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GLOBAL ENVIRONMENT FACILITY  
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**Naoko Ishii**  
CEO and Chairperson

April 25, 2016

Dear Council Member:

UNDP as the Implementing Agency for the project entitled: ***Thailand: Achieving Low Carbon Growth in Cities through Sustainable Urban Systems Management in Thailand (LCC)***, has submitted the attached proposed project document for CEO endorsement prior to final approval of the project document in accordance with UNDP procedures.

The Secretariat has reviewed the project document. It is consistent with the proposal approved by Council in November 2013 and the proposed project remains consistent with the Instrument and GEF policies and procedures. The attached explanation prepared by UNDP satisfactorily details how Council's comments and those of the STAP have been addressed. I am, therefore, endorsing the project document.

We have today posted the proposed project document on the GEF website at [www.TheGEF.org](http://www.TheGEF.org). If you do not have access to the Web, you may request the local field office of UNDP or the World Bank to download the document for you. Alternatively, you may request a copy of the document from the Secretariat. If you make such a request, please confirm for us your current mailing address.

Sincerely,

Naoko Ishii  
Chief Executive Officer and Chairperson

Attachment: GEFSEC Project Review Document  
Copy to: Country Operational Focal Point, GEF Agencies, STAP, Trustee



# REQUEST FOR CEO ENDORSEMENT

**PROJECT TYPE: Full-sized Project**

**TYPE OF TRUST FUND: GEF Trust Fund**

For more information about GEF, visit [TheGEF.org](http://TheGEF.org)

## PART I: PROJECT INFORMATION

Project Title: Achieving Low Carbon Growth in Cities through Sustainable Urban Systems Management in Thailand (LCC)			
Country(ies):	Thailand	GEF Project ID: <sup>1</sup>	5086
GEF Agency(ies):	UNDP	GEF Agency Project ID:	4778
Other Executing Partner(s):	Thailand Greenhouse Gas Management Organisation (TGO), Public Organisation under Ministry of Natural Resources and Environment and cities Khon Kaen, Nakorn Ratchasima, Klaeng and Samui	Submission Date:	26 August 2015
		Resubmission Date	6 April 2016
GEF Focal Area (s):	Climate Change	Project Duration (Months)	48
Name of Parent Program (if applicable):	N/A	Project Agency Fee (\$):	299,250
➤ For SFM/REDD+ <input type="checkbox"/>			
➤ For SGP <input type="checkbox"/>			
➤ For PPP <input type="checkbox"/>			

### **A. FOCAL AREA STRATEGY FRAMEWORK**<sup>2</sup>

Focal Area Objectives	Expected FA Outcomes	Expected FA Outputs	Trust Fund	Grant Amount, \$	Co-financing, \$
CCM-3	Investment in renewable energy technologies increased	Renewable energy capacity installed	GEFTF	1,002,955	97,785,055
CCM-4	Sustainable transport and urban policy and regulatory frameworks adopted and implemented	Cities adopting in low-carbon programs	GEFTF	1,326,446	4,510,000
CCM-4	Increased investment in less-GHG intensive transport and urban systems	Investment mobilized	GEFTF	820,599	80,005,955
<b>Total project costs</b>				3,150,000	182,301,010

<sup>1</sup> Project ID number will be assigned by GEFSEC.

<sup>2</sup> Refer to the [Focal Area Results Framework and LDCF/SCCF Framework](#) when completing Table A.

## B. PROJECT FRAMEWORK

<b>Project Objective:</b> Promotion of sustainable urban systems management in Khon Kaen (KK), Nakorn Ratchasima (NR), Samui and Klang to achieve low carbon growth						
<b>Project Component</b>	<b>Grant Type</b>	<b>Expected Outcomes</b>	<b>Expected Outputs</b>	<b>Trust Fund</b>	<b>Grant Amount (\$)</b>	<b>Confirmed Co-financing (\$)</b>
1.1 Low carbon sustainable urban development planning in selected cities	TA	1.1 Increased number of Thai cities that have formulated and implemented low carbon sustainable urban development plans	1.1.1: GHG inventory for each of the project Cities  1.1.2: Formulated integrated low carbon urban development and action plan in each of the project cities  1.1.3: Formulated and implemented monitoring frameworks for waste management activities in cities	GEF TF	505,312	2,615,000
1.2 Low carbon investments in selected cities	TA	1.2 Increased number of Thai cities with energy efficient urban systems	1.2.1.a: Completed planning, design and engineering plans for the low carbon urban waste management and sustainable transport systems in Khon Kaen  1.2.2.a: Completed planning, design and engineering plans for the low carbon urban waste management and sustainable transport systems in Nakorn Ratchasima  1.2.3.a: Completed planning, design and engineering plans for the low carbon urban (waste management and sustainable transport) systems in Klaeng  1.2.4.a: Completed planning, design and engineering plans for the low carbon urban waste management and sustainable transport systems in Samui	GEF TF	360,323	5,914,300

	INV		<p>1.2.1.b<sup>3</sup>: Operational low carbon urban waste management and sustainable transport systems in Khon Kaen</p> <p>1.2.2.b: Operational low carbon urban waste management and sustainable transport systems in Nakorn Ratchasima</p> <p>1.2.3.b: Operational low carbon urban (waste management and sustainable transport) systems in Klaeng</p> <p>1.2.4.b: Operational low carbon urban waste management and sustainable transport systems in Samui</p>	GEF TF	1,463,231	171,876,710
2. Financial incentives and institutional arrangement in support of low carbon cities initiatives	TA	2.1 Increased volume of investments in energy efficient urban systems by government and private sector.	<p>2.1.1: Completed analysis on existing and forthcoming options on financial incentive schemes, both domestic and international including carbon offset initiatives, particularly the establishment of the Thai voluntary carbon market scheme</p> <p>2.1.2: Financial incentives and institutional arrangement to replicate low-carbon urban development</p> <p>2.1.3: A cadre of qualified technical specialists in the local governments of Thai cities capable of working with market mechanisms for mitigation efforts and accessing funds for climate change mitigation</p> <p>2.1.4: Developed and</p>	GEF TF	671,134	605,000

<sup>3</sup> The investments in low carbon urban systems involve: composting, recycling, waste-to-energy plant, traffic management pilot, shuttle bus services and bikeway in Khon Kaen; anaerobic digestion, recycling, waste-to-energy plant, traffic management pilot and bus reroute project in Nakorn Ratchasima; waste management facility (recycling), shuttle bus services, promotion of non-motorized transport (pedestrian areas and cycling) and energy efficiency measures in a water pumping station in Klaeng; comprehensive waste management facility (recycling), decentralized waste management (composting and recycling), traffic zoning and bikeway (Samui biking paradise 2016) in Samui.

		operational monitoring, reporting and verification system for public offset			
		2.1.5: Designed, developed and conducted training course on Low Carbon Cities			
		2.1.6: Expanded and improved Low Carbon Cities Network			
		2.1.7: Designed, developed and implemented awareness campaign on climate change and low carbon developments			
Subtotal				3,000,000	181,011,010
Project management Cost (PMC) <sup>4</sup>			GEF TF	150,000	1,290,000
<b>Total project costs</b>				3,150,000	182,301,010

**C. SOURCES OF CONFIRMED CO-FINANCING FOR THE PROJECT BY SOURCE AND BY NAME (\$)**

Please include letters confirming co-financing for the project with this form

Sources of Co-financing	Name of Co-financier (source)	Type of Co-financing	Co-financing Amount (\$)
GEF Agency	UNDP	Cash	30,000
GEF Agency	UNDP	In-kind	270,000
National Government	TGO	In-kind	400,000
Local Government	Samui	Cash	26,780,654
Local Government	Samui	In-kind	1,255,202
Local Government	Nakorn Ratchasima	Cash	102,162,752
Local Government	Nakorn Ratchasima	In-kind	1,521,410
Local Government	Khon Kaen	Cash	42,512,056
Local Government	Khon Kaen	In-kind	1,292,308
Local Government	Klaeng	Cash	5,266,816
Local Government	Klaeng	In-kind	809,812
<b>Total Co-financing</b>			182,301,010

**D. TRUST FUND RESOURCES REQUESTED BY AGENCY, FOCAL AREA AND COUNTRY<sup>1</sup> N/A**

**E. CONSULTANTS WORKING FOR TECHNICAL ASSISTANCE COMPONENTS:**

Component	Grant Amount (\$)	Co-financing (\$)	Project Total (\$)
International Consultants	0	0	0
National/Local Consultants	732,831	8,330,000	9,062,831

**F. DOES THE PROJECT INCLUDE A “NON-GRANT” INSTRUMENT? No**

<sup>4</sup> PMC should be charged proportionately to focal areas based on focal area project grant amount in Table D below.

## **PART II: PROJECT JUSTIFICATION**

### **A. DESCRIBE ANY CHANGES IN ALIGNMENT WITH THE PROJECT DESIGN OF THE ORIGINAL PIF<sup>5</sup>**

**A.1 National strategies and plans or reports and assessments under relevant conventions, if applicable, i.e. NAPAS, NAPs, NBSAPs, national communications, TNAs, NCSA, NIPs, PRSPs, NPFE, Biennial Update Reports, etc.: NA.**

**A.2. GEF focal area and/or fund(s) strategies, eligibility criteria and priorities: NA**

**A.3 The GEF Agency's comparative advantage:**

NA. There are no changes in UNDP's comparative advantage from when the PIF was approved.

**A.4. The baseline project and the problem that it seeks to address:**

There have been changes and additions to the project baseline presented in the PIF although these have not resulted in changes to the proposed project outcomes. The PIF was developed in 2012/2013, since then things have changed in the cities. The following changes in project context resulted in changes to the baseline projects in the cities as presented in the PIF:

- Waste management in Khon Kaen: besides the Waste-to-Energy plant identified in the PIF as baseline project, additional baseline projects on waste management were identified during the PPG. Khon Khaen requested to add the following baseline projects: 1) expand/revamp of the waste transfer station and composting plant, 2) programme to promote 3Rs, including recycling and composting at community scale.
- Sustainable transport in Khon Kaen: the PIF identified the BRT system phase 1 as baseline project. Implementation of the BRT system has been delayed, currently the detailed design is taking place. It is unclear whether the commissioning of the BRT system phase 1 will take place during the implementation schedule of the project. Therefore phase 1 of the BRT system is not included as baseline project. However, preparatory activities/projects of the city to prepare citizens for the BRT and other measures to address traffic problems in the meantime have been included as baseline projects such as: 1) city shuttle bus system on the road where the BRT will be realized, 2) traffic centre and traffic pilot, 3) bikeway project have been included as a baseline projects.
- Waste management in Nakorn Ratchasima: in the PIF the realization of an anaerobic digestion system was identified as baseline project. The digester has been installed already, but unfortunately it is not working optimally. The planned activities to 1) improve the operations of the digester; 2) Waste-to-Energy plant, and 3) the programme to promote 3Rs, including recycling at community scale have been included as baselines.
- Sustainable transport in Nakorn Ratchasima: the PIF identified the elevated BRT system as baseline project. Implementation of the elevated BRT system has been delayed; currently the detailed design is taking place. The design is being reconsidered, whether it should be an elevated BRT or not-elevated. It is unclear whether the commissioning of the system will take place during the implementation of the project. Therefore the elevated BRT system is not included as baseline project. However, activities/projects of the city to prepare citizens for the BRT and other measures to address traffic problems in the meantime have been included as baseline projects on request of Nakorn Ratchasima. Similarly, the buses rerouting project and traffic centre and traffic pilot have been included as baseline projects.

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<sup>5</sup> For questions A.1 –A.7 in Part II, if there are no changes since PIF and if not specifically requested in the review sheet at PIF stage, then no need to respond, please enter "NA" after the respective question.

- Sustainable transport in Samui: additional baseline projects on sustainable transport were identified during the PPG and included on request from Samui. Additional baseline projects include: 1) Biking paradise 2016 and bikeway project, 2) traffic zoning project to regulate traffic of heavy trucks on the island.
- Waste management in Klaeng: The baseline project as included in the PIF will form the baseline, however at larger scale. Following the instructions from the central government, Klaeng will need to expand its waste management facilities to process waste from adjacent municipalities. On request from Klaeng, the project to expand its waste management facilities is included as baseline project.
- Sustainable transport and energy efficiency in Klaeng: during the PPG, three additional baseline projects were identified and included on request from Klaeng, including: 1) city shuttle bus services, 2) improvement of pedestrian areas, 3) expansion of the capacity of the water pumping station in Klaeng.

These baseline activities at city level are described in detail in the Project Document, section 1.5.3, page 29 to 35.

At the national level, the following baseline projects are included: (1) TGO's programme on 'Market-based Mechanisms and Low Carbon Schemes (T-VER and LESS)'; (2) the 'Partnership for Market Readiness project (PMR)' implemented by TGO and supported by the World Bank; (3) the 'Low Emission Capacity Building Project (LECB)' implemented by TGO supported by the European Commission and UNDP; (4) TGO's programme to develop a 'Low Carbon Cities Training Course'; (5) Roadmap for Waste Management and National Waste Management Plan, and (6) Master Plan for Sustainable Transport System and Mitigation of Climate Change Impacts.

These baseline activities at national level are described in detail in the Project Document, section 1.5.1, page 26 to 28.

**A. 5. Incremental /Additional cost reasoning: describe the incremental (GEF Trust Fund/NPIF) or additional (LDCF/SCCF) activities requested for GEF/LDCF/SCCF/NPIF financing and the associated global environmental benefits (GEF Trust Fund) or associated adaptation benefits (LDCF/SCCF) to be delivered by the project:**

There are no changes to the Objective, Component and Outcome levels. Taking into account the changes to the baseline projects as described in section A.4 above, some changes to outputs were identified during the PPG stage of project development. These changes are reflected in the description of outputs and activities in section 2.5 in the Project Document from page 40 to page 62.

The changes from the PIF outputs are as follows:

PIF Output Affected	Changes in the Prodoc & Explanations
1.1.2 Formulated integrated low carbon urban development and action plan in each of the project cities. - waste management plan at the city level to maximize GHG emissions reduction (KK, NR, Samui, Klang) - sustainable transport plan at the city level to maximize GHG emissions reduction (KK, NR). - integration of waste management and sustainable transport (KK, NR).	Reworded to make the output description concise to ' <i>Formulated integrated low carbon urban development and action plan in each of the project cities</i> '. The PPG identified the need to build on existing planning practices in cities and to mainstream low carbon planning in existing practices, rather than to develop stand-alone low carbon plans.

1.1.3 Completed training on low carbon sustainable urban development planning, decision making, operations and management for local governments.	This output was moved to outcome 2 and rephrased as output 2.1.5 ' <i>Designed, developed and conducted training course on Low Carbon Cities</i> '. The training on low carbon sustainable urban development planning will be developed and provided by TGO CITC.
	A new Prodoc Output 1.1.3 ' <i>Formulated and implemented monitoring frameworks for waste management activities in cities</i> ' has been added as the PPG identified the need of cities for support on the formulation and implementation of monitoring frameworks for waste management activities, in particular for the large waste management facilities (waste-to-energy and comprehensive waste management facilities) to be constructed in KK, NR and Samui.
1.2.1 Investment in comprehensive waste management (KK, NR, Samui) and in sustainable transport (KK, NR) based on the outcomes and outputs of Component 1a.	<p>This output has been retained as ProDoc output 1.2.1, but output description has been reworded to '<i>Operational low carbon urban systems in ....</i>'. In addition, the output description was split into four for better clarity - with each output description focussing on one city. Output 1.2.1 concerns Khon Kaen, output 1.2.2 Nakorn Ratchasima, output 1.2.3 Klaeng and output 1.2.4 concerns Samui.</p> <p>The PPG identified the need to allocate some of the GEF budget under output 1.2.1 to 1.2.4 from Investment to TA rather than restricting only to investments.</p>
2.1.1 Completed analysis on existing and forthcoming options on financial incentive schemes, both domestic and international including carbon offset initiatives, particularly the establishment of the Thai voluntary carbon market scheme	This output has been retained as ProDoc output 2.1.1.
2.1.2 Financial incentives and institutional arrangement to replicate low-carbon urban development, based on the outcomes and outputs of Components 1a and 1b.	Substantively retained as output 2.1.2 with minor rewording to make the output description more concise with Prodoc Output statement as ' <i>Financial incentives and institutional arrangement to replicate low-carbon urban development</i> '.
2.1.3 Built capacity for market readiness in mitigation efforts, including formulation of NAMAs, at the local government level.	Substantively retained as output 2.1.3, but reworded to ' <i>A cadre of qualified technical specialists in the local governments of Thai cities capable of working with market mechanisms for mitigation efforts and accessing funds for climate change mitigation</i> ' to reflect the need, as identified during the PPG, to focus this output on capacities of local governments to access existing national financial sources rather than limiting to prospective financial resources from market mechanisms.
2.1.4 Monitoring, reporting and verification system for public offset developed.	This output has been retained as prodoc output 2.1.4, with a particular focus on the establishment and operationalization of a MRV institutional framework for each city. The output has been reworded for concise Prodoc Output description to ' <i>Developed and operational monitoring, reporting and verification system for public offset</i> '.
2.1.5 Enforced policies and environmental regulations addressing mitigation issues at the city level	<p>The PPG identified the need to integrate this output with the activities carried out under output 1.2.1 till 1.2.4 in the cities. It also reorganizes PIF output 1.1.3.</p> <p>Output 1.2.5 in the ProDoc refers to the development and conduct of training to local governments on planning, implementing and managing low carbon investments (Prodoc output 1.2.5 '<i>Designed, developed and conducted training course on Low Carbon Cities</i>'.)</p>
2.1.6 Low Carbon Cities Network established	This output reworded to output 2.1.6 ' <i>Expanded and improved Low Carbon Cities Network</i> ' to reflect the fact that a Low Carbon Cities Network has been established recently in 2014/2015 under the ' <i>Promotion of Low Carbon City across Municipalities in Celebration of His Majesty the King's 84th birthday</i> ' (PLCC project). The output



	will focus now on strengthening and expanding the network, rather than establishing it, as agreed upon with the stakeholders during the PPG.
	An additional Prodoc Output 2.1.7 ' <i>Designed, developed and implemented awareness campaign on climate change and low carbon developments</i> ' has been added as the PPG identified the need to include an additional output focussed on awareness raising of citizens, government staff and other stakeholders on climate change mitigation and low carbon urban systems..

Compared to the budget estimates in the PIF, the budget allocated from GEF resources to outcome 2.1 (USD 700,000) was slightly reduced to USD 671,134. More budget was allocated to outcome 1.1 (USD 505,312, which is an increase of USD 5,312 compared to the PIF) and outcome 1.2 (USD 1,823,554, which is an increase of USD 23,554 compared to the PIF). The PPG identified the need to allocate (slightly) more resources to outcome 1.1 and 1.2 and less to outcome 2.1. The co-financing amounts are higher than estimated in the PIF. The PIF estimated a co-financing amount of USD 91,850,000. During the PPG phase more baseline projects on low carbon urban systems were identified in the cities, as explained above in paragraph A.4. As a consequence the total co-financing is USD 182,301,010.

#### **A.6. Risks, including climate change, potential social and environmental risks that might prevent the project objectives from being achieved, and measures that address these risks:**

One additional risk was identified during the PPG and added to the risk log in annex I of the Project document (see page 90-91 in the project document). Continued political unrest and/or unstable economic growth could potentially influence achieving the outcomes of the project. On 20 May 2014, the military declared martial law nationwide in an attempt to stop the country's escalating political crisis. On 22 May, the military deposed the government and formed the NCPO to rule the country. Although most project activities will take place outside Bangkok and political unrest is most likely to take place in Bangkok, unstable economic growth and/or political unrest could affect project activities. The overall risk rating is unchanged and is low.

#### **A.7. Coordination with other relevant GEF financed initiatives**

There are no changes required to the coordination requirements identified in the PIF. However, note that the Project will coordinate closely with the ongoing UNDP/GEF project on Promoting Energy Efficiency in Commercial Buildings (PEECB). The PEECB is considered relevant as it is being implemented in the urban sector. The coordination between these two projects will focus on sharing of lessons learned, overall outcome and impacts associated with capacity building and MRV related activities in the urban buildings sector. Coordination with the PEECB project will take place via the Project Board, in which the Department of Alternative Energy Development and Efficiency (DEDE) under the Ministry of Energy (the implementing partner of PEECB project) will be represented and via the working groups of the LCC project. The PPG recognizes that there are several ongoing and planned GEF initiatives in the country, however, they are not directly related to low carbon development in the cities including energy efficiency, waste management and sustainable transport that are being primarily addressed through this Project.

### **B. ADDITIONAL INFORMATION NOT ADDRESSED AT PIF STAGE:**

#### **B.1. Describe how the stakeholders will be engaged in project implementation.**

The overall governing body for the project will be the Project Board (PB) which will be a multi-stakeholder body chaired by Thailand Greenhouse Gas Management Organisation (TGO – Public Organisation) in close partnership with the four participating cities. The PB will lead the project implementation, oversee the accomplishment of project objectives, outcomes and activities. The

PB will provide strategic oversight and ensure coordination and mobilisation of pledged resources. The arrangement recognises the comparative strengths and mandate of TGO, as TGO is responsible for the planning and setting of targets for greenhouse gas reduction in Thailand, as well as the crucial role the local authorities play in realizing low carbon investments in the cities. The Project will also involve other sectoral ministries, civil society, private sector notably technology suppliers, contractors, urban designers, builders, professional associations. Relevant and specific stakeholders engaged in the project implementation are identified and detailed in the Project Document in section 1.4, page 23 to 24 and Project Management arrangements in section IV Management arrangements page 79 to 83.

Close coordination with the four pilot cities will be ensured by the city coordination office, based in each city. TGO will also be working in close collaboration with the National Municipal League to build on Low Carbon Cities Network that the League has established in the past 3 years, with support from the European Commission. Replication of pilot experiences to other cities in Thailand will be carried out through this network and through the capacity building programmes of CITC under TGO.

To strengthen the link between cities, TGO and the NCCC, in particular with the aim to influence policies facilitating low carbon development in cities, a dedicated 'Policy Coordination Working Group' will be established to further strengthen the link between cities, TGO and the NCCC with the aim of facilitating policies supportive of low carbon development in cities. Members of the working group will include TGO, PCD under MoNRE, Department of Local Administration (DLA) under Ministry of Interior (MoI), Office of Transport Planning and Policy (OTP) under Ministry of Transport (MoT), Energy Policy & Planning Office (EPPO) under Ministry of Energy (MoE) and the National Economic and Sustainable Development Board (NESDB).

**B.2. Describe the socioeconomic benefits to be delivered by the Project at the national and local levels, including consideration of gender dimensions, and how these will support the achievement of global environment benefits (GEF Trust Fund/NPIF) or adaptation benefits (LDCF/SCCF):**

There are socio-economic benefits of the proposed shift to a low carbon city approach that will enhance urban systems and transform local economies to a more sustainable development pathway. For details see section 2.9 in the Project Document on page 70-71. In summary, these include:

- Improved air quality and reduced GHG emissions through improved effectiveness of urban systems, especially transport and waste. Reduction in emissions of other harmful substances including volatile organic compounds, fine particles (PM10/PM2.5) and odor.
- Increased liveability of cities through sustainable transport projects. The speed of traffic and quality of bus services in cities will be improved, resulting in improved passenger comfort, better fuel efficiency, and lower emissions. By the same token, the waste management projects will ameliorate local air quality and odor and reduce contamination of surface and groundwater.
- Reduced dependence on fossil fuels, thereby reducing sensitivity to global energy price fluctuations as Thailand meets 56% of its total energy demand from imported resources<sup>6</sup>.
- Green jobs and market diversification for instance in Samui where they plan to boost tourism through the low carbon approach and aim to become a 'green' island. By attaining a green status Samui aims to differentiate themselves and use the objective as a motivator to tackle the current issues on waste management and transport on the island. Via its green status Samui aims to also attract more tourists, creating more jobs on the island, some of which will

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<sup>6</sup> "Thailand's Renewable Energy Development-Plan", Presentation by Dr. Twarath Sutabutr, DEDE, Ministry of Energy, Thailand, 2 September 2013.

relate to 'green' transport and 'green' waste management. The four cities are also promoting recycling and composting at community scale. It is therefore expected that the project will lead to more green jobs. Recycling offers local communities the potential to generate income, while diverting materials away from landfills. Each of the waste management projects will improve the living conditions of poorer communities and the working conditions of waste management workers.

- Good governance: the project will enhance good governance at the municipal level through the strengthening of planning processes that address climate change and urban systems management issues with stronger participation of key stakeholders. Public consultations will be held for all investment projects.
- Gender benefits are expected primarily through an increased awareness of the need for, and participation of community and marginal groups in local level planning and implementation of projects. For example, careful consideration will be given to strengthen gender balance of the participants during trainings. Also in case green jobs are created, gender considerations will be seriously taken into account and prioritized.

### **B.3. Explain how cost-effectiveness is reflected in the project design:**

The Project has been designed to employ barriers removal approach for the adoption of low carbon development in cities in Thailand through interventions that will improve the overall capacity of stakeholders. This coupled with integrated implementation of the project activities are more cost effective than individual cities undertaking low carbon interventions on their own and in an adhoc manner.

The baseline projects as described in section 1.5 in the Project Document (page 26) will lead to reduced emissions, however this is likely to be a slower pace and with diffuse and uncoordinated rollout. In particular, the investment projects will either not maximise emission reductions or will not be implemented. Importantly, the GEF project will promote integration along several dimensions, such as horizontal cooperation between local authorities and private sector, vertical cooperation between different government levels and intersectoral cooperation to ensure effective engagement across technical areas. In this way cost-effectiveness of the intervention is increased, as compared to other alternative stand alone urban development projects which focus less on integration. In absence of the project's interventions, cooperation between different government agencies at local, regional and central level as well as between departments and with private sector at the local level will remain poor. Collection of data for planning, for accounting of GHG emissions, for making a cost-benefit analysis for the investments and for monitoring & evaluation will remain limited and top-down planning without community involvement will undermine support for the low carbon developments in the cities. Also the limited sharing of lessons-learned with other cities will hamper replication. GEF incremental activities in this project are built on the baseline activities, and they will provide vital support to cities in realizing low carbon developments.

The Project will also strengthen national and sub-national planning systems broadly and this is expected to present economic benefits. The Project will boost investor confidence and generate lessons and knowledge on the promotion and application of low carbon technologies and urban systems. In particular, cities where the main economic drivers are especially closely linked to low carbon development agenda, such as tourism (e.g. Samui Island) will further leverage the low carbon gains towards broader economic benefits. This will catalyse further low carbon technology investments and generate replication and indirect GHG emission reductions.

Also, the project will lay the groundwork for the establishing of bus rapid transport systems in Khon Kaen and Nakorn Ratchasima, which will be commissioned after closure of the Project. In this way the project will contribute to achieving additional emission reductions after the project.

### **C. DESCRIBE THE BUDGETED M & E PLAN:**

Project monitoring and evaluation will be in accordance with the standard approach of UNDP and GEF and is detailed in Monitoring Framework and Evaluation Section of the Project Document, see section V on page 83 to 87 of the Project Document. A summarizing table is included here.

<b>Type of M&amp;E activity</b>	<b>Responsible Parties</b>	<b>Budget US\$ <i>Excluding project team staff time</i></b>	<b>Time frame</b>
Inception Workshop and Report	<ul style="list-style-type: none"> <li>Project Manager</li> <li>UNDP CO, UNDP GEF</li> </ul>	Indicative cost: 10,000. Costs to be borne by IP (co-financing)	Within first three months of project start up
Measurement by Means of Verification of project results.	<ul style="list-style-type: none"> <li>UNDP GEF RTA/Project Manager will oversee the hiring of specific studies and institutions, and delegate responsibilities to relevant team members.</li> </ul>	To be finalized in Inception Phase and Workshop.	Start, mid and end of project (during evaluation cycle) and annually when required.
Measurement by Means of Verification for Project Progress on <i>output and implementation</i>	<ul style="list-style-type: none"> <li>Oversight by Project Manager</li> <li>Project team</li> </ul>	To be determined as part of the Annual Work Plan's preparation.	Annually prior to ARR/PIR and to the definition of annual work plans
ARR/PIR	<ul style="list-style-type: none"> <li>Project manager and team</li> <li>UNDP CO</li> <li>UNDP RTA</li> <li>UNDP GEF Directorate</li> </ul>	Part of Project Management Budget	Annually
PB meetings	<ul style="list-style-type: none"> <li>Project Manager</li> </ul>	Indicative cost: 10,000 (total for project period)	Following Inception Workshop and at least annually thereafter.
Periodic status/ progress reports	<ul style="list-style-type: none"> <li>Project manager and team</li> </ul>	Part of Project Management Budget	Quarterly
Mid-term Evaluation	<ul style="list-style-type: none"> <li>Project manager and team</li> <li>UNDP CO</li> <li>UNDP RCU</li> <li>External Consultants (i.e. evaluation team)</li> </ul>	Indicative cost: 42,500	At the mid-point of project implementation.
Final Evaluation	<ul style="list-style-type: none"> <li>Project manager and team</li> <li>UNDP CO</li> <li>UNDP RCU</li> <li>External Consultants (i.e. evaluation team)</li> </ul>	Indicative cost: 42,500	At least three months before the end of project implementation
Project Terminal Report	<ul style="list-style-type: none"> <li>Project manager and team</li> <li>UNDP CO</li> <li>External Consultant</li> </ul>	Part of Project Management Budget	At least three months before the end of the project
Lessons Learned Report	<ul style="list-style-type: none"> <li>Project manager and team</li> <li>UNDP CO</li> <li>External Consultant</li> </ul>	Part of Project Management Budget	Yearly
Audit Interim/ NEX Audit (as per OAI requirements)	<ul style="list-style-type: none"> <li>UNDP CO</li> <li>Project manager and team</li> <li>National Audit Department</li> <li>Private sector auditors (if necessary)</li> </ul>	Indicative cost 14,000 (total for project period)	Yearly
Visits to field sites	<ul style="list-style-type: none"> <li>UNDP CO</li> </ul>	For GEF supported	Yearly

Type of M&E activity	Responsible Parties	Budget US\$ <i>Excluding project team staff time</i>	Time frame
	<ul style="list-style-type: none"> <li>UNDP RCU (as appropriate)</li> <li>PB members</li> <li>Government representatives</li> </ul>	projects, paid from IA fees and operational budget	
<b>TOTAL indicative COST</b> Excluding project team staff time and UNDP staff and travel expenses		US\$ 109,000	

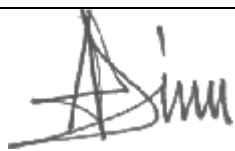
**PART III: APPROVAL/ENDORSEMENT BY GEF OPERATIONAL FOCAL POINT(S) AND GEF AGENCY(IES)**

**A. RECORD OF ENDORSEMENT OF GEF OPERATIONAL FOCAL POINT(S) ON BEHALF OF THE GOVERNMENT(S):**

NAME	POSITION	MINISTRY	DATE
Mr. Chote Trachu	Permanent Secretary	Ministry of Natural Resources and Environment (MONRE)	MAY 24, 2012

**B. GEF AGENCY(IES) CERTIFICATION**

This request has been prepared in accordance with GEF/LDCF/SCCF/NPIF policies and procedures and meets the GEF/LDCF/SCCF/NPIF criteria for CEO endorsement/approval of project.

