1.3.2: Conduct impact assessment in each PICT and determine appropriateness for upgrading of MEPS requirements	0	69,000	0	69,000	0	138,000
Activity 1.3.3: Upgrade and harmonise MEPS for on-grid lighting products to facilitate the transition to efficient lighting technology in PICTs	0	0	51,000	0	51,000	102,000
MEPS sub-total						**494,000**
SUPPORTING POLICIES AND MECHANISMS (SPM)						
Activity 2.1.1: Design a communication strategy on energy-efficient lighting	39,000	0	0	0	0	39,000
Activity 2.1.2: Develop national communication and awareness campaigns	65,000	42,000	0	0	0	107,000
Activity 2.1.3: Implement the communication strategy at national levels	0	290,500	275,500	260,500	256,500	1,083,000
Activity 2.2.1: Review and assess suitable financing mechanisms to support efficient indoor and street lighting technologies	45,500	0	0	0	0	45,500
Activity 2.2.2: Implement selected financing mechanism at national levels	0	447,500	233,000	0	0	680,500
Activity 2.2.3: Develop compulsory funding schemes/obligation for government and/or financial institutions to allocate a portion of the national budget or local commitment for promotion of efficient lighting	0	22,500	7,500	7,500	7,500	45,000
Activity 2.3.1: Design capacity building programmes for policy-makers, policy advocacy groups and lamp importers	84,000	0	0	0	0	84,000
Activity 2.3.2: Design and develop training tools and materials	76,000	38,000	0	0	0	114,000
Activity 2.3.3: Implement capacity building programmes at regional and national levels	0	41,000	41,000	41,000	0	123,000
Activity 2.4.1: Establish efficient lighting procurement policies/guidelines for municipal and national government agencies and electric utilities	105,000	0	0	0	0	105,000
Activity 2.4.2: Demonstrate compliance with efficient lighting procurement policies/guidelines in PICTs	0	286,000	271,000	0	0	557,000
SPM sub-total						**2,983,000**

Table 4.1. Summary of proposed budget for PELS implementation (cont')

Activities	Annual budget (USD)					Total (USD)
	Year 1	Year 2	Year 3	Year 4	Year 5	
MONITORING, VERIFICATION AND ENFORCEMENT (MVE)						
Activity 3.1.1: Ensure extensive dissemination and understanding of the regulatory frameworks development guideline prepared by PALS and ensure the MVE component is incorporated in the country regulatory frameworks	35,000	0	0	0	0	35,000
Activity 3.1.2: Develop and improve regulatory frameworks for supporting MVE schemes in PICTs	120,000	92,000	12,000	12,000	12,000	248,000
Activity 3.2.1: Validate scope and key features of the regional registration system	39,500	0	0	0	0	39,500
Activity 3.2.2: Develop the regional registration system modelled on the Australian online product registration system	81,000	36,500	0	0	0	117,500
Activity 3.2.3: Develop and implement training activities for operation and maintenance of the regional registration system	15,000	49,000	17,000	9,000	8,000	98,000
Activity 3.2.4: Review and recommend HS codes for lighting products in PICTs	31,500	0	0	0	0	31,500
Activity 3.3.1: Establish partnership/cooperation agreements with accredited testing facilities	19,500	19,500	0	0	0	39,000
Activity 3.3.2: Develop market surveillance guidelines and a verification testing plan for PICTs	72,500	26,500	0	0	0	99,000
Activity 3.3.3: Implement market surveillance activities in PICTs (ad hoc and periodic) where MEPS have been introduced	0	0	86,000	86,000	86,000	258,000
Activity 3.4.1: Prioritise gravity of violations against the imposed regulations for lighting products in PICTs	54,000	0	0	0	0	54,000
Activity 3.4.2: Match prioritised violations to a range of penalties	60,000	30,000	0	0	0	90,000
Activity 3.4.3: Develop and implement training programmes supporting the enforcement schemes in PICTs	48,000	33,000	33,000	18,000	48,000	180,000
Activity 3.4.4: Apply the enforcement schemes in PICTs	0	0	31,000	10,000	10,000	51,000
MVE sub-total						**1,340,500**
ENVIRONMENTALLY SOUND MANAGEMENT (ESM)						
Activity 4.1.1: Assess the volume of used lamps, existing collection mechanisms, and capacity of stakeholders to support environmentally sound lamp waste management	48,000	31,000	0	0	0	79,000
Activity 4.1.2: Review existing legal frameworks for waste management in PICTs	69,000	0	0	0	0	69,000
Activity 4.1.3: Identify preventive actions to reduce environmental risks from lighting products	31,500	0	0	0	0	31,500
Activity 4.1.4: Develop a lamp waste management strategy, and conduct pilot implementation of lamp waste management in selected PICTs	183,000	93,000	0	0	0	276,000
Activity 4.1.5: Develop and implement supporting legal mechanisms for lamp waste management	0	67,000	43,500	28,500	20,000	159,000
Activity 4.2.1: Evaluate costs of operation of lamp waste management facilities in PICTs and overseas	50,500	0	0	0	0	50,500
Activity 4.2.2: Identify strategy options for sustainable operation of lamp crusher facilities, storage and disposal of crushed lamps in PICTs	44,500	26,000	0	0	0	70,500
Activity 4.2.3: Enhance capacity of stakeholders involved in environmentally sound storage and disposal facilities in PICTs	0	36,000	36,000	0	3,000	75,000
Activity 4.3.1: Assist in adopting and ratifying the Minamata Convention on Mercury in PICTs	0	0	52,500	37,500	37,500	127,500
Activity 4.3.2: Establish and implement voluntary agreements with importers and distributors to promote environmentally sound lighting products	0	71,000	0	0	0	71,000
ESM sub-total						**1,009,000**
Total	**1,469,006**	**2,410,879**	**1,467,000**	**1,127,500**	**844,000**	**5,826,500**

The proposed budget covers technical assistance for relevant preparatory work under each strategy component, capacity building and expenses related to production and dissemination of training and marketing tools and materials. Costs of energy-efficient lighting products associated with any demonstrations, investments or large-scale distributions are not included. A budget breakdown by main budget items is shown in Table 4.2.

Table 4.2. Breakdown of the proposed PELS budget by main budget items

BUDGET ITEM	TOTAL (USD)	%
International consultants	1,177,500	20%
National consultants	1,153,000	20%
Travels	117,000	2%
Training workshops	279,000	5%
Direct expenses (sub-contractors, miscellaneous)	3,100,000	53%
Total	**5,826,500**	**100%**

About 65% of the proposed budget is proposed to be sought from international and bilateral donor agencies and development banks, to support technical assistance, direct expenses for regional activities, and seed funds for financial mechanisms and demonstration projects. The remaining 35% of the proposed budget is expected to be in-kind and cash contributions from PICTs for implementation of relevant in-country activities. The PELS document will be circulated to the following donor agencies to explore availability and timeframe of technical and financial assistance:

- Asian Development Bank;
- Australian Agency for International Development (Australian Aid);
- New Zealand Agency for International Development (New Zealand Aid Programme);
- European Commission;
- Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH;
- World Bank;
- US Agency for International Development (USAID).

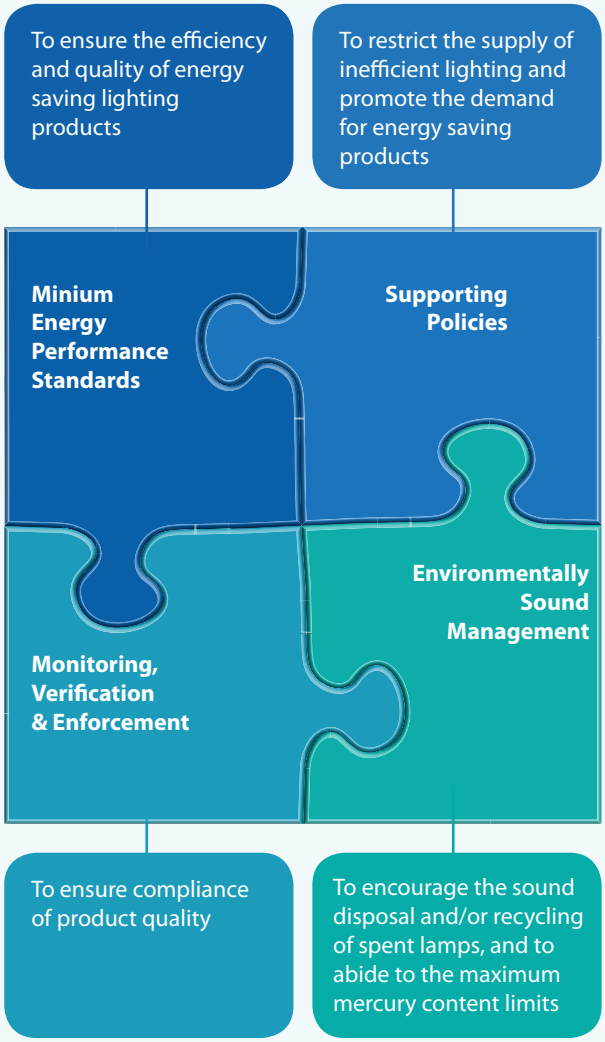
Details of the overall budget estimations and budget per country are provided in Annex G: Details of budget estimation.

5. ANNEXES

5.1 ANNEX A: METHODOLOGY FOR THE DEVELOPMENT OF THE PACIFIC EFFICIENT LIGHTING STRATEGY

The UNEP en.lighten initiative encourages countries to adopt an integrated policy approach as a means to increase the likelihood of a rapid and successful transition to efficient lighting (Figure 5.1).

Figure 5.1. UNEP en.lighten initiative integrated policy approach



The approach and methodology for PELS preparation was discussed in the PELS inception workshop, held in Nadi, Fiji, on 22-23 September 2014. The workshop was attended by representatives from Fiji, Kiribati, the Republic of the Marshall Islands, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu, and country representatives from UNEP, SPC, the Australian Government and the US Government. The participants all agreed in principle that PELS would follow the integrated policy approach.

Working groups were established for each of the four key areas of the integrated policy approach to ensure the process followed a robust and transparent process. Each working group, together with UNEP, SPC and the consultant (from the International Institute for Energy Conservation, IIEC), is responsible for determining how each key element of the integrated policy approach from a regional perspective would fit within the national context of each respective member country, and for ensuring that the regional efficient lighting strategy will complement the existing or future national efficient lighting strategies of the target countries and territories.

Participation in and contributions to the PELS preparation working groups by PICTs are voluntary activities. Coordination of each working group has been facilitated by IIEC through periodic email and telephone updates. Lists of countries participating in the four working groups are given in Table 5.1.

Table 5.1. PELS preparation working groups

Working group	Members
Minimum energy performance standards (MEPS)	On-grid lighting MEPS — the Cook Islands, Fiji, Kiribati, Papua New Guinea, Samoa, Solomon Islands, Tonga, Vanuatu Off-grid lighting MEPS[1]— Fiji, Papua New Guinea, Solomon Islands, Vanuatu
Supporting policies and mechanisms	Fiji, the Republic of the Marshall Islands, Solomon Islands, Tonga, Tuvalu, Vanuatu
Monitoring, verification and enforcement	The Cook Islands, Fiji, Kiribati, Papua New Guinea, Samoa, Solomon Islands, Tonga, Vanuatu
Environmentally sound management	Fiji, Palau, Papua New Guinea, Samoa, Tonga

[1]*Mr Peter Banwell, a representative from US EPA, participated as a technical resource person for the off-grid lighting MEPS working* group.

5.2 ANNEX B: TECHNICAL INFORMATION FOR THE MINIMUM ENERGY PERFORMANCE STANDARDS COMPONENT

5.2.1 CONSIDERATION FOR MEPS OF LIGHTING TECHNOLOGY UNDER PELS

It should be noted that different voltages (i.e. 110-120 V versus 220-240 V) have impacts on lamp efficacies, especially incandescent lamps. Manufacturer catalogue data show that 120 V incandescent lamps are generally more efficient than 240 V incandescent lamps at the same wattage. Therefore, in setting MEPS for tungsten filament-based technology, the mains voltage must be taken into consideration.

Having a common set of MEPS requirements in the Pacific region will enable sharing of resources for product certifications, therefore it is important to confirm the MEPS levels that PELS will recommend for non-PALS countries, especially for the North Pacific countries where mains supply voltage is different from the South Pacific countries (although if an efficacy level higher than halogen lamps is found to be the least life-cycle cost, then the mains supply voltage issue is no longer an issue if incandescent lamps are phased out). In addition to the MEPS levels for main voltage lighting products, PELS recognises the high penetration of off-grid lighting products in PICTs where electrification rates are relatively low, such as Papua New Guinea, Solomon Islands and Vanuatu, and MEPS requirements for off-grid lighting products will also be included in the scope of PELS.

5.2.2 INITIAL MEPS LEVELS FOR PELS

During the PALS and PELS meeting in Canberra in February 2015, the PELS working groups decided to adopt the joint AS/NZS MEPS levels for the most inefficient type of lamp in the market — incandescent lamps operating at 220-240 V. Regarding incandescent lamps operating at 110-120 V in the North Pacific countries, it was decided that the initial MEPS levels should follow the US MEPS levels for incandescent lamps.

With respect to MEPS levels for other lighting technologies in the Pacific region, it is envisaged that the initial MEPS levels for countries in both North and South Pacific regions will be harmonised with the AS/NZS for CLFs, linear fluorescent lamps and ballasts. Regarding the MEPS for LED lighting, PELS will review and monitor ongoing developments by IEA 4E Solid State Lighting Annex[27], the Australian and New Zealand Governments, the US Department of Environment and the European Commission, and consider appropriate requirements for the Pacific region in regulatory reviews in the future. The proposed scope of MEPS for incandescent lamps, CFLs, linear fluorescent lamps, ballasts and off-grid lighting products are described below.

5.2.2.1 INCANDESCENT LAMPS

The initial scope of MEPS for incandescent lamps agreed by the PELS working group covers all general lighting service (GLS) devices used indoors and outdoors, with the wattage range of 25-150 W. This includes any type of lamp and any colour temperature[28]. The efficacy levels of incandescent lamps operating at 110-120 V and 220-240 V are not directly comparable; therefore, PELS initially agrees to the adoption of different MEPS levels for incandescent lamps with different supply voltages, specifically 110-120 V, 60Hz in the North Pacific countries, and 220-240 V, 50Hz in the South Pacific countries. The proposed MEPS levels of incandescent lamps with 110-120 V supply follow the values stipulated in the Energy Independence and Security Act of 2007, USA, as shown in Table 5.2 and Figure 5.2.

