**Technical Assistance Closure Report Template**

**Objective of the technical assistance (TA) Closure Report:**

* To communicate publicly in one document a summary of progress made and lessons learned during the TA towards the anticipated impact (sections 1-4).
* To documentqualitative and quantitative data collected during TA, for usein donor and UN reporting (Annex 1).

**Steps for completing the TA closure report:**

1. The lead TA implementer submits the closure report at the end of the technical assistance as a final deliverable. The TA closure report will capture outputs, outcomes and impacts of all activities conducted under the TA. Please copy and summariserelevant material from previous TA outputs/deliverables and the Response Plan, as relevant.
2. A CTCN Manager will review and revise the closure report before final approval by the CTCN Deputy Director.

**Important note on public and internal use of the closure report**:

Once approved by the CTCN Deputy Director, the TA closure report will be a public document available on the CTCN website www.ctc-n.org. Selected content will be used for targeted communication activities. Annex 2is for internal use only and will not be publicly available.

**Closure Report for CTCN Technical Assistance**

1. **Basic information**

|  |  |
| --- | --- |
| Title of response plan | **Energy efficient street lighting technologies and financing models in Thailand** |
| Technical assistance reference number | **2015000088** |
| Country / countries | **Thailand** |
| NDE organisation  | **National Science and Technology Development Agency** |
| NDE focal point | *Mr Surachai Sathitkunarat* |
| NDE contact information  | *surachai@sti.or.th* |
| Proponent focal point and organisation  | *Mr LertchaiKaewwichian, Provincial Electrical Authority of Thailand,lertchai.kag@pea.co.th* |
| Designer of the response plan | *Yatin Choudhary, The Energy and Resources Institute , Yatin.choudhary@teri.res.in* |
| Implementer(s) of technical assistance | *The Energy and Resources Institute,* *International Institute for Energy Conservation, Thailand* |
| Beneficiaries | *Provincial Electrical Authorityof Thailand* |
| Sector(s) addressed  | *Energy Efficiency* |
| Technologies supported  | *Lighting* |
| Implementation start date | *19/07/2017* |
| Implementation end date | *07/07/2020* |
| Total budget for implementation  | *USD 49950* |
| Description of delivered outputs and products as well as the activities undertaken to achieve them. In doing so, review the log frame of the original response plan and refer to it as appropriate | 1. *Qualitative and quantitative interview based survey for assessment of technological awareness of staff and operation and maintenance aspects of existing pilot projects of energy efficiency in street lighting in Thailand and barriers being face.*
2. *Study of national regulations standards and guidelines*
3. *Techno economic study of energy efficient street lighting project in 3 municipalities*
4. *Development of financial model for implementation of energy efficient street lighting technology*
5. *Road map and recommendation document*
 |
| Methodologies applied to produce outputs and products  | * *Qualitative and quantitative survey*
* *Literature review*
* *Field survey*
* *Techno economic study*
* *Cost benefit analysis*
 |
| Reference to knowledge resources | *Manual Of Financing Mechanisms And Business Models For Energy efficiency, Report by BASE – Basel Agency for Sustainable Energy for UN Environment* |
| Deviations | *The technical assistance required techno economic assessment to be done in 4 municipalities selected by PEA, PEA selected city-level municipalities i.e. Lampang, Nakornsawan, Pathumthani and Nakhorn Ratchasima municipalities. For Nakhorn Ratchasima, as checked with municipality, there was no record of inventory data so assessment for this municipality could not be conducted.*  |
| Anticipated follow-up activities and next steps | * *Initiate discussion with the national government (e.g., Ministry of Energy and Ministry of Finance) in creating an enabling environment for implementation of energy-efficient street lighting in Thai municipalities.*
* *A phase-step multi-year implementation plan for energy-efficient street and outdoor lighting should be developed with a listing of priority municipalities for each phase*
* *Energy efficiency street lighting projects to be implemented through the Deemed Saving model of ESCOs.*
 |