Agency Coordinator, Agency Name	Signature	Date	Project Contact Person	Telephone	Email Address
Adriana Dinu UNDP-GEF Executive Coordinator		6 April 2016	Rakshya Thapa Regional Technical Advisor	+66 2 304 9100 Ext. 5038	Rakshya.thapa@undp.org

## **ANNEX A: PROJECT RESULTS FRAMEWORK.**

A complete project result framework can be found in PROJECT RESULT FRAMEWORK Section of the Project Document (Section III of the project Document, page 72-74).

**ANNEX B: RESPONSES TO PROJECT REVIEWS** (from GEF Secretariat and GEF Agencies, and Responses to Comments from Council at work program inclusion and the Convention Secretariat and STAP at PIF).

(i) GEF Secretariat – PIF review - 12 March 2013

S. N.	Comment	Response
13	The Project Framework (Table B) has been revised, showing the incremental cost reasoning. A clear link between expected GHG impact and what the GEF is funding should be described in detail at the CEO Endorsement stage, if the PIF is cleared.	The project framework has been slightly updated based on information gathered during the PPG phase. The description of activities planned under the alternative scenario which lead to GHG impact and what GEF is funding is included in section 2.5 of the project document (page 43). A detailed analysis of the GHG impact is included in the Annex II of the Project Document (page 92). Specific activities which lead to direct GHG emission reductions include the following demonstration projects: (a) composting in Khon Kaen and Samui, (b) anaerobic digestion in Nakorn Ratchasima, (c) recycling in Khon Kaen, Nakorn Ratchasima, Klaeng and Samui, (d) Waste-to-Energy in Khon Kaen and Nakorn Ratchasima, (e) Energy Efficient water pumping in Klaeng, (f) promotion of cycling (non-motorized transport) in Khon Kaen, Klaeng and Samui, (g) shuttle bus in Khon Kaen and Klaeng, (h) bus rerouting in Nakorn Ratchasima, (i) traffic management pilots in Khon Kaen and Nakorn Ratchasima and traffic zoning in Samui. GEF funding will be utilized for technical assistance and contribute towards the incremental costs of hardware/equipment for these demonstration projects.
14	Explanation on financial incentives and institutional arrangement has been provided. These mechanisms for replication of low-carbon urban development should be considered in detail by the CEO Endorsement stage if the PIF is cleared.	During the PPG an in-depth analysis of available and planned financial incentives and institutional arrangements for replication has been made. The most appropriate and relevant financial incentives that were identified and will be reinforced through GEF support include T-VER, NAMAs, LESS, Environmental Fund and CDM. More details have been elucidated in output 2.1.2 of the project document (page 60). The financial mechanisms will facilitate the implementation of feasible projects and enhance the financial sustainability of the operation and maintenance of the activities. Institutional arrangements targeted under the project predominantly include the Low Carbon Cities Network (a network supported by the municipal league of Thailand). Output 2.1.6 on page 64 of the Project Document contains more details on the Low Carbon Cities Network. The network will facilitate information sharing and cooperation between cities and stakeholders and with that their capacities to plan, access financing, implement and manage low carbon urban systems will be enhanced. In particular sharing of successful examples will have a replication effect, as many cities are faced with similar challenges but don't have examples to learn from. For example, a city which will successfully access financing from one or a combination of the financial mechanisms identified above for integrated urban systems will act as a catalyst and model for other cities, thus, encouraging

		additional investments and uptake of the financial incentives by more cities and private sector.
15	The estimation of GHG emission reduction brought by the GEF funding has been provided. This should be elaborated by the CEO Endorsement stage if the PIF is cleared.	A detailed GHG emission reduction analysis is included in the Annex II of the Project Document (page 92).
20	The coordination role of TGO has been added. It should be elaborated in detail by the CEO Endorsement stage how TGO will influence investments in the four cities, if the PIF is cleared.	TGO is responsible for the planning and setting of targets for greenhouse gas reduction in Thailand. By mandate, TGO's role is to facilitate cooperation and linkages on GHG emission reductions between government agencies and other stakeholders in Thailand. It also serves as one of the main institutional pillars of the National Committee on Climate Change chaired by the Prime Minister. Hence, TGO is in a strategic position to forge a close partnership with the four participating cities to lead the project implementation, oversee the accomplishment of project objectives, outcomes and activities, as formalized in the Project Board. TGO will encourage investments in each participating cities through close engagement with the city coordination offices in each city. For the detailed role of TGO in the project refer to section 1.4 stakeholder analysis (page 23) and Part IV Management arrangements (page 79) of the Project Document.
31	<p>Please address the following items by the CEO Endorsement stage:</p> <p>a) detailed approach to reflect the city plans (Component 1a) into investment (Component 1b);</p>	<p>a) The detailed approach to translate city plans into investment activities has been described in outputs 1.1.1 (page 44), 1.1.2 (page 45) and outputs 1.2.1 to 1.2.4 (page 47 to 56). For example, by preparing the GHG inventories for participating cities, output 1.1.1 allows concrete evidence for planning, priority setting and decision making. This information will be used for establishing baseline scenarios and forecast emissions, track performance of the cities during the implementation of the investment activities under Component 1.2. Additionally, it will inform the identification and prioritization of mitigation options for consideration in the low carbon urban development plan under output 1.1.2. Similarly, local development plans will guide the selection of the most feasible investment alternative based on their cost effectiveness, GHG abatement potential, etc. which will be translated into real actions under Component 1.2. For this to materialize, capacity development trainings will be organized for the public and private sector stakeholders on integrated urban planning; low carbon options identified in the local development plan will be costed; cities will formulate GHG reduction targets; sector specific plans will be formulated and review of assessments/feasibilities of the investments activities planned under component 1.2 will be conducted by technical experts to guide integrated urban planning and</p>



	<p>b) substance of financial incentives and institutional arrangement for replication;</p> <p>c) estimation of GHG emissions reduction and its link with GEF funding;</p> <p>d) Detailed project implementation/ execution arrangement, including the TGO's role to influence investment for low-carbon urban development.</p>	<p>investments. This way the city level plans will be realized into concrete investments. For details refer to the Project Document (pages 44-59).</p> <p>b) Please refer to the response above to GEFSec comment 14. As mentioned above, the financial incentives that will be reinforced by GEF support include T-VER, NAMAs, LESS, Environmental Fund and CDM (for details refer to output 2.1.2 on page 60). By way of augmenting institutional arrangements, the Project will expand and improve the Low Carbon Cities Network to facilitate information sharing and cooperation between cities and stakeholders (see output 2.1.6 on page 64).</p> <p>c) As mentioned above in response to GEFSec comments 13 and 15, detailed GHG calculations have been presented in Annex II of the Project Document (page 92). The cumulative direct GHG emission reductions anticipated from the Project is 177,708 tonnes CO<sub>2</sub>eq by End of Project which translates into 1,359,852 tonnes CO<sub>2</sub>eq over the lifetime of project investment, see annex II of the Project Document. Examples of investment projects leading to direct GHG reductions include: composting in KK, traffic zoning in Samui, traffic management pilot in NR and waste recycling in Klaeng. GEF funding support is needed for the technical and logistical assistance and for the costs for purchase of incremental hardware/equipment and systems for these demonstration projects.</p> <p>d) The overall governing body for the project will be the Project Board (PB) which will be a multi-stakeholder body chaired by Thailand Greenhouse Gas Management Organisation (TGO – Public Organisation) in close partnership with the four participating cities. Close coordination regarding the investments in the four pilot cities will be ensured by the city coordination offices, based in each city. For the detailed role of TGO in the project refer to section 1.4 stakeholder analysis (page 23) and Part IV Management arrangements (page 79) of the Project Document, and section B.1 in this document. See also the response to GEFSec comment 20, above.</p>
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(ii) Comments submitted by GEF Council Members on the work program approved by the Council in November 2013.

Country and Comments:	Responses:
<p>Comments by Germany:</p> <p>1. There is need for intense coordination with existing projects of German cooperation in Thailand targeting very similar areas in order to avoid duplication of efforts and maximise synergies. The PIF mentions the GIZ projects on Clean Air in Smaller Cities and the project on</p>	<p>Responses to comments from Germany:</p> <p>1. The project will ensure coordination of activities in Klaeng and Korat, in close coordination with the city officials of Klaeng and Korat and TGO as implementing partner, and with the “Energy Efficiency and Climate Change Mitigation in the Land Transport Sector in the</p>

<p>“Strategic Alignment and Implementation of the Climate Change Policy in Thailand”, which both have overlap of partners and outputs with the proposed GEF project (in Klang and Korat Province). In addition, coordination should be sought with: “Energy Efficiency and Climate Change Mitigation in the Land Transport Sector in the ASEAN Region” by GIZ on behalf of BMZ, based in Bangkok, “National strategies for supporting Local Climate Mitigation and Low Carbon Development in Africa and Southeast Asia” in preparation, on behalf of BMU, to be implemented by Adelphi, Cities Development Initiative Asia (CDIA), a joint project by Germany and ADB which has experience in financing low carbon city infrastructure across Southeast Asia including Thailand.</p> <p>2. As Thailand is a member of the World Bank’s Partnership for Market Readiness (PMR), and in this context will receive support for establishing the Thai voluntary carbon scheme, the carbon market aspects of the outlined project should be aligned with PMR activities.</p> <p>3. The ‘Clean Air Plan’ developed for Korat advises against an elevated BRT system as proposed in the PIF. This is because of the immense costs an elevated system has compared to a BRT System on street level. The cost-advantage calculation has to be clarified further and coordination with the GIZ Clean Air project is needed. A revision of the elevated BRT system into a normal system should be considered.</p> <p>4. While relevant stakeholders are listed, references to some important institutions are missing from the PIF. Clarification is sought about whether and how these institutions are included. In particular: Office of Transport Planning (OTP) as part of the Ministry</p>	<p>ASEAN Region”, the “National strategies for supporting Local Climate Mitigation and Low Carbon Development in Africa and Southeast Asia” (once it starts) and the “Cities Development Initiative Asia”. The Project Management Unit of the GEF Project will coordinate regularly with the mentioned projects, plan joint workshops (as appropriate) and share lessons learned. This will be facilitated by the fact that for instance the “Cities Development Initiative Asia” is implemented in cooperation with TGO and the “Energy Efficiency and Climate Change Mitigation in the Land Transport Sector in the ASEAN Region” in cooperation with for instance ONEP which is also under the ministry of Environment and Natural Resources.</p> <p>2. The Project is fully aligned with the PMR activities, the PMR is one of the baseline projects of the GEF Project, see section 1.5.1 of the project document. The PMR will work with 20 cities on GHG inventories, while the Project will work with 4 additional cities not only on GHG inventories, but also on integrated low carbon planning and implementation of low carbon investments. While the PMR project focuses on establishing the system to facilitate access for cities to the T-VER scheme and the demand for credits by buyers, the GEF project will complement this by focusing on the credit supply by cities and developing methodologies and standards suitable to the city-context.</p> <p>3. The BRT Project in NR which was originally identified in the PIF as one of the baseline activities has been delayed owing to which it has been omitted as the baseline project. Instead, a city shuttle bus project has been included as a baseline project. The city shuttle bus will make use of the normal road (not elevated). This could be the first step towards a non-elevated BRT system. The project includes a review of the feasibility and technical design of the BRT system, see the description of output 1.2.2 in the project document. The city of Nakorn Ratchasima is well aware of the disadvantages of an elevated BRT system. It considers adjusting the original plans.</p> <p>4. The listed stakeholders have been identified in the stakeholders of the project. For instance, the Office of Transport Planning as part of the Ministry of Transport will be part of the Project Board of the project. Central Land Transport</p>
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<p>of Transport, Central Land Transport Control Board, Bureau of Regional Transport and Traffic Systems Promotion, MoT's Rural Highway Department, TGO training center.</p> <p>5. Coherence with relevant strategies: in addition to the ones mentioned in the PIF, it is also key to align the suggested measures with: the Environmental Sustainable Transport (EST) Master Plan in 2012, National Transport and Traffic Master Plan (2011-2020); Thailand Transport Infrastructure Development Strategy (2013-2020) and Eleventh 'National Economic and Social Development Plan' (2012–2016); provincial Climate Change Action Plans.</p> <p>6. Social inclusion: Clarification is sought about how the song-thaew operators are included in the new transport system. Without including these operators the implementation of a BRT system is much more challenging.</p> <p>7. It is stated that the planned BRT in Korat will reduce approx. 10,000 tCO<sub>2</sub>/year. It is not clear which baseline scenario is taken. In particular against the background that vehicles are responsible for about 85% of the emissions in Korat and with total emissions of 284,346 tons in 2010, the reduction potential of this measure seems very limited. Abatement cost calculation should be further explained.</p>	<p>Control Board and Bureau of Regional Transport and Traffic System Promotion and MoT's Rural Highway Department will be important stakeholders during implementation of the activities in the cities. Coordination will take place via OTP. See paragraph 1.4 in the Project Document for an overview of stakeholders. Similarly, collaborations with the training center of TGO have been elaborated, for instance it will provide trainings on GHG inventory and it will develop a Low Carbon Cities training course, see the description of output 1.1.1 and output 2.1.5 in the project document.</p> <p>5. The project activities on transport in the cities are aligned with the strategies laid out in the mentioned Master Plans and development plans and other plans on transport recently developed by the central government and local governments. All the city plans are developed as per the strategies identified in these national plans. The relevant line ministries which prepared the national strategies were also involved in the preparation of the existing relevant city plans and will be involved in the preparation of new plans on e.g. transport in the four cities during the implementation of the GEF Project via their regional offices. For more details on these plans see section 1.1 Context and Global Significance on page 6 in the project document and page 13 to 15 on sustainable transport.</p> <p>6. Song-thaew operators will be important stakeholders in the transport activities in Nakorn Ratchasima and Khon Kaen. Representatives of the song-thaew operators were present at the stakeholder consultations during the PPG phase in the cities. Song-thaews can serve as feeder to the BRT system/shuttle bus system. For Khon Kaen they are willing to support the city shuttle bus system and drop/pick-up passengers at the bus stops. In Nakorn Ratchasima a bus reroute project is planned in close cooperation with the song-thaew operators.</p> <p>7. In the Project Document Annex II detailed GHG emission reductions are included. Emission reductions from the BRT system are not included in the calculations as it has been omitted as the baseline project. The demonstration activities on transport in Nakorn Ratchasima are the bus reroute project and the traffic control pilot. The GHG reduction estimates and detailed calculations are presented in the Annex II.</p>
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<p>8. The sustainable urban transport plans envisaged under this project should be comprehensive in the sense of taking into account Avoid, Shift and Improve measures and looking into both passenger and freight transport</p> <p>9. Enabling measures for the proposed BRT system should include: Improving access to BRT systems, Long-term integrated urban planning, Managing parking demand; Improvement of the pedestrian and cycling facilities.</p>	<p>8. The Avoid, Shift and Improve approach has been followed in the preparation of the city plans on transport and the design of the GEF project and both passenger and freight transport have been considered. E.g. the Project support non-motorized transport (cycleways) in KK, Samui and Klaeng to encourage people not to use (<i>avoid</i>) motorized transport, it support enhancing bus services in KK, NR and Klaeng to encourage people to <i>shift</i> from using private cars to public transport and in KK, NR and Samui traffic control projects are supported to <i>improve</i> traffic situation and reduce GHG emissions. In Samui the traffic zoning project is aimed mainly at managing vehicular traffic of large trucks/freight transport. For more details see section 1.1 Context and Global Significance and page 12 to 15 for transport strategies and paragraph 2.5 Project Goal, Objective, Outcomes and Outputs/Activities and specifically output 1.2.1 till 1.2.5.</p> <p>9. The project includes enabling activities for the BRT systems planned by the Cities, for instance the city shuttle bus project in Khon Kaen and the bus reroute project in Nakorn Ratchasima. Also a review of the feasibility and design of the BRT systems is included, which will include aspects like improving access to the BRT system, long-term integrated planning, managing parking demand and improvement of the pedestrian and cycling facilities, see the description of output 1.2.1 and output 1.2.2 of the project document.</p>
<p>Comments by United States:</p> <p>10. The proposal does not address how the waste management projects will be managed. The project management is as important as project development. There are many unsuccessful waste management projects as a result of failed management.</p>	<p>Responses to comments from United States:</p> <p>10. The management of the waste projects during implementation, indeed, is an important aspect. The waste management projects at city level will be managed by the Department of Public Health and the Department of Sanitary Engineering of each city. These departments will be responsible for the planning, implementation and management of the waste management projects. Also costs for maintenance and operation will be borne by these departments. GEF will support be provided to monitor the operations &amp; management of the waste projects as well as in the evaluation of the operational, economic and environmental performance of the waste demonstration units. The proponents of the demonstration projects will be closely assisted to formulate and adhere to the management plans to effectively oversee operation of the projects. On-the-job training will be provided by waste</p>

<p>11. To maximize the impact, the project should share its experiences with other municipalities or local governments.</p> <p>12. On p. 10 of the proposal document, with regard to the first activity listed under Component 1A, it is not clear if this relates to the GHG inventory as described in the previous paragraph. The inventory will be very useful information to the cities to develop their low carbon plans.</p> <p>13. There are specific opportunities for USAID to work with the Government of Thailand to help promote best practices achieved in these municipalities at the regional level. Therefore, USAID would like to be informed of project developments and would welcome occasional briefings on progress. We would be happy to provide further contact information as requested.</p>	<p>management experts to personnel of each city to improve sustainability of the waste management activities after the project end. A participatory approach will be applied to ensure active cooperation of residents and relevant local stakeholders.</p> <p>11. Experiences gained during and after project implementation will be shared with other cities via the Low Carbon Cities Network, as described in output 2.1.6 in the project document. Several knowledge products and information materials will be developed during the project, as described in output 2.1.7 of the project document. Via the Low Carbon Cities Network, TGO's &amp; PMR network this information will be shared with other cities.</p> <p>12. The development of GHG inventories in the cities, which will include trends and patterns in GHG emissions in the project cities, forms an integral part of the project. The project will support: the establishment and operationalization of carbon footprint institutional framework in each city, updating and enhancement of the carbon footprint guidelines applied in Thailand, conduct of orientation trainings on City Carbon Footprints at the regional/city level for local government authorities, conduct of the carbon footprint for each of the selected cities in specified sectors and preparation of the carbon footprint reports for the cities. More details are provided in the description of output 1.1.1 in the project document.</p> <p>13. During project formulation, USAID has been consulted via the Low Emission Asia Development (LEAD) program, which is implemented in cooperation with TGO. During implementation, the PMU of the Project will coordinate with USAID (through the LEAD and other relevant programmes) and share updates, lessons learned and explore prospects for joint events/workshops (as appropriate). One area of cooperation will be the development of a module on GHG inventory techniques which is currently being implemented by the LEAD and TGO CITC. The Project will work in synergy with USAID's intervention by developing modules which are particularly tailor-made for city level.</p>
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(iii) Scientific and Technical Advisory Panel (STAP) comments – October 15, 2013

Based on this PIF screening, STAP's advisory response to the GEF Secretariat and GEF Agency(ies): Consent.

Comment	Response
1. At many places in the PIF there is mention of sustainable urban systems management. But the focus is only on public transport and waste management, the rationale for focusing on only these two sectors is not clear.	<p>1. The choice in the PIF to focus on waste management and sustainable transport is in line with the priorities identified by the Thai government and owing to their contributions to the national GHG emissions. During the GEF National Portfolio Formulation Exercise, following an extensive consultative process, supporting cities in low carbon investments, in particular on waste management and sustainable transport, was considered as one of the priority projects for GEF-5.</p> <p>The sectoral choice was reviewed during the PPG and discussed with all stakeholders and cities. The stakeholders confirmed their earlier choice to focus on waste management and sustainable transport. At the request of the cities, in addition to public transport, activities to promote (a) non-motorized transport (e.g. cycleways) and (b) measures aimed at improving general traffic situation such as traffic control pilots, and traffic zoning have been included.</p> <p>The city of Klaeng requested to include a baseline project involving the expansion of its water pumping station. Hence, in addition to public transport and waste management, Energy Efficiency measures have been integrated in this project. See the description of output 1.2.3 in the Project Document.</p>

Comment	Response
<p>2. If the GHG inventory for the urban areas selected shows that the residential sector and the private transport contribute most GHG emissions, which is likely, then there is a need for rationale for selecting only public transport and waste management.</p>	<p>2. As indicated in the response on question 1, at request of the cities, additional sustainable transport interventions such promotion of non-motorized transport (cycleways) and measures aimed at improving general traffic situation/private transport form a part of the investment activities.</p> <p>Regarding the rationale for selection of waste management and sustainable transport as sectors to focus on, see also the response on question 1. Both transport and waste management are important sources of GHG emissions in the urban areas. E.g. it is estimated that in 2050 around 21% of BAU emissions in Thailand are related to transportation and around 10% to waste. BAU emissions in 2050 related to residential/commercial/institutional sector are estimated to be around 3%. The GEF project will thus focus on the sectors contributing relatively to the largest emissions in the urban areas.</p>
<p>3. Transport options involve large investments and involvement of a large number of stakeholders making it one of the most difficult mitigation options to implement. Thus there is a need for a rationale to focus on public transport and to select the best option (dedicated bus lanes, bus rapid transit, metro, light rail, etc.).</p>	<p>3. The selection of baseline projects on public transportation is on request of the cities and central government and aligned with the need for support in this area. Public transport is often not planned well in these cities; there are often gaps. It usually grows adhoc and cities usually don't develop integrated plans for public transport, although good public transport is an important area for many citizens of a city. Gaps include: public transport routes don't follow the most convenient routes, location of bus stops are not at convenient places, connection with other forms of transport is not considered well, etc. By including baseline projects on public transport in the project this gap can be addressed. The inclusion of public transport baseline projects is also in response to the decentralization policies of the central government, which aims to give cities the authority on public transport in their respective cities. To encourage replication in other cities, successful examples need to be shown. The baseline projects on public transport selected (bus rerouting and city shuttle bus services) will provide a good opportunity to showcase successful examples.</p> <p>Regarding the BRT systems in Khon Kaen and Nakorn Ratchasima, they are not likely to be implemented during the project period and are therefore no longer included as baseline projects. Baseline projects related to public transport include a bus reroute project in Nakorn Ratchasima, and projects to establish and improve city shuttle bus services in Khon Kaen and Klaeng. The bus reroute in Nakorn Ratchasima and the project to set up a city shuttle bus service in Khon Kaen are part of the preparations for realizing BRT systems in the cities. The above mentioned weaknesses will be addressed in these projects.</p> <p>Part of the project activities, as described in output 1.2.1 till 1.2.4 (see Project Document) will be a review of the feasibility studies and design of the proposed transport projects to validate the options chosen and/or identify more cost-effective other options. For instance, such a review will be carried out</p>

Comment	Response
	for the BRT system in Nakorn Ratchasima, where other options will be studied, for instance a non-elevated BRT system.
4. It is suggested to adopt an integrated urban systems approach and develop mitigation options covering all sectors along with their mitigation potential and investment costs. However the pilot implementation could still be focussed on public transport and waste management.	4. The suggested approach will indeed be followed under the Project. Under output 1.1.1 GHG inventory for each of the project cities (see page 41 of the Project Document) GHG inventories for the 4 cities will be prepared, including identification of climate change mitigation options in the relevant sectors and their costs. Under output 1.1.2 (see Project Document) local development plans will be prepared as well as sector specific plans in which low carbon considerations will be integrated for all sectors, based on the information gathered under output 1.1.1. Potential climate change mitigation options will be identified, assessed and evaluated based on, amongst others, GHG impact and investment costs (cost-benefit analysis).
5. Many of the activities proposed under component 1a and component 2 (such as GHG inventory, designing NAMAs, MRVs) may overlap with other GEF funded activities in Thailand related to BUR (Biennial Update Report) and National Communications Project. There is a need to avoid duplication and promote complementarity.	5. During the implementation of the project duplication will be avoided and complementarity with other projects will be promoted. The baseline and complementary projects on GHG inventory, NAMAs and MRV are listed in section 1.5 of the project document and section 1.5.4 complementary projects/programmes of the Project Document. Synergies between the projects have been identified. For instance the BUR/TNC and LECB project focusses on the national inventory and national procedures. The Project will make links with the national process and integrate the national procedures with the local procedures. To facilitate this process, working groups in each city on GHG inventory will be established in which representatives of the central level will be included. Complementarity is further facilitated as UNDP is also the Executing Agency of the TNC/BUR as well as the LECB project.
6. Among the risks, (a) the financial viability of large investments, particularly by the private sector in urban transport and waste management will be a challenge. What will be the financial incentives for the private sector to participate in the proposed public transport and waste management projects? (b) Further, co-ordination among different stakeholders and departments within a municipality will be a challenge, and across municipalities will be an even bigger challenge. There is a need to anticipate these problems and design strategies to mitigate them.	6. The mentioned risks have been recognized by the PPG team. (a) The risk related to financial viability of large investment has been recognized by the participating cities and taken into consideration in the project. Mitigation measures include a thorough review of the feasibility studies, design and implementation plans of the baseline investment projects, involvement of all relevant key stakeholders in the design and implementation of the investments to ensure buy-in and support for investments, accessing capital to enhance the financial sustainability and regular monitoring & evaluation of progress during implementation and operations of the urban systems. It should be noted that at this moment Thailand is in a special situation with the NCPO having taken control of the government since May 2014. To speed up realization of large infrastructure projects, the NCPO is considering using art. 44 of the interim constitution which gives them the power to implement certain projects directly, expediting the lead times of the investments. Capital for large investments, such as the WTE plant in Nakorn Ratchasima is envisaged from the central government directly.