Table 5.2. Minimum energy performance standards for incandescent lamps with 110-120 V supply[29]

Rated lumen range	Maximum rate wattage	Efficacy range
1490-2600	72	20.69-36.11
1050-1489	53	19.81-28.09
750-1049	43	17.44-24.4
310-749	29	10.69-25.83

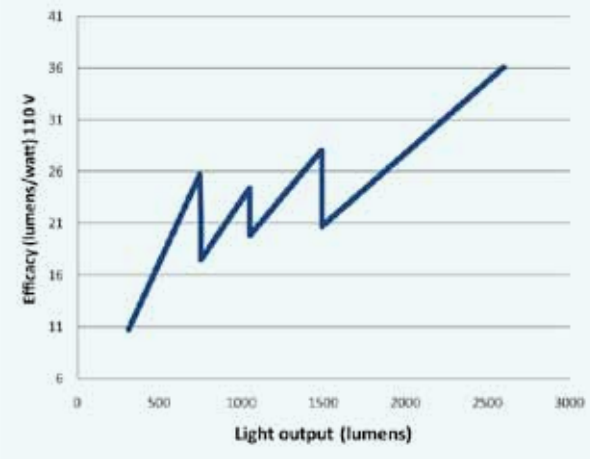
Source: Energy Independence and Security Act of 2007, USA.

[27] *IEA 4E Solid State Lighting is a joint initiative of nine countries (Australia, China, Denmark, France, Korea, the Netherlands, Sweden, the United Kingdom and the United States) working together to address common challenges with SSL technologies.*

[28] *The scope of MEPS for 220–240 V, 50 Hz incandescent lamps references AS 4934.2-2011 standard (http://www.energyrating.gov.au/for-industry/regulation-information-for-industry/product-standards/overview/asnzs4934/)*

[29] *AS 4934.2-2011 Incandescent lamps for general lighting services Part 2: MEPS requirements*

Figure 5.2. Minimum energy performance standards for 110-120 V incandescent lamps

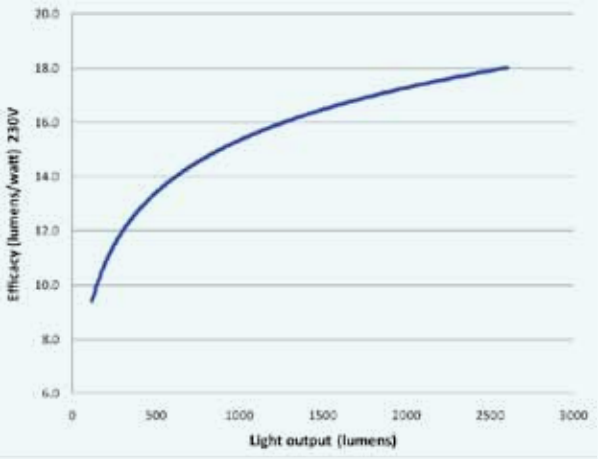


The proposed MEPS levels for incandescent lamps with 220-240 V supply follow the MEPS curve specified in AS/NZS 4934.2-2011, and the equation for the MEPs curve is as follows:

Initial efficacy ≥2.8 x ln (initial lumens)
- 4.0 (note 'ln' represents natural logarithm)

The MEPS curves for 220-240 V incandescent lamps are shown in Figure 5.3.

Figure 5.3. Minimum energy performance standards for 220-240 V incandescent lamps



5.2.2.2 COMPACT FLUORESCENT LAMPS

As PALS countries have agreed to adopt the MEPS level stipulated in AS/NZS 4847.2:2010, Self ballasted lamps for general lighting services Part 2: Minimum Energy Performance Standards (MEPS) requirements, the PELS working group agreed to initially adopt the same requirements. It should be noted that AS/NZS 4847.2:2010 also recognises products certified under the following programmes (with some additional testing required):

a. Efficient Lighting Initiative (ELI) Technical Specification for Self Ballasted Compact Fluorescent Lamps, Version 1 dated 01 March 2006 and Version 2 dated 01 March 2011;
b. UK Energy Saving Trust (EST) Lamp Specification, Version 5, Version 6.1 or Version 7.

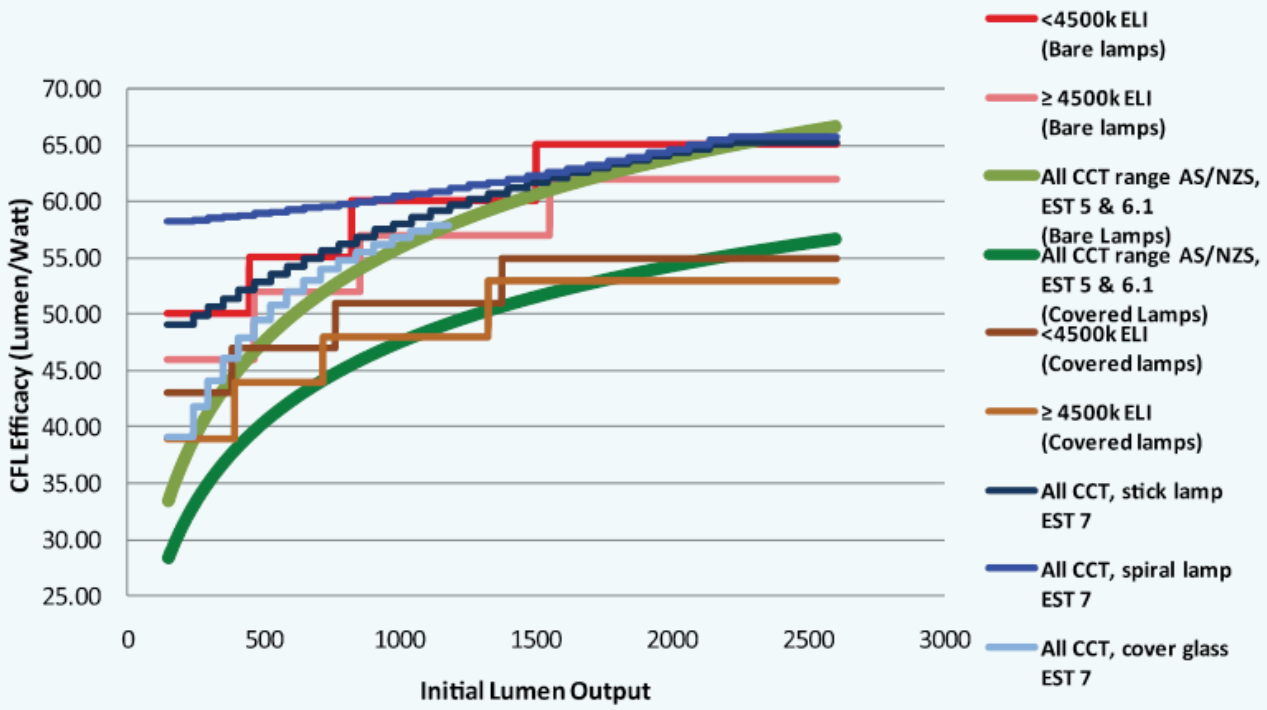
Table 5.3 summarises MEPS compliance options specified in AS/NZS 4847.2:2010, and MEPS curves for these compliance alternatives are illustrated in Figure 5.4.

Table 5.3. Alternative minimum energy performance standards for compact fluorescent lamps recognised by AS/NZS 4847.2:2010[30]

Attribute	Correlated colour temperature (CCT)	Efficient Lighting Initiative equivalent	Efficacy	UK Energy Saving Trust Version 5, 6.1
Minimum efficacy in lm/W (bare lamps)	<4500 K	≥5 to <9 W	50	$\frac{1}{\frac{0.24}{\sqrt{F}} + 0.0103}$ where F = initial luminous flux in lumens
		≥9 to <15 W	55	
		≥15 to <25 W	60	
		≥25 to <60 W	65	
	≥4500 K	≥5 to <9 W	46	
		≥9 to <15 W	52	
		≥15 to <25 W	57	
			62	
Minimum efficacy in lm/W (covered non-reflector lamps)	<4500 K	≥5 to <9 W	43	$\frac{0.85}{\frac{0.24}{\sqrt{F}} + 0.0103}$ where F = initial luminous flux in lumens
		≥9 to <15 W	47	
		≥15 to <25 W	51	
		≥25 to <60 W	55	
	≥4500 K	≥5 to <9 W	39	
		≥9 to <15 W	44	
		≥15 to <25 W	48	
			53	

Source: AS/NZS 4847.2:2010.

Figure 5.4. AS/NZS MEPS and compliance alternatives



[30] *AS/NZS 4847.2:2010 Self ballasted lamps for general lighting services Part 2: Minimum Energy Performance Standards (MEPS) requirements*

5.2.2.3 LINEAR FLUORESCENT LAMPS

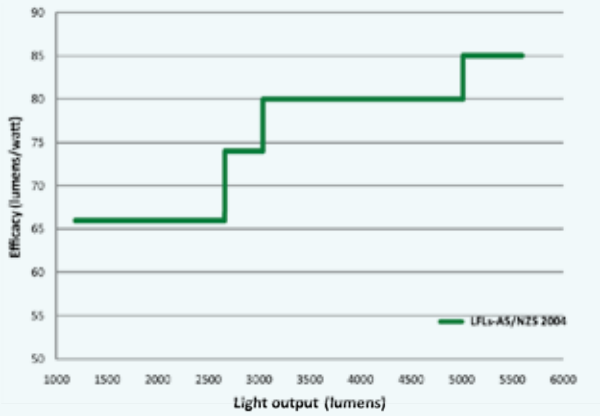
Similar to CFLs, linear fluorescent lamp efficacy standards in PALS countries follow the relevant AS/NZS, and the PELS working group agreed to adopt the MEPS levels per AS/NZS 4782.2:2004, Double-capped fluorescent lamps — Performance specifications Part 2: Minimum Energy Performance Standards (MEPS)[31] in which rare-earth tri-phosphor linear fluorescent lamps would be the least efficient permitted. Table 5.4 summarises MEPS levels for different nominal lengths of linear fluorescent lamps and Figure 5.5 shows the MEPS levels.

Table 5.4. Minimum energy performance standards for linear fluorescent lamps recognised by AS/NZS 4782.2:2004[32]

Lamp nominal length (L, mm)	550 ≤ L < 700	700 ≤ L < 1150	1150 ≤ L < 1350	1350 ≤ L < 1500
Efficacy @ 100 Hours (lumen/watt)	66	74	80	85
Efficacy @ 5000 Hours (lumen/watt)	57.5	61	70	70

Source: AS/NZS 4782.2:2004.

Figure 5.5. Minimum energy performance standards for linear fluorescent lamps



5.2.2.4 BALLASTS FOR FLUORESCENT LAMPS

The PELS working group also agreed to adopt the AS/NZS MEPS levels for ballasts for fluorescent lamps, which prohibit import or sale of low-efficiency magnetic ballasts. Ballast MEPS levels specified in relevant AS/NZS reference the Energy Efficiency Index (EEI) classification, which is an alphanumeric indicator related to the corrected total input power of a ballast-lamp circuit under test, ranging from A (most efficient) to D (least efficient). Ballast that is used with ILCOS lamp type FD (type T) lamps listed in Table 5.5 to 5.7 shall comply with the following requirements[33]:

a. For ferromagnetic ballasts with a minimum rated voltage ≥250 V — corrected total input power shall be less than or equal to the EEI value for B2 as specified in Table 5.5.
b. For ferromagnetic ballasts with a minimum rated voltage ≥240 V and <250 V — corrected total input power shall be less than or equal to the EEI value or B2 as specified in Table 5.6.
c. For all other ballasts — corrected total input power shall be less than or equal to the EEI value for B2 as specified in Table 5.7.

It should be noted that ballasts subject to AS/NZS MEPS shall be labelled legibly with the EEI classification and in the appropriate form, for example: 'EEI = A3'.

[31] *This standard covers lamps for general illumination purposes, for use in luminaires and with lamp ballasts connected to a 230 V 50 Hz single phase or similar mains supply. Lamps that are intended for use only with high frequency (electronic) ballasts are also covered.*
[32] *AS/NZS 4782.2:2004 Double-capped fluorescent lamps – Performance specifications Part 2: Minimum Energy Performance Standards (MEPS)*
[33] *AS NZS 4783.2:2002 Performance of electrical lighting equipment – Ballasts for fluorescent lamp*

Table 5.5. Ballasts for linear fluorescent lamps – EEI classification for rated voltage ≥ 250 V recognised by AS/NZS 4783.2:2002

Lamp type and arrangement	Nominal lamp power* Watts	ILCOS code	Maximum corrected total input power, Watts						
			Energy Efficiency Index (EEI) classification						
			A1†	A2	A3	B1	B2	C	D
Linear	15	FD-15-E-G13-26/450	≤18.0	≤16.0	≤18.0	≤21.0	≤24.0	≤25.0	>25.0
	18	FD-18-E-G13-26/600	≤21.0	≤19.0	≤21.0	≤24.0	≤27.0	≤28.0	>28.0
	30	FD-30-E-G13-26/895	≤33.0	≤31.0	≤33.0	≤36.0	≤39.0	≤40.0	>40.0
	36	FD-36-E-G13-26/1200	≤38.0	≤36.0	≤38.0	≤41.0	≤44.0	≤45.0	>45.0
	38	FD-38-E-G13-26/1047	≤40.0	≤38.0	≤40.0	≤43.0	≤46.0	≤47.0	>47.0
	58	FD-58-E-G13-26/1500	≤59.0	≤55.0	≤59.0	≤64.0	≤68.0	≤70.0	>70.0
	70	FD-70-E-G13-26/1800	≤72.0	≤68.0	≤72.0	≤77.0	≤81.0	≤83.0	>83.0

NOTES:

1 Refer to AS/NZS 61231, International lamp coding system (ILCOS).

2 Applies only to mains frequency ferromagnetic ballasts with two-wire connection and with an external starter.

Table 5.6. Ballasts for linear fluorescent lamps – EEI classification for rated voltage ≥ 240 V and < 250 V recognised by AS/NZS 4783.2:2002

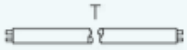
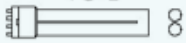
Lamp type and arrangement	Nominal lamp power* Watts	ILCOS code	Maximum corrected total input power, Watts						
			Energy Efficiency Index (EEI) classification						
			A1†	A2	A3	B1	B2	C	D
Linear	15	FD-15-E-G13-26/450	≤18.0	≤16.0	≤18.0	≤21.0	≤23.5	≤25.0	>25.0
	18	FD-18-E-G13-26/600	≤21.0	≤19.0	≤21.0	≤24.0	≤26.5	≤28.0	>28.0
	30	FD-30-E-G13-26/895	≤33.0	≤31.0	≤33.0	≤36.0	≤38.5	≤40.0	>40.0
	36	FD-36-E-G13-26/1200	≤38.0	≤36.0	≤38.0	≤41.0	≤43.5	≤45.0	>45.0
	38	FD-38-E-G13-26/1047	≤40.0	≤38.0	≤40.0	≤43.0	≤45.5	≤47.0	>47.0
	58	FD-58-E-G13-26/1500	≤59.0	≤55.0	≤59.0	≤64.0	≤67.5	≤70.0	>70.0
	70	FD-70-E-G13-26/1800	≤72.0	≤68.0	≤72.0	≤77.0	≤80.5	≤83.0	>83.0

NOTES:

1 Refer to AS/NZS 61231, International lamp coding system (ILCOS).

2 Applies only to mains frequency ferromagnetic ballasts with two-wire connection and with an external starter.

Table 5.7. Other ballasts – corrected total input power shall be less than or equal to the EEI value for B2 by AS/NZS 4783.2:2002

Lamp type and arrangement	Nominal lamp power* Watts	ILCOS code	Maximum corrected total input power, Watts						
			Energy Efficiency Index (EEI) classification						
			A1†	A2	A3	B1	B2	C	D
Linear	15	FD-15-E-G13-26/450	≤18.0	≤16.0	≤18.0	≤21.0	≤23.0	≤25.0	>25.0
	18	FD-18-E-G13-26/600	≤21.0	≤19.0	≤21.0	≤24.0	≤26.0	≤28.0	>28.0
T	30	FD-30-E-G13-26/895	≤33.0	≤31.0	≤33.0	≤36.0	≤38.0	≤40.0	>40.0
	36	FD-36-E-G13-26/1200	≤38.0	≤36.0	≤38.0	≤41.0	≤43.0	≤45.0	>45.0
	38	FD-38-E-G13-26/1047	≤40.0	≤38.0	≤40.0	≤43.0	≤45.0	≤47.0	>47.0
	58	FD-58-E-G13-26/1500	≤59.0	≤55.0	≤59.0	≤64.0	≤67.0	≤70.0	>70.0
	70	FD-70-E-G13-26/1800	≤72.0	≤68.0	≤72.0	≤77.0	≤80.0	≤83.0	>83.0
Compact 2 tube	18	FSD-18-E-2G11	≤21.0	≤19.0	≤21.0	≤24.0	≤26.0	≤28.0	>28.0
	24	FSD-24-E-2G11	≤27.0	≤25.0	≤27.0	≤30.0	≤32.0	≤34.0	>34.0
TC-L	36	FSD-36-E-2G11	≤38.0	≤36.0	≤38.0	≤41.0	≤43.0	≤45.0	>45.0
	40	FSDH-40-L/P-2G11	≤46.0	≤44.0	≤46.0	—	—	—	—
	55	FSDH-55-L/P-2G11	≤63.0	≤59.0	≤63.0	—	—	—	—
Compact 4 tube flat	18	FSS-18-E-2G10	≤21.0	≤19.0	≤21.0	≤24.0	≤26.0	≤28.0	>28.0
TC-F	24	FSS-24-E-2G10	≤27.0	≤25.0	≤27.0	≤30.0	≤32.0	≤34.0	>34.0
	36	FSS-36-E-2G10	≤38.0	≤36.0	≤38.0	≤41.0	≤43.0	≤45.0	>45.0
Compact 4 tube (not flat)	10	FSQ-10-E-G24q = 1 FSQ-10-I-G24d = 1	≤13.0	≤11.0	≤13.0	≤14.0	≤16.0	≤18.0	>18.0
	13	FSQ-13-E-G24q = 1 FSQ-13-I-G24d = 1	≤16.0	≤14.0	≤16.0	≤17.0	≤19.0	≤21.0	>21.0
TC-D TC-DE	18	FSQ-18-E-G24q = 2 FSQ-18-I-G24d = 2	≤21.0	≤19.0	≤21.0	≤24.0	≤26.0	≤28.0	>28.0
	26	FSQ-26-E-G24q = 3 FSQ-26-I-G24d = 3	≤29.0	≤27.0	≤29.0	≤32.0	≤34.0	≤36.0	>36.0
Compact 6 tube	18	FSM-18-I-GX24d = 2 FSM-18-E-GX24q = 2	≤21.0	≤19.0	≤21.0	≤24.0	≤26.0	≤28.0	>28.0
TC-T TC-TE	26	FSM-26-I-GX24d = 3 FSM-26-E-GX24q = 3	≤29.0	≤27.0	≤29.0	≤32.0	≤34.0	≤36.0	>36.0
	32	FSMH-32-L/P-GX24q = 4	≤39.0	≤36.0	≤39.0	—	—	—	—
	42	FSMH-42-L/P-GX24q = 4	≤49.0	≤46.0	≤49.0	—	—	—	—
Compact 2D (double D)	10	FSS-10-E-GR10q FSS-10-L/P/H-GR10q	≤13.0	≤11.0	≤13.0	≤14.0	≤16.0	≤18.0	>18.0
	16	FSS-16-I-GR8 FSS-16-E-GR10q FSS-16-L/P/H-GR10q	≤19.0	≤17.0	≤19.0	≤21.0	≤23.0	≤25.0	>25.0
TC-DD TC-DDE	21	FSS-21-E-GR10q FSS-21-L/P/H-GR10q	≤24.0	≤22.0	≤24.0	≤27.0	≤29.0	≤31.0	>31.0
	28	FSS-28-I-GR8 FSS-28-E-GR10q FSS-28-L/P/L-GR10q	≤31.0	≤29.0	≤31.0	≤34.0	≤36.0	≤38.0	>38.0
	38	FSS-38-E-GR10q FSS-38-L/P/L-GR10q	≤40.0	≤38.0	≤40.0	≤43.0	≤45.0	≤47.0	>47.0
	55	FSS-55-E-GRY10q = 3 FSS-55-L/P/L-GRY10q = 3	≤63.0	≤59.0	≤63.0	—	—	—	—

NOTE: Refer to AS/NZS 61231, International lamp coding system (ILCOS)

5.2.2.5 OTHER PERFORMANCE REQUIREMENTS

In addition to energy efficiency (lamp efficacy and ballast EEI) requirements, relevant AS/NZS for lighting products which have been adopted by the first tier countries specify quality (non-energy performance) requirements which cover safety, service quality and environment-related requirements. These include but are not necessarily limited to minimum lifetime, power factor and colour rendering index (CRI). Tables 5.8, 5.9 and 5.10 detail other non-energy performance requirements for incandescent lamps, CFLs and double-capped fluorescent lamps.

Table 5.8. Other compliance requirements for incandescent lamps based on AS/NZS 4934.2-2011

Attribute	Requirement	Compliance criteria
Lifetime (hours)	2000	Life of the median lamp (or 11th of sample size of 20) shall be at least 2000 hrs
Lumen maintenance (percentage)	75%	When measured at 75% of rated lamp life, the average lumen maintenance shall be at least 80% Lamps that fail prior to 75% of rated life shall not be included in the average All lamps shall fall within two standard deviations of the average

Table 5.9. Other compliance requirements for compact fluorescent lamps based on AS/NZS 4847.2-2010

Attribute	Requirement	Compliance criteria
Maximum starting time (seconds)	2	≥80% of lamps shall start within the times specified
Maximum run-up time (seconds)	60	Average ≤ value specified
Minimum lumen maintenance	2000 hours = 0.88 5000 hours = 0.80	Average ≥ value specified All lamps shall fall within 2 standard deviations of the average
Maximum premature lamp failure rate	10% at 30% of rated life	
Minimum life (hours)	6000	Life of the median lamp (or 11th of sample size of 20) shall be ≥ value specified
Minimum true power factor	0.55 0.9 for high power factor	Average ≥ value specified
Minimum colour rendering index		Average ≥ value specified
Maximum mercury content (mg)	5	Average ≤ value specified, when measured in accordance with IEC 62321 or AS/NZS 4782.3
Harmonics	IEC 61000-3-2	All lamps to comply with the requirements of IEC 61000-3-2
Immunity	The lamps shall comply with the immunity requirements of IEC 61547	All lamps to comply with the requirements of IEC 61547

Table 5.10. Other compliance requirements for double-capped fluorescent lamps based on AS/NZS 4782.2-2004

Attribute	Requirement	Compliance criteria
Minimum colour rendering index (CRI)	69	Minimum CRI of all lamp length must be greater than or equal to 69

5.2.2.6 OFF-GRID LIGHTING PRODUCTS

For off-grid lighting products, Lighting Global Quality Assurance levels and IEC/TS 62257-9-5 (Recommendations for small renewable energy and hybrid systems for rural electrification — Part 9-5: Integrated system — Selection of stand-alone lighting kits for rural electrification, Technical Specification) offer only quality requirements, not efficacy. Due to the difficulty involved in measuring so many different lamps and luminaires, UNEP has proposed a light-source efficacy requirement that establishes a minimum threshold for quality of the LEDs that are incorporated into the device. The requirement is:

- Minimum efficacy — the stand-alone lighting kit producer must ensure that the light source incorporated into the product operates with an efficacy of at least 80 lumens per watt as measured according to an internationally recognised test standard such as IES LM-79[34] or CIE S 025/E:2015[35].

It should be noted that the draft MEPS document is currently under consideration by ECOWAS (the Economic Community of West African States) for off-grid lighting in the West African region.

[34] *IES LM-79 is an approved method for the electrical and photometric measurements of solid-state lighting products.*
[35] *CIE S 025/E:2015 is defined as a Test method for LED lamps, LED luminaires and LED modules*

5.3 ANNEX C: CURRENT STATUS OF EFFICIENT LIGHTING PROGRAMMES AND PROJECTS IN PICTs

Several energy efficiency initiatives supported by international donor agencies and development banks have been implemented in PICTs to demonstrate the viability of energy-efficient technologies, including energy-efficient lighting. The most recent energy efficiency projects implemented in the Pacific region are 35 projects funded by the Asian Development Bank and Global Environment Facility in the PEEP2 countries (the Cook Islands, Papua New Guinea, Samoa, Tonga and Vanuatu). These projects target the residential sector, government and commercial buildings, and street and public lighting, and more than 80% of the projects involve implementation of energy-efficient lighting technologies, including LED (for office and street lighting), T5 linear fluorescent lamps, CFLs and lighting control technologies. Figure 5.6 shows energy-efficient lighting messages printed on the back of electricity bills of Te Aponga Uira, the electric utility in the Cook Islands as part of the PEEP2 project.

Figure 5.6. Energy-efficient lighting information on the back of electricity bills in the Cook Islands. Source: PEEP2 Project

In addition to information and communication activities, Fiji, Palau and the Republic of the Marshall Islands have implemented fiscal instruments and incentives to promote energy-efficient lighting as described below.

- Fiji: Since November 2014 the Government of Fiji has put in place financial incentives for energy-efficient equipment. Imported energy-efficient equipment including energy-saver lights, bicycles, and other electrical appliances and materials are exempt from import tax and duty. Energy-saver lights specifically refer to LED lamps of less than 25 W.
- Palau: The Energy Efficiency Subsidy Programme in Palau provides home loans through the National Development Bank of Palau that specifically target the inclusion of energy efficiency measures in new homes to lower household electricity consumption. Through the programme, the Bank helps moderate income families build new homes with energy-saving features suitable for the Palau environment. The Bank provides subsidies to borrowers ranging from USD 3,000 to USD 10,000, depending on the type and number of features selected by the new home owners. The scope of energy efficiency is extended beyond energy-saver lights and energy star appliances and includes tinted or high-performance glass, solar water heaters, hot water piping insulation, exterior window shading or awnings and more. Since its inception in October 2008, the programme has received a total of 32 applications.
- The Republic of the Marshall Islands: The original tax rate for all lighting products and all other appliances is 8% of cost insurance freight values via ocean freight, and 8% of free-on-board values via air freight. Through amendment of its Import Duties Act in 2011, the Republic of the Marshall Islands has introduced import duty exemption for electrical appliances and lighting products (including but not necessarily limited to LED and fluorescent lamps, refrigerators and freezers, and air conditioners) which carry Energy Star labels or equivalent. Since the introduction of this tax incentive policy measure, the Republic of the Marshall Islands has seen an increase in imports of energy-efficient lighting products such as linear LED lamps. The Republic of the Marshall Islands is refining the scope of energy-efficient products, and fluorescent technologies may be removed from the exemption list.

5.4 ANNEX D: SUPPORTING INFORMATION FOR THE MONITORING, VERIFICATION AND ENFORCEMENT COMPONENT

5.4.1 RECOMMENDED REGULATORY STRUCTURE FOR EFFECTIVE IMPLEMENTATION OF THE MVE SCHEMES

Initial basic guidelines for drafting a sound regulatory framework for implementation of the MVE schemes are as follows.

1. Parties affected and their obligations:
   i. Persons who import/export/manufacture/sell or re-sell lighting products regulated in relevant Acts or ministerial regulations must present their requests to the regulator for registration of the brand and model of the product.
2. Power of the regulator and appointed officials:
   i. Empower government bureaus/departments to be the regulators who take responsibility for registration of lighting products in the monitoring process; and to carry out market surveillance of lighting products in the verification and enforcement processes.
   ii. Specify scope of activities and tasks of key responsible organisations/bureaus and authorise such government units to undertake the following:
      - Audit lighting products in retailers or elsewhere; issue statement of compliance;
      - Inform customs department of products meeting/failing in performance standards;
      - Gather evidence (including samples);
      - Undertake/commission tests on samples;
      - Issue compliance notices; initiate proceedings;
      - De-register products that do not comply with imposed regulations; order withdrawal from sale;
      - Publish information to the public.
3. Administrative procedures:
   i. Registration categories;
   ii. Registration arrangements (such as mandatory up-front registration and submission of test results demonstrating compliance with MEPS requirements);
   iii. Issuing of notices;
   iv. Time allowed for responses;
   v. Verification scheme (see Section 5.4.2 for an example of a verification procedure);
   vi. Check testing;
   vii. Partner accredited laboratory and procedures for sending lamps to the laboratory (when required);
   viii. Commencement of the regulations with respect to each scheduled product.
4. Compliance and penalties:
   i. Criteria regarding violations against imposed regulations in terms of product registration, energy requirements, safety, counterfeit or forging of certified products, illegal importation (see Section 5.4.3 for an example of violations);
   ii. Penalties schemes based on gravity of offence to imposed regulations. A list of penalties schemes is suggested in Section 5.4.3.
   iii. All commercially imported lighting products must meet imposed MEPS requirements, but the regulation should exempt non-commercial (not intentionally for sale or resale) imports.

5.4.2 VERIFICATION PROCESS

PELS will initiate basic guidelines for compliance check testing and market surveillance activities per the following recommendations.

1. The verification process to certify lighting devices will be conducted using a sample of seven units to certify one device and ten units for a family of devices. The recommended quantity per batch/model that needs to be sampled is 20 units. Within the batch/model, products must be of the same brand, voltage, colour temperature, type of base, socket and shape.
2. A performance limit is based on the MEPS levels specified in the MEPS component. All lamps must have at least equal performance as specified in the referred standards.
3. Adopt Australian and New Zealand products testing procedures for energy-efficient lamps; as the procedures comply with the IEC standards, any updates of the referred standards will be amended according to IEC amendment.
4. Violations of any established minimum standards will lead to withdrawal of the certificate and legal enforcement according to the enforcement scheme. The owners/manufacturers/importers must report and declare their products within 60 days after notification has been submitted.

5.4.3 ENFORCEMENT PROCESS

The following actions are considered to be violations of the imposed compliance regulations:

1. Selling non-registered lighting products or forging a certified label or brand of certified lighting product that has been officially certified by PICTs;
2. Family of products or individual product do not meet imposed MEPS and/or safety standards specified in the MEPS component;
3. Non-certified lighting products from producers or assembly companies entering or departing at the border.