1. **Lessons learned**

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| --- | --- | --- |
|  | **Lessons learned** | **Recommendations** |
| Lessons learnedfrom the CTCN TA process  | *The technical assistance required coordination with multiple agencies, and included data collection from the field. The primary agency for implementation of the technical assistance TERI had to take local partner IIEC due to language barrier as most of the relevant codes and standards were in Thai language.* | *In terms of selection of the agency for implementation preference could be given to local agency if there is a language related barrier anticipated for a project.* |
| Lessons learned related to climate technology transfer | *There is a large potential of implementation of energy efficiency technology in street lighting in Thailand* *The study show that most municipalities are still facing several key obstacles and challenges in implementing EE street lighting projects such as High‐cost of EE street lightingtechnologies , Budget , Contractor’s after sales service , Confidence in EE street lighting technologies* *and Knowledge & insufficient skilled staff for M&V*  | *Recommendations include**Implementation of Energy efficiency in street lighting can be done using ESCO model.**It has been done successfully in many smaller pilot projects**Financial and technical risks of such implementation of energy efficiency measures at scale can be taken care by the ESCO thus the barriers such as high cost, lack of knowledge and insufficient skilled staff for M&V could be overcome.* |

**3. Illustration of the TA and photos**

For communication purposes, please provide 2-4Power Point slides, including illustrations or charts, describing barriers, opportunities, methodology, activities, outputs and achieved results. The illustrations must be copied into the TA Closure report but must also be delivered as power point files. Also, please provide at least five high-resolution pictures in jpg format, capturing technical assistance.The pictures should illustrate how the TA has impacted the lives of the beneficiaries in particular and the communities in general.

**4. Impact Statement**

The information in the table below will be used to communicate results and anticipated impacts of this technical assistance publicly. Please copy information from impact statement developed in the M&E Plan and update as relevant.

|  |  |
| --- | --- |
| **Challenge** | *Provincial Electrical Authority , Thailand has found that public lighting services account for about 60%- 70% of the total electricity consumed by the municipality annually.* *Although there is clear evidence about the benefits supported by positive results from PEA's demonstration projects, adoptions of energy efficient street lighting technologies at the municipal level have been still very slow.**The key barriers that contribute to the slow uptake are the lack of confidence in investing these new technologies in a large scale and limited access to investment finance.* |
| CTCN Assistance | *The CTCN Assistance is provided for** *Comparative techno­ economic assessments of different EE street lighting technologies.*
* *Designing of financial mechanisms for implementation of EE street lighting projects at the municipal level.*
 |
| Anticipated impact | *The CTCN Technical Assistance will** *Catalyze the development and investment of practical and affordable EE lighting technologies in Thai municipalities.*
* *Enhance national capacities to implement EE street lighting technologies and practices*
* *Reductions in national energy consumption and GHG emissions from the current public lighting loads.*
 |
| Co-benefits: Achieved or anticipated co-benefits from the TA | * *Validation of existing efforts of Provincial Electrical Authority for energy efficiency*
* *Widespread improvement of public and street lighting system.*
* *Technical assistance will lead to adoption of energy efficient street lighting technologies at municipal level.*
* *Raise confidence in investing in new energy efficient technologies at a large scale using ESCO model*
 |
| Gender aspects of the TA | *Consideration of equal participation of genders were done in implementation of the technical assistance by both agencies TERI and IIEC in both the agencies the lead project planning and implenmentation design was carried out by female calleagues, while equal participation of genders was done on the technical support for carrying out the activities planned.*  |
| Anticipated contribution to NDC | *In Thailand 30% reduction in energy consumption from street lighting is possible through EE street lighting technologies. Amounting to estimated 0.7 GWh energy saving through nationwide implementation.* |
| The narrative story | *The Provincial Electricity Authority (PEA) estimated that about 2.1 GWh ( 1.4 million metric tons of CO2) of electricity were consumed by street lighting nationwide in 2014;At the municipal level, public lighting services account for about 60%- 70% of the total electricity consumed annually.**Although there is clear evidence about the benefits supported by positive results from PEA's demonstration projects, adoptions of energy efficient street lighting technologies at the municipal level have been still very slow.* *The key barriers that contribute to the slow uptake are the lack of confidence in investing these new technologies in a large scale and limited access to investment finance.* *The technical assistance provided comparative techno economic assessment of different EE street lighting technologies, recommendation for using LED based street lighting is found to be suitable for municipalities in Thailand. The barriers for large scale implementation were identified through the Technical Assistance; ESCO model using bulk procurement is suggested for overcoming the financial and technical barriers for implementation.* |
| Contribution to SDGsA complete list of SDGs and their targets is available here: <https://sustainabledevelopment.un.org/partnership/register/> | *SDG-7: The TA will lead to adoption of energy efficient street lighting technologies at municipal level reducing the energy demand**SDG-9: The TA aims to raise confidence in investing the new technologies at a large scale in high energy efficient street lighting technologies and designing project financing models* *SDG-1:1 The TA will include other benefits like safety and security through widespread improvement of street lighting system across Thailand.**SDG-13: The TA aims to enhance the national capacity to implement energy efficient street lighting technologies and practices.*  |

