



Thailand

Low Carbon City (LCC) Programme in Thailand

Good practice summary

[Results/insights]

Through its Market Readiness Proposal (MRP) to the World Bank submitted in 2014, Thailand proposed to design a domestic market mechanism to reduce energy consumption and greenhouse gas (GHG) emissions by preparing the Low Carbon City Programme (LCC) and the Low Carbon City Programme Fund (LCC Fund). These will assist provinces and cities to design and implement GHG mitigation actions through undertaking projects that will apply the Thailand Voluntary Emission Reduction Programme (T-VER) for certifying and issuing carbon credits. The T-VER was initiated by the Thailand GHG Management Organisation (TGO) based in the Ministry of Natural Resources and Environment, and has been functional since 2013. The credits generated under the LCC programme are called LCC-TVER credits. The proposed LCC program is also being driven by TGO and is now in the phase of design development. Implementation and pilot projects are planned to start in late 2016.

Scope covered**Functions**

Measuring Reporting Verification Accounting

Administrative scope

National Regional City-level Policy/programme/project Corporate/Facility-level

Legal basis

[policies, regulations and commitments that the case study has to comply with]

The 11th National Economic and Development Plan (2012-2016)¹: redirects the country to a low-carbon and environmentally friendly economy and establish the Voluntary Domestic Carbon Market. The LCC is in correspondence with this plan². The plan is not legally binding but is a policy guideline proposed by all Thai governmental agencies.

No legal component was developed at the city or municipality level to support the development of the LCC programme.

Operational since

LCC design 2015-2017; LCC implementation (late 2016 onwards)

¹<http://portal.mrcmekong.org/assets/documents/Thai-Law/11th-National-Economic-and-Social-Development-Plan-2012-2016.pdf>

²http://climatetech.net/wordpress/wp-content/uploads/2015/05/10_Jassada-Sakulku_TGO_Thailand-Partnership-for-Market-Readiness.pdf



How is this related to accounting?

[The following is based solely on the consultant's opinion]

» What kind of measures, policies, or commitments are a) monitored and included in an accounting system, b) only monitored, but not included in an accounting system, or c) not even monitored?

The LCC programme will have data and information that could feed the national GHG inventory and the measurement of mitigation actions taking place in the country. However, at the moment, the LCC programme emissions reductions are not planned to feed into the national GHG inventory. It is the responsibility of the National GHG Inventory team to align with LCC programme. Currently the GHG inventory uses top-down data while the LCC programme uses a bottom-up approach and this might bring uncertainties to the inventory. If this alignment of data happens, the system may allow to be integrated into an accounting system, allowing to track Thailand's progress towards the commitments included in their Nationally Determined Contribution (NDC).³

The LCC program also plans to have an LCC registry which will be the same as the T-VER registry. It will be held within the TGO and will not be publically available. It will include the following information that only an administrator and account holder (project owner) could access:

- » Title of the project
- » Name of project owner
- » Crediting period
- » Serial unique number
- » Transaction history

This information could potentially be used to present mitigation actions and compare the progress towards the NDC commitments.

Case description

Background

» What was the need, pre-conditions, and/or experiences that motivated the country to develop this system?

Due to the increasing GHG emissions in the country, the Royal Thai Government is encouraging a paradigm shift within society and behaviour change among its citizens towards low carbon practices. Actions at both, national and local levels were highlighted to be required to achieve the reduction of GHG emissions in the country.⁴

The 11th National Economic and Development Plan (2012–2016) of Thailand called for the development of a GHG registry and a domestic carbon market, a carbon fund, and robust measurement, reporting, and verification (MRV) systems.⁵

Also, the National Master Plan on Climate Change (2015–2050)⁶ and Thailand's NDC identify carbon markets as an important potential mechanism to mitigate GHG emissions. Although, there are no legal instruments that directly support the development of carbon markets, various are currently under design and implementation.⁷ The T-VER which is already functional is an example and interplays with the LCC Program. Annex 1 describes the T-VER program.