Comment	Response
	<p>In addition, under output 2.1.2 (Project Document) a review of the existing financial incentives and funds for low carbon investments is envisaged as well as improvements of existing funds and schemes to provide incentives to private sector and cities to implement and replicate the low carbon investments.</p> <p>(b) The challenges in coordination for instance between different stakeholders have been anticipated (see for instance risk no. 1 in the Risk Log in Annex I of the Project Document. To mitigate this risk, TGO will play an important role in the coordination between the various stakeholders from the government, communities and private sector. TGO has already carried out this role through various initiatives in the past. Also the Project Board will play an important role in decision-making, guiding the project, and bringing all partners together. The risks in the coordination between the different departments in the municipalities will be minimized via the project city coordination offices, which are based in each city. In addition the project will promote integration along 3 dimensions:</p> <ul style="list-style-type: none"> <li>• Horizontal cooperation between local authorities, including private sector and communities. This is achieved by demonstrating low carbon planning within specific subsumed territorial boundaries of a region and facilitating cooperation between different municipalities in a region. The cooperation of local authorities on waste management within the cluster system is an example of it.</li> <li>• Vertical cooperation between government levels, to better enable support from the central government via its regional offices, to the local level, and participation of local level in the national agenda. This is achieved by improving coordination between local and central agencies during local planning, and strengthening vertical coordination structures, such as working groups for GHG inventories and MRV. In these working groups representatives of local governments, regional offices and central government agencies will work together.</li> <li>• Inter-sectorial cooperation, to ensure effective engagement across services and technology areas and efficient use of resources. Planning of the main energy end-use sectors such as waste management, transport and electricity use requires good inter-sectorial cooperation in order to increase resource efficiency. Also consideration of other key areas will be included, such as the climate resilience of the urban systems to prevent negative effects on the lifetime and operation of the urban systems due to adverse effects of climate change.</li> </ul>
<p>7. It is not clear how the four municipalities were selected as pilot cities or whether they represent typical examples in Thailand. They all seem to be leaders and already have projects planned. Having these four projects running in parallel could be useful for the GEF so that other municipalities can relate to at least one of them and</p>	<p>7. The project will work with 4 pilot cities: Khon Kaen, Nakorn Ratchasima, Klaeng and Samui. The choice to work with these four cities is in line with the priorities identified by the Thai government. During the GEF National Portfolio Formulation Exercise, following an extensive consultative process, it was also agreed that the project should include all 3 types of municipalities/cities in Thailand, i.e. large, medium and small municipalities/cities, as each type of city is faced with different kinds of challenges (see also section 2.4 Design</p>

Comment	Response
<p>this should help gain greater replication. Including the latest transport ideas in the schemes (such as ITS) should help gain wide interest in the project as it progresses.</p>	<p>Principles and Strategic Considerations of the Project Document). As such these 4 cities represent typical examples in Thailand.</p> <p>The 4 cities were also selected based on their commitment for taking low carbon actions and the presence of baseline projects, which is a requirement for GEF.</p> <p>Sharing of information between the 4 pilot cities as well as other cities in Thailand during the implementation of the projects will be facilitated via TGO's/PMR network and the Low Carbon Cities Network, see the description of output 2.1.6, Project Document.</p>
<p>8. For the cities to become suppliers of carbon credits as a form of revenue (which is to be encouraged) it will need close co-operation with the national government. There is a risk that revenue from trading carbon may not reach the city administration for local benefits.</p>	<p>8. The described risk has been recognized. Therefore TGO (national level) and the cities (local level) will work together to facilitate access to the T-VER scheme under this project. TGO is the national agency to supervise the T-VER scheme in Thailand. TGO considers income from the T-VER scheme as a potentially important source of income for cities for the maintenance and operations of low carbon urban systems and is committed to facilitate access for the cities to the scheme, with revenues to be kept by city administrations for local benefit. In most cases, the cities will be (one of) the project proponents and therefore can decide on the allocation of the carbon revenues. The project will also facilitate policy interventions to ensure sufficient clarity on the legal provisions for cities to be the recipients of revenue from carbon credits (refer to output 2.1.2, Project document).</p> <p>In section 1.5 baseline projects (see Project Document) the current activities of TGO and the Partnership for Market Readiness which will facilitate access and demand for credits are described. Under output 2.1.2 (see Project Document) the activities implemented under the alternative scenario related to removing barriers for access by cities to the T-VER scheme have been clarified further.</p>
<p>9. STAP encourages the project developers to consider the efforts of existing cities networks (ICLEI, Covenant of Mayors) when establishing a low carbon cities network.</p>	<p>9. The efforts of existing low carbon cities network such as ICLEI, Covenant of Mayors, C40 and the Green Climate Cities Network have been considered. The Low Carbon Cities Network (LCCN) has already established links with these networks. These links will be further strengthened during implementation of the project, see the description of output 2.1.6 in the project document.</p> <p>A clear example of transfer of information via the ICLEI network, is the use of the methods established under ICLEI for GHG inventory in cities by TGO and the cities in Thailand.</p>
<p>10. STAP recommends that future projects expand more on the renewable energy component to become more than waste-to-energy initiatives (e.g., building integrated solar PV; solar cooling; ground source heat pumps,</p>	<p>10. There is an inherent challenge in the design of this project. At the one hand a comprehensive and integrated approach is desirable to achieve maximum impact. At the same time the activities should not be too stretched out in too many sectors which would make the project difficult to manage and to provide sufficient support to each investment in each city. The</p>

Comment	Response
solar water heating).	<p>cities and stakeholder believe they have found the right balance by focusing on several pilot projects on waste management and sustainable transport in 4 pilot cities. In this way, synergies can be achieved and cities can learn from each other during implementation.</p> <p>Nonetheless, energy-integrated planning principles will be applied in the design of the demonstration projects. For example, for the biking facilities and bus stops realized in the cities, energy-efficient lighting (LED) will be integrated. Additionally, urban greening and landscaping has been integrated along with sustainable transport activities in cities such as NR and Samui. For more information on integration strategies of the project, refer to section 2.4 Design Principles and Strategic Considerations of the Project Document.</p>

**ANNEX C: STATUS OF IMPLEMENTATION OF PROJECT PREPARATION ACTIVITIES AND THE USE OF FUNDS<sup>7</sup>**

A. PROVIDE DETAILED FUNDING AMOUNT OF THE PPG ACTIVITIES FINANCING STATUS IN THE TABLE BELOW:

PPG Grant Approved at PIF: USD <b>100,000</b>			
<i>Project Preparation Activities Implemented</i>	<i>GEF/LDCF/SCCF/NPIF Amount (\$)</i>		
	<i>Budgeted Amount</i>	<i>Amount Spent To date</i>	<i>Amount Committed</i>
<b>A: Technical review</b> Baseline studies	35,000	35,000	0
<b>B: Project Design and project document preparation, including institutional arrangements, Monitoring and evaluation</b> PPD development, M&E plan and management arrangements	25,000	21,569	3,431
<b>C: Financial planning and co-financing investments</b> Budget and co-financing	35,000	20,000	15,000
<b>D: validation workshop</b> Validation workshops in four cities and at national level, validation of draft project document	5,000	4,000	1,000
<b>Total</b>	<b>100,000</b>	<b>80,569</b>	<b>19,431</b>

- Project preparation activities were organized across several components as outlined in the table above. Under component A of the project preparation activities, a technical review was carried out. The technical review included baseline studies (national and local baseline projects that were identified in the PIF were validated and new baseline projects identified), identification of specific sites for intervention, and identification of opportunities for GEF incremental support. Also the GEF Climate Change Mitigation tracking tool was prepared. All the studies involved consultations with the key stakeholders.
- The outputs of component A were used as technical input to component B for the formulation of the UNDP-GEF project document. Under component B of the project preparation activities a barrier analysis was conducted. Based on the baseline projects identified under component A and the identified barriers, a logical framework analysis was carried out with the project stakeholders to prepare a project logical framework (log frame). The analysis in essence verified and confirmed the project framework that was in the GEF-approved PIF. Based on the agreed project log frame, detailed project activities including demonstration projects were identified and designed in close cooperation with all relevant stakeholders both at the national and local levels. In addition, the management arrangements and sustainability plan were defined and a monitoring & evaluation plan developed.
- Component C of the project preparation activities involved the preparation of multi-year budgets, identification of co-financing and securing of co-financing letters.
- Under component D of the project preparation activities validation workshops were organized in the four participating cities and at national level to present, discuss and validate the final draft project document. During the validation workshops, specific attention was given to receiving inputs from CSOs and private sector.

<sup>7</sup> If at CEO Endorsement, the PPG activities have not been completed and there is a balance of unspent fund, Agencies can continue undertake the activities up to one year of project start. No later than one year from start of project implementation, Agencies should report this table to the GEF Secretariat on the completion of PPG activities and the amount spent for the activities.

**ANNEX D: CALENDAR OF EXPECTED REFLOWS** (if non-grant instrument is used)

Provide a calendar of expected reflows to the GEF/LDCF/SCCF/NPIF Trust Fund or to your Agency (and/or revolving fund that will be set up): N/A



**United Nations Development Programme**  
**Country: Thailand**  
**PROJECT DOCUMENT**

<b>Project Title:</b>	Achieving Low Carbon Growth in Cities through Sustainable Urban Systems Management in Thailand
<b>UNDAF Outcome(s):</b>	UNPAF Area 4: Climate Change
<b>UNDP Strategic Plan Environment and Sustainable Development</b>	<u>Primary Outcome:</u> Mainstreaming Environment and Energy <u>Secondary Outcome:</u> Catalysing Climate Finance
<b>Expected CP Outcome(s):</b> CP OUTCOME (2012-2016)	Thailand is better prepared to coherently address climate change and environmental security issues through the enhancement of national capacity and policy readiness. 1. Improved understanding and capacity, in particular at local level, on low carbon development; 2. Strengthened institutional system for the planning, management and operations of low carbon investments in cities; 3. Increased number of low carbon activities and investments in cities; 4. Knowledge exchange established to facilitate know-how flow among key stakeholders in low carbon development in cities
<b>Expected Outputs (s):</b> ( <i>Those that will result from the project</i> )	Thailand Greenhouse Gas Management Organisation (TGO), Public Organisation, Ministry of Natural Resources and Environment.
<b>Implementing Partner:</b>	Thailand Greenhouse Gas Management Organisation (TGO), Public Organisation, Ministry of Natural Resources and Environment and UNDP.
<b>Responsible Partners:</b>	

**Brief Description**

The 11th National Economic and Social Development Plan (2012-2016) aims to move Thailand towards a low carbon and climate resilient society as one of its 6 development pillars. Important steps have been taken, but progress at the local level on low carbon urban developments is slow. This project therefore aims to strengthen the capacities and processes at local level for bottom-up integrated low carbon development planning and the implementation & sustainable management of low carbon development projects. The 4-year project will focus on low carbon urban systems, in particular waste management and sustainable transport, in 4 cities: Khon Kaen, Nakorn Ratchasima, Samui and Klaeng, while experiences will be shared with other cities to learn from. The project objective is to "promote sustainable urban systems management in Khon Kaen, Nakorn Ratchasima, Samui and Klaeng to achieve low carbon growth." The objective will be achieved by removing barriers to adoption of low carbon development in cities in Thailand a) Low carbon sustainable urban development planning in 4 cities, which will enable them to formulate and implement low carbon sustainable urban development plans; b) Low carbon investments in 4 cities leading to more energy efficient urban systems, c) Financial incentives and institutional arrangements to increase volume of investments in energy efficient urban systems by government and private sector. It is estimated that the project direct GHG emissions reductions of 177,708 tons CO<sub>2</sub>e will be achieved by end of project. Over the lifetime of the technologies deployed with project support, cumulative direct emission reductions will be 1,359,852 tons CO<sub>2</sub>e.

Programme Period:	1 January 2016 – 31 December 2019
Atlas Award ID:	86188
Project ID:	93514
PIMS #	4778
Start date:	1 January 2016
End Date	31 December 2019
Management Arrangements	NIM
PAC Meeting Date	_____

Total resources re
Total allocated reso
• GEF:
Other (in-kind & in
• Federal
• UNDP

Agreed by (Government): \_\_\_\_\_  
Date/Month/Year

Agreed by (Executing Entity/Implementing Partner): \_\_\_\_\_  
Date/Month/Year

Agreed by (UNDP): \_\_\_\_\_  
Date/Month/Year

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## Acronyms

AEDP	Alternative Energy Development Plan
APR	Annual Project Review
ARR	Annual Review Report
AWP	Annual Work Plan
BoI	Board of Investment
BRT	Bus Rapid Transit
BUR	Biennial Update Report
CDM	Clean Development Mechanism
CH <sub>4</sub>	Methane
CO <sub>2</sub>	Carbon dioxide
COP	Conference of Parties
CP	Country Programme
CPD	Country Programme Document
CPEIR	Climate Public Expenditure and Institutional Review
DEDE	Department of Alternative Energy Development and Efficiency under the Ministry of Energy
DEQP	Department of Environmental Quality Promotion under MoNRE
DNA	Designated National Authorities
EE	Energy Efficiency
EEDP	Energy Efficiency Development Plan
EGAT	Electricity Generating Authority of Thailand
EPC	Energy Performance Certificate (Scheme)
EV	Electric Vehicles
FiT	Feed-in-Tariff
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Green House Gas
GIZ	German International Cooperation Agency
IPCC	Intergovernmental Panel on Climate Change
JGSEE	Joint Graduate School of Energy and Environment, King Mongkut's University of Technology Thonburi
J-VER	Japan Voluntary Emission Reduction Unit
KK	City of Khon Kaen
KI	City of Klaeng
LCC	Low Carbon City
LCMT	Low Carbon Model Town project as part of Asian-Pacific Economic Cooperation project
LCS	Low Carbon Society
LECB	Low Emission Capacity Building Project
LESS	Low Emission Supporting Scheme
LULUCF	Land Use, Land Use Change and Forestry
MDGs	Millennium Development Goals
MoE	Ministry of Energy
MOEJ	The Japan Ministry of Environment
MoNRE	Ministry of Natural Resources and Environment
MoPH	Ministry of Public Health
MoT	Ministry of Transport
MRV	Measurement Reporting and Verification
MSW	Municipal Solid Waste
NAMA	Nationally Appropriate Mitigation Action

NC	National Communication
NCCC	National Climate Change Committee
NCPO	National Council for Peace and Order
NESDB	National Economic and Social Development Board of Thailand
NFP	National Focal Point
NIM	National Implementing Modality
NMT	Non-Motorised Transport
NR	City of Nakorn Ratchasima (Korat)
ONEP	Office of Natural Resources and Environmental Policy and Planning under MoNRE
OTP	Office of Transport and Traffic Policy and Planning
PEA	Provincial Electricity Authority
PB	Project Board
PCD	Pollution Control Department under MoNRE
PD	Project Director
PM	Project Manager
PMR	World Bank's Partnership for Market Readiness project
PMU	Project Management Unit
PPR	Project Progress Report
RDF	Refuse-Derived Fuel
Q	Quarter
QA/QC	Quality Assurance/Quality Control
QPRs	Quarterly Progress Report
RGOT	Royal Government of Thailand
RE	Renewable Energy
S	City of Samui (island)
SBAA	Standard Basic Assistance Agreement
SME	Small and Medium Industries
SLCP	Short-lived climate pollutants
SNC	Second National Communication to UNFCCC
T-COP	Thailand Carbon Offsetting Program
TGO	Thailand Greenhouse Gas Management Organization (Public Organization)
THB	Thai Baht currency
TNA	Training Needs Assessment
TNC	Third National Communication
T-VER	Thailand Voluntary Emission Reduction Program
UNDP	United Nations Development Programme
UNPAF	United Nations Partnership Framework
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention for Climate Change
USD	US Dollar (\$)

### **Currency Equivalents**

Currency Unit = Thai Baht, THB  
1 USD = THB 32.5

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## I. SITUATION ANALYSIS

### *1.1 Context and Global Significance*

1. More than a third of Thailand's population of 69.5 million<sup>1</sup> lives in cities and with an urbanization rate of 1.8% per year that proportion will continue to rise. Over the past several decades, Thailand has experienced rapid economic growth, a trend that is expected to continue. Economic growth is projected to average around 3-4% per year in 2015-18<sup>2</sup>. Brisk economic expansion and urbanization have combined to create both benefits and challenges. The immediate and pressing challenges for the cities are in the areas of transport and waste management.
2. Regarding transport, e.g. since 2000 passenger car registrations have skyrocketed from 83,000 to more than 2 million per year in 2014<sup>3</sup>, contributing to traffic congestion and air pollution in many cities. Thailand also faces serious challenges in managing municipal solid waste (MSW). In 2009, the volume of waste generated was around 15 million tonnes. In 2013 this had increased to more than 26 million tonnes<sup>4</sup>.
3. As a consequence of economic growth, increase in population and urbanisation, GHG emissions have risen and are expected to grow. Thailand's Second National Communication<sup>5</sup> (SNC) indicates that in 2000 Thailand emitted 281 MtCO<sub>2</sub>e/yr, with effective reduction of 52 MtCO<sub>2</sub>e due to carbon sinks' absorption effects, resulting in a net balance of 229 MtCO<sub>2</sub>e/yr. Increasing at an annual rate of 3.9% the overall emissions reached around 331.4 MTCO<sub>2</sub>eq in 2009 (see Figure 1). GHG emissions from MSW makes up around 4% and transport around 19% of total national emissions. The growth from the waste sector has been the highest at 5.7% per annum. Total GHG emissions in the baseline scenario is estimated to grow to more than 1,300 MTCO<sub>2</sub>eq/year by 2050 (see Figure 2)<sup>6</sup>.

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<sup>1</sup> [www.worldpopulationstatistics.com](http://www.worldpopulationstatistics.com) accessed 04-10-2014.

<sup>2</sup> National Economic and Social Development Board of Thailand, <http://www.nesdb.go.th/>

<sup>3</sup> Department of Land Transport (DLT), Vehicle Registration Data, [http://apps.dlt.go.th/statistics\\_web/statistics.html](http://apps.dlt.go.th/statistics_web/statistics.html)

<sup>4</sup> Status quo of waste management in Thailand 2013, Pollution Control Department, Ministry of Natural Resources and Environment: <http://infofile.pcd.go.th/waste/wastesituation56.pdf?CFID=1462735&CFTOKEN=75355187>

<sup>5</sup> ONEP (2011) Thailand's Second National Communication under the United Nations Framework Convention on Climate Change. Bangkok. 102P.

<sup>6</sup> TGO & JGSEE (2012): Final Report on Projection of Greenhouse Gas Emission and Mitigation and Their Scenario Studies Using Economic Models.

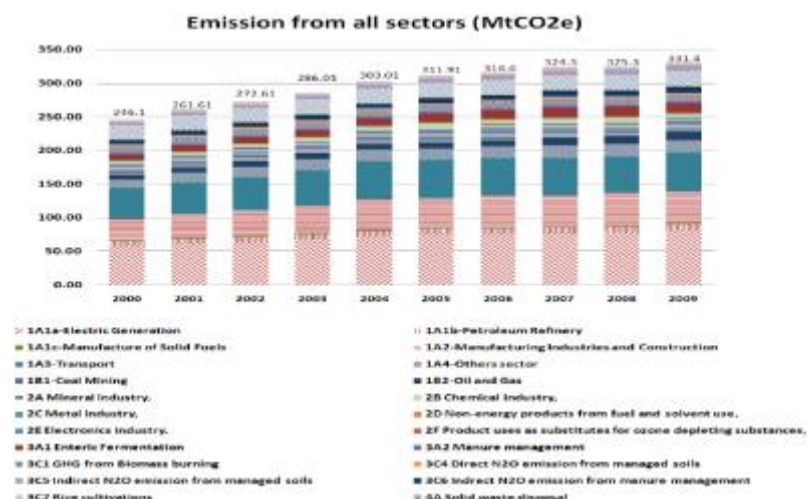


Figure 1: Thailand's GHG emissions from 2000 till 2009<sup>7</sup>

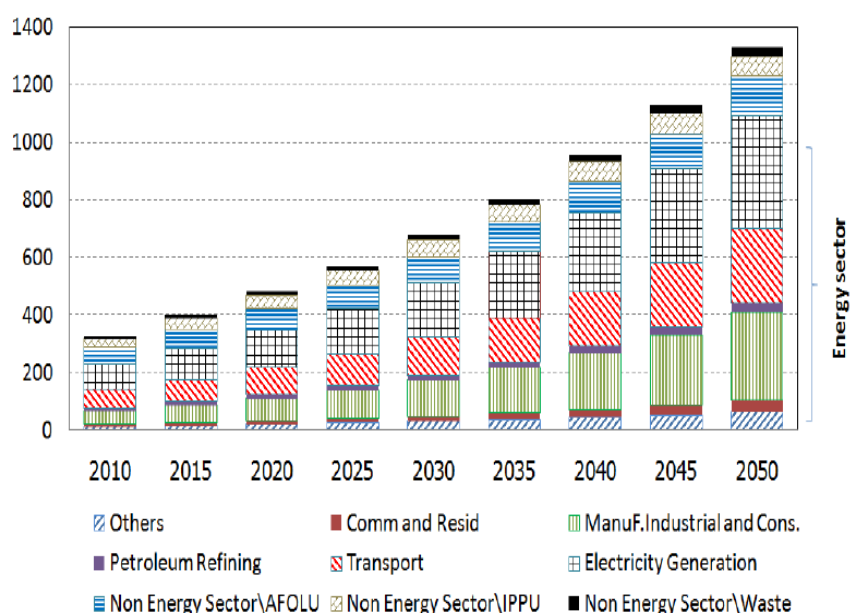


Figure 2: Future emission projection in the BAU scenario 2012-2050 (M tCO<sub>2</sub>eq)<sup>8</sup>

- To address the challenges posed by economic growth, urbanisation, the increasing GHG emissions, local pollution as well as climate related disasters, the Royal government of Thailand (RGoT) has put in place the institutional infrastructure and strategies to support the move towards a low carbon and climate resilient society. Key institutions include the establishment of the National Climate Change Committee (NCCC) in 2006 and Thailand Greenhouse Gas Management Organization (Public Organization, TGO) in 2007. Key policies and plans to promote Low Carbon Developments and Green Growth in Thailand include the "11th National Development Plan"<sup>9</sup> (2012-2016) of The National Economic and Social Development Board (NESDB)

<sup>7</sup> TGO & JGSEE (2012): Final Report on Projection of Greenhouse Gas Emission and Mitigation and Their Scenario Studies Using Economic Models.

<sup>8</sup> TGO & JGSEE (2012): Final Report on Projection of Greenhouse Gas Emission and Mitigation and Their Scenario Studies Using Economic Models

<sup>9</sup> Eleventh National Economic and Social Development Plan (2012-2016) for Thailand, The National Economic and Social

and the 'Thailand Climate Change Master Plan' (2012-2050)<sup>10</sup>.

5. The 11th National Economic and Social Development Plan (2012-2016) aims to move Thailand towards a low carbon and climate resilient society as one of its 6 development pillars. This marks the first time that climate change issues have become an explicit goal on the national development agenda, rather than an obligation to the United Nations Framework Convention on Climate Change (UNFCCC) handled solely by the Ministry of Natural Resources and Environment.
6. The Ministry of Natural Resources and Environment (MoNRE), as the national focal point of the United Nations Framework Convention on Climate Change and a focal point for programmes and projects related to climate change implementation in Thailand, formulated Thailand's Strategic Plan on Climate Change (2008-2012<sup>11</sup>). The Plan identified the goal to 'reduce greenhouse gas emissions and promote green technologies' across four sectors: energy, water, industry and agriculture with further guidelines to increase carbon sinks and to develop and promote mechanisms that support clean technology development. In 2011 MoNRE finalized the National Master Plan for Climate Change (2012-2050). The plan's strategy #2 aims to reduce GHG emissions and increase carbon sinks based on sustainable development through 1) promoting a low-carbon mode of urban management; 2) promoting low-carbon solid waste management; and 3) promoting low-carbon services.
7. TGO is responsible for the planning and setting of targets for greenhouse gas reduction in Thailand. The organization was established to "promote greenhouse gases reduction activities at both project and policy level for environmentally sustainable development, economy and society".
8. In January 2013, the Prime Minister of Thailand announced four national strategies to move Thailand forward<sup>12</sup>. Among these are 1) the "Green Growth" strategy which is explained as growth on the quality-of-life on environmentally-friendly basis and 2) "Inclusive Growth" strategy which seeks to reduce social disparity between low-income and high-income earners in the country and provide greater opportunities for the people, based on economic, social, and political equality. Greening cities and promoting low carbon investments fits well within these two strategies. The national strategies are used as a guideline for public budget allocation including to the local levels since fiscal year 2014 (starting October 2013) onwards.
9. Following the National Master Plan for Climate Change (2012-2050)<sup>13</sup>, each line ministry is responsible for developing plans and strategies for climate change mitigation actions in line with their mandate. For example, the Ministry of Energy has developed a plan for renewable energy generation. The Alternative Energy Development Plan (AEDP<sup>14</sup>)

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Development Board (NESDB) (2012)

<sup>10</sup> National Master Plan on Climate Change (2011–2050) – Thailand, Office of Natural Resources and Environmental Policy and Planning - Ministry of Natural Resources and Environment, Thailand (2013)

<sup>11</sup> Thailand's Strategic Plan on Climate Change (2008-2012), Thailand, Office of Natural Resources and Environmental Policy and Planning - Ministry of Natural Resources and Environment, Thailand (2008)

<sup>12</sup> Statement by Prime Minister Yingluck Shinawatra, 22 January 2013 (<http://www.thaigov.go.th/asem/item/75924-keynote-address-by-her-excellency-prime-minister-yingluck-shinawatra-at-fcct-2013-annual-correspondents-dinner.html>)

<sup>13</sup> National Master Plan on Climate Change (2011–2050) – Thailand, Office of Natural Resources and Environmental Policy and Planning - Ministry of Natural Resources and Environment, Thailand (2013)

<sup>14</sup> Alternative Energy Development Plan (2012-2021), Department of Alternative Energy Development and Efficiency (DEDE) – Ministry of Energy Thailand (2012)

approved in 2013 sets targets for generation of electricity from different renewable sources and aims to achieve 25% of electricity generation from renewable sources by 2021. The Ministry of Transport has prepared a transport strategy which includes sustainable transport. This 8-year plan is called “the Transport Infrastructure Development Strategy’ (2015-2023<sup>15</sup>). Similarly, to achieve prior strategies and plans, recently each line ministry is developing and proposing Nationally Appropriate Mitigation Actions (NAMAs) in line with their mandate. The line ministries submit their proposed NAMAs to the Office of Natural Resources and Environmental Policy and Planning (ONEP) which consolidates the final NAMAs of Thailand for submission to UNFCCC.

10. Thailand officially announced their GHG emission reduction targets at COP 20<sup>16</sup> (9 December 2014 and as approved by the Cabinet on 25 November 2014): *“Thailand will, on a voluntary basis, reduce its GHG emissions in the range of 7%-20% below the business as usual (BAU) in 2020, with subject to the level of international supports provided in the form of technology, finance, and capacity building for NAMAs preparation and implementation. The above-mentioned NAMAs will include counter-measures, as following: 1) Renewable energy, 2) Energy efficiency improvement in industries, buildings and transportation; 3) Bio-fuels in transportation, 4) Environmentally sustainable transport systems.”*
11. The Government of Thailand realizes that cities are a natural partner on the low carbon growth path. As a large share of the population currently lives in cities and in the future this will be even more, achieving GHG emission targets is only possible with the cooperation of the people in the cities.
12. Presently, various cities in Thailand are starting to embrace sustainable development concepts such as green cities, eco-cities, carbon neutral cities and low carbon cities. However, some long-standing problems/barriers have seriously restricted or limited the achievement of urban sustainable development objectives. Challenges include for example:
  - Lack of successful examples of sustainably managed low carbon investments and low emission technologies at the local level;
  - Lack of interest and awareness of the general public in cities to support low emission sustainable development;
  - Lack of data to plan, design and evaluate low carbon investments and activities;
  - Lack of skills to plan, design, implement and manage low carbon development actions.
13. In the context of Thailand, sustainable urban systems management is understood to encompass energy efficiency & renewable energy applications in waste management, public transportation and urban green space. Cities are not only key greenhouse gas emitters and energy consumers, but can also be energy producers and suppliers. They have potential to become motivators and actors for providing sustainable public transportation services and non-motorized transport facilities; managing urban waste sustainably; adopting energy efficiency; using renewable energy and increasing green areas.

<sup>15</sup> Transport Infrastructure Development Strategy (2015-2023) – Ministry of Transport Thailand (2014)

<sup>16</sup> [http://unfccc.int/files/meetings/cop\\_15/copenhagen\\_accord/application/pdf/thailandcphaccord\\_app2.pdf](http://unfccc.int/files/meetings/cop_15/copenhagen_accord/application/pdf/thailandcphaccord_app2.pdf)



14. There are three types of municipalities/cities in Thailand, categorized mainly by the size of their population:
- Large municipality/city (Thesaban Nakhon) with population of at least 50,000;
  - Medium municipality/city (Thesaban Muang) with population of at least 10,000;
  - Small municipality (Thesaban Tambon) with population of at least 5,000.
15. With a total of 2,283 cities/municipalities nationwide, the potential contribution of cities in addressing climate change and reducing Thailand's carbon emissions is immense. Through the effectiveness of urban systems management within their geographic constituencies, cities/municipalities can become more active players in reducing GHG emissions by integrating low carbon and sustainability into all aspects of the urban development planning process.
16. Considering the readiness and motivation to participate, the project will work with four pilot cities, including two large cities: Khon Kaen (also referred to as: KK) and Nakhon Ratchasima/Korat (also referred to as: NR), one medium size municipality/city: Samui (also referred to as S. Samui is an Island), and one small municipality called Klaeng (also referred to as KI). All of these cities are at a critical juncture to choose their development pathway towards a low carbon and climate resilient development. The criteria applied for selection of the cities are described in chapter 2.4. All four cities indicated waste management and sustainable transport as their most pressing and immediate priority for reducing GHG emissions and working towards more liveable cities and a low carbon society. These priority areas for each pilot city have been identified in national policy frameworks such as the 'Roadmap for Waste Management' and 'Master Plan for Sustainable Transport System and Mitigation of Climate Change Impacts'. Described in detail in the subsequent sections below, these policy frameworks have prioritized actions that cities need to systematically design and implement.

## **Waste management**

### General

17. The situation regarding waste management in Thailand is challenging. Waste generation is increasing every year, local authorities have limited capacities and financial means to provide proper waste management services and existing landfills and dumps are full and/or cause significant environmental problems, including toxic fumes from fires and water pollution.
18. Waste generation has continuously increased as a consequence of economic development and population growth. In 2013, waste generation in Thailand was 26.77<sup>17</sup> million tonnes per year. In total, 19% of generated waste is recycled, 27% disposed properly and 54% of generated waste is not properly managed (e.g. uncollected, open dumping, control dump, open burning and incineration without environmental countermeasures)<sup>18</sup>. The waste generation rate of 1.15 kg/capita/day in Thailand is higher than in Japan (0.975 kg/capita/day)<sup>19</sup>, but similar to China (1.2 kg/capita/day)<sup>20</sup>.