**Annex 1Technical assistance data collection**

Please add quantitative and qualitative values for the indicatorsselected in the M&E plan and monitored throughout the technical assistance in the tables below.Indicators which have been monitored in addition to the proposed indicators below may be added at the end of table A.Non-relevant indicators should be left blank.

1. **Output and outcome indicators**

|  |  |  |
| --- | --- | --- |
| **Indicator**Please note indicators below highlighted as **anticipated**  | **Quantitative value** *Numerals only; disaggregates must sum to the total*  | **Qualitative description***List the various elements corresponding to the quantitative value as well as timelines and responsible institutions* |
| Total number of events organized by proponents and implementing partners | *List total number here* |  |
| Number of participants in events organized by proponents and implementing partners |  |  |
| Number of men | *List total number here* | *Disaggregate by country* |
| Number of women |  |  |
| Number of climate technology RD&D related events |  |  |
| Number of participants in climate technology RD&D events | *List total number here* |  |
| Number of men |  |  |
| Number of women  |  |  |
| Number of training organized by proponents and implementing partners | *List total number here* | *List the title of the training sessions and capacity strengthening activities* |
| Number of participants in trainings organized by proponents and implementing partners | *List total number here* |  |
| Number of men  |  |  |
| Number of women  |  |  |
| Total number of institutions trained | *List total number here* |  |
| Governmental (national or subnational) |  | *List the name of organisations trained here* |
| Private sector (bank, corporation, etc.) |  | *List the name of organisations trained here* |
| Nongovernmental (NGO, University, etc.)  |  | *List the name of organisations trained here* |
| Percentage of participants reporting satisfaction with CTCN training (from CTCN training feedback form) |  | *Satisfied= 4+ on 5-pt scale* |
| Percentage of participants reporting increased knowledge, capacity and/or understanding as a result of CTCN training (from CTCN training feedback form) |  | *Increased knowledge, capacity and/or understanding= 4+ on 5-pt scale* |
| 1. Percentage of men
 |  |  |
| 1. Percentage of women
 |  |  |
| Total number of deliverables produced during the assistance (excluding mission, progress and internal reports) | ***5*** |  |
| Number of communication materials, including news releases, newsletters, articles, presentations, social media postings, etc. |  | *List the name of the documents* |
| Number of tools and technical documents strengthened, revised or developed | **5** | ***Activity 1 : Report on key findings from interview based survey******Activity 2: Study of regulation standards and guidelines for street lighting in Thailand******Activity 3:Techno economic study if energy efficient street lighting project in 3 municipalities*** ***Activity 4:Development of financial model for implementation of energy efficient technologies*** ***Activity 5 Development of roadmap and recommendation*** |
| Number of other information materials strengthened, revised or created (For example training and workshop reports, Power Points, exercise docs etc.) |  | *List the name of the documents* |
| Total number of policies, strategies, plans, laws, agreements or regulations supported by the assistance | *List total number here* |  |
| 1. Adaptation related
 |  | *List the type and name of documents supported* |
| 1. Mitigation related
 |  | *List the type and name of documents supported* |
| 1. Both adaptation- and mitigation related
 |  | *List the type and name of documents supported* |
| **Anticipated** number of policies, strategies, plans, laws, agreements or regulations proposed, adopted or implemented as a result of the TA | *List total number here* |  |
| 1. Adaptation related
 |  | *List the type of documents anticipated to be proposed, adopted or implemented* |
| 1. Mitigation related
 |  | *List the type of documents anticipated to be proposed, adopted or implemented* |
| 1. Both adaptation- and mitigation related
 |  | *List the type of documents anticipated to be proposed, adopted or implemented* |
| **Anticipated** number of technologies transferred or deployed as a result of CTCN support  | ***1*** | ***Lighting***  |
| **Anticipated** number of collaborations facilitated or enabled as a result of technical assistance | *List total number here* |  |
| Number of South-South collaborations |  | *List the names of the organisations (excluding the CTCN or TA implementers)* |
| Number of RD&D collaborations  |  | *List the names of the organisations (excluding the CTCN or TA implementers)* |
| Number of private sector collaborations |  | *List the names of the organisations (excluding the CTCN or TA implementers)* |
| Number of countries with strengthened National System of Innovation as a result of CTCN support | **1** | *Thailand* |
| **Insert any additional indicators here** |  |  |