The Ministry of Natural Resources and Environment's National Master Plan on Climate Change (2015–2050), aligned with the above, aimed to reorient economic development towards a low carbon society, and promote sustainable development, promoting the action from cities in Thailand.

³http://www4.unfccc.int/submissions/INDC/Published%20Documents/Thailand/1/Thailand_INDC.pdf

⁴http://cdkn.org/2013/03/feature-thailands-low-carbon-city-initiative/?loclang=en_gb

⁵<http://portal.mrcmekong.org/assets/documents/Thai-Law/11th-National-Economic-and-Social-Development-Plan-2012-2016.pdf>

⁶http://eeas.europa.eu/delegations/thailand/documents/thailande_eu_coop/environment_energy/onep_climate_policy_en.pdf

⁷https://icapcarbonaction.com/en/?option=com_etsmap&task=export&format=pdf&layout=list&systems%5B%5D=81

The LCC programme was developed to achieve GHG emissions reductions at a city level and to shift the behaviour among Thailand's citizens; and aims to support achieving the national goal to shift towards a low carbon society by implementing GHG mitigation actions in municipalities.

General description of the system

[Questions below should be answered only when applicable]

- » General definition/description of the system
- » What are the main types of action that mitigate GHG emissions?
- » What linkages to other systems/ system elements of environmental information (including adaptation to climate change or emissions trading schemes) do exist and why were they established? What linkages exist to other statistical/ monitoring systems?
- » Which platforms are used to transport information and are they specific to the purpose of usage MRV information?

A 'Low Carbon City' refers to a province or city that pursues a systematic process to achieve GHG emission reductions but does not need to have a GHG inventory to do so. The implementation of the LCC programme will be carried out together with the municipalities where local authorities will act as a driving entity in the development of mitigation actions by undertaking projects linked to: renewable energy, energy efficiency, community waste management, public transport, and promotion of green spaces projects. One of the most common projects is expected to be the generation of renewable energy from landfill gas (expected to be 8MW as of yet). The local government initiatives (i.e. feed-in-tariff, soft loan, investment subsidy, ESCO Fund) will support the design and implementation of mitigation actions⁸.

The following actions are expected to be undertaken to design a LCC project⁹:

- » Estimate the city GHG emissions
- » Identify the potential GHG emission reduction activities.
- » Develop GHG abatement plan in accordance with local municipality context.
- » Develop the local abatement guideline which included environmental and social management framework.
- » Develop Project Design Document (PDD) for pilot municipalities.
- » Develop a domestic MRV system and registry system for LCC programme.
- » Study on pricing mechanism for LCC - TVERs and incentive options for LCC-TVER buyers.
- » Study on fund structure, including administrative and legal arrangement.

The projects under the LCC programme will need to apply to the T-VER Programme to issue carbon credits. LCC-TVER credits can be used to offset GHG emissions in voluntary markets, and once the domestic emission-trading scheme in Thailand is established, the LCC-TVER credits will be eligible, for compliance purposes, in the scheme with a possibility to be linked with other countries ETS'. At the moment, TGO the major emitters including state enterprises and private sector will be the target group of ETS. They also plan to develop a regional carbon market with ASEAN countries.

The national level is not involved in the LCC programme. A relationship exists only between the LCC and the respective city and/or province where a staff member within the city government would be responsible to approach the LCC program if interested in developing an LCC project. At the moment, there has not been any institutional arrangements to have the local authorities work together, but they are planning to record all the information on projects in the LCC registry, already described above.