<sup>17</sup> Thailand State of Pollution Report 2013, published by the Department of Pollution Control.

<sup>18</sup> PCD, 2014, Status Quo of Waste Management in Thailand 2013. 566P.

<sup>19</sup> MOEJ, 2014, Status quo of waste management in Japan in 2012, 25P

<sup>20</sup> WMW, 2012, China set to produce twice as much waste as US by 2030 <http://www.waste-management-world.com/articles/2012/06/china-set-to-produce-twice-as-much-waste-as-us-by-2030.html>

19. Only 4,179 from 7,782 local authorities (approximately 54%) has waste collection services<sup>21</sup>. Their main constraint is limited budget and personnel capacity. There are around 466 proper waste treatment facilities (including engineer landfill, sanitary landfill, etc.) and 2,024 improper disposal sites (including those owned by the public and private companies) in Thailand.
20. GHG emissions from MSW shares 4% of the national inventory<sup>22</sup> which is rapidly increasing at 5.7% p.a. due to i) rapid increase of waste generation due to changing of lifestyle and economic growth, ii) improve waste collection coverage, and iii) upgrading of open dumping to deep sanitary landfill without gas recovery. The amount of GHG emissions increased from 0.4 MtCO<sub>2</sub>eq/year in 1994<sup>23</sup> to 9.3 MtCO<sub>2</sub>eq/year in 2004 and to 13.5 MtCO<sub>2</sub>eq/year in 2008<sup>24</sup>.
21. Major GHG from the waste sector is methane which shares 14% of total methane emissions<sup>25</sup>. Methane can be used for energy generation. Therefore the government of Thailand is prioritizing waste to energy projects. By using methane for energy generation direct emissions of methane are prevented, but also GHG emissions in the energy sector are reduced.

### Policies

22. The central government is promoting local authorities to improve waste management service towards a comprehensive waste management approach including waste reduction, separation and utilization as well as separated collection of household hazardous waste, and increase waste collection efficiency. Also, the central government has tried to introduce a cluster system (joint waste management facilities for local authorities) to upgrade waste management facilities in an economically and environmentally sound manner.
23. Waste to energy is jointly promoted by MoE and MoNRE as a means to reduce GHG emissions (from decay of organic waste and during power generation from fossil fuel sources), increasing electricity production and reducing the waste problem. The Pollution Control Department (PCD) under MoNRE has published a 'Guideline of Waste Management and Waste-to-Energy Technologies for Municipalities' in 2011 and planning to set a target. Due to lack of instruments and incentives to motivate local governments to comply with the national policy implementation is low. However, under the recent leadership of the NCPO, local authorities are urged to cooperate with the national government to implement the national policy including centralized waste management in a cluster approach. The NCPO has however not yet set a target.

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<sup>21</sup> Pollution Control Department (PCD), 2014, Status Quo of Waste Management in Thailand 2013. 566P.

<sup>22</sup> ONEP (2011) Thailand's Second National Communication under the United Nations Framework Convention on Climate Change. Bangkok. 102P. The Third National Communication is currently being prepared. Data from this report is not yet available.

<sup>23</sup> MSTE [Ministry of Science, Technology and Environment, Thailand] (2000) *Thailand's Initial National Communication under the United Nations Framework Convention on Climate Change*. Bangkok. 100P.

<sup>24</sup> Sang-Arun, et al. (2011) Practical Guide for Improved Organic Waste Management: Climate benefits through the 3Rs in developing Asian countries. IGES policy report. 71P.

<sup>25</sup> ONEP (2011) Thailand's Second National Communication under the United Nations Framework Convention on Climate Change. Bangkok. 102P.



24. As per the Alternative Energy Development Plan (AEDP) 2012-2021<sup>26</sup>, the government plans to increase energy generation from the waste sector from 13.45 MW to 400 MW by i) promoting public participation in small scale waste-to-energy projects in communities, schools, religious organizations, institutions, and small to medium scale municipalities, ii) providing incentives for public private partnership, iii) revising laws and regulations to enhance investments of the private sector, e.g. by revising the Public Private Partnership Act B.E. 2435 (1992), iv) improving basic infrastructure, v) increasing public relation and awareness of citizens, for example, involve residents to waste-to-energy projects, educate children on waste-to-energy and environmental benefits, and vi) R&D on alternative energy industries, for example, RDF management, technologies for incineration and electricity generation from small scale incineration (less than 50 tonnes/day), and standards and equipment for conversion of plastic to oil.
25. To achieve this target in the AEDP, the government provides subsidy for construction of waste to energy plants via the Environmental Fund and provides monetary incentives to the private sector by buying the generated electricity at a higher rate, called an 'adder' (through the Provincial Electricity Authority, PEA). Also, capacity building budget is allocated via the Environmental Fund.
26. Implementers of waste-to-electricity projects can receive an adder for the generated electricity at 2.5-3.5 THB/kWh (0.076 - 0.107 USD/kWh)<sup>27</sup>. The payment is due only to the net amount of electricity generated, not the total generation.
27. The government has promoted the 3R (reduce, reuse, recycle) to shift from the end-of-pipe solution to upstream waste management and increase waste utilization and proposed to revise the Public Health Act B.E. 2535 (1992) to include waste separation at source as a mandatory practice. Also, the PCD has submitted the 3R law to the Parliament for consideration. If these proposed legislations are approved, the 3R will be a mandatory for sustainable waste management in Thailand.
28. The strategic framework for waste management in the country is laid down in the 'Roadmap for waste management'. The roadmap prepared by MoNRE and endorsed by the National Council for Peace and Order (NCPO) is in effect since August 2014. The roadmap includes the following policies: i) reducing waste generation and increase waste separation at source, ii) establishment of waste management clusters, iii) introduction of appropriate technology for integrated waste management with focus on waste to energy and maximize use of waste as resources through public private partnership, iv) raising awareness and disciplines of citizens, youths and students to participate in waste management from upstream to downstream.
29. In August 2014 the NCPO also announced a new Regulation of the Office of the Prime Minister on the National Waste Management and Administration System<sup>28</sup> which indicated that all provinces (led by the provincial governor) must develop a provincial master plan for municipal solid waste management and submit it to MoNRE by December 2014. The MONRE will integrate all the plans to develop the 'National waste management plan', which will be completed by 2016. After approval by the Parliament,

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<sup>26</sup> Alternative Energy Development Plan (2012-2021), Department of Alternative Energy Development and Efficiency (DEDE) – Ministry of Energy Thailand (2012)

<sup>27</sup> Thailand's Feed-in Tariffs, Calculation, Impacts, and Future Directions, Sopitsuda Tongsopit Energy Research Institute, Chulalongkorn University, February 2014.

<sup>28</sup> Regulation of the Office of the Prime Minister on the National Waste Management and Administration System, 26 August 2014.

the Bureau of the Budget must allocate budget to achieve that plan. In particular waste-to-energy plants are prioritized.

30. From the above it can be concluded that waste management has been a pressing problem at the local level in Thailand for a long time. Only since recently, it has become a priority for the central government. The central government is now willing to provide the required budgets to do the necessary investments in the cities to tackle the problems. The focus of the government is on identifying and implementing sustainable solutions, which includes reducing & recycling waste (3R) and low carbon technologies such as waste-to-energy projects.

## Transport

### General

31. The transport sector in Thailand accounted for around 19% of total GHG emissions in 2009<sup>29</sup> (i.e., approx. 60 MtCO<sub>2</sub>eq) - out of this around 97% of the emissions can be accounted from road transport. The energy consumption from the transport sector is expected to increase to 46,810 ktoe by 2030 (BAU expectation)<sup>30</sup>. CO<sub>2</sub> emissions are projected at more than 100 MtCO<sub>2</sub>eq in 2030<sup>31</sup>.
32. Traffic congestion across several Thai cities has been deteriorating. Weak or inconvenient public transportation system has resulted in preference to private vehicles. The number of public bus passengers in Thailand has declined from 1,067.49 million passengers in 2004 to 759.37 million passengers in 2012<sup>32</sup>. The worsening traffic situation is aggravated by limitations in expanding road space. In 2012 the length of paved road in Thailand was 187,207 kilometres and had an average growth rate of only 1.3% (since 2004). In the same period the growth rate in vehicle registration was around 5.84% per year<sup>33</sup>. For more details see Table 1.

Measures	Unit	2004	2005	2006	2007	2008	2009	2010	2011	2012	Growth Rate (%)
Total road length	Thousand Kilometers	215.88	216.05	222.74	223.56	223.86	224.49	229.44	230.93	231.62	0.88%
Length of paved road	Thousand Kilometers	168.58	169.20	174.26	175.44	176.88	178.00	185.17	186.50	187.21	1.32%
Number of vehicle registration	Million	20.62	22.57	24.81	25.62	26.42	27.18	28.48	30.19	32.48	5.84%
Number of public bus passengers	Million	1067.49	1012.59	978.39	1106.34	1036.01	833.10	823.43	786.31	759.38	-4.17%

Table 1: Length of road, number of vehicle registration and number of public passengers in Thailand

<sup>29</sup> TGO & JGSEE (2012): Final Report on Projection of Greenhouse Gas Emission and Mitigation and Their Scenario Studies Using Economic Models.

<sup>30</sup> Thailand's energy consumption (for Q1 2014) and GHG emission from transport sector, Department of Alternative Energy Development and Efficiency, Ministry of Energy.

<sup>31</sup> TGO & JGSEE (2012): Final Report on Projection of Greenhouse Gas Emission and Mitigation and Their Scenario Studies Using Economic Models.

<sup>32</sup> 2014 ASEAN-Japan Common Templates Data (2004-2014), <http://www.ajtpweb.org/statistics/Thailand/index.html> (Last Access: April, 2015)

<sup>33</sup> Department of Land Transport (DLT), Vehicle Registration Data ([http://apps.dlt.go.th/statistics\\_web/statistics.html](http://apps.dlt.go.th/statistics_web/statistics.html)) (Last Access: April, 2015)

33. There is a strong decline in the ratio between total population and vehicle stocks since 1999. In 1999 there were 61.66 million people in Thailand, while in 2013 there were around 64.79 million people. In the same time vehicle registration rose from 20.1 million to 34.62 million. These figures mean a decline in the number of people per vehicle from 3.06 in 1999 to 1.87 in 2013, see Figure 3.

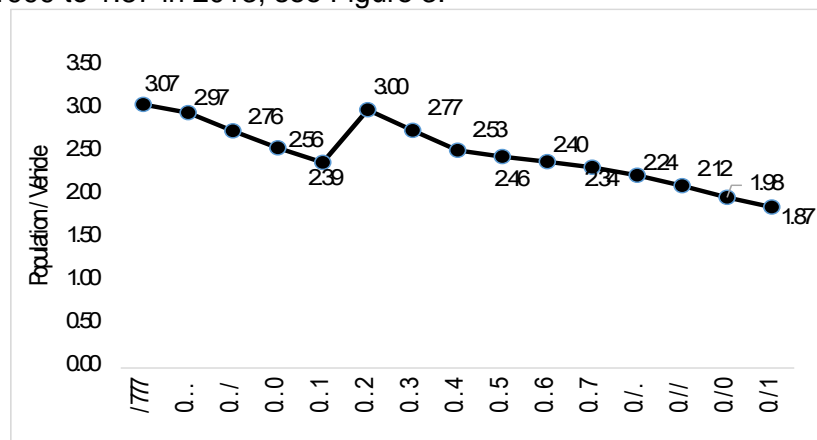


Figure 3: Average number of people per vehicle in Thailand<sup>34</sup>

34. Besides the problems of high energy consumption and increasing GHG emissions, the number of road accidents and issues concerning road safety is high in Thailand. According to a World Health Organization (WHO) report in 2014<sup>35</sup>, Thailand was ranked no.2 in the world for road traffic fatalities with 44 deaths per a population of 100,000 per year.

### Policies

35. The Eleventh National Economic and Social Development Plan (2012-2016)<sup>36</sup> include two strategies that are related to sustainable transport. The first strategy is to improve the connection with neighbouring countries via public transportation like trains. The second strategy is to promote sustainable transportation.
36. For the design and implementation of infrastructure projects and traffic measures in Thailand various (strategic) plans of the government on transport have been developed in the past, this includes the Environmental Sustainable Transport Master Plan<sup>37</sup>, National Transport and Traffic Master Plan<sup>38</sup> and Thailand Transport Infrastructure Development Plan<sup>39</sup>.
37. The recent 'Master Plan for Sustainable Transport System and Mitigation of Climate Change Impacts' (2013 – 2030)<sup>40</sup> by the Office of Transport and Traffic Policy and Planning (OTP) under MoT includes two phases, i.e., the short term plan (from 2013-

<sup>34</sup> Department of Provincial Administration (DOPA) and Department of Land Transport (DLT) Vehicle Registration Data ([http://apps.dlt.go.th/statistics\\_web/statistics.html](http://apps.dlt.go.th/statistics_web/statistics.html)) (Last Access: April, 2015)

<sup>35</sup> Global status report on road safety 2013, World Health Organisation (2014)

<sup>36</sup> Eleventh National Economic and Social Development Plan (2012-2016) for Thailand, The National Economic and Social Development Board (NESDB) (2012)

<sup>37</sup> Environmental Sustainable Transport Master Plan (2012), Ministry of Transport Thailand

<sup>38</sup> National Transport and Traffic Master Plan (2011 – 2020), Ministry of Transport Thailand

<sup>39</sup> Thailand Transport Infrastructure Development Plan (2013-2020), Ministry of Transport Thailand

<sup>40</sup> Master Plan for Sustainable Transport System and Mitigation of Climate Change Impacts (2013 – 2030) , the Office of Transport and Traffic Policy and Planning (OTP) Ministry of Transport (2013)

2017) and the long term plan (2018-2030). The objectives is to support the sustainable transportation development in the country in order to save energy and reduce GHG emission in this sector. The master plan targets to reduce 10 million tCO<sub>2</sub>e by 2017 and 23 million tCO<sub>2</sub>e by 2030. Three rules in developing a sustainable transport society are applied:

- Avoid (reducing or avoid the need to travel);
- Shift (shift to or maintain share of more environmentally friendly transport modes);
- Improve (improve the energy efficiency of transport modes and vehicle technology).

38. The Master Plan identifies local authorities where transport projects and programmes must be prioritized and implemented. The Master Plan comprises 5 underlying strategies, including: i) upgrade capability of agencies and personnel for the development of an environmentally sustainable transport system, ii) Establish appropriate plans and mechanisms for interfacing and monitoring of transport and traffic work plans/measures/projects; and to move them forward to implementation, iii) Establish comprehensive and inter connected transport infrastructure, iv) Efficient transport management for sustainability and greenhouse gas reduction, v) promote transport R&D and adoption of environment-friendly innovations and technologies, and iv) Promote public awareness of the environment. Local level transport initiatives in pilot cities are guided by these underlying strategies.

39. The NCPO/MoT announced in September 2014 a new transport strategy. The “Transport Infrastructure Development Strategy”<sup>41</sup> is an eight year plan covering the period from 2015 to 2023 with approximately USD 92,721 million in investments, see Figure 4. There are 5 strategies including:

- Rail transportation improvements;
- Public transportation development for Bangkok and its vicinity;
- Roadway improvement for transport and logistic connectivity;
- Waterway transportation improvements;
- Air transportation improvement which concentrates on improving Suvarnabhumi Airport, expanding Don Muang Airport (both airports are located in Bangkok) and buying new airplanes for Thai Airways.



<sup>41</sup> “Strategies on Thailand’s Infrastructure Development in Transportation (2015 – 2023)”, Ministry of Transport (2014)

Figure 4: Overview Thailand Infrastructure Development Strategy (2015-2023)

40. Nearly all funding for sustainable transportation projects comes from the central government. These funds are mainly related to mega projects such as the development of public rapid transit in Bangkok. The Master Plan for Sustainable Transport System and Mitigation of Climate Change Impacts suggested that sustainable transport projects in cities can be included under the internationally supported NAMAs.

### Renewable Energy and Energy Efficiency

41. Over the last 5 years, the Ministry of Energy has developed several plans to increase renewable energy generation. Table 2 presents these plans and the targets for each type of renewable energy. It shows that electricity generation from municipal solid waste has been gaining prominence over time. The revised Alternative Energy Development Plan aims for an installed capacity of 400 MW for Waste-to-Energy plants by 2021.

Energy/Fuel	REDP (2009) Target in 2022 (MW)	AEDP (2011) Target in 2021 (MW)	New AEDP (2013) Target in 2021 (MW)
Solar	500	2,000	3,000
Wind	800	1,200	1,800
Hydro Power	324	1,608	324
Biomass	3700	3,630	4,800
Biogas	120	600	3,600
MSW	160	160	400
New energy	3	3	3
<b>Total</b>	<b>5,607</b>	<b>9,201</b>	<b>13,927</b>

Table 2: Renewable energy targets as per REDP and AEDP<sup>42</sup>

42. To support the realization of the renewable energy target several government agencies involved in the energy sector, such as Ministry of Energy, Department of Alternate Energy Development and Efficiency (DEDE), Electricity Generating Authority of Thailand (EGAT) and the Board of Investment (BoI) established several policies and incentive schemes over the years, ranging from investment grants to tax breaks and from technical support for new technologies to the electricity “adder” for specific renewable energies. The main policies and incentive schemes are depicted in Figure 5 below and target the private sector. The energy soft loan facility (revolving fund) has already been ended as sufficient capital (debt or equity) for renewable energies and energy efficiency measures is available in the financial markets in Thailand.

<sup>42</sup> Alternative Energy Development Plan (2012-2021), Department of Alternate Energy Development and Efficiency (DEDE) – Ministry of Energy Thailand (2012)

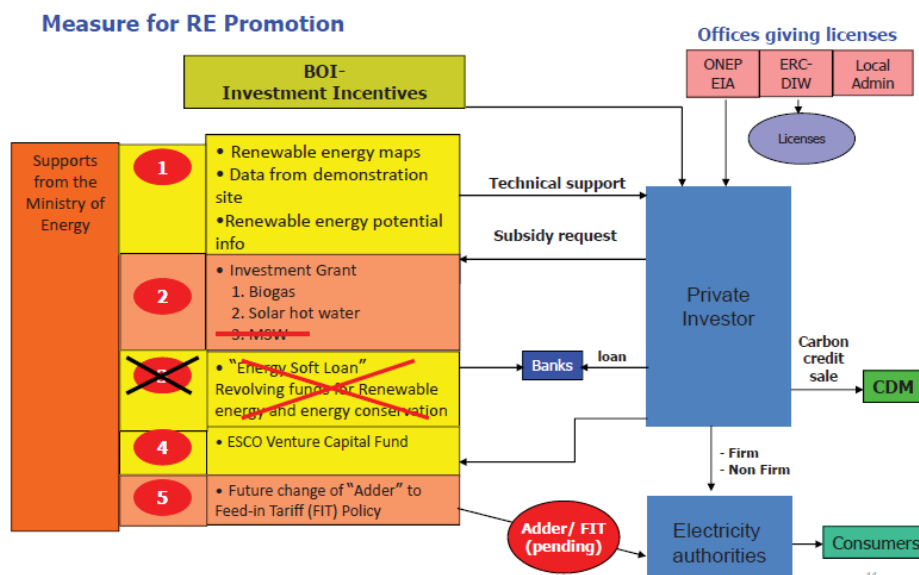


Figure 5: Overview main Renewable Energy policies/incentive schemes<sup>43</sup>

43. MoE has formulated a 20-year Energy Efficiency Development Plan (EEDP, 2011 – 2030).<sup>44</sup> The aim of the plan is to promote the reduction of energy intensity by 25% in 2030 compared with that in 2010. The plan is mainly focussed on energy intensive industries and does not include support to cities to reduce their energy intensity. Implementing energy efficiency measures in cities is also not high on the (political) agenda of most cities.

## 1.2 Threats and Root Causes

44. The continued economic growth of Thailand is leading to a growth in unsustainable development practices and increase in GHG emissions. To prevent a further increase in these unsustainable development practices, the Royal Government of Thailand (RGOT) has established an institutional framework, formulated strategies to address climate change and has set targets for GHG reductions as discussed in the preceding section. While progress has been made on central level, at the local level challenges still persists and progress is slow.
45. The RGoT recognizes that low carbon development is one of the keys to stimulate economic growth while simultaneously ensuring the country, in particular cities, are 'liveable'. For example many cities experiencing significant air pollution from traffic and environmental pollution from waste. Several initiatives have been taken by the government to support low carbon developments in the country, but progress in cities is slow.
46. The root causes for the slow realization of low carbon developments in cities is the lack of bottom-up and inclusive planning processes, a very limited understanding of policy makers, government staff and citizens on climate change and the benefits of sustainable

<sup>43</sup> "Thailand Renewable Energy Development....", presentation by Dr. Twarath Sutabutr, 2 September 2013.

<sup>44</sup> Thailand 20-year Energy Efficiency Development Plan (2011 - 2030), Ministry of Energy Thailand (2011)



low carbon activities and investments, limited skills to manage low carbon activities and lack of a mechanism to collect data for planning and monitoring purposes. Local policy makers, staff and citizens alike are not being exposed to information and best practices on low carbon technology applications for development of the cities. These root causes including the barriers discussed below will be addressed by the project.

47. Not addressing the root causes and barriers for the low carbon development in cities poses a number of threats to sustainable urban development at the local level, including:

- Increase of unsustainable development practices leading to environmental pollution in cities which will make it less attractive to live in cities (liveability of cities decreases) and an increase in GHG emissions;
- Continued lack of support from citizens in cities for low carbon developments;
- Continued lack of data which can be used for planning purposes and monitoring of investments and improvements to the urban services to increase user convenience;
- Failure of low carbon investments in cities resulting in a reduction in confidence of private sector investors in low carbon projects in cities;
- Continued nuisance from waste management practices for citizens in cities, undermining trust in local government;
- Continued traffic congestions in cities, undermining economic growth;
- Continued ad-hoc planning practices without community involvement, leading to limited support for the investments and possibly failure.

48. Without external donor assistance, the unsustainable development practices will likely continue and cities will only be able to a very limited extend to contribute to the GHG emission reduction targets set by the RGOT.

### ***1.3 Barrier Analysis***

49. Barriers to low carbon development in cities in Thailand include:

50. **Lack of awareness on climate change and benefits of low carbon sustainable systems by citizens and government officials at the local level:** While it is assumed by many practitioners in the field of climate change that by now everybody should know the causes of climate change, the effects and solutions for it, the opposite is true at the local level in Thailand. In the cities there are very few people who understand the causes, effects and solutions for climate change and the benefits of low carbon developments. In particular investments which require the support of the citizens in the cities to make it a success, such as sustainable public transport systems or waste separation, are affected by this lack of awareness. Also the awareness of many government staff is limited. Many workshops on low carbon developments have been held in the past, but they were mainly organised at the central level. In addition, only few people from the provinces participate at these events.

51. In addition, there is a lack of examples of successfully managed and operated low carbon urban systems at the local level. From these examples, policy makers, government staff and citizens could learn. Some local politicians and city staff, in particular those which are exposed to international developments and/or attended workshops related to low carbon developments are, at a theoretical level, aware of the benefits of low carbon investments. However, they don't know how to apply the ideas to

the actual planning, developing, managing, operating and maintaining the investments. During the national stakeholder consultation workshop the mayors of the cities, who are the key decision makers, summarized this as: they don't know "how to walk". They would like to learn from real examples in a local city context. This also relates to the Thai way of learning things, which is by seeing things and by peer-to-peer learning. Learning from written guidelines is not the usual way of learning new things. To support realisation of low carbon investments in cities, successful examples in a local city context must be shown.

52. There are a few successful examples of low carbon investments in Thailand. However they are all located in Bangkok. E.g. rail based mass transit systems; landfill gas recovery project for waste management. Bangkok is however in many ways different from cities in Thailand; capacities of people to plan, implement and manage low carbon investments are significantly higher than at the local level. Most planned low carbon investments outside Bangkok are oftentimes not realized. Lack of awareness and understanding hampers the planning processes, development & implementation of policies, coordination of activities and mobilising of investments. Support to cities during the whole process, from planning to design and from construction to operation will be an important incremental activity.
53. **Lack of capacity to plan, design, implement and managed sustainable development solutions.** Capacities of governmental staff in cities are limited. They have few training opportunities and the quality of education in the countryside is not as advanced as in Bangkok. This lack of capacity/knowledge on both low emission development and urban development in cities impacts on the ability of cities to plan and implement actions. Overall, the successful implementation of low carbon projects in Thailand is very much dependent on long-term planning, financial feasibility, technical know-how and the skills of the staff planning, managing and operating the plants.
54. The lack of capacities to sound planning e.g. is evident in Nakorn Ratchasima where a large biodigester for the anaerobic digestion of organic waste was built, without considering the supply of sufficient organic waste to feed the biodigester. No measures were planned to increase the supply of organic waste to the digester. Similarly, the biogas to electricity project in Rayong failed because it was not planned well and as a consequence the contracted private sector operator could not secure sufficient organic waste for the digester. Local stakeholders, such as markets, were not motivated to supply organic waste to the facility. Also skills of staff to operate the facility were not sufficient resulting in the equipment to break down.
55. **Limited sharing of lessons learned:** lessons learned in low carbon development are not being shared effectively between the cities and with other countries. Cities don't monitor, collect and disseminate information on low carbon development activities and progress. Each city tries to invent the wheel again. Consequently, lessons are often not well communicated. E.g. Samui had bad experiences with a waste-to-energy plant and don't want to use the technology again. Khon Kaen at the same moment is planning a waste-to-energy technology. It would be good for Khon Kaen to know the challenges faced by Samui and to address those. There is no formal mechanism to support the exchange of information between cities.
56. **Limited bottom up and inclusive development planning and involvement of stakeholders during planning as well as implementation of low carbon urban**



**systems.** An important strategy for low emission climate resilient development planning is effective community participation. However involvement of local stakeholders in the planning is often lacking or very limited. The lack of involvement of local stakeholders in the planning stage results in low support for the investments. If there are negative effects to the local communities, often conflicts with local communities will develop. Another consequence could be that the design of urban systems will not meet the requirements of its users. An example of this is the bus rapid transit (BRT) system in Bangkok. The stations for the BRT systems are not closely and conveniently located to major hubs where majority of population work and live due to which the number of passengers is significantly lower than anticipated during design.

57. Also the implementation of low carbon urban systems requires support from citizens. E.g. a traffic manage system which synchronizes traffic lights need understanding and cooperation by drivers. If they are not willing to follow traffic directions or stop for traffic lights, implementation will be very challenging particularly when enforcement and penalty for non-compliance are not effective. In addition, often plans are made (and budgets made available) at the central level without involvement of important stakeholders from the local level. This is currently for example the case in Klaeng. The central government has ordered Klaeng to expand its waste management capacities, but stakeholder consultations, despite being a legal requirement, have not taken place.
58. Conducting stakeholder consultations during planning as well as involvement of stakeholders during implementation/operation of low carbon urban systems will be one of the main incremental activities.
59. **Lack of implementation after preparation of a plan.** Many development plans, master-plans, sector plans etc. have been prepared over the years in Thailand. However actual implementation of these plans is very challenging. After making a plan, things often stop moving. This also applies to plans related to climate change mitigation. There are several reasons for the lack of implementation, as mentioned earlier: lack of skills of staff in cities as they don't know how to move forward, political interference, limited support of citizens for the implementation and limited coordination between departments and agencies.
60. **Lack of cooperation across sectors & jurisdiction.** Low carbon considerations are not being made in a coordinated manner across urban services sectors. This problem happens often at city level, as roles are often not clear, responsibilities have sometimes not been assigned and/or there are overlapping responsibilities. In new areas, such as climate change, this problem is more profound. Thailand has many government agencies, but little coordination between the agencies is taking place. In addition, while the provincial governor or mayor has to guide the local agencies in a province or a city and make them work together, the staff in the local agencies report to their respective line ministries at central level in Bangkok. Local government staff often doesn't have time to engage in lengthy consultations and coordination with all government agencies and stakeholders involved. This also requires special skills. For example, to realize the bus reroute project in Nakorn Ratchasima or traffic zoning in Samui, the challenge for the cities is the coordination with all government agencies and engagement with all stakeholders.