The following actions are considered to be examples of countermeasures to illegitimate acts:

1. Notification to the owners/importers of products and the public;
2. Seizure and deregistration of products which are subject to the offence;
3. Fines (depending on the gravity of the offence);
4. Legal action for repeated violations; seizure of all properties; closure of the business establishment, warehouse or other structure used in committing the offence.

5.5 ANNEX E: LAMP CRUSHER EQUIPMENT

A commercial product called a lamp crusher or 'bulb eater' is available to support lamp waste disposal activities. This equipment processes spent fluorescent lamps into small fragments. The model shown in Figure 5.7 (550 VRS — Vapour Removal System) can process all types of fluorescent lamps (CFLs, linear fluorescent lamps of different lengths, U-shaped lamps). It comes with a 55 gallon drum with a capacity of around 1350 linear fluorescent lamps (4 foot) and is complete with a filtration system that complies with US EPA (Environment Protection Agency) requirements. It should be noted that there are similar products offered by different companies.

The filtration system has three filters — two for the removal of dust particulates up to 99.99%, and a carbon filter which captures the mercury and converts it to mercury sulfide which is non-hazardous[36]. The first filter bag is normally changed twice per drum and the second filter bag is replaced once every 10 full drums (i.e. 13,000 linear fluorescent lamps). The activated carbon filter is replaced after every one million lamps. The filter could be disposed in standard landfill sites and could be sealed in 'vapour-lock' containers/bags as an added precaution prior to disposal. If recycling is preferred the sealed bags could be shipped to recycle facilities, but this is not a cost-effective option and could be considered only for environmental reasons.

Under the PEEP2 project, five bulb eater machines were procured and delivered to the PEEP2 implementing agencies in the Cook Islands, Papua New Guinea, Samoa, Tonga and Vanuatu in November 2013. They are currently in operation in the Cook Islands and Tonga (Figure 5.8).

Figure 5.7. Bulb eater design

[36] *The US EPA studied the previous version of this machine and found some mercury content in the air; however the US Government neither approved nor discouraged the use of this machine. More information is available at http://www.epa.gov/solidwaste/hazard/wastetypes/universal/drumtop/drum-top.pdf*

The costs of the unit and spare parts below are based on the procurement undertaken by the PEEP2 project in 2013-2014.

a.	CFL Premium Bulb Eater with T8/T5 entry tubes and starter kit	USD 5,200
b.	Filter kit (100 stage 1 and 5 stage 2)	USD 1,000
c.	Carbon filter kit	USD 1,200
d.	55 gallon drum	USD 100
e.	Miscellaneous items	USD 500
	Total (excluding shipping)	**USD 8000**

Figure 5.8. Operation of a bulb eater in Tonga

Source: www.ee-pacific.net

5.6 ANNEX F: COMPARISON OF LAMP WASTE MANAGEMENT COSTS IN PICTS AND OVERSEAS

	20 ft container (31,000 lamps)			40 ft container (66,000 lamps)			1,000,000 lamps (40 ft container @ 15 times)		
	Purchasing bulb eater	Disposal waste lamps in other countries		Purchasing bulb eater	Disposal waste lamps in other countries		Purchasing bulb eater	Disposal easte lamps in other countries	
		Australia [3]	New Zealand [4]		Australia [3]	New Zealand [4]		Australia [3]	New Zealand [4]
Bulb eater cost	6,420			6,420			6,420		
Freight cost [1]	5,600			5,600			5,600		
Labor cost [2]	269			573			8,681		
Storage services	1,000			2,000			40,000		
Disposal/recycling services		15,000	22,055		21,000	44,110		315,000	661,650
Ocean freight cost		2,300	1,950		3,800	3,100		57,000	46,500
Total cost	**13,289**	**17,300**	**24,005**	**14,593**	**24,800**	**47,210**	**60,701**	**372,000**	**708,150**
unit cost	**0.43**	**0.56**	**0.77**	**0.22**	**0.38**	**0.72**	**0.06**	**0.37**	**0.71**

[1] FOB, Air freight cost for shipping bulb eater from Miami to Pacific Islands

[2] 2,880 Lamps per day @ labor cost of 25 USD

[3] Based on telephone conversation, will get the formal quotation by 31 May 2015

[4] Disposal service 2.94 USD per kilogram, estimated for 7,500 and 15,000 kilogram

Initial calculations were made on the current costs of lamp crusher equipment and quotations from waste management companies in Australia and New Zealand. The cost of an engineered landfill site is not included in the estimation.

5.7 ANNEX G: DETAILS OF BUDGET ESTIMATION

COMPONENT 1: MINIMUM ENERGY PERFORMANCE STANDARDS

Outcome/ Activity	Budget Description	Rate (USD)	Unit	Amount Year 1 (USD)	Amount Year 2 (USD)	Amount Year 3 (USD)	Amount Year 4 (USD)	Amount Year 5 (USD)	Total (USD)	Budget Note - Description
Outcome 1.1: Overall electricity savings in each implemented countries and region										
Output 1.1: Adoption of regionally harmonised MEPS for on-grid lighting products in the Pacific region										
Activity 1.1.1: Accelerate adoption of MEPS levels in the 2nd and 3rd tier countries	International Consultants	15,000	Man-Month	15,000	-	-	-	-	15,000	Support compilation and dissemination of implementation experience in 1st tier countries (based on SPC's data)
	National Consultants	3,500	Man-Month	14,000	-	-	-	-	14,000	Support in-country information dissemination in 2nd and 3rd tier countries
	Advertisement	1,000	#	4,000	-	-	-	-	4,000	Information dissemination in 2nd and 3rd tier countries
	Travel	-	Trip	-	-	-	-	-	-	
	Contractual services	-	#	-	-	-	-	-	-	
	Training, Workshops and Conference	-	#	-	-	-	-	-	-	
	Miscellaneous	500	#	2,000	-	-	-	-	2,000	
Sub Total				**35,000**	**-**	**-**	**-**	**-**	**35,000**	
TOTAL OUTCOME 1.1				**35,000**	**0**	**0**	**0**	**0**	**35,000**	
Outcome 1.2: Adoption of regionally harmonised MEPS for common off-grid lighting products in the Pacific region										
Output 1.2: Recommended off-grid lighting product categories and their respective MEPS requirements building initiatives and market										
Activity 1.2.1: Review potential MEPS for off-grid lighting product categories in PICTs	International Consultants	15,000	Man-Month	30,000	30,000	-	-	-	60,000	Study and review of MEPS for off-grid lighting
	National Consultants	3,500	Man-Month	14,000	14,000	-	-	-	28,000	Support in-country market surveys
	surveys, tests, etc.	10,000	#	40,000	40,000	-	-	-	80,000	Travel and workshop are allocated for field surveys, tests
	Travel	1,000	Trip	7,000	4,000	-	-	-	11,000	Travel for international consultant and representatives from 4
	Contractual services	-	#	-	-	-	-	-	-	
	Training, Workshops and Conference	2,000	#	2,000	2,000	-	-	-	4,000	meeting to discuss survey results
	Miscellaneous	500	#	1,500	1,500	-	-	-	3,000	
Sub Total				**94,500**	**91,500**	**-**	**-**	**-**	**186,000**	
TOTAL OUTCOME 1.2				**94,500**	**91,500**	**0**	**0**	**0**	**186,000**	

Outcome/ Activity	Budget Description	Rate (USD)	Unit	Amount Year 1 (USD)	Amount Year 2 (USD)	Amount Year 3 (USD)	Amount Year 4 (USD)	Amount Year 5 (USD)	Total (USD)	Budget Note - Description
Outcome 1.3: MEPS for lighting products enforced, upgraded and harmonised with international requirements										
Output 1.3: Reports on economic benefits of EE lighting market transformation at national levels, and recommendations on new and/or updated MEPS for lighting products										
Activity 1.3.1: Conduct reviews of internationally-recognised MEPS requirements for lighting products	International Consultants	15,000	Man-Month	-	15,000	-	15,000	-	30,000	Conduct international review of MEPS requirements for lighting products
	National Consultants	-	Man-Month	-	-	-	-	-	-	
	Individual Contracts	-	Man-Month	-	-	-	-	-	-	
	Travel	1,000	Trip	-	-	-	-	-	-	
	Contractual services	-	#	-	-	-	-	-	-	
	Training, Workshops and Conference	-	#	-	-	-	-	-	-	
	Miscellaneous	500	#	-	1,500	-	1,500	-	3,000	
Sub Total				**-**	**16,500**	**-**	**16,500**	**-**	**33,000**	
Activity 1.3.2: Conduct impact assessment in each PICT and determine appropriateness for upgrading of MEPS requirements	International Consultants	-	Man-Month	-	-	-	-	-	-	
	National Consultants	3,500	Man-Month	-	42,000	-	42,000	-	84,000	Preparation of impact assessment in 12 PICTs
	surveys, tests, etc.	-	#	-	-	-	-	-	-	Data from verification will be used in this activity
	Travel	500	Trip	-	-	-	-	-	-	
	Contractual services	-	#	-	-	-	-	-	-	
	Training, Workshops and Conference	2,000	#	-	24,000	-	24,000	-	48,000	National workshop
	Miscellaneous	500	#	-	3,000	-	3,000	-	6,000	
Sub Total				**-**	**69,000**	**-**	**69,000**	**-**	**138,000**	
Activity 1.3.3: Upgrade and harmonise MEPS for on-grid lighting products to facilitate the transition to efficient lighting technology in PICTs	International Consultants	15,000	Man-Month	-	-	30,000	-	30,000	60,000	Preparation of recommendations based on the impact assessments
	National Consultants	-	Man-Month	-	-	-	-	-	-	
	Individual Contracts	-	Man-Month	-	-	-	-	-	-	
	Travel	1,000	Trip	-	-	12,000	-	12,000	24,000	
	Contractual services	-	#	-	-	-	-	-	-	
	Training, Workshops and Conference	5,000	#	-	-	5,000	-	5,000	10,000	organisation of regional workshops
	Miscellaneous	500	#	-	-	4,000	-	4,000	8,000	
Sub Total				**-**	**-**	**51,000**	**-**	**51,000**	**102,000**	
TOTAL OUTCOME 1.3				**0**	**85,500**	**51,000**	**85,500**	**51,000**	**273,000**	
TOTAL COMPONENT 1 (MEPS)				129,500	177,000	51,000	85,500	51,000	494,000	

COMPONENT 2: SUPPORTING POLICIES AND MECHANISMS

Outcome/ Activity	Budget Description	Rate (USD)	Unit	Amount Year 1 (USD)	Amount Year 2 (USD)	Amount Year 3 (USD)	Amount Year 4 (USD)	Amount Year 5 (USD)	Total (USD)	Budget Note - Description
Outcome 2.1: More awareness of energy-efficient lighting products among the identified target audiences										
Output 2.1: Implementation of communication activities for different groups of target audiences										
Activity 2.1.1: Design a communication strategy on energy-efficient lighting	International Consultants	15,000	Man-Month	15,000	-	-	-	-	15,000	Design communiation strategy on energy efficient lighting
	National Consultants	3,500	Man-Month	21,000	-	-	-	-	21,000	Cover only 12 countries (0.5 man-month each)
	Individual Contracts	-	Man-Month	-	-	-	-	-	-	
	Travel	-	Trip	-	-	-	-	-	-	
	Contractual services	-	#	-	-	-	-	-	-	
	Training, Workshops and Conference	-	#	-	-	-	-	-	-	
	Miscellaneous	500	#	3,000	-	-	-	-	3,000	
Sub Total				**39,000**	**-**	**-**	**-**	**-**	**39,000**	
Activity 2.1.2: Develop national communication and awareness campaigns	International Consultants	15,000	Man-Month	15,000	15,000	-	-	-	30,000	Assist in development of national communication campaign
	National Consultants	3,500	Man-Month	28,000	14,000	-	-	-	42,000	Develop national communication campaign in each PICTs (12 countries)
	Individual Contracts	-	Man-Month	-	-	-	-	-	-	
	Travel	-	Trip	-	-	-	-	-	-	
	Contractual services	2,000	#	2,000	2,000	-	-	-	4,000	
	Training, Workshops and Conference	2,000	#	16,000	8,000	-	-	-	24,000	Consultation workshop in each PICTs to conclude the campaign
	Miscellaneous	500	#	4,000	3,000	-	-	-	7,000	
Sub Total				**65,000**	**42,000**	**-**	**-**	**-**	**107,000**	
Activity 2.1.3: Implement communication strategy at national levels	International Consultants	15,000	Man-Month	-	30,000	15,000	-	-	45,000	Support design of communication materials and implementations
	National Consultants	3,500	Man-Month	-	10,500	10,500	10,500	10,500	42,000	Part-time coordinator for implementation of communication strategy (1wk/country)
	Roadshows, etc.	1,000	Man-Month	-	4,000	4,000	4,000	-	12,000	Priority on 1st tier countries, (est. 4 countries implement the roadshow each year
	Travel	-	Trip	-	-	-	-	-	-	
	Communication program	20,000	#	-	240,000	240,000	240,000	240,000	960,000	Cost of communication materials and tools and media
	Training, Workshops and Conference	-	#	-	-	-	-	-	-	
	Miscellaneous	500	#	-	6,000	6,000	6,000	6,000	24,000	
Sub Total				**-**	**290,500**	**275,500**	**260,500**	**256,500**	**1,083,000**	
TOTAL OUTCOME 2.1				**104,000**	**332,500**	**275,500**	**260,500**	**256,500**	**1,229,000**	