The LCC programme selected 24 pilot municipalities before expanding to the remaining cities in Thailand,¹⁰ however, the pilot projects have not begun yet. The first pilot project is meant to be begin in late 2016, which will be supported by the LCC Fund. Figure 1 highlights the relationship between the LCC programme and the LCC Fund. The LCC fund has not been

⁸https://www.thepmr.org/system/files/documents/Final%20MRP_Thailand_07022014.pdf

⁹http://climatetech.net/wordpress/wp-content/uploads/2015/05/10_Jassada-Sakulku_TGO_Thailand-Partnership-for-Market-Readiness.pdf

¹⁰http://conference.tgo.or.th/download/tgo_or_th/Article/2015/Concept%20Paper%20_PMR_English%20version.pdf

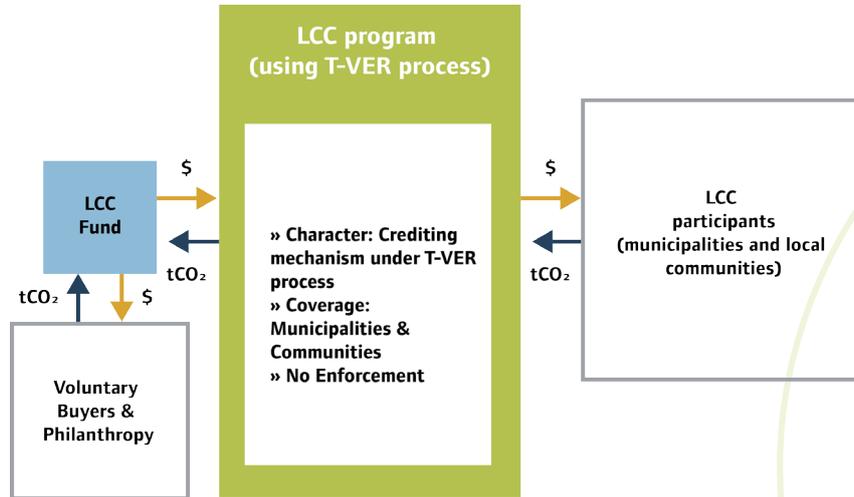


Figure 1 Conceptual framework of the LCC programme¹¹

Even though the LCC fund will fund the reductions, they still belong to the project proponents. The protocol for transfer of the emissions reductions will be developed following the Internationally Transferred Mitigation Outcomes (ITMO) under the Paris Agreement.

Figure 2 shows how the LCC programme fits into the larger domestic carbon market proposed under the PMR.

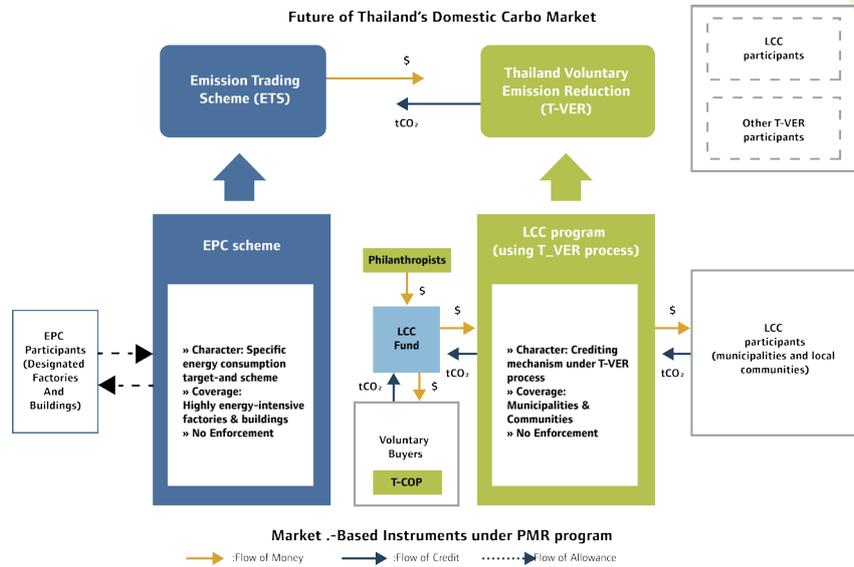


Figure 2 Conceptual Design of carbon market ¹²

¹¹https://www.thepmr.org/system/files/documents/Final%20MRP_Thailand_07022014.pdf

¹²http://climatetech.net/wordpress/wp-content/uploads/2015/05/10_Jassada-Sakulku_TGO_Thailand-Partnership-for-Market-Readiness.pdf

MRV and accounting systems, processes and procedures

[Questions below should be answered only when applicable]

- » How is information generated, communicated, integrated, and verified at each stage of the MRV chain?
- » What information needs to be gathered in order to quantify the effect of these actions?
- » How is such information gathered or estimated? By whom?
- » How is this information reported? How is it verified?
- » In what areas information is shared among accounting and MRV systems?
- » What kind of agreements are used to establish the relevant institutional roles?