61. **Lack of data** in cities which can support planning, policy making and monitoring of progress. At city level, data is hardly collected in a structured way. Cities often e.g. don't know how much waste is collected and landfilled or how many vehicles drive through certain streets. With a lack of data it is impossible to plan well or to weigh the costs and benefits of certain investments and conduct effective low carbon urban development planning. Also most cities have no idea about the scale of GHG emissions in their cities.
62. In particular for transport planning, historical and present data is important to see changes. However most cities in Thailand do not collect traffic and transport data. The existing data are mainly based on secondary data sources such as data from the department of land transport and the department of highway. In some examples cities did collect traffic and transport data, but only related to a specific project. Currently no cities in Thailand, including Bangkok, are collecting traffic data systematically over a period of time. These experiences are supported by the experiences of a GIZ funded project with the Ministry of Transport. This project aims to develop a NAMA and MRV system on sustainable transport for Thailand, but one of the main obstacles faced is the lack of data on transport and lack of systems to monitor the data on transportation in Thailand.
63. Also during the planning of the BRT systems in Khon Kaen and Nakorn Ratchasima it became clear that traffic data is required to plan the systems well. The same applies to all 4 cities for waste management. To plan waste management activities, in particular recycling, treatment of organic waste, etc. data on the source where waste is produced, the type and amount of waste is required. This information is currently not available.
64. Data collection for monitoring purposes is also hardly taking place. After project investments have taken place, there is usually very little monitoring on the performance of the urban system and how the services can be improved to increase user convenience and meet the requirements of the users. This links to the above barrier on lack of stakeholder involvement during the implementation phase of urban systems.
65. **Local politics** plays a very important role in implementation of local policies and investment decisions, as is the case in many countries. Local politicians are being replaced every four years. Usually new leaders don't want to continue initiatives started by the former leaders. This could be due to different political agendas, but often this are also personal issues or that the new leaders don't want to be seen repeating things the former leaders have done. This can have significant negative effects on the sustainability of low carbon investment.
66. **Difficulties accessing financial support:** cities, in particular smaller cities and cities not strategically well connected to Bangkok, have difficulties securing sufficient funding for their low carbon investments. The financial means of the cities are limited and the larger budgets are controlled by the central government in Bangkok. Application procedures can be long. This is often caused by incomplete submission, documents are missing or information is not provided. This is particularly the case for smaller cities, as they have limited staff with limited capacity to prepare requirement applications and documentations. Also, the smaller cities have often less informal networks/connections with the central level, so their options to informally influence the decision making process is limited. This is in particular a challenge for the larger public transport projects which require larger budgets. The general budgets that municipalities have to support their three year development plan are not enough to launch the projects. Hence, most

budgets reserved for transport are spent on small infrastructure maintenance work, such as road improvements.

67. **Social resistance:** Many local waste management projects are faced with social resistance. Existing waste management practices can cause several environmental problems, including visual pollution, smell nuisance and housefly's outbreaks. Additionally, landfill fires occur on open dump sites in the dry season (March to May) generate air pollutants (including carcinogens) and cause water and soil pollution and disturb living condition of residents in the vicinity. It increases the NIMBY phenomenon of residents making it more difficult for local authorities to find new area for e.g. landfilling or waste management facilities. The social resistance can be a consequence of limited stakeholder engagement during planning and implementation.

## 1.4 Stakeholder Analysis

68. Stakeholders involved in the promotion of low carbon urban development who will be engaged during project implementation are presented in below Table 3.

Name of Stakeholder	Description:	Role in project:
Thailand Greenhouse Gas Management Organization under Ministry of Environment (Public Organisation, TGO)	TGO has an overall mandate for GHG reduction in Thailand.	TGO will be the implementing partner for this project and Chair of the Project Board. TGO in close partnership with the four participating cities will lead the project implementation, oversee the accomplishment of project objectives, outcomes and activities, lead co-funding requirements, link to national policy in collaboration through other agencies, and facilitate coordination with key stakeholders including all related ministries, agencies, and local authorities. Since TGO serves as the secretariat of the National Climate Change Committee (NCCC) under the leadership of the Prime Minister, it facilitates and coordinates the integration of GHG mitigation and low carbon consideration in activities commissioned by all levels of government, including line ministries and local authorities. By virtue of this and in its capacity as a central government agency, TGO is mandated to engage with cities in planning, evaluation, design and execution of low carbon interventions including waste management activities. TGO is already carrying out this mandate through its current engagement with over 20 cities in ongoing programmes and projects. TGO will build on and expand this role to assume the IP functions in the GEF Project. It will collaborate with local authorities and support them with highly specialized guidance on planning, design and implementation of low carbon systems. That said, the overall authority to implement city level projects including the waste project lies with the local authorities, who as co-executing partner in the GEF Project, will work hand in hand with TGO.
Participating cities	Khon Kaen, Nakorn Ratchasima, Samui (Samui Island) and Klaeng municipality are the 4 pilot cities	Khon Kaen, Nakorn Ratchasima, Samui and Klaeng are the main beneficiaries of the project and members of the project board. They are the co-implementation partners with guidance from TGO and will be responsible for coordination of all local planning activities and will ensure that technical assistance provided by the Project is linked to local planning needs and aligned with local priorities. They will be important stakeholders in scaling up of low carbon urban interventions in collaboration with the private sectors.
Ministry of Interior, Department of Local Administration (DLA)	DLA is the key partner for sub-national and local authorities. Local authorities report to DLA and officials are appointed by DLA. DLA is the executor and guardian on local policies and acts related to city planning, local authorities, local development planning and basic services. Its key strength is the direct authority over local governments in terms of enforcing policies.	Through DLA, the buy-in from cities and integration with existing sub-national planning processes will be ensured. DLA will be a member of the Project Board.
Ministry of Natural Resources and Environment (MoNRE): Pollution Control Department (PCD)	PCD is responsible for developing appropriate systems, methodologies, and technologies for the management of solid waste, hazardous substances, water quality, air quality, noise level, and vibration. It operates via its 16 Regional Environment Offices which are an important stakeholder at city level.	During Project implementation PCD will be a source of data on municipal solid waste and advisor on appropriate technologies and methodologies of waste to local governments. PCD will be a member of the Project Board.
Office of Natural Resources and Environment Policy and Planning (ONEP).Ministry of Natural	ONEP is the National Focal Point to the UNFCCC and Secretary of The National Committee for Climate Change. It developed and monitors Thailand's Climate Change Master Plan 2012 – 2050 and the	ONEP will be a member of the Project Board. The lessons learned in the cities while planning and implementing the low carbon investments form a basis for ONEP to influence policy formulation.

Name of Stakeholder	Description:	Role in project:
Resources	National Strategy on Climate Change BE 2556-2560 (A.D. 2013-2017). ONEP ensures the linkages with Thailand's Climate Change Master Plan, NAMAs and policy discussions at central level.	
Ministry of Transport (MoT), Office of Transport and Traffic Policy and Planning (OTP)	OTP is responsible for analysing and preparing Thailand's master plan on transport and traffic. OTP's mission is to make comprehensive studies and analysis, set up a database of with information on transport and supervise and expedite the operations of agencies under the Ministry of Transport. OTP, in cooperation with its local offices, approves plans for sustainable transport projects in cities (such as BRT systems).	During Project implementation OTP will be a source of data on transport and advisor on appropriate technologies and methodologies for sustainable transport for local governments OTP will be a member of the Project Board.
The Department of Land Transportation (DLT) under the Ministry of Transport (MoT) <sup>45</sup>	DLT is an important stakeholder at local level. The DLT's role consists in implementing plans to foster links with other modes of transport so that the land transport becomes integrated, well run, convenient, nationwide and secure. DLT is responsible for policies, planning and regulating all aspects of train, bus and taxi services as well as road- and rail-based freight transport. DLT has a major Influence in enforcing new policies on public transportation at local level.	DLT will ensure coordination between cities and the Ministry of Transport at central level. DLT will also be an important source of data on transport and will support the implementation of the activities in the transport sector in the cities.
Ministry of Energy (MoE)	MoE is responsible for energy policies and integrate/review energy management plans of the country. In addition it prepares national strategies for energy conservation and alternative energy. MoE is a key partner in the development of NAMAs and MRV in the energy sector in Thailand. It promotes energy generation from municipal solid waste	MoE will be a member of the Project Board and will provide technical planning support to the activities implemented in the energy field.
Ministry of Public Health, Department of Health	MoPH is the policy maker on health issues. It works through regional health offices. At local level it is an important advisor on municipal waste management	MPH will be a member of the Project Board and will ensure coordination of activities between the central level and the cities on waste management. It will also be an important source of data on waste management.
City offices/provincial offices of Thai Traffic Police	Thai police is responsible for traffic law enforcement and management of traffic systems in cities.	Support by police for enforcing new traffic management systems in pilot cities is required
Local academic institutes	Academic institutions such as Suranaree Technology University, Nakorn Ratchasima, Khon Kaen University, Khon Kaen, Burapha University, Chonburi (for Klaeng), Rajabhat Surat University, Surat (for Samui). Universities conduct policy research and studies to strengthen baseline data, impact analysis, etc. on sustainable transportation and MSW.	The universities will be an advisor on MSW and sustainable transportation for the 4 pilot cities.
Private sector	Examples include association of hotels and restaurants, Provincial Chamber of Commerce, shopping malls and department stores, recycling companies, buyers/scavengers, local transportation groups	These entities are a major source of waste generation and influencer on the success of the waste management and transport projects
Civil society	For example environmental groups such as recycle banks, pollution watcher groups, environmental protection volunteer, bicycle groups, woman groups, public health volunteer groups, youth groups, local NGOs	These groups are the main beneficiaries and change agents and will play an important role during the project in advocacy and awareness raising.
Communities	For example schools, religion places; mosques, temples, churches, communities	These groups are a major source of municipal waste and are transport users. They are the main beneficiaries, change agents and will play an important role during the project in advocacy and awareness raising.
Media	Local newspapers, local cable TV, local radio, citizen reporters.	They will contribute to raising awareness and media campaign on low carbon

<sup>45</sup> Within MoT also the Central Land Transport Control Board, Bureau of Regional Transport and Traffic System Promotion and the Rural Highway Department play an important role in enforcement of policies and data provision. Via OTP coordination with these departments/agencies will take place.

Name of Stakeholder	Description:	Role in project:
	These groups are a source of PR and dissemination of news in local communities.	developments.

Table 3: Overview main stakeholders

## ***1.5 Baseline Analysis***

69. The baseline projects, defined as all ongoing and planned activities, projects and programmes on low emissions development in cities that will be implemented without the GEF assistance, that participating cities, (central) government agencies and key stakeholders are undertaking. These baseline activities will serve as a basis on which activities of the project will build incrementally or modify to enhance the Global Environmental Benefits (GEBs). The following relevant projects and programmes in Thailand will complement the project either as baseline projects or serve as a rationale or source of lessons learned for the project. The description for each baseline project is presented below, first at the national level followed by sub-national level.

### **1.5.1 Baseline projects at national level**

70. **Market-based mechanism and low carbon schemes (T-VER and LESS):** TGO is spearheading several initiatives to support the development of a domestic carbon market and to support low carbon actions in the country, including in cities, via:

- Thailand Voluntary Emission Reduction Program (T-VER): a voluntary domestic GHG crediting mechanism (project-based), using methodologies derived from CDM and J-VER methodologies (Japan's Offset Credit Scheme). In the coming 4 years TGO aims to make the scheme fully operational, promote the scheme with private sector and with local governments and link it with international trading schemes.
- Low Emission Supporting Scheme (LESS): a non-financial scheme proposed by TGO in 2015 to provide recognition for low carbon activities in cities, communities and by the private sector. This concerns activities which do not qualify under the CDM or T-VER mechanism, e.g. because they are too small or no robust GHG ER calculation methodologies are available for the particular actions. It is a non-financial mechanism which provides recognition to the actions taken in cities. It plans to use simplified methodologies and approaches derived from the CDM & T-VER mechanism. It will also be a means to enhance awareness on achieving a low carbon society. By 2016, TGO plans to prepare all required procedures and forms and launch the mechanism. In the following years, TGO aims to promote the scheme with local governments and organise events to award organisations and people displaying leadership in low carbon actions.

Total budget from TGO for these two initiatives from 2016 till 2019 is USD 50,000.

71. **Partnership for Market Readiness project:** TGO is implementing the Partnership for Market Readiness project (PMR) of the World Bank. The project aims to prepare readiness on market-based mechanisms in Thailand. The project envisions to:

- Design and implement a pilot domestic market mechanism to reduce energy consumption and GHG emissions in energy sector with a view to transform to emission trading scheme in the future;
- Prepare the infrastructure for market mechanism including database, MRV system, registry system, institutional and regulatory framework;
- Promote and support municipalities to implement GHG mitigation actions while achieving sustainable development and low carbon society goals through domestic market mechanism



The budget for the PMR related to the work with cities is USD 170,000. Implementation schedule is 2015 till 2018/2019.

72. Under the PMR an instrument, called the Low Carbon City Programme, will be set up to facilitate access for cities to the T-VER scheme and promote cities to take GHG mitigation actions. The LCC programme will:

- Select 20 cities to prepare city-wide GHG inventories and identify GHG mitigation actions. The GHGs covered include CO<sub>2</sub>, methane and nitrous oxide and the potential activities included are: energy efficiency measures; renewable energy; waste management, transport management; forestry and green areas; agriculture. Support during implementation of mitigation actions is not included;
- Establishing the procedures, developing forms, etc. to facilitate access for cities to the T-VER scheme;
- Work with private sector to create demand for credits from cities.

While the PMR focuses on establishing the system to facilitate access for cities to the T-VER scheme and the demand for credits by buyers, the GEF incremental activities will focus on the credit supply by cities and developing methodologies and standards suitable to the city-context. The preparations for the LCC mechanism will take place from 2015 till 2016, while full implementation will start in 2017/2018.

73. **Low Emission Capacity Building Project (LECB):** The LECB assists in enhancing national greenhouse gas (GHG) inventory systems, develop NAMA concepts as well as designing measurement, reporting, and verification (MRV) framework that ultimately serves national priorities for LEDS. Some of the on-going and planned activities that are considered as baseline activities to the project include assistance in developing procedure and data collection system for national GHG data; strengthening the institutional framework on GHG inventory at the national level; developing sector-specific MRV guidelines in collaboration with the private sector (waste sector); capacity development trainings to operationalize the inventory reporting cycle and related guidelines and tools.

74. The Project will benefit from the preparatory work undertaken by the LECB project especially the formulation of procedure and data collection system for national level GHG data, and NAMA concepts and MRV systems which can provide early lessons to the cities. GEF assistance will enlarge the scope of the LECB by including the development of GHG inventories or accounting frameworks applicable at the city level. (Budget: USD 270,000 and implementation is scheduled from 2014 to 2016).

75. **Low Carbon Cities Training Course:** The activity is being implemented by the Climate Change International Technical and Training Centre (CITC), established by TGO in 2014. The CITC aspires to be a learning resource center on climate change mitigation and adaptation with activities to 1) conduct trainings in the area of climate change, 2) establish networking platform for ASEAN countries, 3) disseminate knowledge and best practices on climate change. CITC training programs have a wide-ranging target group from governmental agencies, academic institutions to private companies, and general public. The CITC was established in support of achieving a more climate resilient and carbon neutral ASEAN Community (AC) and provide services to the countries within the



AC.

76. CITC has already developed several courses, including on: 1) GHG inventory management, 2) Sustainable GHG management, 3) Low Carbon Society Development and 4) Mitigation Mechanism. The Low Carbon Society Development curriculum is being developed with support from JICA and at end of 2014 a peer-review of the curriculum was organized. TGO is planning to develop a low carbon cities training course, building on the materials developed for the Low Carbon Society Development Course. Additional topics need to be developed, for example on integrated low carbon planning and management & evaluation of low carbon urban systems. (Budget: USD 30,000 and implementation schedule from 2016 till 2019).
77. These baseline projects at the national level form a compelling linkage with the city level initiatives whereby existing schemes such as T-VER will be further adjusted to include dedicated financing for low carbon initiatives at the cities levels. These national level baseline activities implemented by TGO are not only related to supporting the development of market based mechanism but, equally, in catalyzing low carbon actions at the sub-national level by enabling access to capital for low carbon urban systems.

**78. Roadmap for Waste Management and National Waste Management Plan:** comprise a strategic framework for waste management in the country and is prepared by MoNRE and endorsed by the National Council for Peace and Order (NCPO). It identifies local authorities where waste management projects and programmes must be prioritized. Pilot cities such as Khon Kaen, Nakorn Ratchasima, Klaeng and Samui are also some of the identified cities in the strategic framework documents where actions on waste management have been called for. While Klaeng has been assigned by the Roadmap to urgently implement waste management project, Khon Kaen, Nakorn Ratchasima and Samui are required to execute actions in the mid-term. The baseline projects on waste management in each pilot city mentioned in the subsequent section (1.5.3) are guided by and in line with the Roadmap.

**79. Master Plan for Sustainable Transport System and Mitigation of Climate Change Impacts** (2013 – 2030) prepared by the Office of Transport Policy (OTP) under MoT identifies local authorities which include the pilot cities of Khon Kaen, Samui and Nakhon Ratchasima where transport projects and programmes must be prioritized. Once called for by the Master Plan, these identified local authorities are required to design and implement the prioritized projects. E.g. the shuttle bus & bus-rerouting and BRT systems in Khon Kaen and Nakorn Ratchasima, biking projects in Khon Kaen and Samui traffic control pilots in Nakorn Ratchasima and Khon Kaen have been underscored by the Master Plan. This way, national level initiatives are connected to cities and provide guidance in planning and implementing local level actions. In the absence of these national level strategic initiatives, cities would not have prioritized waste management and transport related projects in their jurisdiction, with the same urgency and within the stipulated timeframe.

### 1.5.2 Relevant past and ongoing projects and activities

80. **“Promotion of Low Carbon City across Municipalities in Celebration of His Majesty the King’s 84th birthday” (PLCC project)** implemented by National Municipal League of Thailand (NMLT): NMLT is implementing this PLCC project with the aspiration of contributing to national GHG reduction by facilitating actions of Thai

municipalities/cities. The contribution at local government organization level has remained weak and limited as a result of their limited capacity, knowledge, limited manpower and constrained resources. The project works with 100 municipalities and aims to identify actions in 4 areas: 1) city of waste minimization, 2) city of trees, 3) city of energy efficiency and 4) city of sustainable consumption. Under the project a Low Carbon Cities Network has been established. The Project will built upon this network and will expand and improve it further. As the network is managed by NMLT and the cities themselves, it is a suitable entry-point to build upon and ensure sustainability. The project is supported by the EU with a budget of around USD 275,000 and is scheduled to end in December 2015. The Project will build and expand the low carbon city network established under this initiative.

### 1.5.3 Baseline projects at the city level

#### Khon Kaen

81. Khon Kaen municipality/city covers 46 km<sup>2</sup> of Khon Kaen Province. Registered population as of 2013 is 112,329 people. The number of non-registered population is estimated at around 220,000. So the total number of people in Khon Kaen city is around 330,000. It is noteworthy that the significant number of unregistered population exists due to the presence of several universities and schools, which attract a lot of students and transient day time working population from nearby provinces. Most of this populace is registered in the municipality of their birth and not necessarily in Khon Kaen. However, both registered and unregistered population are being taken into account in urban development planning in Thai including Khon Kaen and the 3 other project cities. For instance for transport planning, data from the National Statistical Office (NSO) is being used, which is based on surveys in cities, including random sampling of number of people living in city dwellings.

82. In an effort to address challenges related to its urban regulatory services, the municipality has formulated a Low Carbon City plan under the umbrella of the PLCC project. The strategic framework comprises proper waste management, recycling and composting; energy conservation and efficiency; improved traffic management, sustainable public transport and non-motorized transport services, and promotion of vertical green spaces. As a part of this overall broader framework the city has been undertaking the following ongoing and planned initiatives in the waste management and sustainable transport sector as depicted in Table 4 and Table 5 below are considered as baseline to the project.

83. The following ongoing and planned initiatives in the waste management sector are considered as baseline to the project:

Owner & Project Name	Brief Description & Implementation Period	Linkage to GEF Project	Total Budget 2015-2019 [USD]
<b>City of Khon Kaen</b>			
Waste Management, Composting	In the BAU scenario, a total 212 tonnes/day of waste is being collected in the city. 2 tonnes of organic waste	GEF incremental activities described below will augment the baseline efforts of the city.	USD 39.7 million

Promotion of 3Rs and Waste-to-Energy plant	<p>per day is composted and around 1,900 tonnes per month segregated, collected and sold to recycling business chain. To improve the waste management practices, the city and other stakeholders aim to:</p> <p>a) Waste transfer stations: double the capacity of the waste transfer station to around 300 tonnes per day and repair the composting facility with an increase of capacity to 20 tonnes per day (commissioning by January 2017)</p> <p>b) Conventional community level recycling and composting: promote recycling of waste to 2,200 tonnes per month by EOP and start composting in 5 communities (5 communities times 1 tonne per day by January 2017)</p> <p>c) Construct a <b>standard</b> waste-to-energy plant without advanced GHG monitoring equipment (450 tonnes of waste per day, 4.9 MW, commissioning by January 2017).</p> <p>In the baseline, a conventional WTE without sophisticated, advanced technology and monitoring system would have been installed. Financing will come from the city, as confirmed in the co-financing letter.</p>	<p>a) <b>Upgraded</b> waste transfer station: Comprehensive technical &amp; financial feasibility review of the waste transfer and composting facility to integrate resource and energy-efficient measures;</p> <p>Upgrade waste transfer station integrated with energy and resource efficient measures. GEF incremental investment in composting plants that will integrate climate-resilient measures to prevent the plant from climate related risks, such as flooding;</p> <p>b) <b>Improved</b> community level recycling and composting facilities where GEF incremental funding will be used in installing 10 in-vessel composting units with modern techniques for composting at source; expansion of the composting programme to more communities using advanced composting techniques.</p> <p>c) <b>Advanced</b> Waste to Energy Plant: Evaluation and determination of the best available technical options to maximize GHG and other environment friendly features of the baseline WTE demonstration unit;</p> <p>Plant performance tests during commissioning of the WTE unit;</p> <p>Formulation and institutionalization of a monitoring framework as well as installation of real time monitoring equipment.</p> <p>In the absence of the GEF funding, these incremental features would not have been incorporated by the project developer on its own. The GEF incremental support, thus, enhances the WTE plant and maximises its GHG reduction potential.</p>	
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Table 4: Baseline projects Khon Kaen waste management

84. The Khon Kaen Master Plan for Urban Public Transportation (2012) paves way for the development of a BRT system and a feeder system to the main BRT trunk line. The total budget estimated is approx. USD 238 million. The detailed design of the BRT system will begin in 2016. A major investment such as the BRT is time intensive but at the same time the municipality is in a time pressed situation to immediately address the deteriorating traffic situation. Therefore, as the BRT is under preparation, KK has decided to implement a city shuttle bus project as a demo in the run up to full-fledged BRT project. The results and lessons learnt from this demo will be incorporated in the BRT design. In addition, non-motorized transport is promoted as well as a traffic data management centre will be established.

85. The following ongoing and planned initiatives in the sustainable transport sector are considered as baseline to the project:

Owner & Project Name	Brief Description & Implementation Period	Linkage to GEF Project	Total Budget 2015-2019 [USD]
<b>City of Khon Kaen</b>			
Sustainable Transport Initiatives: city shuttle bus, bikeway and traffic data management	<p>The sustainable transport initiatives planned by KK include:</p> <p>a) City shuttle bus service as preparation of the BRT. The first 2 pilot routes are scheduled to be implemented in 2016. The pilot routes will be (2*2=) 4 kilometers long and the routes will follow the route where the BRT system is planned and pass through several important areas where schools and shopping malls are located. Five buses will initially be used for this pilot project. After the realization of the BRT, the shuttle bus service will be rerouted to serve as feeder to the BRT. KK plans the shuttle services to start by January 2017.</p> <p>b) Bikeway project: The construction of a 4.8 km bikeway project is expected to start end of 2015 and will be completed by January 2017.</p> <p>c) Traffic data management: During the conception stages of the BRT system the KK municipality realized the dearth of recent data to facilitate an evidence-based decision making process. KK felt the need for a more permanent way of collecting traffic data, hence, a study has been commissioned to evaluate the establishment of a traffic data centre and a traffic control &amp; management system. The study is expected to be completed end 2015. Based on the outcome of the study, KK plans to establish a traffic data centre and implement a traffic management pilot project at two intersections by January 2018.</p>	<p>GEF incremental activities will enhance the baseline activities through the provision of following assistance:</p> <p>a) City bus shuttle: A comprehensive technical &amp; financial feasibility analyses of the BRT system; Establishing performance baseline and targets for the traffic control pilot; Incremental investment in the purchase of GPS devices and information system to track buses and inform passengers on schedule; incremental cost support in the installation of modern bus shelters which are commuter friendly, safe and convenient with advanced information display.</p> <p>b) Bikeway project: incremental investment in bicycle parking facility with shelter, bicycle racks, LED lighting.</p> <p>c) Incremental investment in 6 pneumatic road tubes with other applications to assist evidence based planning and GHG monitoring; facilitating stakeholder consultations.</p>	USD 3.7 million

Table 5: Baseline projects Khon Kaen sustainable transport sector

## Nakorn Ratchasima

86. Nakorn Ratchasima covers an area of 73 km<sup>2</sup> of Nakorn Ratchasima Province. Registered population as of 2013 is 135,160 people. Non-registered population is estimated at 29,735. Both registered and unregistered people are taken into account in the city planning. Over the last few years the number of registered people living in Nakorn Ratchasima city has declined from 165,000 in 2010 to 135,160 in 2013. The number of people living in surrounding areas has however increased, creating urban sprawl. Nakorn Ratchasima city serves as a central transport point in the province. NR has not formulated a low carbon strategic or action plan.

87. The following ongoing and planned initiatives depicted in Table 6 in the waste

management sector are considered as baseline to the project:

Owner & Project Name	Brief Description & Implementation Period	Linkage to GEF Project	Total Budget 2015-2019 [USD]
<b>City of Nakorn Ratchasima</b>			
Waste Management, Promotion of 3Rs and Waste to Energy facility	<p>In the BAU scenario, a total of 200 tonnes/day of waste is being collected in the city. Around 10 tonnes per day is treated in an anaerobic digester (AD) (capacity 80 tonnes/day) and 750 tonnes per month segregated, collected and sold to recycling business chain.</p> <p>To improve the waste management practices, the city aims to</p> <p>a) Recycling: promote recycling of waste at community level to 1,150 tonnes per month by EOP</p> <p>b) Anaerobic digester: improve the working of the AD and increase the collection of organic waste for treatment in the AD (target is full capacity at 80 tonnes per day by EOP) and</p> <p>c) Waste-to-Energy facility: realize a waste-to-energy facility. Originally the city planned for a facility with a capacity of 250 tonnes per day. The facility would be fully financed by the government and managed by the city. However, in the beginning of 2015 the NCPO requested NR to increase the capacity of the plant to 900 tonnes per day/9 MW in order that also waste from other municipalities could be incinerated. Next step will be to study the most appropriate financial and management model. Options include a PPP-model, fully financed by the government or complete sub-contraction. Commissioning is expected by July 2018.</p>	<p>GEF incremental activities will enhance the baseline activities through the provision of following assistance:</p> <p>(a) Recycling: Investment on 5 three-wheelers (locally known as "tuktuks") for collection of organic waste and recyclable materials; Investment on the compartmentalization of existing waste collection trucks for effective collection.</p> <p>b) Anaerobic digester: install and operate GHG monitoring tools such as methane measurement kits; Investment to refurbish the digester, and organize food waste collection systems.</p> <p>c) Waste-to-Energy facility: GEF incremental activities include commissioning of waste data survey and analysis for an up to date and accurate information on waste characteristics; assistance to determine the best-available-technology (BAT); installation of GHG monitoring equipment to optimize the emission reductions potential of the WTE, and conduct series of tests for plant performance during the commissioning of the demo unit.</p> <p>Without the GEF incremental activities, in the business as usual, the project would not have invested in these features.</p>	USD 99.7 million

Table 6: Baseline projects Nakorn Ratchasima waste management

88. The Traffic and Transport Master Plan prepared by OTP in 2004 for Nakorn Ratchasima suggested developing a BRT system on the main truck lines of the city. An elevated structure (sky buses) was suggested as best solution. Initially one line would be constructed and expanded with additional lines over the years. The total project investment for the initial plan (14 kilometres bus line with 40 buses in operation) was

around 146 million USD. Currently the detailed design for the first line of the BRT system is being carried out and expected to be finished by 2016. As preparation to the BRT system, NR has decided to implement a bus rerouting project. This will prepare the citizens for the future BRT system and the rerouted bus lines could serve as feeder lines to the BRT.