Outcome/ Activity	Budget Description	Rate (USD)	Unit	Amount Year 1 (USD)	Amount Year 2 (USD)	Amount Year 3 (USD)	Amount Year 4 (USD)	Amount Year 5 (USD)	Total (USD)	Budget Note - Description
Outcome 2.2: Financial incentive and disincentive mechanisms designed, adopted and implemented in PICTs										
Output 2.2: Pragmatic financial incentive and disincentive mechanisms that can be applied to support energy-efficient lighting										
Activity 2.2.1: Review and assess suitable financing mechanisms to support efficient indoor and street lighting technologies	International Consultants	15,000	Man-Month	30,000	-	-	-	-	30,000	Review and assess financial mechanisms
	National Consultants	3,500	Man-Month	10,500	-	-	-	-	10,500	Assist international consultant in review and assess financial mechanisms
	Individual Contracts	-	Man-Month	-	-	-	-	-	-	
	Travel	1,000	Trip	2,000	-	-	-	-	2,000	
	Contractual services	-	#	-	-	-	-	-	-	
	Training, Workshops and Conference	-	#	-	-	-	-	-	-	
	Miscellaneous	500	#	3,000	-	-	-	-	3,000	
Sub Total				**45,500**	**-**	**-**	**-**	**-**	**45,500**	
Activity 2.2.2: Implement selected financial mechanism at national levels	International Consultants	15,000	Man-Month	-	15,000	15,000	-	-	30,000	Provide supervision to countries in selection of financial mechanisms
	National Consultants	3,500	Man-Month	-	10,500	7,000	-	-	17,500	Part-time coordinators to support in-country agency to conclude financial mechanism
	Individual Contracts	-	per year	-	-	-	-	-	-	
	Travel	-	Trip	-	-	-	-	-	-	
	Seed fund	50,000	per country	-	400,000	200,000	-	-	600,000	Budget allocated as seed fund for on-bill financing and revolving fund based on activity 2.2.1
	Training, Workshops and Conference	2,000	#	-	16,000	8,000	-	-	24,000	
	Miscellaneous	500	#	-	6,000	3,000	-	-	9,000	
Sub Total				**-**	**447,500**	**233,000**	**-**	**-**	**680,500**	
Activity 2.2.3: Develop compulsory funding schemes/obligation for government and/or financial institutions to allocate a portion of the national budget or local commitment for promotion of efficient lighting	International Consultants	15,000	Man-Month	-	15,000	-	-	-	15,000	Provide supervision to countries in selection of financial mechanisms
	National Consultants	3,000	Man-Month	-	6,000	6,000	6,000	6,000	24,000	Part-time coordinators to support in-country agency to conclude financial mechanism
	Individual Contracts	-	per year	-	-	-	-	-	-	
	Travel	-	Trip	-	-	-	-	-	-	
	Contractual services	-	#	-	-	-	-	-	-	
	Training, Workshops and Conference	-	#	-	-	-	-	-	-	
	Miscellaneous	500	#	-	1,500	1,500	1,500	1,500	6,000	
Sub Total				**-**	**22,500**	**7,500**	**7,500**	**7,500**	**45,000**	
TOTAL OUTCOME 2.2				**45,500**	**470,000**	**240,500**	**7,500**	**7,500**	**771,000**	

Outcome/ Activity	Budget Description	Rate (USD)	Unit	Amount Year 1 (USD)	Amount Year 2 (USD)	Amount Year 3 (USD)	Amount Year 4 (USD)	Amount Year 5 (USD)	Total (USD)	Budget Note - Description
Outcome 2.3: Enhanced capacity among policy-makers and policy advocacy groups to design and implement supporting policies and mechanisms for energy-efficient lighting										
Output 2.3: Policy-makers, policy advocacy groups, and private sector entities get better understanding and autonomously implement energy-efficient lighting programmes										
Activity 2.3.1: Design capacity building programmes for policy-makers and policy advocacy groups and lamp importers	International Consultants	15,000	Man-Month	15,000	-	-	-	-	15,000	Provide supervision to countries in training needs assessment
	National Consultants	3,500	Man-Month	42,000	-	-	-	-	42,000	Conduct in-country training needs assessment
	Individual Contracts	-	Man-Month	-	-	-	-	-	-	
	Travel	-	Trip	-	-	-	-	-	-	
	Contractual services	-	#	-	-	-	-	-	-	
	Training, Workshops and Conference	2,000	#	24,000	-	-	-	-	24,000	Consultation workshop in each PICT
	Miscellaneous	500	#	3,000	-	-	-	-	3,000	
Sub Total				**84,000**	**-**	**-**	**-**	**-**	**84,000**	Provide supervision to countries in design and develop training tools and materials
Activity 2.3.2: Design and develop training tools and materials	International Consultants	15,000	Man-Month	30,000	15,000	-	-	-	45,000	
	National Consultants	-	Man-Month	-	-	-	-	-	-	
	Individual Contracts	-	Man-Month	-	-	-	-	-	-	
	Travel	-	Trip	-	-	-	-	-	-	
	Contractual services	5,000	#	40,000	20,000	-	-	-	60,000	Contractual services to design and develop training tools and materials
	Training, Workshops and Conference	-	#	-	-	-	-	-	-	
	Miscellaneous	500	#	6,000	3,000	-	-	-	9,000	
Sub Total				**76,000**	**38,000**	**-**	**-**	**-**	**114,000**	Support regional capacity buildings
Activity 2.3.3: Implement capacity building programmes at regional and national levels	International Consultants	15,000	Man-Month	-	15,000	15,000	15,000	-	45,000	Support national capacity building activities (training for trainers in 2nd and 3rd tier in 2019)
	National Consultants	3,500	Man-Month	-	14,000	14,000	14,000	-	42,000	
	Individual Contracts	-	Man-Month	-	-	-	-	-	-	
	Travel	-	Trip	-	-	-	-	-	-	
	Contractual services	-	#	-	-	-	-	-	-	
	Training, Workshops and Conference	2,000	#	-	8,000	8,000	8,000	-	24,000	Organise training workshop in each PICT
	Miscellaneous	500	#	-	4,000	4,000	4,000	-	12,000	
Sub Total				**-**	**41,000**	**41,000**	**41,000**	**-**	**123,000**	
TOTAL OUTCOME 2.3				**160,000**	**79,000**	**41,000**	**41,000**	**0**	**321,000**	

Outcome/ Activity	Budget Description	Rate (USD)	Unit	Amount Year 1 (USD)	Amount Year 2 (USD)	Amount Year 3 (USD)	Amount Year 4 (USD)	Amount Year 5 (USD)	Total (USD)	Budget Note - Description
Outcome 2.4: Transparent and effective government procurement system										
Output 2.2: Energy-efficient government procurement system										
Activity 2.4.1: Establish efficient lighting procurement policies/guidelines for municipal and national government agencies and electric utilities	International Consultants	15,000	Man-Month	60,000	-	-	-	-	60,000	Provide guidelines for creating the EE procurement guide
	National Consultants	3,500	Man-Month	42,000	-	-	-	-	42,000	Gather existing procurement policies/guidelines in each PICT
	Individual Contracts	-	Man-Month	-	-	-	-	-	-	
	Travel	-	Trip	-	-	-	-	-	-	
	Contractual services	-	#	-	-	-	-	-	-	
	Training, Workshops and Conference	-	#	-	-	-	-	-	-	
	Miscellaneous	500	#	3,000	-	-	-	-	3,000	
Sub Total				**105,000**	**-**	**-**	**-**	**-**	**105,000**	Support implementation of demonstration projects
Activity 2.4.2: Demonstrate compliance with efficient lighting procurement policies/guidelines in PICTs	International Consultants	15,000	Man-Month	-	15,000	-	-	-	15,000	Support implementation and evaluation of demonstration projects
	National Consultants	3,000	Man-Month	-	15,000	15,000	-	-	30,000	
	Individual Contracts	-	per year	-	-	-	-	-	-	
	Travel	-	Trip	-	-	-	-	-	-	
	Demo projects	50,000	#	-	250,000	250,000	-	-	500,000	Budget for EE lighting demonstation projects in 9 PELS countries + Fiji
	Training, Workshops and Conference	-	#	-	-	-	-	-	-	
	Miscellaneous	500	#	-	6,000	6,000	-	-	12,000	
Sub Total				**-**	**286,000**	**271,000**	**-**	**-**	**557,000**	
TOTAL OUTCOME 2.4				**105,000**	**286,000**	**271,000**	**0**	**0**	**662,000**	
TOTAL COMPONENT 2 (SPM)				414,500	1,167,500	828,000	309,000	264,000	**2,983,000**	

COMPONENT 3: MONITORING, VERIFICATION AND ENFORCEMENT

Outcome/ Activity	Budget Description	Rate (USD)	Unit	Amount Year 1 (USD)	Amount Year 2 (USD)	Amount Year 3 (USD)	Amount Year 4 (USD)	Amount Year 5 (USD)	Total (USD)	Budget Note - Description
Outcome 3.1: Effective in-country regulatory frameworks to support implementation of mandatory MEPS approved in PICTs										
Output 3.1: Energy efficiency regulatory frameworks established in PICTs										
Activity 3.1.1: Ensure extensive dissemination and understanding of the regulatory frameworks development guideline prepared by PALS and ensure the MVE component is incorporated in the country regulatory frameworks	International Consultants	-	Man-Month	-	-	-	-	-	-	
	National Consultants	-	Man-Month	-	-	-	-	-	-	
	Individual Contracts	1,000	Man-Month	12,000	-	-	-	-	12,000	To support SPC in dissemination of regulatory framework guildines
	Travel	1,000	Trip	12,000	-	-	-	-	12,000	
	Contractual services	-	#	-	-	-	-	-	-	
	Training, Workshops and Conference	5,000	#	5,000	-	-	-	-	5,000	Regional workshop for legal in experts in PICTs
	Miscellaneous	500	#	6,000	-	-	-	-	6,000	
Sub Total				**35,000**	**-**	**-**	**-**	**-**	**35,000**	
Activity 3.1.2: Develop and improve regulatory frameworks for supporting MVE schemes in PICTs	International Consultants	15,000	Man-Month	60,000	60,000	-	-	-	120,000	Recommendations and improvement of regulatory frameworks in PICTs' context
	National Consultants	3,500	Man-Month	28,000	14,000	10,500	10,500	10,500	73,500	MVE experts to support improvement and development works in each PICT
	Individual Contracts	-	per year	-	-	-	-	-	-	
	Travel	-	Trip	-	-	-	-	-	-	
	Legal experts	3,500	Man-Month	28,000	14,000	-	-	-	42,000	Legal experts to support improvements in the 1st tier and new development in 2nd and 3rd tier
	Training, Workshops and Conference	-	#	-	-	-	-	-	-	
	Miscellaneous	500	#	4,000	4,000	1,500	1,500	1,500	12,500	
Sub Total				**120,000**	**92,000**	**12,000**	**12,000**	**12,000**	**248,000**	
TOTAL OUTCOME 3.1				**155,000**	**92,000**	**12,000**	**12,000**	**12,000**	**283,000**	

Outcome/ Activity	Budget Description	Rate (USD)	Unit	Amount Year 1 (USD)	Amount Year 2 (USD)	Amount Year 3 (USD)	Amount Year 4 (USD)	Amount Year 5 (USD)	Total (USD)	Budget Note - Description
Outcome 3.2: Online lighting product database facilitating transition to energy-efficient lighting and phasing out of incandescent lamps in PICTs										
Output 3.2.1: A regional registration system for lighting products established										
Activity 3.2.1: Validate scope and key features of the regional registration system	International Consultants	15,000	Man-Month	7,500	-	-	-	-	7,500	Identify scope and key features of the regional registration system
	National Consultants	3,500	Man-Month	21,000	-	-	-	-	21,000	Support international consultant in identifying scope (0.5 m-m for each PICT)
	Individual Contracts	-	Man-Month	-	-	-	-	-	-	
	Travel	1,000	Trip	8,000	-	-	-	-	8,000	For 1st tier countries to review the system in Australia
	Contractual services	-	#	-	-	-	-	-	-	
	Training, Workshops and Conference	-	#	-	-	-	-	-	-	
	Miscellaneous	500	#	3,000	-	-	-	-	3,000	
Sub Total				**39,500**	**-**	**-**	**-**	**-**	**39,500**	
Activity 3.2.2: Develop the regional registration system modelled on the Australian online product registration system	International Consultants	15,000	Man-Month	15000	7,500	-	-	-	22,500	Supervise development of the regional registration system
	National Consultants	3,500	Man-Month	28,000	14,000	-	-	-	42,000	Support in-country agency during the development of the regional registration system
	Individual Contracts	-	Man-Month	-	-	-	-	-	-	
	Travel	1,000	Trip	2,000	1,000	-	-	-	3,000	
	Contractual services	20,000	#	30,000	10,000	-	-	-	40,000	Contractor for development of the regional reis. System
	Training, Workshops and Conference	-	#	-	-	-	-	-	-	
	Miscellaneous	500	#	6,000	4,000	-	-	-	10,000	
Sub Total				**81,000**	**36,500**	**-**	**-**	**-**	**117,500**	
Activity 3.2.3: Develop and implement training activities for operation and maintenance of the regional lighting registration system	International Consultants	15,000	Man-Month	15,000	15,000	-	-	-	30,000	Support development and implementation of training programme
	National Consultants	3,500	Man-Month	-	14,000	14,000	7,000	7,000	42,000	Support organization on national training activities
	Individual Contracts	-	Man-Month	-	-	-	-	-	-	For organisation of training activities
	Travel	1,000	Trip	-	12,000	-	-	-	12,000	
	Contractual services	-	#	-	-	-	-	-	-	
	Training, Workshops and Conference	5,000	#	-	5,000	-	-	-	5,000	Regional level
	Miscellaneous	500	#	-	3,000	3,000	2,000	1,000	9,000	
Sub Total				**15,000**	**49,000**	**17,000**	**9,000**	**8,000**	**98,000**	
Output 3.2.2 Recommendations on specific harmonised system (HS) codes for lighting products for registration and customs purposes										
Activity 3.2.4: Review and recommend HS codes for lighting products in PICTs	International Consultants	15,000	Man-Month	7,500	-	-	-	-	7,500	Review and recommend HS Codes for lighting products in PICTs
	National Consultants	3,500	Man-Month	7,000	-	-	-	-	7,000	Support international consultant and countries ot review and recommend HS Codes for lighting products in PICTs
	Individual Contracts	-	Man-Month	-	-	-	-	-	-	
	Travel	1,000	Trip	8,000	-	-	-	-	8,000	Travel for 1st tier countries
	Contractual services	-	#	-	-	-	-	-	-	
	Training, Workshops and Conference	5,000	#	5,000	-	-	-	-	5,000	Organise a meeting to conclude HS codes for lighting products used in the PICTs
	Miscellaneous	500	#	4,000	-	-	-	-	4,000	
Sub Total				**31,500**	**-**	**-**	**-**	**-**	**31,500**	
TOTAL OUTCOME 3.2				**167,000**	**85,500**	**17,000**	**9,000**	**8,000**	**286,500**	