Description of proposed MRV

Thailand has a centralised monarchic system, which mandated several governmental departments and agencies to develop the domestic MRV. In this case, the TGO is responsible for all MRV related activities that are part of the LCC programme¹³.

Measurement¹⁴

Existing monitoring methods and guidelines

The LCC programme will rely on the existing monitoring methodologies developed by the T-VER scheme to gather necessary data to estimate the GHG emission reductions achieved by Thai municipalities. The methodology that was used to develop the T-VER scheme was based on the CDM methodology, however was modified where appropriate for the Thai context and was made simpler in some cases. It is important to note that these methodologies are different from the National GHG

Inventory methodology as they use CDM methodology. Annex 2 shows the approved T-VER Methodology.

Reporting¹⁵

Monitoring report

Thai municipalities and/or cities under the LCC programme will be required to submit annual monitoring reports to track the GHG emission reductions. The goal of the monitoring reports will be to ease the monitoring process and to generate standard and comparable documentation. Consistent with the LCC programme development, a reporting cycle will be designed to ensure integrity, fairness and effectiveness of the mechanism. The reporting cycle will be tailored to fit the national context and to simplify the whole pipeline. It will be based on the T-VER scheme based on different existing practices in project-level carbon market mechanisms (CDM, ISO 14064-2 and 14064-3).

The TGO developed a standard excel reporting template for each methodology used. These need to be filled out by the project developers. An applicability and eligibility criteria will inform the project developers which methodologies they can use. It is expected that cities themselves pay for a consultant to fill out the template on their behalf.

One reporting template has been developed for the demonstration project which includes 4 tabs with the following information:

- 1) Baseline emission
- 2) project emission
- 3) Leakage emission
- 4) Emission reduction of the project

Verification¹⁶

The Monitoring report will be verified by an accredited Validation and Verification Body (VVB) under ISO 14065 and approved by the TGO. The juristic person must have the following qualifications:

¹³http://www.erc.uct.ac.za/sites/default/files/image_tool/images/119/Papers-2014/14-Boyd_etal-Comparative_analysis.pdf

¹⁴https://www.thepmr.org/system/files/documents/Final%20MRP_Thailand_07022014.pdf

¹⁵https://www.thepmr.org/system/files/documents/Final%20MRP_Thailand_07022014.pdf

¹⁶https://www.thepmr.org/system/files/documents/Final%20MRP_Thailand_07022014.pdf

- » Government agency/ Public institute/ Public organization
- » Juristic person registered under the Thai law – as a “Thai Juristic Person”
- » Juristic person registered under the Thai law – as a “Foreign Juristic Person”
- » Juristic person registered under the foreign law – as a Designated Operational Entities (DoE) under Clean Development Mechanism.
- » Juristic Agency that has acquired accreditation on ISO 14065

The person needs to be registered with TGO and also needs to have relevant experiences of at least 2 years, have expertise on specific type of T-VER project, pass the training courses as specified by TGO.

Design and set-up

[Questions below should be answered only when applicable]

- » How was the system designed?
- » What was the overall process to set-up the system?

When the LCC programme was being designed, it did not have to develop new baseline methodologies nor MRV systems, it used the existing design from T-VER programme as a basis for generating and certifying carbon credits¹⁸.

T-VER methodologies is developed by TGO technical staff and considered by Methodology Working Groups formed of a lecturer from a university, representative from the Federation of Industries, Pollution Control Department, Department of Industrial Works, Department of Alternative Energy Development and Efficiency work together to approve the specific methodology. The draft methodology is approved by Methodology Sub-committee.

Improvement over time

- » Is there an internal evaluation of the systems established aiming to enable improvement over time?