1. **Core impact indicators**

Please fill in the tables for anticipated impacts of the CTCN assistance. Every technical assistance should contribute to at least one of the indicators below. For guidance on how to report on core indicators see the ‘[M&E Guidance Document for TA Implementers’](https://www.ctc-n.org/resources/me-guidance-document-ta-implementers).

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| **Core indicator 1** | **Anticipated metric tons of CO2 equivalent (CO2e) emissions reduced or avoided as a result of CTCN TA** *Please add your calculations in word or excel format as an Annex to this Closure Report, where applicable.* |
|  | Anticipated metric tons of CO2e reduced or avoided as a result of the TA**on annual basis** | Anticipated metric tons of CO2e reduced or avoided as a result of the TA**in total** |
| Quantitative value*(emissions reductions)* | *1663.38* | *7485.21* |
| Unit | tCO2e | tCO2e |
| **GHG assessment boundary (project emissions)**Identify expected post-TA activities, associated effects and assess boundary for quantification of GHG emission reductions | Post TA activities that will have impact on the project boundary* Initiate discussion with the national government in creating an enabling environment for implementation of energy-efficient street lighting in Thai municipalities.
* A phase-step multi-year implementation plan for energy-efficient street and outdoor lighting should be developed with a listing of priority municipalities for each phase
* Energy efficiency street lighting projects to be implemented through the Deemed Saving model of ESCOs.
 |  |
| **Baseline emissions**Describe baseline scenario, baseline candidates, emission factors and emissions calculated | *About 2.1 GWh ( 1.4 million metric tons of CO2) of electricity were consumed by street lighting nationwide in 2014;At the municipal level, public lighting services account for about 60%- 70% of the total electricity consumed annually.* |  |
| **Methodology** Explain the method or process of verifying the indicator and how data was gathered | *As per the techno economic study Lampang, Nakornsawan, and Pathumthani Municipalitymunicipalities have AECI lower than 2.58kWh/m2 2.24kWh/m2 and 1.72kWh/m2 respectively.However, replacing fluorescent tube lamps and MV lamps with LED tubes and LED luminaires can reduce AECI to 1.6 kWh/m2. Thus a combined reduction of 33 % can be achieved as per techno-economic study.* |  |
| **Assumptions**Describe assumptions made during calculation and quantification of GHG reductions | *The scope of energy saving is calculated based on techno economic study done in the project for 3 municipalities of Lampang, Nakornsawan, andPathumthani* | PEA’s Pilot projects have shown mixed results of lamp life ranging from 30,000 hours to 10,000 hours considering annual usage of 4400 hours this range from 6.82 years to 2.27 yearsEmissions are calculated for the duration of average duration 4.5 years  |