Outcome/ Activity	Budget Description	Rate (USD)	Unit	Amount Year 1 (USD)	Amount Year 2 (USD)	Amount Year 3 (USD)	Amount Year 4 (USD)	Amount Year 5 (USD)	Total (USD)	Budget Note - Description
Outcome 3.3: Appropriate national verification frameworks established in PICTs; quality lighting products sold in markets										
Output 3.3 Development and implementation of market surveillance systems for PICTs										
Activity 3.3.1: Establish partnership/ cooperation agreements with accredited testing facilities	International Consultants	15,000	Man-Month	7,500	7,500	-	-	-	15,000	Recommend suitable lighting labs for PICTs
	National Consultants	3,500	Man-Month	7,000	7,000	-	-	-	14,000	Support international consultant to coordinate with PICTs (part-time)
	Individual Contracts	-	Man-Month	-	-	-	-	-	-	
	Travel	1,000	Trip	3,000	3,000	-	-	-	6,000	Visit testing labs to review capacity
	Contractual services	-	per year	-	-	-	-	-	-	
	Training, Workshops and Conference	-	#	-	-	-	-	-	-	
	Miscellaneous	500	#	2,000	2,000	-	-	-	4,000	
Sub Total				**19,500**	**19,500**	**-**	**-**	**-**	**39,000**	
Activity 3.3.2: Develop market surveillance guidelines and a verification testing planfor PICTs	International Consultants	15,000	Man-Month	30,000	-	-	-	-	30,000	Develop market surveillance guidelines
	National Consultants	3,500	Man-Month	10,500	10,500	-	-	-	21,000	Support international consultant to coordinate with PICTs (part-time)
	Individual Contracts	2,000	Man-Month	12,000	6,000	-	-	-	18,000	In-country data collections
	Travel	-	Trip	-	-	-	-	-	-	
	Contractual services	-	#	-	-	-	-	-	-	
	Training, Workshops and Conference	2,000	#	16,000	8,000	-	-	-	24,000	In-country training workshops
	Miscellaneous	500	#	4,000	2,000	-	-	-	6,000	
Sub Total				**72,500**	**26,500**	**-**	**-**	**-**	**99,000**	
Activity 3.3.3: Implement market surveillance activities in PICTs (ad-hoc and periodic) where MEPS have been introduced	International Consultants	-	Man-Month	-	-	-	-	-	-	
	National Consultants	3,500	Man-Month	-	-	28,000	28,000	28,000	84,000	For implementation of market surveillance activities (all
	Individual Contracts	3,000	Man-Month	-	-	24,000	24,000	24,000	72,000	costs associated with the surveys are included) and
	Travel	-	Trip	-	-	-	-	-	-	
	Lab tests fee	30,000	per year	-	-	30,000	30,000	30,000	90,000	Estimate budget for lab tests (1st tier countries)
	Training, Workshops and Conference	-	#	-	-	-	-	-	-	
	Miscellaneous	500	#	-	-	4,000	4,000	4,000	12,000	
Sub Total				**-**	**-**	**86,000**	**86,000**	**86,000**	**258,000**	
TOTAL OUTCOME 3.3				**92,000**	**46,000**	**86,000**	**86,000**	**86,000**	**396,000**	

Outcome/ Activity	Budget Description	Rate (USD)	Unit	Amount Year 1 (USD)	Amount Year 2 (USD)	Amount Year 3 (USD)	Amount Year 4 (USD)	Amount Year 5 (USD)	Total (USD)	Budget Note - Description
Outcome 3.4: Fair, level playing field among manufacturers; efficient lighting products sold in markets										
Output 3.4: Escalating set of counter violation measures and corrective actions										
Activity 3.4.1: Prioritise gravity of violations against the imposed regulations for lighting products in PICTs	International Consultants	15,000	Man-Month	30,000	-	-	-	-	30,000	Provide guidelines and summarise key violations in the PICTs
	National Consultants	3,500	Man-Month	21,000	-	-	-	-	21,000	Support international consultant to coordinate with PICTs (part-time)
	Individual Contracts	-	Man-Month	-	-	-	-	-	-	
	Travel	-	Trip	-	-	-	-	-	-	
	Contractual services	-	#	-	-	-	-	-	-	
	Training, Workshops and Conference	-	#	-	-	-	-	-	-	
	Miscellaneous	500	#	3,000	-	-	-	-	3,000	
Sub Total				**54,000**	**-**	**-**	**-**	**-**	**54,000**	
Activity 3.4.2: Match prioritised violations to a range of penalties	International Consultants	15,000	Man-Month	30,000	15,000	-	-	-	45,000	Provide guidelines and summarise key violations in the PICTs
	National Consultants	3,500	Man-Month	21,000	10,500	-	-	-	31,500	Support international consultant to coordinate with PICTs (part-time)
	Individual Contracts	3,000	Man-Month	6,000	3,000	-	-	-	9,000	
	Travel	-	Trip	-	-	-	-	-	-	
	Contractual services	-	#	-	-	-	-	-	-	
	Training, Workshops and Conference	-	#	-	-	-	-	-	-	
	Miscellaneous	500	#	3,000	1,500	-	-	-	4,500	
Sub Total				**60,000**	**30,000**	**-**	**-**	**-**	**90,000**	
Activity 3.4.3: Develop and implement training programmes supporting the enforcement schemes in PICTs	International Consultants	15,000	Man-Month	15,000	15,000	-	-	-	30,000	Support development and implementation of training programme in the first 2 years
	National Consultants	3,500	Man-Month	14,000	7,000	14,000	7,000	21,000	63,000	Support in-country training programmes (Half a month/country)
	Individual Contracts	3,000	Man-Month	-	-	-	-	-	-	
	Travel	1,000	Trip	-	-	-	-	-	-	
	Contractual services	-	#	-	-	-	-	-	-	
	Training, Workshops and Conference	2,000	#	16,000	8,000	16,000	8,000	24,000	72,000	In-country training workshops
	Miscellaneous	500	#	3,000	3,000	3,000	3,000	3,000	15,000	
Sub Total				**48,000**	**33,000**	**33,000**	**18,000**	**48,000**	**180,000**	
Activity 3.4.4: Apply the enforcement schemes in PICTs	International Consultants	15,000	Man-Month	-	-	-	-	-	-	
	National Consultants	3,500	Man-Month	-	-	28,000	7,000	7,000	42,000	Documentation of enforcement scheme in the 1st tier PICTs, and implementation of the enforement scheme in other tier countries in 2019-2020
	Individual Contracts	3,000	#	-	-	-	-	-	-	
	Travel	1,000	Trip	-	-	-	-	-	-	
	Contractual services	-	#	-	-	-	-	-	-	
	Training, Workshops and Conference	-	#	-	-	-	-	-	-	
	Miscellaneous	500	#	-	-	3,000	3,000	3,000	9,000	
Sub Total				**-**	**-**	**31,000**	**10,000**	**10,000**	**51,000**	
TOTAL OUTCOME 3.4				**162,000**	**63,000**	**64,000**	**28,000**	**58,000**	**375,000**	
TOTAL COMPONENT 3 (MVE)				576,000	286,500	179,000	135,000	164,000	**1,340,500**	

COMPONENT 4: ENVIRONMENTALLY SOUND MANAGEMENT

Outcome/ Activity	Budget Description	Rate (USD)	Unit	Amount Year 1 (USD)	Amount Year 2 (USD)	Amount Year 3 (USD)	Amount Year 4 (USD)	Amount Year 5 (USD)	Total (USD)	Budget Note - Description
Outcome 4.1: Adoption of a lamp waste management strategy and legal frameworks										
Output 4.1.1: Recommendation on an appropriate lamp waste management strategy for PICTs										
Activity 4.1.1: Assess the volume of used lamps, existing collection mechanisms, and capacity of stakeholders to support environmentally sound lamp waste management	International Consultants	15,000	Man-Month	15,000	15,000	-	-	-	30,000	Assess existing collection mechanisms
	National Consultants	3,500	Man-Month	28,000	14,000	-	-	-	42,000	Support international consultant (tier 1 in 2016, other tier in 2017)
	Individual Contracts	-	Man-Month	-	-	-	-	-	-	
	Travel	-	Trip	-	-	-	-	-	-	
	Contractual services	-	#	-	-	-	-	-	-	
	Training, Workshops and Conference	-	#	-	-	-	-	-	-	
	Miscellaneous	500	#	5,000	2,000	-	-	-	7,000	
Sub Total				48,000	31,000	-	-	-	**79,000**	
Activity 4.1.2: Review existing legal frameworks for waste management in PICTs	International Consultants	15,000	Man-Month	45,000	-	-	-	-	45,000	For review of existing legal frameworks related to lamp waste management in the region
	National Consultants	3,500	Man-Month	21,000	-	-	-	-	21,000	Coordination and provision of information to international consultant
	Individual Contracts	-	Man-Month	-	-	-	-	-	-	
	Travel	-	Trip	-	-	-	-	-	-	
	Contractual services	-	#	-	-	-	-	-	-	
	Training, Workshops and Conference	-	#	-	-	-	-	-	-	
	Miscellaneous	500	#	3,000	-	-	-	-	3,000	
Sub Total				69,000	-	-	-	-	**69,000**	
Activity 4.1.3: Identify preventive actions to reduce environmental risks from lighting products	International Consultants	15,000	Man-Month	15,000	-	-	-	-	15,000	Identify preventive actions accorging to surveys/assessment
	National Consultants	3,500	Man-Month	10,500	-	-	-	-	10,500	Support international consultant in providing information
	Individual Contracts	3,000	#	3,000	-	-	-	-	3,000	Field surveys on risk of mercury in PICTs
	Travel	-	Trip	-	-	-	-	-	-	
	Contractual services	-	#	-	-	-	-	-	-	
	Training, Workshops and Conference	-	#	-	-	-	-	-	-	
	Miscellaneous	500	#	3,000	-	-	-	-	3,000	
Sub Total				31,500	-	-	-	-	**31,500**	

Outcome/ Activity	Budget Description	Rate (USD)	Unit	Amount Year 1 (USD)	Amount Year 2 (USD)	Amount Year 3 (USD)	Amount Year 4 (USD)	Amount Year 5 (USD)	Total (USD)	Budget Note - Description
Output 4.1.2: Specific legal mechanisms to support lamp waste management developed and approved in PICTs										
Activity 4.1.4: Develop a lamp waste management strategy, and conduct pilot implementation of lamp waste management in selected PICTs	International Consultants	15,000	Man-Month	30,000	15,000	-	-	-	45,000	Develop lamp waste management strategy in country where environmental law are in place
	National Consultants	3,500	Man-Month	28,000	14,000	-	-	-	42,000	Estimate 8 countries will implement pilot programs in 2016, and 4 countries will implement in 2017
	Individual Contracts	-	Man-Month	-	-	-	-	-	-	
	Travel	1,000	Trip	2,000	1,000	-	-	-	3,000	Travel of international/national consultant to selected PICTs
	pilot lamp waste management	15,000	#	120,000	60,000	-	-	-	180,000	Budget for pilot lamp waste management program
	Training, Workshops and Conference	-	#	-	-	-	-	-	-	
	Miscellaneous	500	#	3,000	3,000	-	-	-	6,000	
Sub Total				183,000	93,000	-	-	-	**276,000**	
Activity 4.1.5: Develop and implement supporting legal mechanisms for lamp waste management	International Consultants	15,000	Man-Month	-	30,000	15,000	-	-	45,000	Recommendations and improvement of supporting legal mechanisms for lamp waste management in PICTs' context
	National Consultants	3,500	Man-Month	-	14,000	10,500	10,500	7,000	42,000	Environmental experts to support improvement and development works in each PICT
	Individual Contracts	-	Man-Month	-	-	-	-	-	-	
	Travel	-	Trip	-	-	-	-	-	-	
	legal experts	5,000	#	-	20,000	15,000	15,000	10,000	60,000	Legal experts to support improvements in the 1st tier and new development in 2nd and 3rd tier
	Training, Workshops and Conference	-	#	-	-	-	-	-	-	
	Miscellaneous	500	#	-	3,000	3,000	3,000	3,000	12,000	
Sub Total				-	67,000	43,500	28,500	20,000	**159,000**	
TOTAL OUTCOME 4.1				**331,500**	**191,000**	**43,500**	**28,500**	**20,000**	**614,500**	

Outcome/ Activity	Budget Description	Rate (USD)	Unit	Amount Year 1 (USD)	Amount Year 2 (USD)	Amount Year 3 (USD)	Amount Year 4 (USD)	Amount Year 5 (USD)	Total (USD)	Budget Note - Description
Outcome 4.2: Improved operation of lamp waste management facilities in PICTs										
Output 4.2 Recommendations on options for sustainable management of lamp waste management facilities in PICTs										
Activity 4.2.1: Evaluate costs of operation of lamp waste management facilities in PICTs and overseas	International Consultants	15,000	Man-Month	30,000	-	-	-	-	30,000	Evaluate costs of operation of lamp waste management facilities in PICTs
	National Consultants	3,500	Man-Month	17,500	-	-	-	-	17,500	For assess and test lamp waste facilities
	Individual Contracts	-	Man-Month	-	-	-	-	-	-	
	Travel	-	Trip	-	-	-	-	-	-	
	Contractual services	-	#	-	-	-	-	-	-	
	Training, Workshops and Conference	-	#	-	-	-	-	-	-	
	Miscellaneous	500	#	3,000	-	-	-	-	3,000	
Sub Total				**50,500**	**-**	**-**	**-**	**-**	**50,500**	
Activity 4.2.2: Identify strategy options for sustainable operation of lamp crusher facilities, storage and disposal of crushed lamps in PICTs	International Consultants	15,000	Man-Month	30,000	15,000	-	-	-	45,000	Prepare sustainable management of the lamp crushing facilities, specify storage areas
	National Consultants	3,500	Man-Month	10,500	7,000	-	-	-	17,500	Support international consultant in assessing various lamp crushing facilities options (5 countries have this facility in place)
	Individual Contracts	-	Man-Month	-	-	-	-	-	-	
	Travel	-	Trip	-	-	-	-	-	-	
	Contractual services	-	#	-	-	-	-	-	-	
	Training, Workshops and Conference	-	#	-	-	-	-	-	-	
	Miscellaneous	500	#	4,000	4,000	-	-	-	8,000	
Sub Total				**44,500**	**26,000**	**-**	**-**	**-**	**70,500**	
Activity 4.2.3: Enhance capacity of stakeholders involved in environmentally sound storages and disposal facilities in PICTs	International Consultants	15,000	Man-Month	-	15,000	15,000	-	-	30,000	Provide supervision to countries in training needs assessment
	National Consultants	-	Man-Month	-	-	-	-	-	-	
	Individual Contracts	-	Man-Month	-	-	-	-	-	-	
	Travel	1,000	Trip	-	12,000	12,000	-	-	24,000	country delegate (12countries)
	Contractual services	-	#	-	-	-	-	-	-	
	Training, Workshops and Conference	5,000	#	-	5,000	5,000	-	-	10,000	Regional consultation workshop for 1st tier countries in 2017 and other tiers in 2018
	Miscellaneous	500	#	-	4,000	4,000	-	3,000	11,000	
Sub Total				**-**	**36,000**	**36,000**	**-**	**3,000**	**75,000**	
TOTAL OUTCOME 4.2				**95,000**	**62,000**	**36,000**	**0**	**3,000**	**196,000**	