There is not a formal process in place to ensure improvement over time. However, methodologies that were developed under the T-VER which will be used for the LCC programme are reviewed and revised once a year by TGO technical staff to make them more accurate and specific to the Thai context.

Institutions involved

- » What institutional arrangements allow for the flow and integration of this information?
- » What types of entities take a role in the above structures?

Lead: The Thailand Greenhouse Gas Management Organisation (TGO) which is the implementing agency for GHG emission reduction in Thailand, and is an autonomous governmental organisation based in the Ministry of Natural Resources and Environment. It is responsible for the T-VER programme, the LCC programme, the MRV of the LCC programme and the LCC registry.

¹⁷http://conference.tgo.or.th/download/tgo_or_th/seminar/presentation/2014/Mar/2728/06_TVER.pdf

¹⁸https://www.thepmr.org/system/files/documents/Final%20MRP_Thailand_07022014.pdf

- » Relevant municipality/city
- » Validation and Verification Body
- » Methodology Working Groups and Methodology Sub-committee

Case learning

Why is it good practice

The LCC program is good practice because it does not start a domestic carbon market from scratch, rather, it builds on already established systems, methodologies and procedures. It facilitates the harmonization between the T-VER and the LCC programs and uses already available resources and knowledge such as the T-VER methodologies, T-VER registry and T-VER framework.

LCC programme also encourages cities and/or provinces to undertake domestic GHG emission reductions which they might not have done without it. The LCC programme hence provides incentives and a framework for new actors to join the overall Thai government's aim of developing low carbon practices. The LCC Program will allow provinces, cities, and municipalities to develop mitigation actions and translate the emission reductions achieved into "Certificates" under the TVER.

Specifically, this is a good MRV case because it relies on existing monitoring methods and guidelines. International standards are used (CDM, ISO 14064-2 and 14064-3) and standard excel reporting templates are provided to ensure comparability. The verification process is scrutinized by registered VVB who needs to have very specific skills.

Barriers that have been overcome

[barriers that have been overcome till date]

Institutional: When having the initial discussions for the most suitable platform for the LCC Programme, it was discussed whether a new system should be built or if an existing platform could be used to support the programme. It was identified that the T-VER registry could be used since functions were similar and roles and responsibilities were already set in place.

Barriers to overcome

[barriers that are still present and needed to overcome]

Institutional: Cities/and or provinces are a governmental agency and hence the money from the LCC programme needs to go through the Ministry of finance. This step slows down and complicates the process of money exchange between the LCC and the relevant local government.

Sociocultural: Getting political buy in from mayors to undertake these projects has been a barrier as they do not always see the co-benefits of engaging in mitigation activities.

Other possible challenges that have been identified¹⁹:

- » How to create demand for credits
- » How to minimize the costs of the T-VER scheme
- » How to ensure commonality with other country's schemes

¹⁹http://conference.tgo.or.th/download/tgo_or_th/seminar/presentation/2014/Mar/2728/06_TVER.pdf

Quantitative information

Funding obtained

Confidential

Funding required²⁰

To engage in activities for the LCC programme, Thailand's government requested a total of US\$ 1,650,000 to be covered by both the PMR fund and Thailand's National government.

Activity	Deliverable	Total Estimated Cost over 3 years 2014-2016 (in US\$)
Data	Development of the project design documents for the LCC programme.	400,000
MRV	1) Assessment study on present MRV system of other voluntary carbon standards (e.g. VCS, Gold Standard) and compliance standard (e.g. CDM). 2) Create suitable number of verifiers. 3) Development of a guidebook on T-VER. 4) Capacity building of validators and verifiers. 5) Propose a domestic MRV system is well received in global market	350,000
Registry	1) Development of system for LCC registry (using TVER registry). 2) Training officials and staff for LCC registry	300,000
Total budget requested funding by National Government		1,050,000

Table 1: Proposed budget

Thailand requested a further 600,000 US\$ from the PMR fund to engage further in the "data" area to conduct the following for the years 2014-2016:

- » A research report to identify potential GHG emission reduction from LCC programme.
- » Development of the Local GHG abatement plan guidelines.
- » Development of the Local GHG abatement plans.