89. The following ongoing and planned initiatives as depicted in Table 7 in the sustainable transport sector are considered as baseline to the project:

Owner & Project Name	Brief Description & Implementation Period	Linkage to GEF Project	Total Budget 2015-2019 [USD]
<b>City of Nakorn Ratchasima</b>			
Sustainable Transport Initiatives: bus reroute and traffic data management centre and pilot project	<p>The sustainable transport initiatives planned include:</p> <p>a) Bus reroute project: The bus rerouting project involves rerouting existing city busses (260 busses) along 13 routes for a better coverage area; Improving service quality of the city buses, developing bus stop maps and schedules; Improving traffic flow at bus stops. The stakeholder consultations and planning of the rerouting will start within 2015 and the city aims to start with the re-route schedule by July 2017. After the BRT system is realized, the busses will serve as feeder to the BRT system.</p> <p>b) Traffic data management centre and traffic management pilot: During the conception stages of the BRT system NR realized that limited data was available to facilitate an evidence-based decision making process. NR felt the need for a more permanent way of collecting traffic data, therefore it was decided to establish a traffic data centre. In addition, it plans to implement a traffic management pilot project at 2 intersections to try out traffic signalling (aligning traffic flow with demand, etc.). The city aims to establish the traffic centre and pilot by January 2018.</p>	<p>GEF incremental activities will supplement and enhance the baseline activities of the city in (among other things):</p> <p>a) Bus reroute and BRT project: Investments in GPS tracking devices for the buses and passenger information systems; Conducting a comprehensive technical &amp; financial feasibility analyses of the BRT system; improving smooth access of commuters to the BRT system; long-term integrated planning; managing parking demand; improvement of the pedestrian and cycling facilities connected to the BRT, and integration of energy efficiency and renewable energy applications in the station design.</p> <p>Gathering transport data to facilitate evidence based decision making; Facilitating stakeholder consultations for the bus re-route project.</p> <p>(b) Traffic management demo: GEF incremental activities include transport data collection and analysis to facilitate evidence based decision making; Investment in pneumatic road tubes (traffic counter) including software/database (and training commensurate to the application of the software) to enhance the traffic control demos and allow for effective monitoring.</p>	USD 3.6 million

Table 7: Baseline projects Nakorn Ratchasima sustainable transport sector

### City of Samui/Samui Island

90. Samui is the third largest island in Thailand, after Phuket and Chang Island. The administrative area of Samui city is approximately 227 square kilometers. Most areas are mountainous area and only 73 square kilometer is flat area. Total registered population is approximately 62,388. However, there are around 300,000 unregistered people living on the island, mainly labourers. The un-registered population is significant



due to the presence of large number of foreign workers on the island who may or may not be registered with the central government, but are usually not registered with the local government. The city takes registered and unregistered people (including foreign workers and tourists) into account in city planning. Most foreign workers are housed by the resorts and hotels where they work. In addition, around 1.5 million tourists visit Samui each year who are considered in the urban development planning, in particular as tourism is the most important source of income of the island. There are around 465 hotels in Samui. All the tourists and the labourers produce a significant amount of waste and cause significant traffic congestion especially during rush hour. There is only one main road around the island. During rush hour this road is severely congested in the same way as in big cities.

91. A feasibility study for Low carbon Development for Samui Island<sup>46</sup> was conducted by the AEPC LCMT project managed by DEDE. The study proposes 9 strategies, including: 1) Town Structure Planning; 2) Transportation Planning; 3) Area Energy Planning; 4) Area Energy Management; 5) Renewable Energy; 6) Untapped Energy Use Planning; 7) Low Carbon Building; 8) Eco-Lifestyle; 9) Environmental Planning. The current projects of the city and the incremental activities of the GEF project will build on the strategies identified in this report.

92. The following ongoing and planned initiatives depicted in Table 8 in the waste management sector are considered as baseline to the project:

Owner & Project Name	Brief Description & Implementation Period	Linkage to GEF Project	Total Budget 2015-2019 [USD]
<b>City of Samui</b>			
Waste Management, promotion of decentralized waste management and integrated waste management facility	In the BAU scenario, a total of 170 tonnes/day of waste is being collected on the island. 4 tonnes per day is composted and 715 tonnes per month segregated, collected and sold to recycling business chain. To improve the waste management practices, the city aims to: a) Decentralized waste management: Promote decentralized waste management. Samui plans to continue its efforts on decentralized waste management by encouraging hotels, schools, and communities to separate waste to reduce the amount of waste to be collected and treated. Technologies focussed on are composting and recycling at community scale. The targets are 10 tonnes of waste to be composted by EOP. b) Comprehensive waste management facility: Realize a comprehensive waste management facility. The city plans to construct a comprehensive	GEF will support the following incremental activities: a) Decentralized waste management: investments in advanced in-vessel compost systems for commercial (e.g. hotels) and community purposes; provision of technical assistance to train communities and hotels on modern composting techniques. In the baseline scenario basic composting techniques would have been installed. b) Comprehensive waste management facility: incremental activities include waste source survey and data analysis; establishing reference baseline and targets for the comprehensive waste management facility as well as establishing a robust monitoring framework; Expansion of the composting	USD 26.7 million

<sup>46</sup> Final report for Asia-Pacific Economic Cooperation (APEC) Low Carbon Model Town Project Phase 2, Energy Working Group, 2013. [http://publications.apec.org/publication-detail.php?pub\\_id=1400](http://publications.apec.org/publication-detail.php?pub_id=1400)

	waste treatment facility which is envisaged to include a combination of front-end waste separation, plastic to oil processing, pyrolysis of wood waste, anaerobic digestion and RDF production. The government is assessing the financing structure which will either be based on a PPP-model or 100% public financed. The facility is expected to be operational by 2017. The target is to increase recycling to 1,315 tonnes of waste by EOP (both from community based decentralized recycling and centralized facility).	programme by including more communities and hotels and using more advanced composting technologies.	
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Table 8: Baseline projects Samui waste management

The following ongoing and planned initiatives as depicted Table 9 in the sustainable transport sector are considered as baseline to the project:

Owner & Project Name	Brief Description & Implementation Period	Linkage to GEF Project	Total Budget 2015-2019 [USD]
<b>City of Samui</b>			
Sustainable Transport Initiatives: traffic zoning and bikeway	The sustainable transport initiatives planned by Samui include: a) Traffic zoning project: due to the growing number of community shopping malls and gas stations on Samui Island, a large number of trucks and trailers is traveling from the ferry port to the city during the day. These trips create both traffic congestions and risk of serious traffic accidents. Samui plans to implement controls to these freight movements. The idea is to implement zoning and time restrictions on the island. The city aims to start consultation with the stakeholders by end-2015 and implement the zoning by January 2018. b) Bikeway and Samui biking paradise 2016. Samui aims to change the image of the island towards a green island. As part of the efforts, the city aims to promote 'Samui biking paradise 2016' and create a pedestrian and bike- friendly environment. The bikeway (around 5 km long) should be opened during the launch of 'Samui biking paradise 2016', mid/end 2016.	GEF will enhance the baseline activities through the following incremental activities: a) Traffic zoning: investment in GPS tracking devices for trucks; investment in software/database to support traffic zoning enforcement and monitoring data survey and analysis; Facilitating stakeholder consultations. b) Bikeway: install safety features (physical barriers, reflectors, LED lights) of the bikeway and parking shelters. In the baseline, no safety features and energy efficient interventions was planned to be incorporated.	USD 1.04 million

Table 9: Baseline projects Samui sustainable transport sector

## Klaeng

93. Muang Klaeng is a small city compared with the other cities covered in this project. Muang Klaeng covers an area of 14.5 km<sup>2</sup> of Rayong Province. Registered population as of 2013 is 17,773 people. The number of unregistered people is around two times the number of registered people. So in total around 50,000 people are living in Muang Klaeng. Both registered and unregistered people are taken into account in city planning. Klaeng has 13 communities and 7 schools with around 8,000 students within its



administrative area.

94. Klaeng is an example for other cities in Thailand in the area of waste management. At its transfer station it has established a Waste Management Learning Centre in which the various ways of waste treatment, recycling and re-use are shown. For example, organic waste is separated and 1) use as animal feed (pigs are held at the centre), 2) composted and 3) digested anaerobically. The gas produced in the anaerobic digester is used for heating water at the slaughterhouse which is also located in the same area. Waste is separated and recycled using a waste conveyor belt. In addition, waste separation at source is taking place and the separated waste is collected by the municipality. Last but not least, it has a research centre to identify new ways of using recycled materials. The learning centre and transfer station is visited by many government staff from local authorities to learn on good waste management practices.

95. The following ongoing and planned initiatives depicted in Table 10 in the waste management sector are considered as baseline to the project:

Owner & Project Name	Brief Description & Implementation Period	Linkage to GEF Project	Total Budget 2015-2019 [USD]
<b>City of Klaeng</b>			
Waste Management	In the BAU scenario, a total of 22 tonnes/day of waste is being collected in the city and brought to a landfill. 11 tonnes per month is segregated, collected and sold to recycling business chain. (a) Waste management facility: The central government recently decided that Klaeng will need to expand its waste management facilities up to 100 tonnes per day and process waste from surrounding cities. Klaeng has established recycling practices which are an example for other cities. The current good practices on recycling will be applied to the expanded waste management facility. The facility should be ready by January 2017. The city aims to recycle an additional 20 tonnes per month by EOP.	GEF support will augment the baseline activities through the following incremental activities: a) Waste management facility: investment in a conveyor belt for effective waste sorting; comprehensive technical & financial feasibility analyses of waste management facility expansion and commissioning of the waste source survey and data analysis.	USD 4.8 million

Table 10: Baseline projects Klaeng waste management

96. The following ongoing and planned initiatives as depicted in Table 11 in the energy and sustainable transport sector are considered as baseline to the project:

Owner & Project Name	Brief Description & Implementation Period	Linkage to GEF Project	Total Budget 2015-2019 [USD]
<b>City of Klaeng</b>			
Sustainable Transport Initiatives: city shuttle bus service	The sustainable transport initiatives planned by Klaeng include: a) City shuttle bus services: Improvement of the city shuttle bus service. The city is planning to improve its shuttle bus services with one additional route by 2017. Two additional busses will be procured should start operations by	GEF will finance the following incremental activities: (a) City shuttle bus services: GEF will assist in the demonstration of modern bus stops with improved,	USD 540,000

and pedestrian areas	<p>January 2017.</p> <p>b) Pedestrian areas/cycling: Improvement of pedestrian areas. The city is planning to improve its pedestrian areas in the city over the coming 3 years (2015 to 2017). Activities include improving of the pavement, removing obstacles and construct crossing where pedestrians can easily and safely pass roads. The incremental activities related to improving biking facilities will be commissioned by January 2017.</p>	<p>passenger friendly and safety features such as signs, convenient access and shelters, connections to other forms of transport, LED lighting, upgraded bus information systems for passengers. Without GEF investment, the city would not have invested in such modern bus shelters that would encourage commuters to switch to public buses; Establishing performance baseline and targets for the city bus service and carrying out user surveys.</p> <p>c) Pedestrian areas/cycling: investment in cycle parking facilities, racks and energy efficient lighting (LED) improvement; Facilitating stakeholder consultations for the programme to improve pedestrian areas.</p>	
Energy efficiency	<p>Water pumping station: Klaeng is planning to double the capacity of the water pumping station. Current capacity of the pumping station is 288,000 m<sup>3</sup>/month, after expansion the capacity will be 576,000 m<sup>3</sup>/month. This entails procurement and installation of additional water pumps. The project is scheduled to be commissioned January 2017.</p>	<p>GEF will finance the incremental activities on establishing baseline and targets for the improvements and expansion in the water pumping station; investments to purchase four energy efficient pumps to enhance the GHG mitigation potential of the baseline project. Without GEF incremental support, the city would not have considered installing energy efficient pumps.</p>	USD 619,000

Table 11: Baseline projects Klaeng sustainable transport and energy sectors

#### 1.5.4 Complimentary projects / programmes

97. In addition to the projects, initiatives and programmes listed above, the project will coordinate with and seek to build synergies and complementarities with other on-going activities in the country, in particular the following:

- **The Third National Communication (TNC) and the first Biennial Update Report (BUR):** for its official national communications to UNFCCC. The Project will closely coordinate with TNC/BUR project to ensure integration of data systems and linkages with planning. It is expected that sub-national authorities will be participating in the GHG inventory process and preparation of the mitigation and adaptation measures. The TNC/BUR project represents a strategic tool to integrate climate change considerations into sector policies and programs, as well as building on the project's outputs especially with regards data and GHG accounting. The preparation of the 1st

BUR report is on-going for submission in 2016. The project will coordinate with the TNC and BUR project via TGO, which is a member of the Project Board of TNC/BUR project, and directly via its project implementation unit.

- **Promoting Energy Efficiency in Commercial Buildings (PEECB):** The PEECB project is a four-year (2012-2015) collaboration project implemented through the Department of Alternative Energy Development and Efficiency (DEDE) under Ministry of Energy, Thailand. The project is designed to promote and facilitate the widespread application of building energy efficiency technologies and practices in commercial buildings in Thailand. The realization of this objective will be facilitated through the removal of barriers to the uptake of building energy efficiency technologies, systems, and practices. It is comprised of activities aimed at improving energy efficiency and promoting the widespread adoption of energy efficient building technologies and practices in the Thai commercial building sector. The project will coordinate with the PEECB project via MoE/DEDE which is a member of the Project Board and directly via its project implementation unit. Close coordination will be made in particular on the lessons learned and the MRV procedures in buildings, as well as the capacity building processes.
- **MONRE Environmental Fund:** The Environmental Fund managed by MoNRE provides financial resources in the form of grants and loans to local governments and private sector for environmental related projects, including waste management projects. Both governmental agencies and the private sector are eligible for funding but in practise it is difficult for the private sector to access the fund. The fund requires that local governments allocate 10-35% of co-funding to the construction of waste treatment facilities. Additionally, local governments must submit the proposal to ONEP as a part of the provincial environmental management plan. A detailed feasibility study is required as part of the request for funding. The environmental fund is a main source of funding for environmental management projects of local authorities. Approval of grants for the construction of waste management infrastructure may however take a few years. Often delays occur due to incomplete document submission by local governments. The project will coordinate with the Environmental Fund via MoNRE, which is a member of the Project Board.

## ***1.6 Baseline Scenario***

98. The baseline scenario is a continuation of the present business as usual (BAU) situation, which follows from existing government policy, activities, legislation and institutions. The BAU scenarios described above will most likely be characterised as follows:

- Limited integrated low carbon development planning at the city level, e.g. limited cooperation between different departments within the local government result inefficient use of resources (intersectoral cooperation) or limited cooperation between local, regional and national governments (vertical integration);
- Unsuccessful low carbon investments in cities. Shortly after the investments, the project might fail due to poor planning and lack of capacities to manage and maintain the investments;
- Top-down planning without community involvement, leading to limited support for low carbon development actions in cities;
- Continued lack of data which can be used for planning and monitoring of activities and investments;
- Limited coordination and cooperation between agencies at local level, hampering

- effective planning and implementation of low carbon activities;
  - Unavailability of data on GHG emissions at the local level, hampering an effective cost/benefit analysis and evidence based decision making;
  - Cities will have limited access to domestic and international sources of climate finance as they don't know how to access them and their monitoring systems will not meet the requirements;
  - Successful examples of low carbon investments and activities and integrated urban systems will remain few with ineffective dissemination of lessons and best practices;
  - Several of the baseline projects as described in section 1.5 will most likely be implemented without support from GEF, however, in the BAU scenario this is likely to be at a later date, at a smaller scale, with uncoordinated roll-out, in a less integrated and sustainable way leading to less GHG emission reductions. These baseline projects were intended mainly for addressing waste management and transport management problems, hence, originally designed without the notion of potential GHG emission reduction benefits. Implementation of some baseline projects might be delayed significantly without the GEF support, which potentially could lead to cancellation
  - Limited support from citizens in cities for low carbon initiatives which will increase the chance of failure.
99. Under the BAU scenario, cities will contribute to GHG emission reduction actions but only marginally and not at a scale and pace required to contribute to the GHG emission reduction target of 7%-20% below the business as usual (BAU) in 2020 as set by the central government. Under the national BAU scenario, total national GHG emissions have been projected to grow to more than 1,300 million tCO<sub>2</sub>e by 2050<sup>47</sup>. Around 34% of BAU emissions are related to the key urban sectors: transportation (around 21% in 2050), waste (around 10% in 2050) and energy: residential/commercial/institutional sector (around 3% in 2050). The emissions in the urban sectors (transport, waste and energy: residential/commercial/institutional sector) are projected to increase from around 72.9 MtCO<sub>2</sub>eq in 2009 to around 115 MtCO<sub>2</sub>eq in 2020 and around 415 MtCO<sub>2</sub>eq in 2050, see figure 9.

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<sup>47</sup> TGO & JGSEE (2012): Final Report on Projection of Greenhouse Gas Emission and Mitigation and Their Scenario Studies Using Economic Models.

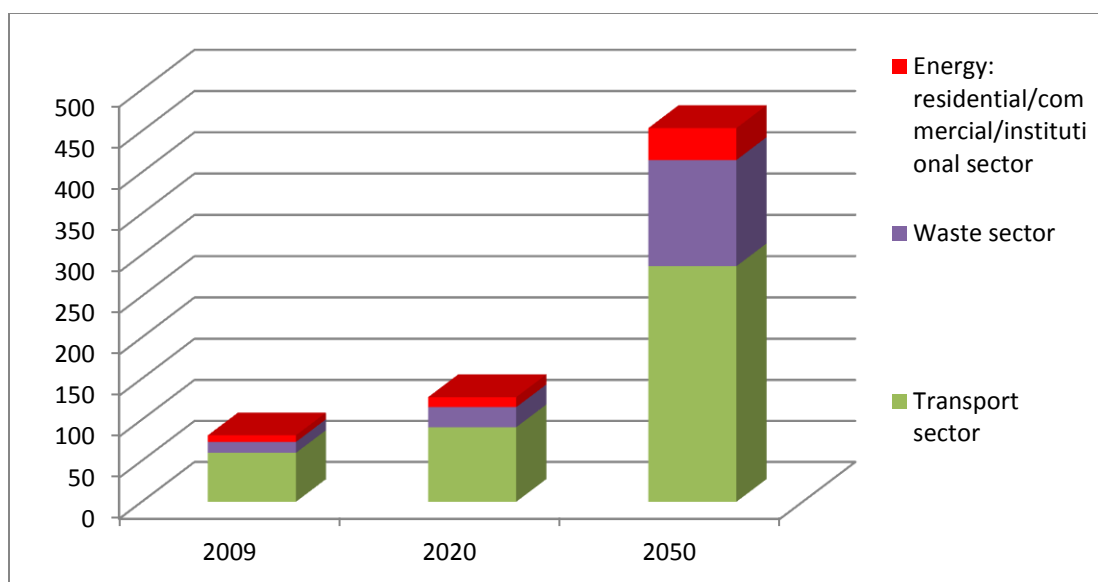


Figure 6: BAU scenario GHG emissions urban sectors in 2009, 2020 and 2050 (in MtCO2eq)

100. The project will work with the cities and the central government to address the identified barriers and contribute to GHG emission reductions in Thailand. Figure 10 presents the BAU scenario for GHG reductions without the GEF Project and the alternative scenario in the presence of the GEF Project. In the alternative scenario, the Project will deliver direct GHG emissions of approximately 177,708 tCO2eq from 2016-2019.

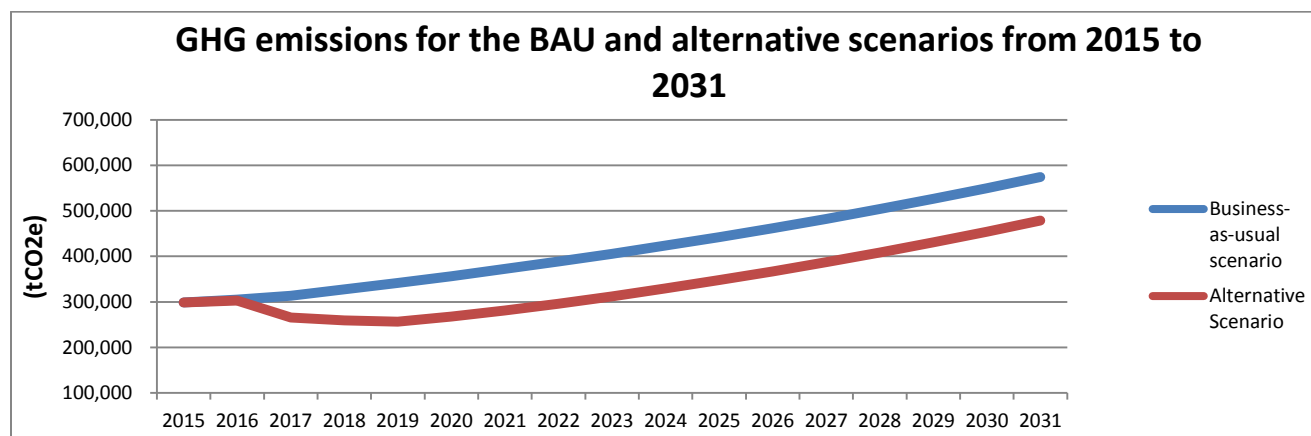


Figure 7: GHG emissions for the BAU and alternative scenarios from 2015 till 2031

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## II. STRATEGY

### ***2.1 Project Rationale and Policy Conformity***

101. Overall, this project is set against a background of rising concerns about the sustainable management of Thailand's natural resources and the liveability of cities and an increasing reliance of Thailand on imported fossil fuels to meet its energy needs. Similar to most developing countries which are increasingly energy importers, the likely increase in future energy costs and the disruption in energy supply could jeopardize Thailand's economic growth. In addition, the increasing urbanization and population growth is causing significant environmental challenges in cities. The RGOT acknowledges the challenges ahead, in particular at local level.
102. The goal of the project is the reduction of future GHG emissions from cities in Thailand and the project objective is the promotion of sustainable urban systems management in Khon Kaen (KK), Nakorn Ratchasima (NR), Samui and Klaeng to achieve low carbon growth. The proposed project is consistent with one of the pillars in the 11th National Economic and Social Development Plan (2012-2016), which aims to move Thailand towards a low carbon and climate resilient society. In addition, the project is aligned with the officially announced GHG emission reduction targets of Thailand. Thailand will, on a voluntary basis, reduce its GHG emissions in the range of 7%-20% below the business as usual (BAU) in 2020.
103. The proposed project conforms to the GEF-5 Climate Change Strategic Objective 4 on the promotion of energy efficiency, low carbon transport and urban systems. The Project will contribute to the reduction of GHG emissions from urban systems in cities in Thailand through the removal of barriers for low carbon development in cities. In particular the sustainable transport and waste management sectors are targeted, as requested by the Thai Government during the GEF5 strategic planning workshops. The project will enhance/improve and expand baseline activities related to: composting & digestion of waste, waste-to-energy projects, recycling of waste, traffic control & management projects, shuttle bus improvement and bus reroute projects as preparation for bus rapid transport systems and energy efficiency measures. These projects and measures will contribute to reducing emissions and promotion of low carbon development pathways for cities.

### ***2.2 Country Ownership: Country Eligibility***

104. The RGOT has ratified the UNFCCC in 1994 and the Kyoto Protocol (KP) in 2002. Since the proposed "Achieving Low Carbon Growth in Cities through Sustainable Urban Systems Management in Thailand" project will contribute to the reduction of GHG emissions in cities and also lead to sustainable global benefits, the proposal lends itself to Thailand's compliance to said convention. The project will address the underlying causes of global environmental concerns such as inadequate policies and regulatory frameworks, institutional weaknesses and limited capacity of stakeholders hampering low carbon developments in cities.
105. As a GEF member, Thailand is eligible to avail of GEF funds for this initiative. The proposed project is in line with the RGOT aim to increase the adoption of low carbon

development approaches and low carbon technologies for maintaining environmental balance.

### ***2.3 Country Driven-ness***

106. For a nation like Thailand, whose economic growth has brought about unsustainable development practices and an increase in greenhouse gas emissions, the concept of sustainable development and low emissions development pathway have been an essential goal. It is facing a growing population and increased urbanisation while at the same time pushing hard to develop its economy that will further increase the pressure on the environment and lead to an increase in GHG emissions. Cities play a crucial role in reducing the emissions of GHG. Also the increasing pollution in cities is encouraging the government to identify sustainable ways forward which would increase liveability of the cities.

### ***2.4 Design Principles and Strategic Considerations***

107. Given the limited successful examples of sustainably managed urban systems at the local level in Thailand, the design of the proposed project will focus on demonstrating best practices that are applicable to the Thai context and take into account lessons learned and experiences from previous initiatives. The project will remove awareness barriers with government staff and citizens in cities and enhance skills in the planning, development and management of low carbon urban systems. Also data gathering for planning and monitoring purposes of the performance of the low carbon urban systems will be addressed.
108. The project promotes an integrated approach to low carbon planning by addressing the following dimensions:
- Horizontal cooperation between local authorities, private sector and communities in a specific region. This is achieved by demonstrating low carbon planning within a region encompassing several municipalities and facilitating cooperation among various stakeholders in different municipalities in that region. The cooperation across local authorities on waste management in Klaeng and surrounding municipalities within the cluster system (under the cluster system typically 5 to 10 municipalities in an area work together on waste management by e.g. operating one landfill for the area and collaborating on waste collection) or the cooperation between private sector, communities and government on promotion of recycling in KK and NR city are examples of it. Also the cooperation and sharing of lessons learned between cities under the Low Carbon Cities Network is an example of horizontal cooperation.
  - Vertical cooperation between government levels, to better enable support from the national government via its regional offices, to the local level, and participation of local level in the national agenda. This is achieved by improving coordination between local, regional and central agencies during local planning processes, and strengthening vertical coordination structures, such as working groups for GHG inventories and MRV. In these working groups representatives of local governments, regional offices and central government agencies will work together.
  - Inter-sectorial cooperation, to ensure effective engagement across services and technology areas and efficient use of resources. Planning of the main energy end-



use sectors such as waste management and transport requires good inter-sectoral cooperation in order to increase resource efficiency. The planned urban systems will be designed based on energy-integrated planning principles (e.g. the expansion and improvements in efficiency of municipal services such as water supply in Klaeng will be realized by considering energy efficient pumps). Also incorporating climate resilient considerations into urban planning to make urban systems more resilient to adverse effects of climate related risks. For example, the design of the composting plant in Khon Kaen will include measures to protect against flooding. Also, in Samui and NR, municipalities plan to green the landscape around the city and island which will be linked to the investments in low carbon and non-motorized transport systems, such as bikeways, to attract more users by creating green spaces, enhancing the aesthetics as well as comfort for the bikers.

### **Selection of cities**

109. As indicated in chapter 1.1 the project will work with 4 pilot cities: Khon Kaen, Nakorn Ratchasima, Klaeng and Samui. The choice to work with these four cities and to enhance their actions in the identified investment areas are in line with the priorities identified by the Thai government. For example, during the GEF National Portfolio Formulation Exercise, following an extensive consultative process, supporting cities in low carbon investments, in particular waste management and sustainable transport, was considered as one of the priority projects for GEF-5. During this consultative process it was also agreed that the project should include all 3 types of municipalities/cities in Thailand, i.e. large, medium and small municipalities/cities, as each type of city is faced with different kinds of challenges.
110. The identified investment areas are also closely aligned with the results of the Second National Communication to the UNFCCC. The energy sector is the biggest contributor to Thailand's GHG emissions. The transport sector alone, which is a subsector of the energy sector, is responsible for more than one-fifth of the country's GHG emissions. The SNC identifies the waste sector as an important contributor to methane emissions, a potent greenhouse gas. Solid waste disposal on land and waste water handling result in nearly 400,000 tonnes of methane emissions per year, representing 14% of the country's methane emissions. Waste-to-energy technologies can reduce GHG emissions in the waste sector as well as reduce GHG emissions in the energy sector. Two of the priority GHG mitigation measures put forward in the SNC are increasing the energy efficiency in transportation (e.g. via public transportation or non-motorized transport) and reducing the amount of waste generated and landfilled (e.g. via recycling or processing).
111. Thailand's Technology Needs Assessment identified two GHG mitigation options for the waste sector: waste management and waste conversion to energy, both of which will be implemented under this project. In addition, amongst others, mass transit transport and traffic management, are identified as GHG mitigation options for the energy sector.
112. To ensure success, the demonstrations of the low carbon urban systems will:
  - Be planned in a bottom-up inclusive way with involvement of all main stakeholders and integrate international best-practices. Planning will involve local stakeholders (communities, local private sector), representatives from different sectors in the



government and representatives from the central government in both planning and implementation phases;

- Involve enhancing awareness and knowledge among government staff and citizens of cities – in general, of issues related to climate change, and low carbon urban systems, in particular. This will include targeted awareness campaigns and training activities;
- Include strengthening institutions by establishing cooperating modalities and working groups responsible for processes to collect data for planning purposes and monitoring of projects (including GHG inventory and MRV); and,
- Include (user) data gathering for planning and monitoring purposes in order to track performance of urban systems and improve services to citizens.

113. The project will be implemented over 4 years to ensure support to cities over a long period of time during their planning processes, designing, implementation and management of low carbon urban systems. The project will strengthen the capacity of cities towards low carbon development as well as undertaking concrete actions that will deliver emission reductions during the life of the project. The activities will be funded by co-financing from cities, and in certain cases (partly) funded by GEF support. The project aims to leverage additional resources where ever possible, especially from the private sector, towards the project objectives.

114. The alternative to the BAU scenario will be enabled through the activities proposed in this project. These will ensure the removal of barriers for the adoption of low carbon development in cities in Thailand. .

115. The implementation of the alternative scenario will require the involvement of several key stakeholders, such as 1) government officials and mayors of the 4 cities, 2) local stakeholders in the cities such as communities and private sector, 3) TGO, and 4) line ministries and representatives of line ministries at local level, such as MoI, MoNRE, MoT, MoE, and MoH.