Outcome/ Activity	Budget Description	Rate (USD)	Unit	Amount Year 1 (USD)	Amount Year 2 (USD)	Amount Year 3 (USD)	Amount Year 4 (USD)	Amount Year 5 (USD)	Total (USD)	Budget Note - Description
Outcome 4.3: Environmentally sound societies, minimal toxic lamps waste										
Output 4.3 Acceptance of the Minamata Convention in PICTs and agreement with lamp importers										
Activity 4.3.1: Assist in Adopting and ratifying the Minamata Convention on Mercury in PICTs	International Consultants	15,000	Man-Month	-	-	15,000	-	-	15,000	
	National Consultants	3,500	Man-Month	-	-	10,500	10,500	10,500	31,500	In-country research and case studies preparation - (1 person/week per PICT)
	communication	2,000	#	-	-	24,000	24,000	24,000	72,000	Media cost (e.g., newspaper, radio, television) in PICTs
	Travel	-	Trip	-	-	-	-	-	-	
	Contractual services	-	#	-	-	-	-	-	-	
	Training, Workshops and Conference	-	#	-	-	-	-	-	-	
	Miscellaneous	500	#	-	-	3,000	3,000	3,000	9,000	
Sub Total				**-**	**-**	**52,500**	**37,500**	**37,500**	**127,500**	
Activity 4.3.2: Establish and implement voluntary agreements with importers and distributors to promote environmentally sound lighting products	International Consultants	15,000	Man-Month	-	30,000	-	-	-	30,000	Provide supervision to countries
	National Consultants	3,500	Man-Month	-	28,000	-	-	-	28,000	Tier 1 countries are expected to join a program
	Individual Contracts	3,000	Man-Month	-	6,000	-	-	-	6,000	Development of communication materials inclusion with new lamps
	Travel	1,000	Trip	-	4,000	-	-	-	4,000	Travel associated in development of the program
	Contractual services	-	#	-	-	-	-	-	-	
	Training, Workshops and Conference	-	#	-	-	-	-	-	-	
	Miscellaneous	500	#	-	3,000	-	-	-	3,000	
Sub Total				**-**	**71,000**	**-**	**-**	**-**	**71,000**	
TOTAL OUTCOME 4.3				**0**	**71,000**	**52,500**	**37,500**	**37,500**	**198,500**	
TOTAL COMPONENT 4 (ESM)				426,500	324,000	132,000	66,000	60,500	**1,009,000**	

BUDGET ESTIMATION BY COUNTRY AND ACTIVITY

Outcome/ Activity	Budget Description	Regional	National - TIER 1	National - TIER 2	Budget Note - Description
Outcome 1.1: Overall electricity savings in each implemented countries and region realised					
Output 1.1: Adoption of regionally harmonised MEPS for on-grid lighting products in the Pacific region					
Activity 1.1.1: Accelerate adoption of MEPS levels in the second and third tier countries	International Consultants	15,000	-	-	Support compilation and dissemination of implementation experience in 1st tier countries (based on SPC's data)
	National Consultants	-	9,333	4,667	Support in-country information dissemination
	Advertisement	-	2,667	1,333	Information dissemination
	Travel	-	-	-	
	Contractual services	-	-	-	
	Training, Workshops and Conference	-	-	-	
	Miscellaneous	-	1,333	667	
Sub Total					
TOTAL OUTCOME 1.1		**15,000**	**13,333**	**6,667**	
Outcome 1.2: Adoption of regionally harmonised MEPS for common off-grid lighting products in the Pacific region					***Estimation only liable for 3 tier-one countries (Solomon, Tonga, Vanuatu) and 1 tier-two country (PNG)**
Output 1.2: Recommended for off-grid lighting product categories and their respective MEPS requirements					
Activity 1.2.1: Review potential MEPS for off-grid lighting product categories in PICTs	International Consultants	**60,000**	**-**	-	Study and review of MEPS for off-grid lighting (4 countries)
	National Consultants	-	**21,000**	**7,000**	Support in-country market surveys ($7,000/country)
	surveys, tests, etc.	-	**60,000**	**20,000**	Travel and workshop are allocated for field surveys, tests ($20,000/country)
	Travel	-	**8,250**	**2,750**	Travel for international consultant and representatives from 4 countries to participate in workshops ($2,750/country)
	Contractual services	-	**-**	**-**	
	Training, Workshops and Conference	-	**3,000**	**1,000**	meeting to discuss survey results
	Miscellaneous	-	**2,250**	**750**	
Sub Total					
TOTAL OUTCOME 1.2		**60,000**	**94,500**	**31,500**	

COMPONENT 1: MINIMUM ENERGY PERFORMANCE STANDARDS - BUDGET LINE ITEM BY COUNTRY

Outcome/ Activity	Budget Description	Regional	National - TIER 1	National - TIER 2	Budget Note - Description
Outcome 1.3: MEPS for lighting products enforced, upgraded and harmonised with international requirements					
Output 1.3: Reports on economic benefits of EE lighting market transformation at national levels, and recommendations on new and/or updated MEPS for lighting products					
Activity 1.3.1: Conduct reviews of internationally-recognised MEPS requirements for lighting products	International Consultants	30,000	-	-	Conduct international review of MEPS requirements for lighting products
	National Consultants	-	-	-	
	Individual Contracts	-	-	-	
	Travel	-	-	-	
	Contractual services	-	-	-	
	Training, Workshops and Conference	-	-	-	
	Miscellaneous	-	2,000	1,000	
Sub Total		**30,000**	**2,000**	**1,000**	
Activity 1.3.2: Conduct impact assessment in each PICT and determine appropriateness for upgrading of MEPS requirements	International Consultants	-	-	-	
	National Consultants	-	56,000	28,000	Preparation of impact assessment in 12 PICTs
	surveys, tests, etc.	-	-	-	Data from verification will be used in this activity
	Travel	-	-	-	
	Contractual services	-	-	-	
	Training, Workshops and Conference	-	32,000	16,000	National workshop
	Miscellaneous	-	4,000	2,000	
Sub Total		**-**	**92,000**	**46,000**	
Activity 1.3.3: Upgrade and harmonise MEPS for on-grid lighting products to facilitate the transition to efficient lighting technology in PICTs	International Consultants	60,000	-	-	Preparation of recommendations based on the impact assessments
	National Consultants	-	-	-	
	Individual Contracts	-	-	-	
	Travel	24,000	-	-	
	Contractual services	-	-	-	
	Training, Workshops and Conference	10,000	-	-	organisation of regional workshops
	Miscellaneous	-	5,333	2,667	
Sub Total		**94,000**	**5,333**	**2,667**	
TOTAL OUTCOME 1.3		**124,000**	**99,333**	**49,667**	

COMPONENT 2: SUPPORTING POLICIES AND MECHANISMS — BUDGET LINE ITEM BY COUNTRY

Outcome/ Activity	Budget Description	Regional	National - TIER 1	National - TIER 2	Budget Note - Description
Outcome 2.1: More awareness of energy-efficient lighting products among the identified target audiences					
Output 2.1: Implementation of communication activities for different groups of target audiences					
Activity 2.1.1: Design a communication strategy on energy efficient lighting	International Consultants	15,000	-	-	Design communiation strategy on energy efficient lighting
	National Consultants	-	14,000	7,000	Cover 12 countries (0.5 man-month each)
	Individual Contracts	-	-	-	
	Travel	-	-	-	
	Contractual services	-	-	-	
	Training, Workshops and Conference	-	-	-	
	Miscellaneous	-	2,000	1,000	
Sub Total		**15,000**	**16,000**	**8,000**	
Activity 2.1.2: Develop national communication and awareness campaigns	International Consultants	30,000	-	-	Assist in development of national communication campaign
	National Consultants	-	28,000	14,000	Develop national communication campaign in each PICTs (12 countries)
	Individual Contracts	-	-	-	
	Travel	-	-	-	
	Contractual services	-	2,667	1,333	
	Training, Workshops and Conference	-	16,000	8,000	Consultation workshop in each PICTs to conclude the campaign
	Miscellaneous	-	4,667	2,333	
Sub Total		**30,000**	**51,333**	**25,667**	
Activity 2.1.3: Implement communication strategy at national levels	International Consultants	45,000	-	-	Support design of communication materials and implementations
	National Consultants	-	28,000	14,000	Part-time coordinator for implementation of communication strategy (1wk/country)
	Roadshows, etc.	-	8,000	4,000	Priority on 1st tier countries, (est. 4 countries implement the roadshow each year
	Travel	-	-	-	
	Communication program	960,000	-	-	Cost of communication materials and tools and media
	Training, Workshops and Conference	-	-	-	
	Miscellaneous	-	16,000	8,000	
Sub Total		**1,005,000**	**52,000**	**26,000**	
TOTAL OUTCOME 2.1		**1,050,000**	**119,333**	**59,667**	

Outcome/ Activity	Budget Description	Regional	National - TIER 1	National - TIER 2	Budget Note - Description
Outcome 2.2: Financial incentive and disincentive mechanisms designed, adopted and implemented in PICTs					
Output 2.2: Pragmatic financial incentive and disincentive mechanisms that can be applied to support energy-efficient lighting					
Activity 2.2.1: Review and assess suitable financing mechanisms to support efficient indoor and street lighting technologies	International Consultants	30,000	-	-	Review and assess financial mechanisms
	National Consultants	-	7,000	3,500	Assist international consultant in review and assess financial mechanisms
	Individual Contracts	-	-	-	
	Travel	-	1,333	667	
	Contractual services	-	-	-	
	Training, Workshops and Conference	-	-	-	
	Miscellaneous	-	2,000	1,000	
Sub Total		**30,000**	**10,333**	**5,167**	
Activity 2.2.2: Implement selected financial mechanism at national level	International Consultants	30,000	-	-	Provide supervision to countries in selection of financial mechanisms
	National Consultants	-	11,667	5,833	Part-time coordinators to support in-country agency to conclude financial mechanism
	Individual Contracts	-	-	-	
	Travel	-	-	-	
	Seed fund	600,000	-	-	Budget allocated as seed fund for on-bill financing and revolving fund based on activity 2.2.1
	Training, Workshops and Conference	-	16,000	8,000	
	Miscellaneous	-	6,000	3,000	
Sub Total		**630,000**	**33,667**	**16,833**	
Activity 2.2.3: Develop compulsory funding schemes/obligation for government and/or financial institutions to allocate a portion of the national budget or local commitment for promotion of efficient lighting	International Consultants	15,000	-	-	Provide supervision to countries in selection of financial mechanisms
	National Consultants	-	16,000	8,000	Part-time coordinators to support in-country agency to conclude financial mechanism
	Individual Contracts	-	-	-	
	Travel	-	-	-	
	Contractual services	-	-	-	
	Training, Workshops and Conference	-	-	-	
	Miscellaneous	-	4,000	2,000	
Sub Total		**15,000**	**20,000**	**10,000**	
TOTAL OUTCOME 2.2		**675,000**	**64,000**	**32,000**	

Outcome/ Activity	Budget Description	Regional	National - TIER 1	National - TIER 2	Budget Note - Description
Outcome 2.3: Enhanced capacity among policy-makers and policy advocacy groups to design and implement supporting					
Output 2.3: Policy-makers, policy advocacy groups, and private sector entities get better understanding and autonomously					
Activity 2.3.1: Design capacity building programmes for policy-makers and policy advocacy groups and lamp importers	International Consultants	15,000	-	-	Provide supervision to countries in training needs assessment
	National Consultants	-	28,000	14,000	Conduct in-country training needs assessment
	Individual Contracts	-	-	-	
	Travel	-	-	-	
	Contractual services	-	-	-	
	Training, Workshops and Conference	-	16,000	8,000	Consultation workshop in each PICT
	Miscellaneous	-	2,000	1,000	
Sub Total		**15,000**	**46,000**	**23,000**	Provide supervision to countries in design and develop training tools and materials
Activity 2.3.2: Design and develop training tools and materials	International Consultants	45,000	-	-	
	National Consultants	-	-	-	
	Individual Contracts	-	-	-	
	Travel	-	-	-	
	Contractual services	60,000	-	-	Contractual services to design and develop training tools and materials
	Training, Workshops and Conference	-	-	-	
	Miscellaneous	-	6,000	3,000	
Sub Total		**105,000**	**6,000**	**3,000**	Support regional capacity buildings
Activity 2.3.3: Implement capacity building programmes at regional and national levels	International Consultants	45,000	-	-	Support national capacity building activities (training for trainers in 2nd and 3rd tier in 2019)
	National Consultants	-	28,000	14,000	
	Individual Contracts	-	-	-	
	Travel	-	-	-	
	Contractual services	-	-	-	
	Training, Workshops and Conference	24,000	-	-	Organise training workshop in each PICT
	Miscellaneous	-	8,000	4,000	
Sub Total		**69,000**	**36,000**	**18,000**	
TOTAL OUTCOME 2.3		**189,000**	**88,000**	**44,000**	

Outcome/ Activity	Budget Description	Regional	National - TIER 1	National - TIER 2	Budget Note - Description
Outcome 2.4: Transparent and effective government procurement system					
Output 2.2: Energy-efficient government procurement system					
Activity 2.4.1: Establish efficient lighting procurement policies/guidelines for municipal and national government agencies and electric utilities	International Consultants	60,000	-	-	Provide guidelines for creating the EE procurement guide
	National Consultants	-	28,000	14,000	Gather existing procurement policies/guidelines in each PICT
	Individual Contracts	-	-	-	
	Travel	-	-	-	
	Contractual services	-	-	-	
	Training, Workshops and Conference	-	-	-	
	Miscellaneous	-	2,000	1,000	
Sub Total		**60,000**	**30,000**	**15,000**	Support implementation of demonstration projects
Activity 2.4.2: Demonstrate compliance with efficient lighting procurement policies/guidelines in PICTs	International Consultants	15,000	-	-	Support implementation and evaluation of demonstration projects
	National Consultants	-	24,000	6,000	
	Individual Contracts	-	-	-	
	Travel	-	-	-	
	Demo projects	500,000	-	-	Budget for EE lighting demonstation projects in 9 PELS countries + Fiji
	Training, Workshops and Conference	-	-	-	
	Miscellaneous	-	9,600	2,400	
Sub Total		**515,000**	**33,600**	**8,400**	
TOTAL OUTCOME 2.4		**575,000**	**63,600**	**23,400**	

COMPONENT 3: MONITORING, VERIFICATION AND ENFORCEMENT — BUDGET LINE ITEM BY COUNTRY

Outcome/ Activity	Budget Description	Regional	National - TIER 1	National - TIER 2	Budget Note - Description
Outcome 3.1: Effective in-country regulatory frameworks to support implementation of mandatory MEPS approved in PICTs					
Output 3.1: Energy efficiency regulatory frameworks established in PICTs					
Activity 3.1.1: Ensure extensive dissemination and understanding of the regulatory frameworks development guideline prepared by PALS and ensure the MVE component is incorporated in the country regulatory frameworks	International Consultants	-	-	-	
	National Consultants	-	-	-	
	Individual Contracts	-	8,000	4,000	To support SPC in dissemination of regulatory framework guildines
	Travel	12,000	-	-	
	Contractual services	-	-	-	
	Training, Workshops and Conference	5,000	-	-	Regional workshop for legal in experts in PICTs
	Miscellaneous	-	4,000	2,000	
Sub Total		**17,000**	**12,000**	**6,000**	
Activity 3.1.2: Develop and improve regulatory frameworks for supporting MVE schemes in PICTs	International Consultants	120,000	-	-	Recommendations and improvement of regulatory frameworks in PICTs' context
	National Consultants	-	49,000	24,500	MVE experts to support improvement and development works in each PICT
	Individual Contracts	-	-	-	
	Travel	-	-	-	
	Legal experts	42,000	-	-	Legal experts to support improvements in the 1st tier and new development in 2nd and 3rd tier
	Training, Workshops and Conference	-	-	-	
	Miscellaneous	-	8,333	4,167	
Sub Total		**162,000**	**57,333**	**28,667**	
TOTAL OUTCOME 3.1		**179,000**	**69,333**	**34,667**	