Staff

[Number of staff involved in the design and implementation of the case study]

Confidential

Time

[Time required to get to this stage]

3 years

²⁰https://www.thepmr.org/system/files/documents/Final%20MRP_Thailand_07022014.pdf

Further information

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References

Climate & Development Knowledge Network (CDKN). (2013). Thailand's Low Carbon City Initiative. Retrieved from http://cdkn.org/2013/03/feature-thailands-low-carbon-city-initiative/?loclang=en_gb

Energy Research Centre – University of Cape Town. (2014). A comparative analysis of emerging institutional arrangements for domestic MRV in developing countries. Retrieved from http://www.erc.uct.ac.za/sites/default/files/image_tool/images/119/Papers-2014/14-Boyd_etal-Comparative_analysis.pdf

International Carbon Action Partnership (ICAP). (2016). ETS Detailed Information: Thailand. Retrieved from https://icapcarbonaction.com/en/?option=com_etsmap&task=export&format=pdf&layout=list&systems%5B%5D=81

Ministry of National Resources and Environment. (2012). Thailand Climate Policy: Perspectives beyond 2012. PowerPoint Presentation. Retrieved from http://eeas.europa.eu/delegations/thailand/documents/thailande_eu_coop/environment_energy/onep_climate_policy_en.pdf

National Economic and Social Development Board Office of the Prime Minister. The 11th National and Economic Social Development Plan (2012-2016). Retrieved from <http://portal.mrcmekong.org/assets/documents/Thai-Law/11th-National-Economic-and-Social-Development-Plan-2012-2016.pdf>

Office of Natural Resources and Environmental policy and Planning. (2015). Thailand's Nationally Intended Determined Contribution. Retrieved from http://www4.unfccc.int/submissions/INDC/Published%20Documents/Thailand/1/Thailand_INDC.pdf

PMR. Review and monitoring office, Thailand Greenhouse Gas Management Organization (Public Organization): TGO. Retrieved from http://conference.tgo.or.th/download/tgo_or_th/Article/2015/Concept%20Paper%20_PMR_English%20version.pdf

PMR. (2014). Thailand Final Market Readiness Proposal. PowerPoint Presentation. Retrieved from https://www.thepmr.org/system/files/documents/Final%20MRP%20presentation_Thailand_rev.3_TGO_0.pdf

TGO. (2014). Thailand's Market Readiness Proposal. Retrieved from https://www.thepmr.org/system/files/documents/Final%20MRP_Thailand_07022014.pdf

TGO. Thailand Voluntary Emission Reduction Program (T-VER). PowerPoint Presentation. Retrieved from http://conference.tgo.or.th/download/tgo_or_th/seminar/presentation/2014/Mar/2728/06_TVER.pdf

TGO & PMR. Thailand Partnership for Market Readiness: A way forward for market-based climate instruments in Thailand's context. PowerPoint presentation. Retrieved from http://climatetech.net/wordpress/wp-content/uploads/2015/05/10_Jassada-Sakulku_TGO_Thailand-Partnership-for-Market-Readiness.pdf

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Organiser

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Annex 1: Explanation of T-VER²¹

The T-VER voluntary domestic GHG emission reduction program (crediting program) was initiated by TGO in 2013. Trade of the carbon credits is allowed domestically and the credits obtained from the program are mainly used for CSR purposes and voluntary carbon offsets of companies in Thailand. The GHG reductions are: project based and baseline-and-credit. There is no limitation to the size of the project and gases covered are: CO₂, CH₄, and N₂O. Project developers must declare co-benefits rising from the project by presenting a co-benefit evaluation report.

The project types are:

1. Energy Efficiency
2. Alternative Energy
4. Transportation
5. Waste Management
6. Forestation and Green area
7. Agriculture
8. Other.