116. In the alternative scenario the following will be realized:

- Enhanced awareness of citizens in cities and government staff on climate change, low carbon development and benefits of low carbon urban systems;
- Motivated communities willing to support low carbon activities, such as waste separation and recycling and the use of non-motorized transport and sustainable transport services;
- Established processes to gather data for planning and monitoring of low carbon activities and investments (incl. user satisfaction data, GHG emissions and MRV) in order to improve services to citizens and reduce GHG emissions;
- Strengthened capacities in the cities to plan, design, implement and manage low carbon investments, in particular on waste management and sustainable transport;
- Demonstrated benefits of low carbon urban projects via successful examples;
- Demonstrated inclusive low carbon planning in at least 4 cities; (stakeholder involvement during planning stages and implementation stages, in order to increase support for the investments by citizens and improve the design);
- Demonstrated integrated low carbon planning, integration will be shown 'horizontally' (cooperation between local authorities and local stakeholders, e.g. in increasing the recycling and composting activities in communities), 'vertically'

(cooperation between government levels, e.g. in the MRV and carbon footprint working groups), and inter-sectorial cooperation (across services and technology areas and including climate resilience, e.g. by inclusion of energy efficiency principles or climate resilience approaches in the design of the composting plant). Another example is the linking of the community based composting activities in Samui with efforts to green the island and in local vegetable gardens;

- Demonstrated the successful operation of low carbon supporting schemes, such as T-VER and LESS;
- Improved mechanisms to collect waste and traffic data to be used for evidence-based decision-making;
- Strengthened and clarified roles and responsibilities with regard to measuring and reporting data related to urban systems and GHG emissions. In particular improved cooperation between officials within the local government and with officials at regional and central level
- Increased access to national and international sources of climate finance;
- Expanded and enhanced network of cities to share experiences on low carbon development planning;
- Produced and disseminated best practice examples on low carbon activities and investments at city level.

117. In this alternative scenario, city development planning will adopt a low carbon approach. The estimated direct GHG emission reductions by the end of project in 2019 will be about 177,708 tonnes of CO<sub>2</sub>eq lower than compared to the BAU situation. Subsequent direct GHG emission reductions after the project till end of lifetime of the investments are expected to provide 1,359,852 tonnes of CO<sub>2</sub>eq. For more details see Annex II: Detailed CO<sub>2</sub> Calculations and Assumptions.

## ***2.5 Project Goal, Objective, Outcomes and Outputs/Activities***

118. This project addresses the barriers to adoption of low carbon development in cities Thailand through interventions that will improve significantly the overall capacity of stakeholders.

### **Project Outcome, Outputs and Activities**

119. In order to realize the project objective, the project is designed to comprise of two components, each of which addressing a specific category of barriers to adoption of low carbon development in cities Thailand. The project components are:

- Component 1.1: Low carbon sustainable urban development planning in selected cities;
- Component 1.2: Low carbon investments in selected cities;
- Component 2.1: Financial incentives and institutional arrangement in support of low carbon cities initiatives.

### **Component 1.1: Low carbon sustainable urban development planning in selected cities**

120. This component addresses specific barriers to adoption of low carbon development in 4 cities (KK, NR, Samui and Klaeng) which include limited bottom-up and integrated low carbon development planning, lack of capacities of staff to implement and manage low carbon urban development projects and lack of data for planning & monitoring of low carbon investments. The expected outcome from this component is the increased number of Thai cities that have formulated and implemented low carbon sustainable urban development plans. As explained in detail below, outcomes 1.1 and 1.2 will collectively result in the establishment of decision making and planning tools that will be employed by local authorities, policy makers, project developers and other key stakeholders in the four project cities to integrate urban planning considerations in their local planning processes. In doing so, these early movers will provide a practical and visible demonstration of successfully employing evidence based low carbon urban planning. Through this, additional cities will be able to draw important lessons on how well designed, tried and tested decision tools combined with capacity development and institutional strengthening can enable them to reap the benefits of low carbon urban planning. Increased number of Thai cities, consequently, will be encouraged to formulate and implement their own low carbon urban development plans. Under outcome 1.1 cities will integrate low carbon consideration in the local development plan and prepare low carbon action plans wherein key low carbon urban systems will be prioritized. The actual implementation of the action plans along with the supportive investment in low carbon urban systems will be leveraged and brought to fruition through activities in outcome 1.2. Furthermore, activities in outcome 1.1 - that involve establishing city level baseline information and monitoring frameworks - will reinforce the 'readiness' of cities to leverage investments in low carbon interventions (as showcased in outcome 1.2). The linkage between these project components is in fact two-way, whereby lessons arising from successful demonstration of investments projects in outcome 1.2 will subsequently inform planning activities under Component 1.1. Ideally and where appropriate, these outcomes will be sequenced. The following outputs will contribute to the achievement of this outcome:
121. Output 1.1.1: GHG inventory for each of the project cities – This is a set of GHG carbon footprint<sup>48</sup> reports for selected cities (including the 4 pilot cities) that will be prepared in coordination with the planned carbon footprints by TGO & the Partnership for Market Readiness Project (PMR) and the GHG emissions inventory work that will be done by ONEP as part of the preparation of Thailand's Third National Communication (TNC) and first Biannual Update Report (BUR). The following activities will be carried out to deliver this output:
- Establishment and operationalization of carbon footprint institutional framework – This will be done for each city and will include all of the relevant regional and city government agencies, private sector entities and NGOs/CSOs - Such framework shall define the responsibilities of each party involved and the protocols/procedures for the carbon footprint data gathering work and the sectors to focus on. A special GHG carbon footprint working group will be formed and deployed in each of the selected cities that will be tasked to coordinate gathering, processing, analysing

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<sup>48</sup> The GHG inventory methodology applied is referred to by TGO as 'carbon footprint methodology'. It will be the same methodology as applied under the WB's PMR project. The concept and methodology is adopted from ICLEI.

and reporting carbon footprint data. Representatives of the central level and regional level will be part of the working groups. The working groups should enhance the cooperation between central level and local level (vertical integration).

- Updating and enhancement of the carbon footprint guidelines – This will involve the updating of the guidelines prepared by TGO for use in GHG emissions inventories. Aside from the technical guidelines, necessary tools for the inventory, data processing and analytical works will be developed and provided.
- Conduct of orientation training on City Carbon Footprints at the regional/city level for local government authorities - This includes training on the use of the technical guidelines and the tools that will be used for the data gathering, processing and analysis works that will be done. It will include specialized technical training on the same for local government personnel that will be involved in the regular inventory work.
- Conduct of the carbon footprint for each of the selected cities in specified sectors - The carbon footprint will include identification of mitigation options in the relevant sectors and their costs. This will be planned and implemented in coordination with the TGO and where applicable with the ONEP for each of the target cities. All of the data gathered from the carbon footprints will be processed and analysed, and where inconsistencies are encountered in any of the target cities, further investigations will be carried out following the established institutional framework protocols. In particular on waste management data, inconsistencies have been identified already.
- Preparation of the carbon footprint reports for the cities - For each city, a draft report will be prepared for discussion among the members of the carbon footprint working group. Once consensus is reached among the members on the various findings, recommendations and conclusions of the carbon footprint work, the report is finalized and published. The results will be shared with government stakeholders at central level, including TGO and ONEP for use also in the TNC and BUR projects.

*GEF support is required for the technical assistance in the capacity building of the city and regional government agencies and technical personnel on preparing carbon footprints for cities; and in the conduct of the works involved in the inventory in each city.*

122. Output 1.1.2: Formulated integrated low carbon urban development and action plan in each of the project cities - This output entails formulate local development plans in which low carbon considerations are integrated and low carbon action plans for each of the 4 city. The following activities will be carried out to deliver this output:

- Conduct of training of government officials, private sector and stakeholder on integrated low carbon urban planning and low carbon investments in cities - For this TGO CITC will develop a Low Carbon Cities training course, see output 2.1.5. TGO CITC will also provide the training.
- Preparation and approval/adoption of the local development plans for each city in which low carbon considerations are integrated - The 3-year planning cycle for the preparation and approval of the local development plans of the cities will be taken as starting point. Each city is in a difference phase of the 3-year development plan, at the same time it is common practice every year to make adjustments to the 3-year development plans. The project will enhance the planning process by

promoting collection and analysis of waste and traffic related data to facilitate evidence-based decision making. Based on the local development plans, low carbon action plans for each city will be formulated. The low carbon investments included in the local development plans and low carbon action plans will be based on development priorities of the cities, cost-effectiveness of investment options and the abatement potential of low carbon actions. The cities will formulate GHG emission reduction targets and indicators. A consultative approach will be followed for the preparation of the local development plans and low carbon action plans. Low carbon development considerations (including land-use) will be factored into the local level through the local development plans. The project will improve planning effectiveness -including decision making with regards to land-use and zoning (e.g., in planned development areas of cities) - through the review of local planning guidelines and capacity development of council staff to strengthen delivery of regulatory services.

- Preparation of sector specific plans - Based on the priorities identified in the local development plans and low carbon action plans, sector specific plans to maximize GHG emission reductions, including on waste management (KK, NR, Samui, Klaeng) and sustainable transport (KK, NR, Klaeng and Samui) will be prepared. Each of the sector specific plans will take into account cooperation between different departments in the city and government agencies and other relevant sector(s)/plans to ensure integration and inter-sectoral cooperation to maximize effective planning and GHG emission reductions. For example, energy-integrated planning of investments will be included, such as for the WTE plant in NR, or climate resilience of low carbon urban infrastructure will be ensured, such as the protection against flooding of the composting plant in Khon Kaen and cooperation between municipalities will be enhanced, such as the cooperation between Klaeng and surrounding municipalities on waste management. Another example applies to NR where it has a plan to promote greening the landscape in the city. It aims to reserve certain areas for living, others for work and create green spaces. The green landscape will be integrated with urban systems such as transport which will be detailed out in the sector specific plans as well as design of the low carbon investments. A similar example applies to Samui. Samui aims to make the island more 'green' by planting trees and vegetation along roads and along plots which are currently not being used. This will be linked to the community based composting programme, which offer good options for synergies. The produced compost can be used in these green areas or in vegetable gardens. Also the efforts to promote cycling on the island will be integrated with the landscape greening plans. Investment options will be costed, funding sources and financing strategies identified. For each sector the cities will also formulate GHG emission reduction targets and indicators;
- Conduct of survey on waste data and characteristics (e.g. volume of waste generated, compositions, sources, etc.) in the participating cities - Data analysis will be conducted to process the gathered data and form the basis for the preparation of the sector specific plans in the waste management sector;
- Conduct of technical assistance – This will be carried out by technical experts in waste management and sustainable transport during the planning, design, implementation, management and monitoring of the low carbon urban systems planned under activities between outputs 1.2.1 and 1.2.4. Sectoral experts will provide technical backstopping, review of assessments/feasibility reports, monitoring frameworks and provide strategic recommendations.



*GEF support is required for the technical assistance in the capacity building of the city government agencies and technical personnel on low carbon urban development planning; and in the conduct of the works involved in preparing the urban development plans with low carbon considerations integrated and sector specific plans in each city.*

123. Output 1.1.3: Formulated and implemented monitoring frameworks for waste management activities in cities – this is a set of environmental monitoring frameworks for the large waste management facilities being planned and realized in KK, NR and Samui. The following activities will be carried out to deliver this output:

- Conduct of orientation trainings – The trainings will be focussed on the environmental aspects of waste-to-energy and comprehensive waste management facilities to regional/city level government authorities; and specialized technical training on the same for local government personnel that will be involved in the regular monitoring work;
- Formulation of an institutional framework for the monitoring of large waste management facilities in each city – The frameworks will include all of the relevant government agencies, operator of the facility and representatives of local communities. Such framework shall define the responsibilities of each party involved and the protocols/procedures for the monitoring and communication. The institutional set up will provide procedures for addressing concerns, increase transparency of environmental control and dissemination of correct information to residents. The framework will include public hearings to receive feedbacks from local stakeholders on the environmental management plans submitted by the operator. These hearings will take place prior to adoption of the plan;
- Preparation of environmental monitoring frameworks for the 3 cities – The environmental monitoring framework will include the indicators which will be monitored;
- Conduct of technical assistance – This will be carried out by technical experts in the review of the environmental management plans submitted by the operators of the waste management facilities to the cities;
- Facilitation of exchanges, visits and meetings between the 3 cities which are preparing the environmental monitoring plans - This in order the cities can learn from each other's experiences. All the activities together will increase the enforcement of environmental laws applicable to waste management facilities.

*GEF support is required for the technical assistance in the capacity building of the city government agencies on environmental impacts of waste management facilities and effective monitoring approaches & frameworks and in the conduct of the works involved in establishing the institutional framework and preparing the monitoring framework in the cities.*

## **Component 1.2: Low carbon investments in selected cities:**

124. This component addresses specific barriers to adoption of low carbon development in cities which include limited capacities for designing, implementing, managing low carbon urban investments; lack of data gathering for monitoring of the systems in cities, and lack of examples of successfully managed low carbon urban systems in the local context in Thailand. Also the lack of stakeholder involvement during

planning and implementation will be addressed. These and other more cross-cutting issues will be addressed across all investment projects on priority, simultaneously ensuring that the investment activities are implemented in a way to demonstrate direct GHG emissions reductions within the 4 year project supervision period. The expected outcome from this component is the increased number of Thai cities with energy efficient urban systems. Each of the below outputs refer to one specific city and will contribute to the achievement of this outcome:

**125. Output 1.2.1: Operational low carbon urban waste management and sustainable transport systems in Khon Kaen** – This output entails installed low carbon urban systems that will be designed based on energy-integrated planning principles. These systems are on urban waste management and urban sustainable transport. They will be implemented by the city and its partners, who agreed to subsume their respective projects to be among the demonstrations under this UNDP-GEF project. **The output and the following sub-outputs will be delivered through a combination of baseline activities and incremental activities funded by the GEF. GEF incremental activities will enhance, modify and/or compliment the baseline activities to increase their GHG abatement potential.**

126. The sub-outputs include (a) Expansion of the waste transfer station to accommodate 300 tonnes per day and revamp of the waste composting facility to 20 tonnes per day; (b) Promotion of recycling and composting at community level (target: 5 communities each of which will compost 1 tonne of organic waste per day and total amount of waste recycled in the city will be 2,200 tonnes per month), (c) Construction of an enhanced waste to energy plant for processing of 450 tonnes of waste per day and with a electricity generation capacity of 4.9 MW, (d) City shuttle bus service along 2 pilot routes; (e) 4.8 km bikeway project; and, (f) Traffic data management center and traffic management pilot at 2 intersections. These urban system infrastructure projects will be implemented as demonstrations of low carbon and sustainable urban waste management and sustainable transport system infrastructures. These will involve engineering design, planning, including stakeholder consultations, financing, and construction and operation activities. These activities will be carried out together with the city and stakeholders in showcasing the design, engineering, planning, financing, installation and operation of low carbon urban system projects. These demonstrations are expected to perform satisfactorily and are expected to be good showcases of the environment-friendly features and benefits of low carbon urban systems. The following are the activities that will be carried out to deliver this set of sub-outputs:

- Review of feasibility analysis and establishment of baseline and performance targets of each of the 6 demonstrations - This will involve the review of the existing and planned waste management and transport infrastructure that will be improved/revamped or realized. It will also involve collecting baseline data, e.g. via waste source surveys and traffic surveys. This is for the purpose of establishing baseline data and performance target for each of the 6 demonstration activities. Specifically, the composting plant will be designed to incorporate incremental energy & resource efficient features that will enhance the low carbon stature and quality of compost. In addition climate resilience features will be integrated in the design to make the composting plant flood-proof. The design of the BRT system will be analysed and improved, in particular in areas related to improving access to the BRT system, long-term integrated planning, managing parking demand and improvement of the pedestrian and cycling facilities connected to the BRT. The

planning of the shuttle bus service project will be enhanced by including a plan on how the shuttle bus can best serve as feeder to the BRT system once realized. Using a applicable techno-economic model or performance simulation tool, the realistic and achievable targets in terms of annual volume of waste processed, annual amount of recycled waste, annual non-transport mode utilization from cyclists, average speed of traffic in the area of the city where the traffic control pilot is implemented, annual reduction in vehicle emissions, annual energy savings (as compared to the current operations), and annual CO2 emission reduction (e.g., due to avoidance of CH4 release as a result of composting activities) will be established. The financial viability (e.g., in terms of IRR) will serve as the minimum economic performance target.

- Evaluation of logistical, safety, administrative, and legal requirements for the sustainable urban projects - This will involve the thorough evaluation of all the requirements for the implementation of the 6 demonstration projects such as legal/social requirements (e.g., public hearings for the waste transfer and composting plant project), administration, safety, and all logistic needs (e.g. for the recycling programme to transport separated waste). Based on the findings, policy recommendations will be developed to come up with support policies that would expedite or easily facilitate securing all the necessary safety, administrative and legal requirements for the proposed project implementations.
- Facilitation of the successful implementation of the urban waste management and sustainable transport demonstrations - This will involve the provision of assistance to the city and partners in the promotion of the low carbon systems to the public and to the relevant local government agencies. It will involve the identification and implementation of action courses for securing the various logistical, safety, administrative and legal requirements for, as well as for the removal of any barriers to, the successful implementation of the demonstration projects. This is for the socialization of the project to secure public acceptance and approval of the communities and relevant agencies. Acceptance by public and stakeholders, e.g. for the composting and recycling projects, will also increase the implementation/enforcement of regulations on waste separation/management. The city will be assisted in obtaining agreement from all stakeholders and permission for the installation and operation of each demo. The city will be assisted in facilitating the smooth planning, implementation and operation of the demo projects, a team of experts will be available to support when needed.
- Conduct of stakeholder consultations with all stakeholders involved, including government agencies at city-level and regional level, private sector, civil society, academic institutions and communities - Consultations will take place during the design phase and implementation phase. During the design phase, adjustments to the design can be made based on the feedback received. Consultations at the implementation phase will be important to ensure support from citizens and stakeholders and adjust the plans when needed. In particular the traffic management pilot, community based composting and recycling projects, and city shuttle bus project will require stakeholder consultations to ensure buy-in from citizens and communities. The city will be assisted in facilitating the stakeholder consultation process which would allow for incorporation of suggestions from stakeholders. For the transport projects the involvement of the local police during stakeholder consultations and project implementation is important to ensure enforcement of traffic regulations.



- Development of the engineering design and implementation plan (including financial plan) of the demonstrations - This activity will be carried out by the city. The allocated GEF funds will be for investments on incremental features of the projects to make them more cost-effective and productive, more energy efficient, climate-resilient, and environment-friendly. GEF funds will specifically be used for incremental investments in the following hardware: a) climate-resilient infrastructure and equipment for the composting plant of 20 tonnes/day, including a wood grinder. GEF funds will be used for showcasing measures which would increase the climate-resilience of the composting facility. Preliminary risk screening indicates that the facility is flood-prone, but in the current baseline design no measures against flooding have been incorporated. During the project specific climate resilience measures will be identified (e.g. physical barriers, flood walls and construction material selection, drainage systems and landscaping measures, etc.), b) 10 in-vessel composting units of 500 kg/day for the expansion of the community based composting programme, c) 6 pneumatic road tubes, including software/database to analyse the data to enhance the traffic control pilot and allow for evidence-based planning and monitoring, d ) 1 bicycle parking with cover & racks and LED lighting to compliment the cycle path, e) to improve the city shuttle bus service and to showcase examples of bus stops which are user-friendly: for two locations a modern bus-stop, with cover, convenient access/links with other forms of transport, bus stop signs, marking improvements on the road and an electronic sign with up to date information on bus schedules.
- GEF supported technical assistance will specifically be provided in the design, engineering, implementation and planning of the composting facility and traffic management pilot. In addition, incremental activities funded by the GEF includes evaluation and determination of the best available technical options to maximize GHG and other environment friendly features of the baseline WTE unit. International best-available-technologies (BAT) will be evaluated and considered as a starting point. In the absence of the GEF funding, these incremental features would not have been incorporated by the project developer on its own.
- Implementation of the urban systems demonstrations - This activity will be carried out by the city, and GEF funded assistance will be provided in specific aspects of the project equipment installation and commissioning., For example in the provision of technical advice in the waste to energy power plant performance tests during the commissioning of the WTE demo unit. Also technical advice in the management and operations of the composting plant and traffic management center will be provided.
- Operation and performance evaluation of each urban system demonstrations - This will involve formulation of a monitoring framework; installation of real time monitoring equipment and conducting regular monitoring of the operational performance of all 6 demo project, as well as the economic and environmental performance. A monitoring and evaluation plan will be developed and institutionalized for this purpose taking into account the baseline data and targets.
- Demonstration results presentation and follow-up planning - A consolidated report on the urban waste management and sustainable transport system infrastructure demonstration results and impacts will be prepared. The report will contain the operational, environmental and economic performance results, best practices, lessons learnt, as well as operational problems encountered and how these were addressed in each demo. This demonstration program results will be presented in separate workshops organized for (a) local stakeholders and (b) organized in cooperation with the LCCN for a broader audience, including stakeholders from other

cities and central level. The aim of the workshops is get enough feedback and recommendations for monitoring and evaluation of the demo projects, as well as recommendations for system performance.

*GEF support is needed for the technical and logistical assistance required in the following: (a) review of feasibility analyses of the demos, demo project design and in the establishment of the demo project performance baseline and targets; (b) facilitation of the socialization, regulatory, and business aspects of the demo implementation and operation; (c) evaluation of logistical, safety, administrative and legal requirements for urban sustainable projects, including policies for facilitating meeting the requirements; (d) facilitating stakeholder consultations at different stages of the process; (e) design, engineering, implementation and financial planning of each demo, and for the costs for purchase of incremental hardware for the demo units, such as composting units to expand the community based composting programme and support facilities to improve the bicycle path and shuttle bus service (f) installation and/or commissioning of the demo units; (g) monitoring of the operations and in the evaluation of demo unit operational, economic and environmental performance; and, (h) demonstration results evaluation, presentation in seminar-workshop and documentation.*

127. Output 1.2.2: Operational low carbon urban waste management and sustainable transport systems in Nakorn Ratchasima – This output entails installed low carbon urban systems that will be designed based on energy-integrated planning principles. These systems are on urban waste management and urban sustainable transport. They will be implemented by the city and its partners, who agreed to subsume their respective projects to be among the demonstrations under this UNDP-GEF project. The output and sub-outputs described below for NR will be delivered through a combination of baseline activities and GEF incremental activities. GEF incremental activities will enhance, modify and/or compliment the baseline activities to increase their GHG abatement potential.

128. The sub-outputs include (a) improvement of the anaerobic digestion facility and increase amount of organic waste to be digested to 80 tonnes per day; (b) Promotion of 3R and recycling to 1,150 tonnes per month, (c) Waste-to-Energy plant with a capacity to process 600 tonnes of waste per day and installed capacity for electricity generation of 6.5 MW; (d) Bus rerouting project along 13 routes, (e) Traffic data management center and traffic management pilot at 2 intersections. These urban system infrastructure projects will be implemented as demonstrations of low carbon and sustainable urban waste management and sustainable transport system infrastructures. These will involve engineering design, planning, including stakeholder consultations, financing, and construction and operation activities. These activities will be carried out together with the city and stakeholders in showcasing the design, engineering, planning, financing, installation and operation of low carbon urban system projects. These demonstrations are expected to perform satisfactorily and are expected to be good showcases of the environment-friendly features and benefits of low carbon urban systems. The following are the activities that will be carried out to deliver this set of sub-outputs:

- Review of feasibility analysis and establishment of baseline and performance targets of each of the 5 demonstrations – This will involve the review of the existing waste management and transport infrastructure that will be improved and the plans for the new projects. It will also involve collecting baseline data, e.g. via waste source surveys and traffic surveys. This is for the purpose of establishing baseline data and performance target for each demonstration activity. These demos will be designed to incorporate incremental features that will enhance the low carbon

stature. For example the design of the BRT system will be analyzed and improved, in particular in areas related to improving access to the BRT system, long-term integrated planning, managing parking demand and improvement of the pedestrian and cycling facilities connected to the BRT, and integration of energy efficiency and renewable energy applications in the station design. Originally NR planned an elevated BRT system, but GEF support will assist in the evaluation of alternatives, including a BRT using the normal road (not elevated), dedicated bus lanes, bus rapid transit, metro, light rail, etc. The planning of the bus reroute project will be enhanced by including a plan on how the buses can best serve as feeder to the BRT system once realized. Using an applicable techno-economic model or performance simulation tool, the realistic and achievable targets in terms of annual volume of organic waste digested, annual amount of recycled waste, average speed of traffic in the pilot sites, annual electricity generation (for the WTE plant), annual reduction in vehicle emissions, annual energy savings, and annual CO2 emission reduction will be established. The financial viability (e.g., in terms of IRR) will serve as the minimum economic performance target.

- Evaluation of logistical, safety, administrative, and legal requirements for the 5 sustainable urban projects - This will involve the thorough evaluation of all the requirements for the implementation of the demonstration units such as legal/social requirements (e.g., public hearings), administration, safety, and all logistic needs (e.g., negotiations with actors to ensure sufficient space is available for new bus stops as part of the bus reroute project and environmental impact assessments or the negotiation of power purchase agreements (PPA) for the WTE plant). Based on the findings, policy recommendations will be developed to come up with support policies that would expedite or easily facilitate securing all the necessary safety, administrative and legal requirements for the 5 proposed sustainable urban project implementations.
- Facilitation of the successful implementation of the 5 urban waste management and sustainable transport demonstrations - This will involve the provision of assistance to the city and partners in the promotion of the low carbon systems to the public and to the relevant local government agencies. It will involve the identification and implementation of action courses for securing the various logistical, safety, administrative and legal requirements for, as well as for the removal of any barriers to, the successful implementation of the demonstration projects. This is for the socialization of the project to secure public acceptance and approval of the communities and relevant agencies. The city will be assisted in securing agreement from stakeholders and permission for the installation and operation of each demo. Acceptance by public and stakeholders, e.g. for the composting and recycling projects, will also increase the implementation/enforcement of regulations on waste separation/management. The city will be assisted in facilitating the smooth planning, implementation and operation of the demo projects. For the WTE plant, while it is expected that the city will work out the PPA with EGAT, if required, technical/advisory assistance will also be provided in the PPA negotiations. NR has a plan for greening the city. It aims to reserve certain areas for living, others for work and create green spaces. This plan is however not integrated with the plans for the low carbon investments. During the design of the low carbon urban systems the integration with the 'greening plan' will be worked out in order to enhance complementarity.
- Conduct of stakeholder consultations with all stakeholders involved, including government agencies at city-level and regional level, private sector, civil society, academic institutions and communities - Consultations will take place during the

design phase and implementation phase. During the design phase, adjustments to the design can be made based on the feedback received. Consultations at the implementation phase will be important to ensure support from citizens and stakeholders and adjust the plans when needed. The city will be assisted in facilitating the stakeholder consultation process which would allow for incorporation of suggestions from stakeholders. In particular for the bus rerouting project, a carefully planned stakeholder consultation process is important to make the project successful. For the recycling programme and the project to increase the amount of organic waste digested consultations with the communities involved will be organized. For the transport projects the involvement of the local police during stakeholder consultations and project implementation is important to ensure enforcement of traffic regulations

- Development of the engineering design and implementation plan (including financial plan) of the demonstrations - This activity will be carried out by the city. The allocated GEF funds will mainly be for investments on incremental features of the urban infrastructure system projects to make them more cost-effective and productive, more energy efficient, climate-resilient, and environment-friendly. GEF funds will be used for incremental investments in the following hardware a) GHG measurement and monitoring tools such as methane measurement kit to detect leakages; refurbishment of digester and stirrer; high performance food waste bins to organize food waste disposal and collection systems; sieves for fine segregation of slurry/compost b) GPS tracking devices for 20 buses on 1 route and software/mobile application for tracking buses and informing passengers on bus schedule, thereby, enhancing the services to passengers and monitoring the performance of the bus reroute project c) 5 three wheeler *tuk-tuks* for collection of organic and recyclable wastes; and the compartmentalization of 5 existing waste collection trucks to enhance collection services of segregated waste under the community based recycling programme, (d) installation of GHG monitoring equipment to optimize the emission reductions potential of the WTE, (e) investment in pneumatic road tubes (traffic counter) including software/database to enhance the traffic control demos and allow for effective monitoring.
- Additionally, GEF funding will be used to provide technical assistance in (a) the evaluation and determination of best-available-technologies (BAT) for the WTE; Technical assistance in the design, engineering, implementation and (financial) planning of the other demonstration projects will be considered if needed.
- Implementation of the 5 urban systems demonstrations - This will be carried out by the city, and if needed, assistance will be provided in specific aspects of the project equipment installation and commissioning. Assistance will be provided in the provision of technical advice in the waste to energy power plant performance tests during the commissioning of the WTE demo unit and in the provision of technical advice in the planning of the bus rerouting project and management and operations of the traffic management center and traffic management pilot.
- Operation and performance evaluation of each urban system demonstration – This will involve the regular monitoring of the operational performance of each of the 5 demo project, as well as the economic and environmental performance. A monitoring and evaluation plan will be developed for this purpose taking into account the baseline data and targets.
- Demonstration results presentation and follow-up planning - A consolidated report on the urban waste management and sustainable transport system infrastructure demonstration results and impacts will be prepared. The report will contain the

operational, environmental and economic performance results, best practices, lessons learnt, as well as operational problems encountered and how these were addressed in each demo. This demonstration program results will be presented in a workshop organized for local stakeholders and a workshop organized in cooperation with the LCCN for a broader audience, including stakeholders from other cities and central level. The aim of the workshops is get enough feedback and recommendations for monitoring and evaluation of the demo projects, as well as recommendations for system performance.