Outcome/ Activity	Budget Description	Regional	National - TIER 1	National - TIER 2	Budget Note - Description
Outcome 3.2: Online lighting product database facilitating transition to energy-efficient lighting and phasing out of incandescent lamps					
Output 3.2.1: A regional registration system for lighting product established					
Activity 3.2.1: Validate scope and key features of the regional registration system	International Consultants	7,500	-	-	Identify scope and key features of the regional registration system
	National Consultants	-	21,000	-	Support international consultant in identifying scope (0.5 m-m for each PICT)
	Individual Contracts	-	-	-	
	Travel	-	8,000	-	For 1st tier countries to review the system in Australia
	Contractual services	-	-	-	
	Training, Workshops and Conference	-	-	-	
	Miscellaneous	-	3,000	-	
Sub Total		**7,500**	**32,000**	**-**	
Activity 3.2.2: Develop the regional registration system modelled on the Australian online product registration system	International Consultants	22,500	-	-	Supervise development of the regional registration system
	National Consultants	-	28,000	14,000	Support in-country agency during the development of the regional registration system
	Individual Contracts	-	-	-	
	Travel	-	2,000	1,000	
	Contractual services	40,000	-	-	Contractor for development of the regional reis. System
	Training, Workshops and Conference	-	-	-	
	Miscellaneous	-	6,667	3,333	
Sub Total		**62,500**	**36,667**	**18,333**	
Activity 3.2.3: Develop and implement training activities for operation and maintenance of the regional registration system	International Consultants	30,000	-	-	Support development and implementation of training programme
	National Consultants	-	28,000	14,000	Support organization on national training activities
	Individual Contracts	-	-	-	For organisation of training activities
	Travel	12,000	-	-	
	Contractual services	-	-	-	
	Training, Workshops and Conference	5,000	-	-	Regional level
	Miscellaneous	-	6,000	3,000	
Sub Total		**47,000**	**34,000**	**17,000**	
Output 3.2.2 Recommendations on specific harmonised system (HS) codes for lighting products for registration and customs purposes					
Activity 3.2.4: Review and recommend HS Codes for lighting products in the Pacific	International Consultants	7,500	-	-	Review and recommend HS Codes for lighting products in PICTs
	National Consultants	-	7,000	-	Support international consultant and countries ot review and recommend HS Codes for lighting products in PICTs
	Individual Contracts	-	-	-	
	Travel	8,000	-	-	Travel for 1st tier countries
	Contractual services	-	-	-	
	Training, Workshops and Conference	5,000	-	-	Organise a meeting to conclude HS codes for lighting products used in the PICTs
	Miscellaneous	-	4,000	-	
Sub Total		**20,500**	**11,000**	**-**	
TOTAL OUTCOME 3.2		**137,500**	**113,667**	**35,333**	

Outcome/ Activity	Budget Description	Regional	National - TIER 1	National - TIER 2	Budget Note - Description
Outcome 3.3: Appropriate national verification frameworks established in PICTs, quality lighting products sold in markets					
Output 3.3 Development and implementation of market surveillance systems for PICTs					
Activity 3.3.1: Establish partnership/ cooperation agreements with accredited testing facilities	International Consultants	15,000	-	-	Recommend suitable lighting labs for PICTs
	National Consultants	-	9,333	4,667	Support international consultant to coordinate with PICTs (part-time)
	Individual Contracts	-	-	-	
	Travel	-	4,000	2,000	Visit testing labs to review capacity
	Contractual services	-	-	-	
	Training, Workshops and Conference	-	-	-	
	Miscellaneous	-	2,667	1,333	
Sub Total		**15,000**	**16,000**	**8,000**	
Activity 3.3.2: Develop market surveillance guidelines and a verification testing planfor PICTs	International Consultants	30,000	-	-	Develop market surveillance guidelines
	National Consultants	-	14,000	7,000	Support international consultant to coordinate with PICTs (part-time)
	Individual Contracts	-	12,000	6,000	In-country data collections
	Travel	-	-	-	
	Contractual services	-	-	-	
	Training, Workshops and Conference	-	16,000	8,000	In-country training workshops
	Miscellaneous	-	4,000	2,000	
Sub Total		**30,000**	**46,000**	**23,000**	
Activity 3.3.3: Implement market surveillance activities in PICTs (ad-hoc and periodic) where MEPS have been introduced	International Consultants	-	-	-	
	National Consultants	-	56,000	28,000	For implementation of market surveillance activities (all costs associated with the surveys are included) and information sharing to other tier countries
	Individual Contracts	-	48,000	24,000	
	Travel	-	-	-	
	Lab tests fee	90,000	-	-	Estimate budget for lab tests (1st tier countries)
	Training, Workshops and Conference	-	-	-	
	Miscellaneous	-	8,000	4,000	
Sub Total		**90,000**	**112,000**	**56,000**	
TOTAL OUTCOME 3.3		**135,000**	**174,000**	**87,000**	

Outcome/ Activity	Budget Description	Regional	National - TIER 1	National - TIER 2	Budget Note - Description
Outcome 3.4: Fair, level playing field among manufacturers; efficient lighting products sold in markets					
Output 3.4: Escalating set of counter violation measures and corrective actions					
Activity 3.4.1: Prioritise gravity of violations against the imposed regulations for lighting products in PICTs	International Consultants	30,000	-	-	Provide guidelines and summarise key violations in the PICTs
	National Consultants	-	14,000	7,000	Support international consultant to coordinate with PICTs (part-time)
	Individual Contracts	-	-	-	
	Travel	-	-	-	
	Contractual services	-	-	-	
	Training, Workshops and Conference	-	-	-	
	Miscellaneous	-	2,000	1,000	
Sub Total		**30,000**	**16,000**	**8,000**	
Activity 3.4.2: Match prioritised violations to a range of penalties	International Consultants	45,000	-	-	Provide guidelines and summarise key violations in the PICTs
	National Consultants	-	21,000	10,500	Support international consultant to coordinate with PICTs (part-time)
	Individual Contracts	-	6,000	3,000	
	Travel	-	-	-	
	Contractual services	-	-	-	
	Training, Workshops and Conference	-	-	-	
	Miscellaneous	-	3,000	1,500	
Sub Total		**45,000**	**30,000**	**15,000**	
Activity 3.4.3: Develop and implement training programs in supporting the enforcement schemes in PICTs	International Consultants	30,000	-	-	Support development and implementation of training programme in the first 2 years
	National Consultants	-	42,000	21,000	Support in-country training programmes (Half a month/country)
	Individual Contracts	-	-	-	
	Travel	-	-	-	
	Contractual services	-	-	-	
	Training, Workshops and Conference	-	48,000	24,000	In-country training workshops
	Miscellaneous	-	10,000	5,000	
Sub Total		**30,000**	**100,000**	**50,000**	
Activity 3.4.4: Apply the enforcement schemes in PICTs	International Consultants	-	-	-	
	National Consultants	-	28,000	14,000	Documentation of enforcement scheme in the 1st tier PICTs, and implementation of the enforement scheme in other tier countries in 2019-2020
	Individual Contracts	-	-	-	
	Travel	-	-	-	
	Contractual services	-	-	-	
	Training, Workshops and Conference	-	-	-	
	Miscellaneous	-	6,000	3,000	
Sub Total		**-**	**34,000**	**17,000**	
TOTAL OUTCOME 3.4		**105,000**	**180,000**	**90,000**	
TOTAL COMPONENT 3 (MVE)		**556,500**	**537,000**	**247,000**	

COMPONENT 4: ENVIRONMENTALLY SOUND MANAGEMENT — BUDGET LINE ITEM BY COUNTRY

Outcome/ Activity	Budget Description	Regional	National - TIER 1	National - TIER 2	Budget Note - Description
Outcome 4.1: Adoption of a lamp waste management strategy and legal frameworks					
Output 4.1.1: Recommendation on an appropriate lamp waste management strategy for PICTs					
Activity 4.1.1: Assess the volume of used lamps, existing collection mechanisms, and capacity of stakeholders to support environmentally sound lamp waste management	International Consultants	30,000	-	-	Assess existing collection mechanisms
	National Consultants	-	28,000	14,000	Support international consultant (tier 1 in 2016, other tier in 2017)
	Individual Contracts	-	-	-	
	Travel	-	-	-	
	Contractual services	-	-	-	
	Training, Workshops and	-	-	-	
	Miscellaneous	-	4,667	2,333	
Sub Total		**30,000**	**32,667**	**16,333**	
Activity 4.1.2: Review existing legal framework for waste management in PICTs	International Consultants	45,000	-	-	For review of existing legal frameworks related to lamp waste management in the region
	National Consultants	-	14,000	7,000	Coordination and provision of information to international consultant
	Individual Contracts	-	-	-	
	Travel	-	-	-	
	Contractual services	-	-	-	
	Training, Workshops and	-	-	-	
	Miscellaneous	-	2,000	1,000	
Sub Total		**45,000**	**16,000**	**8,000**	
Activity 4.1.3: Identify preventive actions to reduce environmental risks from lighting products	International Consultants	15,000	-	-	Identify preventive actions accorging to surveys/assessment
	National Consultants	-	7,000	3,500	Support international consultant in providing information
	Individual Contracts	-	2,000	1,000	Field surveys on risk of mercury in PICTs
	Travel	-	-	-	
	Contractual services	-	-	-	
	Training, Workshops and	-	-	-	
	Miscellaneous	-	2,000	1,000	
Sub Total		**15,000**	**11,000**	**5,500**	

Outcome/ Activity	Budget Description	Regional	National - TIER 1	National - TIER 2	Budget Note - Description
Output 4.1.2: Specific legal mechanisms to support lamp waste management developed and approved in PICTs					
Activity 4.1.4: Develop a lamp waste management strategy, and conduct pilot implementation of lamp waste management in selected PICTs	International Consultants	45,000	-	-	Develop lamp waste management strategy in country where environmental law are in place
	National Consultants	-	28,000	14,000	Estimate 8 countries will implement pilot programs in 2016, and 4 countries will implement in 2017
	Individual Contracts	-	-	-	
	Travel	3,000	-	-	Travel of international/national consultant to selected PICTs
	pilot lamp waste management	180,000	-	-	Budget for pilot lamp waste management program
	Training, Workshops and Conference	-	-	-	
	Miscellaneous	-	4,000	2,000	
Sub Total		**228,000**	**32,000**	**16,000**	
Activity 4.1.5: Develop and implement supporting legal mechanisms for lamp waste management	International Consultants	45,000	-	-	Recommendations and improvement of supporting legal mechanisms for lamp waste management in PICTs' context
	National Consultants	-	28,000	14,000	Environmental experts to support improvement and development works in each PICT
	Individual Contracts	-	-	-	
	Travel	-	-	-	
	legal experts	-	40,000	20,000	Legal experts to support improvements in the 1st tier and new development in 2nd and 3rd tier
	Training, Workshops and	-	-	-	
	Miscellaneous	-	8,000	4,000	
Sub Total		**45,000**	**76,000**	**38,000**	
TOTAL OUTCOME 4.1		**363,000**	**167,667**	**83,833**	

Outcome/ Activity	Budget Description	Regional	National - TIER 1	National - TIER 2	Budget Note - Description
Outcome 4.2: Improved operation of lamp waste management facilities in PICTs					
Output 4.2 Recommendations on options for sustainable management of lamp waste management facilities in PICTs					
Activity 4.2.1: Evaluate costs of operation of lamp waste management facilities in PICTs and overseas	International Consultants	30,000	-	-	Evaluate costs of operation of lamp waste management facilities in PICTs
	National Consultants	-	11,667	5,833	For assess and test lamp waste facilities
	Individual Contracts	-	-	-	
	Travel	-	-	-	
	Contractual services	-	-	-	
	Training, Workshops and Conference	-	-	-	
	Miscellaneous	-	2,000	1,000	
Sub Total		**30,000**	**13,667**	**6,833**	
Activity 4.2.2: Identify strategy options for sustainable operation of lamp crusher facilities and storage of crushed lamps in PICTs	International Consultants	45,000	-	-	Prepare sustanable management of the lamp crushing facilities, specify storage areas
	National Consultants	-	11,667	5,833	Support international consultant in assessing various lamp crushing facilities options (5 countries have this facility in place)
	Individual Contracts	-	-	-	
	Travel	-	-	-	
	Contractual services	-	-	-	
	Training, Workshops and Conference	-	-	-	
	Miscellaneous	-	5,333	2,667	
Sub Total		**45,000**	**17,000**	**8,500**	
Activity 4.2.3: Enhance capacity of stakeholders involved in environmentally sound storages and disposal facilities in PICTs	International Consultants	30,000	-	-	Provide supervision to countries in training needs assessment
	National Consultants	-	-	-	
	Individual Contracts	-	-	-	
	Travel	24,000	-	-	country delegate (12countries)
	Contractual services	-	-	-	
	Training, Workshops and Conference	10,000	-	-	Regional consultation workshop for 1st tier countries in 2017 and other tiers in 2018
	Miscellaneous	-	7,333	3,667	
Sub Total		**64,000**	**7,333**	**3,667**	
TOTAL OUTCOME 4.2		**139,000**	**38,000**	**19,000**	

Outcome/ Activity	Budget Description	Regional	National - TIER 1	National - TIER 2	Budget Note - Description
Outcome 4.3: Environmentally sound societies, minimal toxic lamps waste					
Output 4.3 Acceptance of the Minamata Convention in PICTs and agreement with lamp importers					
Activity 4.3.1: Assist in Adopting and ratifying the Minamata Convention on Mercury in PICTs	International Consultants	15,000	-	-	Provide inportant insights for policy-makers
	National Consultants	-	21,000	10,500	In-country research and case studies preparation - (1 person/week per PICT)
	communication	-	48,000	24,000	Media cost (e.g., newspaper, radio, television) in PICTs
	Travel	-	-	-	
	Contractual services	-	-	-	
	Training, Workshops and Conference	-	-	-	
	Miscellaneous	-	6,000	3,000	
Sub Total		**15,000**	**75,000**	**37,500**	
Activity 4.3.2: Establish and implement voluntary agreements with importers on promotions of environmentally sound lighting products	International Consultants	30,000	-	-	Provide supervision to countries
	National Consultants	-	28,000	-	Tier 1 countries are expected to join a program
	Individual Contracts	6,000	-	-	Development of communication materials inclusion with new lamps
	Travel	-	4,000	-	Travel associated in development of the program
	Contractual services	-	-	-	
	Training, Workshops and Conference	-	-	-	
	Miscellaneous	-	3,000	-	
Sub Total		**36,000**	**35,000**	**-**	
TOTAL OUTCOME 4.3		**51,000**	**110,000**	**37,500**	
TOTAL COMPONENT 4 (ESM)		553,000	315,667	140,333	

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