The scheme is also harmonized with International Standards:

- » Monitoring/calculation rules based on ISO 14064-2 and CDM Methodologies
- » Validation/verification guidelines based on ISO 14064-3
- » Validation and verification body based on ISO14065/DOE

²¹http://conference.tgo.or.th/download/tgo_or_th/seminar/presentation/2014/Mar/2728/06_TVER.pdf

It is the Subcommittee on GHG Reduction Project and activity that considers the issuance of TVER credits. In an attempt to prevent double counting in case that there are many projects in the same juristic area and projects are submitted separately, PP should identify in the application form, under item “double counting prevention”.

Annex 2: Approved T-VER Methodology

These are the approved T-VER methodologies which cities could eventually use depending on their context and the chosen project. However, in the case that there is no approved methodology applicable for the LCC projects, TGO can develop new methodologies to cover the project activities. The development process will take at least 3 months for the drafting, the consideration by the Methodology Working Group, to receive comments from the focus group and to be approved by the Methodology Sub-Committee.

Project type	T-VER-METH-	Title
Energy Efficiency	EE-01	Energy Efficiency Improvement for Lightings
	EE-02	High Energy Efficiency Lighting Installation in Buildings
	EE-03	Installation of Cogeneration System to Replace the Separated System
	EE-04	New Installation of Cogeneration System
	EE-05	Energy Efficiency for Thermal Generation
	EE-06	Energy Efficiency for Electricity Generation
	EE-07	Waste Heat Recovery and Utilization for Power Generation at Cement Plants
	EE-08	Replacement of Existing Chiller with High Efficiency Chiller
Alternative energy	AE-01	On-Grid Renewable Electricity Generation
	AE-02	Off-Grid Renewable Electricity Generation
	AE-03	Switching of Fossil Fuel or Increasing of Renewable Energy Utilization to Generate Thermal Energy
	AE-04	New Installation of Renewable Energy System to Generate Thermal Energy
	AE-05	Biodiesel Production for Use as Fuel of Vehicle or Agricultural Machinery
Waste management	WM-01	Methane Capture from Anaerobic Wastewater Treatment for Utilization or Flaring
	WM-02	Municipal Solid Waste Incineration
	WM-03	Organic Waste Composting
	WM-04	Refuse Derived Fuel: RDF Production from Municipal Solid Waste
	WM-06	Methane Capture from Anaerobic Digester for Utilization
	WM-07	Methane Recovery from Municipal Solid Waste Management for Utilization or Flaring
	WM-08	Methane Recovery in Swine Wastewater Treatment
	Agriculture	AGR-01
AGR-02		Carbon Sequestration and Reducing Emission in Orchards
Forest	FOR-01	Sustainable Forestation
	FOR-02	Reducing Emission from Deforestation and Forest Degradation and Enhancing Carbon Sequestration in Forest Area Project Level: P-REDD+
	FOR-03	Large Scale Sustainable Forestation Project



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Kurukulasuriya, P. The UNDP Low Emission Capacity Building (LECB) Programme: A global initiative to support mitigation action. Retrieved from: https://unfccc.int/files/cooperation_support/response_measures/application/pdf/lecb_programme_presentation_pk_undp_no_speaker_notes.pdf

National Communication Support Programme. (2012). Country papers: Preparation of National Communications from Non-Annex I Parties to the UNFCCC - A Compilation of Lessons Learned and Experiences from selected countries. Retrieved from: ncsp.undp.org/sites/default/files/Country%20papers%20Final%20Version_1.pdf

Parliament of the Republic of Ghana (1994). Environmental Protection Agency Act, 1994, Act 490. Retrieved from: <http://www.resourcegovernance.org/sites/default/files/Environmental%20Protection%20Agency%20Act.pdf>

UNFCCC. (2015). Ghana's First Biennial Update Report, Ghana Government submission to the United Nations Framework Convention Climate Change (UNFCCC). Retrieved from: <http://unfccc.int/resource/docs/natc/ghnbur1.pdf>

UNFCCC (2016, February). Summary report on the technical analysis of the first biennial update report of Ghana submitted on 21 July 2015. Retrieved from: <http://unfccc.int/resource/docs/2016/tasr/gha.pdf>

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