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| **Core indicator 2** | **Anticipated increased economic, health, well-being, infrastructure and built environment, and ecosystems resilience to climate change impacts as a result of technical assistance***Please provide a* ***qualitative*** *description of the anticipated impacts on the categories below* |
| **Infrastructure and built environment**Anticipated increased infrastructure resilience (avoided/mitigated climate induced damages and strengthened physical assets) | **TA will lead to widespread improvement in the street lighting infrastructure in municipalities of Thailand, as per targeted survey conducted with the officers of twenty five municipalities for assessing the impact of better street lighting infrastructure on built environment, eleven out of twenty-five had opinion that improvement in street lighting reduced traffic accidents while nine said they did not had data. Similarly twelve out of twenty five had opinion that better street lighting infrastructure reduced crime, while nine said they did not had information.**  |
| **Ecosystems and biodiversity**Anticipated increased ecosystem resilience (areas with increased resistance to climate-induced disturbances and with improved recovery rates) |  |
| **Economic**Anticipated increased economic resilience (e.g. less reliance on vulnerable economic sectors or diversification of livelihood) | **TA will catalyse the investment in the energy efficiency technologies**  |
| **Health and wellbeing**Anticipated increased health and wellbeing of target group(e.g.improved basic health, water and food security) | **Increased safety in public areas**  |

|  |  |
| --- | --- |
| **Core indicator 3** | **Anticipated number of direct and indirect beneficiaries as a result of the TA** |
|  | **Quantitative value** | **Means of verification** |
| Total beneficiaries |  *Total population of 164000 shall benefit from TA* | *Introduction of ESCO model for large scale implementation of Energy Efficient technologies in street lighting in municipalities will benefit the entire population of the Lampang, Nakornsawan, and Pathumthani municipalities*  |
| Number of adaptation beneficiaries |  | *Describe calculation methods and assumptions made* |
| Number of mitigation beneficiaries |  | ***At institutional level Provincial Electrical Authority , and Lampang, Nakornsawan, and Pathumthani Municipalities of Thailand are the beneficiaries*** |
| Number of adaptation-and mitigation beneficiaries |  | *Describe calculation methods and assumptions made* |

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| **Core indicator 4** | **Anticipated amount of funding/investment leveraged (USD) as a result of TA (disaggregated by public, private, national, and international sources, as well as between anticipated/confirmed funding)** |
|  | **Quantitative value confirmed** *in USD* | **Quantitative value anticipated** *in USD* | **Qualitative description***List the institutions, timelines, and description or title of the investment*  | **Methods***Describe methods used for quantification of funds leveraged*  |
| Total funding  | *Total number in USD (numerals only, no rounding or abbreviations)* | *Investment identified- 879,924 Cost Savings- 3,003,035**Source- report on the Financing models**EESL, India has shown interest in implementation of the street lighting infrastructure improvement in the Lampang, Nakornsawan, and Pathumthani municipalities.* | **The TA has led to the identification of investment opportunities of worth** *879,924 . With a payback period of 2.1 Years, the investment can save up to 3 millions in 7 years warranted lifetime of the LED street lights*  | **As per the technical analysis, average cost of LED luminaires is about $0.03 per luminaire lumen output. Based on this information the quantification of funds is carried out in the techno economical analysis.** **the analysis used following approaches i.e delivering lower lighting power density while maintaining equivalent light output as compared with common conventional street and outdoor lighting technologies in PEA’s service areas** |
| Anticipated amount of public funding mobilised from national/domestic sources  |  |  |  |  |
| Anticipated amount of public funding mobilised from international/ regional sources  |  |  |  |  |
| Anticipated amount of private funding mobilised from national/domestic sources |  |  |  |  |
| Anticipated amount of private funds mobilised from international/regional sources  |  |  |  |  |

**Annex 2 (for internal use – to be filled in by the CTCN)**

**CTCN evaluation**

This section will be completed by the relevant CTCN Technology Manager.

* Evaluation of the timeliness of the TA implementation as measured against the timeline included in the response plan;
* Evaluation of TA quality as defined in the response plan;
* Overall performance of the Implementers;
* Overall engagement of the NDE and Proponent;
* Lessons learned on the CTCN process and steps taken by the CTCN to improve.