*GEF support is needed for the technical and logistical assistance required in the following: (a) review of feasibility analyses of the demos, demo project design and in the establishment of the demo project performance baseline and targets; (b) facilitation of the socialization, regulatory, and business aspects of the demo implementation and operation; (c) evaluation of logistical, safety, administrative and legal requirements for urban sustainable projects, including policies for facilitating meeting the requirements; (d) facilitating stakeholder consultations at different stages of the process; (e) design, engineering, implementation and financial planning of each demo, and for the costs for purchase of incremental components, such as refurbishment of the anaerobic digester and equipment to increase the amount of organic waste to be collected and digested in the system and e.g. GPS tracking devices and software for busses to enhance information provision to passengers; (f) installation and/or commissioning of the demo units; (g) monitoring of the operations and in the evaluation of demo unit operational, economic and environmental performance; and, (h) demonstration results evaluation, presentation in seminar-workshop and documentation.*

129. Output 1.2.3: Operational low carbon urban (waste management and sustainable transport) systems in Klaeng – This output entails installed low carbon urban systems that will be designed based on energy-integrated planning principles. These systems are on urban waste management, urban sustainable transport and efficient water pumping applications. They will be implemented by the city and its partners, who agreed to subsume their respective projects to be among the demonstrations under this UNDP-GEF project. The output and sub-outputs described below for Klaeng will be delivered through a combination of baseline activities and GEF incremental activities. GEF incremental activities will enhance, modify and/or compliment the baseline activities to increase their GHG abatement potential.
130. The sub-outputs include: (a) project to increase capacity of waste management facilities to 100 tonnes per day and increase recycling to 31 tonnes per month; (b) Improvements to the city shuttle bus services with 2 additional busses and 1 additional route; (c) Improvements to pedestrian areas and promoting cycling (non-motorized transport); and (d) Expansion of capacity of water pumping station with energy efficient pumps. These urban system infrastructure projects will be implemented as demonstrations of low carbon and sustainable urban waste management, sustainable transport and energy efficient system infrastructures. These will involve engineering design, planning (including stakeholder consultations), and financing and operation activities. These activities will be carried out together with the city and stakeholders in showcasing the design, engineering, planning, financing, installation and operation of low carbon urban system projects. These demonstrations are expected to perform satisfactorily and are expected to be good showcases of the environment-friendly features and benefits of low carbon urban systems. The following are the activities that will be carried out to deliver this set of sub-outputs:



- Review of feasibility analysis and establishment of baseline and performance targets of each of the 4 demonstration – GEF support will be provided to review of the existing waste management, transport and water service delivery infrastructure that will be improved. It will also involve collecting baseline data, e.g. via waste source surveys. This is for the purpose of establishing baseline data and performance target for each demonstration activity. For example for the recycling project targets for the amount of waste to be separated will be determined. These demos will be designed to incorporate incremental features that will enhance the low carbon stature. For example the design of the water pumping station will be evaluated to identify options for further energy savings. Using an applicable techno-economic model or performance simulation tool, the realistic and achievable targets in terms of, annual amount of recycled waste, annual energy savings from using more energy efficient pumps in the water pumping station, and annual CO2 emission reduction will be established. The financial viability (e.g., in terms of IRR) will serve as the minimum economic performance target.
- Facilitation of the successful implementation of the 4 urban system demonstrations - This will involve the provision of assistance to the city and partners in the promotion of the low carbon systems to the public and to the relevant local government agencies. It will involve the identification and implementation of action courses for securing the various logistical, safety, administrative and legal requirements for, as well as for the removal of any barriers to, the successful implementation of urban system demonstration projects. This is for the socialization of the project to secure public acceptance and approval of the communities and relevant agencies. The city will be assisted in obtaining agreement from all stakeholders. The city will be assisted in facilitating the smooth planning, implementation and operation of the demo projects. In particular for the expansion of the waste management facilities to 100 tonnes per day (the cluster approach for waste management) cooperation with other local authorities in the region is required. The project will support the cities in the negotiations with other local authorities. This is an example of horizontal integration.
- Conduct of stakeholder consultations with all stakeholders involved, including government agencies at city-level and regional level, private sector, civil society, academic institutions and communities - Consultations will take place during the design phase and implementation phase. During the design phase, adjustments to the design can be made based on the feedback received. Consultations at the implementation phase will be important to ensure support from citizens and stakeholders and adjust the plans when needed. In particular the improvements to the shuttle bus service and pedestrian areas/cycling facilities will require involvement of stakeholders. The city will be assisted in facilitating the stakeholder consultation process which would allow for incorporation of suggestions from stakeholders. For the transport projects the involvement of the local police during stakeholder consultations and project implementation is important to ensure enforcement of traffic regulations.
- Development of the engineering design and implementation plan (including financial plan) of the demonstrations - This activity will mainly be carried out by the city. The allocated GEF funds will mainly be for investments on incremental features of the urban infrastructure system projects to make them more cost-effective and productive, more energy efficient, climate-resilient, and environment-friendly. GEF funds will be used for incremental investments in the following

hardware: a) incremental costs for the purchase of four energy efficient pumps in the water pumping station, b) a conveyor belt for separation of waste to improve the environmental-friendliness of the expansion of the waste management facilities, c) 4 bicycle parking racks and shelter with LED lighting to compliment the pedestrian improvement programme of the city to stimulate non-motorized transport, d) to improve the city shuttle bus service and expand the service area to surrounding communities for two locations a modern bus-stop, with improved passenger friendly and safety features such as signs, convenient access and shelters, connections to other forms of transport, LED lighting, upgraded bus information systems for passengers. The incremental investments in more EE pumps in the water pumping station is an example of integration of energy efficiency considerations in planned investments of cities in urban systems. Additional technical assistance in the design, engineering, implementation of the expansion of the water pumping station will be provided to ensure further integration of energy-efficient approaches.

- Implementation of the 4 urban systems demonstrations - This will be carried out by the city, and if needed, assistance will be provided in specific aspects of the project. Assistance can be provided, for example in the planning of the improvements to the city shuttle bus service and pedestrian & cycling areas.
- Operation and performance evaluation of each of the 4 urban system demonstrations - This will involve the regular monitoring of the operational performance of each demo project, as well as the economic and environmental performance. A monitoring and evaluation plan will be developed for this purpose taking into account the baseline data and targets.
- Demonstration results presentation and follow-up planning - A consolidated report on the urban waste management and sustainable transport system infrastructure demonstration results and impacts will be prepared. The report will contain the operational, environmental and economic performance results, best practices, lessons learnt, as well as operational problems encountered and how these were addressed in each demo. This demonstration program results will be presented in a workshop organized for local stakeholders and a workshop organized in cooperation with the LCCN for a broader audience, including stakeholders from other cities and central level. The aim of the workshops is get enough feedback and recommendations for monitoring and evaluation of the demo projects, as well as recommendations for system performance.

*GEF support is needed for the technical and logistical assistance required in the following: (a) review of feasibility analyses of the demos, demo project design and in the establishment of the demo project performance baseline and targets; (b) facilitation of the socialization, regulatory, and business aspects of the demo implementation and operation; (c) evaluation of logistical, safety, administrative and legal requirements for urban sustainable projects, including policies for facilitating meeting the requirements; (d) facilitating stakeholder consultations at different stages of the process; (e) design, engineering, implementation and financial planning of each demo, and for the costs for purchase of incremental hardware for the demo units, such as incremental costs for the purchase of four energy efficient pumps in the water pumping station and a conveyor belt for separation of waste to improve the environmental-friendliness of the expansion of the waste management facilities; (f) installation and/or commissioning of the demo units; (g) monitoring of the operations and in the evaluation of demo unit operational, economic and environmental performance; and, (h) demonstration results evaluation, presentation in seminar-workshop and documentation.*

131. Output 1.2.4: Operational low carbon urban waste management and sustainable transport systems in Samui – This output entails installed low carbon urban systems that will be designed based on energy-integrated planning principles. These systems are on urban waste management and urban sustainable transport. They will be implemented by the city and its partners, who agreed to subsume their respective projects to be among the demonstrations under this UNDP-GEF project. This output including the sub-outputs described below for Samui will be delivered through a combination of baseline activities and GEF incremental activities. GEF incremental activities will enhance, modify and/or compliment the baseline activities to increase their GHG abatement potential.

132. The sub-outputs include: (a) Decentralized waste management programme aiming to achieve composting of 10 tonnes of organic waste per day; and promotion of 3R and recycling to 1,315 tonnes per month, (b) Realizing an integrated waste management facility, (c) Samui biking paradise 2016 and bikeway construction (5 km), (d) Traffic zoning project. These urban system infrastructure projects will be implemented as demonstrations of low carbon and sustainable urban waste management and sustainable transport system infrastructures. These will involve engineering design, planning, including stakeholder consultations, financing, and construction and operation activities. These activities will be carried out together with the city and stakeholders in showcasing the design, engineering, planning, financing, installation and operation of low carbon urban system projects. These demonstrations are expected to perform satisfactorily and are expected to be good showcases of the environment-friendly features and benefits of low carbon urban systems. The following are the activities that will be carried out to deliver this set of sub-outputs:

- Review of feasibility analysis and establishment of baseline and performance targets of each of the 4 demonstrations - This will involve the review of the existing waste management and transport infrastructure facilities/practices as well as the plans for the new facilities. It will also involve collecting baseline data, e.g. via waste source surveys and traffic surveys. This is for the purpose of establishing baseline data and performance target for each demonstration activity. These demos will be designed (e.g., the basic engineering and process scheme, system and equipment sizing and specifications of the comprehensive waste management plant) to incorporate incremental features that will enhance the low carbon stature. Using a applicable techno-economic model or performance simulation tool, the realistic and achievable targets in terms of, annual volume of organic waste composted, annual amount of recycled waste, average speed of traffic in areas of the island where the zoning will be implemented, annual reduction in vehicle emissions, annual energy savings, and annual CO<sub>2</sub> emission reduction will be established. The financial viability (e.g., in terms of IRR) will serve as the minimum economic performance target.
- Evaluation of logistical, safety, administrative, and legal requirements for sustainable urban projects - This will involve the thorough evaluation of all the requirements for the implementation of the demonstration units such as legal/social requirements (e.g., public hearings), administration, safety, and all logistic needs (e.g., land use and environmental impact assessments for the comprehensive waste management facility and bikeway). Based on the findings, policy recommendations will be developed to come up with support policies that would



expedite or easily facilitate securing all the necessary safety, administrative and legal requirements for the proposed sustainable urban project implementations.

- Facilitation of the successful implementation of the 4 urban waste management and sustainable transport demonstrations - This will involve the provision of assistance to the city and partners in the promotion of the low carbon systems to the public and to the relevant local government agencies. It will involve the identification and implementation of action courses for securing the various logistical, safety, administrative and legal requirements for, as well as for the removal of any barriers to, the successful implementation of urban waste management and sustainable transport system demonstration projects. This is for the socialization of the project to secure public acceptance and approval of the communities and relevant agencies. The city will be assisted in obtaining agreement from all stakeholders and permission for the installation and operation of each demo. The city will be assisted in facilitating the smooth planning, implementation and operation of the 4 demo projects.
- Conduct of stakeholder consultations with all stakeholders involved, including government agencies at city-level and regional level, private sector, civil society, academic institutions and communities - Consultations will take place during the design phase and implementation phase. During the design phase, adjustments to the design can be made based on the feedback received. Consultations at the implementation phase will be important to ensure support from citizens and stakeholders and adjust the plans when needed. The city will be assisted in facilitating the stakeholder consultation process which would allow for incorporation of suggestions from stakeholders. In particular for the traffic zoning project, a carefully planned stakeholder consultation process is important to make the project successful. Large shopping malls and owners of truck companies will need to cooperate. For the transport projects the involvement of the local police during stakeholder consultations and project implementation is important to ensure enforcement of traffic regulations.
- Development of the engineering design and implementation plan (including financial plan) of the demonstrations - This activity will be carried out by the city. The allocated GEF funds will mainly be for investments on incremental features of the urban infrastructure system projects to make them more cost-effective and productive, more energy efficient, climate-resilient, and environment-friendly. GEF funds will be used for incremental investments in the following hardware: a) safety features such as physical barriers with other traffic, LED lighting, parking shelters and reflectors on the road to improve the cycle way, b) 40 GPS tracking devices for trucks and software/database to monitor and enhance the enforcement of the traffic zoning project, c) 20 advance, in-vessel composting units of 300 kg/day for communities and 2 advanced in-vessel composting units of 800 kg/day for hotels to expand the composting programme of the city, d) a conveyor belt for separation of waste to improve the environmental-friendliness of the current landfilling practices and planned comprehensive waste management facility. Technical assistance in the design, engineering, implementation and (financial) planning of demonstration projects will also be provided for the comprehensive waste management project. The composting programme which works with communities, schools and hotels will be further improved by promoting the use of the produced compost in local vegetable gardens which deliver vegetables to the local hotels. This is an example of inter-sectoral integration in the field of landscaping. In addition, Samui aims to make the island more 'green' by planting trees and vegetation along roads and in areas which are not being used and linked to this community based composting

programme, which offer good options for synergies. The produced compost can be used in these green areas.

- Implementation of the 4 urban systems demonstrations - This will be carried out by the city, and if needed, assistance will be provided in specific aspects of the project equipment installation and commissioning. Assistance can be provided, for example in the provision of technical advice in the design of the integrated waste management facility or in the provision of technical advice in the planning of the traffic zoning project.
- Operation and performance evaluation of each of the 4 urban system demonstrations - This will involve the regular monitoring of the operational performance of each demo project, as well as the economic and environmental performance. A monitoring and evaluation plan will be developed for this purpose taking into account the baseline data and targets.
- Demonstration results presentation and follow-up planning - A consolidated report on the urban waste management and sustainable transport system infrastructure demonstration results and impacts will be prepared. The report will contain the operational, environmental and economic performance results, best practices, lessons learnt, as well as operational problems encountered and how these were addressed in each demo. This demonstration program results will be presented in a workshop organized for local stakeholders and a workshop organized in cooperation with the LCCN for a broader audience, including stakeholders from other cities and central level. The aim of the workshops is get enough feedback and recommendations for monitoring and evaluation of the demo projects, as well as recommendations for system performance.

*GEF support is needed for the technical and logistical assistance required in the following: (a) review of feasibility analyses of the demos, demo project design and in the establishment of the demo project performance baseline and targets; (b) facilitation of the socialization, regulatory, and business aspects of the demo implementation and operation; (c) evaluation of logistical, safety, administrative and legal requirements for urban sustainable projects, including policies for facilitating meeting the requirements; (d) facilitating stakeholder consultations at different stages of the process; (e) design, engineering, implementation and financial planning of each demo, and for the costs for purchase of incremental hardware for the demo units, such as safety features for the cycle way to separate cyclists from the other traffic on the road and in-vessel composting units to expand the composting programme of the city, (f) installation and/or commissioning of the demo units; (g) monitoring of the operations and in the evaluation of demo unit operational, economic and environmental performance; and, (h) demonstration results evaluation, presentation in seminar-workshop and documentation.*

## **Component 2: Financial incentives and institutional arrangement in support of low carbon cities initiatives**

133. This component addresses specific barriers to adoption of low carbon development in cities which include difficulties in accessing financial supporting mechanisms, limited sharing of lessons learned, inadequate policy and regulatory framework to support low carbon urban systems and lack of awareness of climate change and low carbon sustainable development approaches. The expected outcome from this component is the increased volume of investments in energy efficient urban systems by government and private sector. **While outcomes 1.1 and 1.2 support**

exclusively four project cities to realize low carbon planning and tangible investments in urban systems, outcome 2 is linked to four pilot cities by directly supporting the cities to gather, evaluate and document experiences and lessons generated through the activities implemented and demonstrated in outcome 1. Project developers in pilot cities will also benefit from the financial scheme(s) and database, guidance on financing options available for low carbon investments in outcome 2. This way Component 2 is linked to the pilot cities in facilitating financing for implementing low carbon projects. The following outputs will contribute to the achievement of this outcome:

134. Output 2.1.1: Completed analysis on existing and forthcoming options on financial incentive schemes, both domestic and international including carbon offset initiatives, particularly the establishment of the Thai voluntary carbon market scheme – this output is comprised of an up-to-date and easy-to-understand guideline with requirements for each financing option applicable to Thailand and written in Thai. The primary target audience will be the stakeholders involved in the local level planning, development and financing of low carbon investments which includes sub-national government officials (e.g. city authorities and staff or the regional offices of the MoNRE and MoT), private sector (e.g. waste management and waste recycling companies) and financing sector (e.g. local banks providing debt financing to waste management projects) at the local and regional levels. Additionally, the training will also target central level stakeholders including government officials (e.g. MoI staff) , private sector (e.g. waste management technology providers and companies providing transport solutions) and financing sector (e.g. prospective banks to provide debt financing to PPP structures) as many of them are also not aware of available financial incentive schemes for low carbon developments.

135. To deliver this output, the following activities will be carried out:

- Preparation of an analysis of national and international sources of financial and technological support for low carbon developments in cities in Thailand - This will include domestic schemes and funds, such as the Environmental Fund, T-VER, LESS and domestic support for NAMAs as well as international sources of funds, such as CDM, NAMA support and potential other sources of funds/support;
- Preparation of guidance for financing options – This will involve the development of up-to-date and easy-to-understand guideline with requirements and steps-to-follow for each financing option applicable to Thailand and written in Thai. It will also consolidate the revised guidelines on T-VER scheme, but explained in a simplified way.

*GEF support is required in the analysis of the national and international financing options; for developing modules, curricular, guidelines, which are based on practical examples and tailor-made to the context of cities in Thailand. Since English language is not prevalent at the local levels in country, guidelines and courses will need to be adapted in the Thai language emphasizing specific local context by considering local planning processes, political and institutional context.*

136. Output 2.1.2: Financial incentives and institutional arrangement to replicate low-carbon urban development - This output is comprised of feasible schemes that will be developed, including identification of funding sources, formulation of institutional arrangements and the implementation mechanisms for assisting project developers in

cities to access financing for low carbon urban development projects. To deliver this output, the following activities will be carried out:

- Review of the performance of the existing financing schemes in Thailand - This is to determine the most appropriate baseline scheme(s) and institutional arrangements for the envisioned schemes for financing low carbon urban development projects in cities. The experiences and lessons learned from the four pilot cities in Component 1 will be monitored, documented and analysed. This will include institutional arrangements which will facilitate low carbon developments and lessons learned and insights on financial barriers and how each of the four cities employed solutions to eliminate or reduce those barriers. This could include, but not limited to, insights on constraints that project developers in pilot cities may have encountered while raising finance for their low carbon projects; issues typically faced with financial institutions and investors; whether the financial institutions had conducive policies or dedicated windows for low carbon projects; what are the typical investment risks on such low carbon projects; what sort of risk/return profiles are the investors looking for and so on. The insights will (a) inform the design of the financial scheme(s), discussed below, to ensure that it is better aligned to project developers and investors interests to attract increased investments; and (b) to enrich with practical case examples the awareness and capacity development trainings in Component 2 targeted towards those stakeholders involved in the development, implementation and authorization of financing schemes and financial incentive programs. For this purpose, a working group will be established comprising of key stakeholders such as financial and energy experts, local & central governments, financing institutions, local ESCOs and other relevant entities engaged in low carbon (energy efficiency, renewable energy, sustainable transport, waste management) project development, planning, financing and implementation. The review will include an evaluation of the financial performance of the available schemes (T-VER, Environmental Fund, CDM, etc.), its effectiveness and ease-of-access. The latest international literature and experience on similar financial mechanisms for low carbon technologies will also be evaluated.
- Evaluation of the viability of financing low carbon urban development projects in cities - This will include an assessment of the need for financing, current financing options available, how and how much financing is currently being extended to local infrastructure projects by the local financing institutions and schemes including TGO's T-VER scheme and potential financing structures and solutions, which would meet the requirements of cities and local developers. Enhancement of the funding scope of/improvements to the Environmental Fund and the T-VER scheme will be evaluated to determine the viability of including low carbon urban systems such as waste management and sustainable transport projects. Cities will provide important inputs to this assessment to ensure the T-VER scheme fits the situation on the ground in the cities. Part of the assessments will be the evaluation to: (a) increase the involvement of local governments in supporting low carbon initiatives, not only at the stage of investments but also during operations; (b) reduce the uncertainties and market risk for local financial institutions and leverage more commercial funds; and, (c) showcase sustainable financial support mechanisms to local governments and increase the sustainability and momentum for future relevant governmental actions and efforts. In the evaluation potential fiscal measures (e.g. tax exemptions, subsidies, etc.) to incentivize private sector investment in urban systems will be considered. This will be coordinated with

potential fiscal measures which will be taken in the area of energy efficiency in support of the 20 years Energy Efficiency Development Plan.

- Design of financing scheme(s), institutional setting and implementation mechanisms for low carbon initiatives in cities - Based on the evaluation findings, the design of appropriate financing scheme(s) for low carbon urban development projects will be carried out. These scheme(s) shall be based on existing government schemes/funds such as the Environmental Fund and the T-VER, as well as loans from financial intermediaries. The details of the terms and conditions for each scheme will be prepared including financing structure, implementation arrangements and identification of a fund manager. The identification and assessment of sources of finance, tariff structures and fiscal aspects will also be covered, including the development of selection criteria for the financing schemes and the selection of eligible borrowers, and the various components of viable new business models such as market development requirements, institutional arrangements, operational procedures, criteria for project evaluation, loan and risk management, etc.
- Analysis of the institutional/legal arrangements at city level to identify whether they contain barriers and/or provide sufficient incentives for local officials to take low carbon actions - Based on the analysis recommendations for improvements in the arrangements will be proposed. Two areas will initially be targeted. The first area targeted is to include key performance indicators on low carbon actions in the performance evaluation of city staff. During project formulation, it was reported that city staff are not motivated to undertake low carbon actions in their jurisdiction partly because it is not reflected as a key indicator in the performance review mechanism of the government. In the yearly performance review, there is no reference to sustainability or low carbon actions. This activity will involve facilitating discussions with cities, MoNRE and Ministry of Interior (Mol) to prepare policy recommendations for inclusion of sustainability/low carbon actions in the performance review scheme of the government. In conjunction, another policy area targeted is to provide legal clarity to cities on how they can receive carbon revenues. Currently, in the absence of such clarify cities are hesitant to weigh the options of accessing the carbon markets and schemes such as T-VER as a financing prospect to support low carbon investments. The activity will be spearheaded by TGO. TGO is preparing legal recommendations and tabling it for approval by the cabinet. Both policy changes will be developed in cooperation with the Ministry of Interior.

*GEF support is needed for the required technical assistance in the evaluation of existing financing schemes and institutional arrangements in Thailand and in other countries, and in the design of the new/revised financing schemes and preparation of policy recommendations.*

137. Output 2.1.3: A cadre of qualified technical specialists in the local governments of Thai cities capable of working with market mechanisms for mitigation efforts and accessing funds for climate change mitigation- This output will entail building capacity at city level for market readiness in mitigation efforts that will be carried out in coordination with the ongoing capacity building efforts of TGO on T-VER, CDM, NAMAs and LESS. To deliver this output, the following activities will be carried out:

- Conduct of capacity assessment – This is to gauge the current level of understanding and technical capability with regards low carbon urban development



projects among city officials. The capacity will focus on capacities to understand the requirements for accessing funds and mechanisms such as T-VER, LESS, CDM and Environmental Fund and the formulation of NAMAs. Staff at cities is not familiar with these mechanisms, requirements and unsure in locating a proper channel to accessing correct information. In addition, much of the information is only available in English, which is a barrier for many local level officials.

- Conduct of capacity development training courses – This are for government staff, city officials to make them familiar with the overall existing market mechanisms on climate change mitigation, eligibility criteria, application procedure, requirements, documentation, funding prospect, etc. The simplified guidance developed under output 2.1.1 will be used during the trainings.
- Conduct on-the-job technical advisory services (coaching) to city staff - To ensure trainees are utilizing what they have learned, a resource group of participating trainers, experienced professionals from cities and technical specialists will be organized to provide on-the-job technical support for city officers on the preparations & managing the process for accessing funds and financing mechanisms for climate change mitigation actions. The on-the-job trainings will be provided in close coordination with the Low Carbon Cities Network (see output 2.1.6), which has already adopted an on-the-job/coaching approach. Officials from one city which have experience on a specific topic will be deployed to provide on-the-job support to officials from other cities. This activity is expected to pave way for exchange of knowledge and best practices and ultimately lead to increased number of projects from cities qualifying under the T-VER scheme.
- Preparation of documents for accessing the Environmental Fund, T-VER and other mechanisms – This will be done by the cities and support will be provided by the project when required. The capacity development trainings and on-the-job coaching will support the creation of a pipeline of climate change mitigation projects in cities which qualify for the T-VER mechanism. The PMR project/TGO will work in the same time on the creation of demand by private sector and other stakeholders for T-VER credits. During the process of training and preparing the documents, feedback on the T-VER-mechanism and its suitability for the city context will be provided to TGO/PMR project, so the mechanism can be adjusted where and when necessary.
- Development of sectoral NAMAs - Cities will provide inputs to the NAMA process in Thailand via TGO and relevant line ministries to ONEP. Thailand has chosen to develop sectoral NAMAs (the development of urban NAMAs is not foreseen at this stage by the government) and ONEP leads this process, while the line ministries provide their inputs. The project will coordinate with the cities to gather their experiences on taking climate change mitigation actions, including for urban systems, and channel their inputs via TGO to ONEP for inclusion in NAMAs.
- Impact assessment of capacity development interventions – This will involve periodic post-training evaluation surveys will be undertaken to gather feedback on the effectiveness of the training programme.

*GEF support is required for the technical assistance in the capacity building of the city government staff in accessing financing mechanisms/funds for climate change mitigation actions.*

138. Output 2.1.4: Developed and operational monitoring, reporting and verification system for public offset – this output is comprised of the development and institutionalization of

an MRV framework for the waste management sector in the four cities. It will build on and expand the scope of the LECB activities and enhance capacities at the local level in the 4 pilot cities to set up and institutionalize an MRV system which is consistent with the approaches followed at central level. To deliver this output, the following activities will be carried out:

- Capacity building on urban waste management – This involves the conduct of trainings to local government staff and stakeholders on MRV requirements and approaches in the waste management sector;
- Establishment of a working group on MRV in each city - It is important to internalise the processes of gathering data for MRV, in order that regularly data is gathered and analysed in order to adjust ongoing activities. The working group will include officials working in the waste management sector in the city, representatives of the regional environmental office of MoNRE, officials from the central level working on MRV, CSO and private sector. The working group should enhance the cooperation between central level and local level thereby leading vertical integration. The local MRV working groups will be linked with each other and with the central level to ensure consistency in approaches and facilitate learning;
- Establishment of an MRV framework for the waste management sector – This will entail the creation of an MRV framework in each of the 4 cities, and will include definition of the responsibilities of each stakeholder involved, the protocols/procedures for the data gathering, data processing, analysing and reporting;
- Development of a guidance note on MRV at the local level - This will include recommended responsibilities within the local government organisations, developing formats for measuring & reporting, recommended set up of a system for quality peer-review and reporting lines and built upon the experiences gained and structures and procedures proposed at central level.
- Formulation of MRV protocols for each waste management demo project – This will entail the development of the MRV protocol and the training of the staff at the demo facilities in each participating city on the monitoring and reporting of key parameters in estimating amount of waste processed, energy use and GHG emission reductions. These protocols will be evaluated by stakeholders at the central level (e.g. ONEP, TGO and MoNRE) and the other pilot cities to receive feedback and ensure compatibility with the reporting requirements from the central level.
- Impact assessment of capacity development interventions – This will involve the conduct of periodic post-training evaluation surveys will be undertaken to gather feedback on the effectiveness of the training programme.

*GEF support is required for the technical assistance in the capacity building of the city government agencies and technical personnel of the demo facilities on MRV requirements; and in the conduct of the works involved in establishing MRV working groups and MRV protocols in each city.*

139. Output 2.1.5: Designed, developed and conducted training course on Low Carbon Cities - This output will involve the design and development of a training course on Low Carbon Cities by TGO CITC. The training course will build on the Low Carbon Society Course being developed by TGO CITC. To deliver this output, the following activities will be carried out:

- Conduct of training needs assessments – This is to determine the current level of understanding on low carbon urban planning and implementation of low carbon actions among staff in the pilot cities and other intended beneficiaries of the training. This will include identification of gaps in knowledge and potential topics to be included in the training. Also low carbon courses in other countries will be analysed to identify topics to be included in the training.
- Preparation of a “Low Carbon Cities” training course and development of a curriculum for the course - At a minimum the course will address capacities on integrated low carbon planning, tools for identification and evaluation of low carbon options (cost-benefit analyses, evidenced based decision making) and the management and evaluation of the performance of low carbon urban projects. The integrated low carbon planning part of the course will take as basis the normative planning and budgeting cycles in cities and the 3-year local development plans. Horizontal, vertical and cross-sectoral integration in low carbon planning will be an integral part of the training.
- Conduct of trail runs for “low Carbon Cities” training course – This is to adjust the training programme where needed. City officials working on low carbon urban development planning will be invited to peer-review the training course;
- Conduct of “Low Carbon Cities” training program – The designed course will be conducted for government officials and relevant partners in the private sector.
- Identification of good practice examples internationally and nationally - Successes achieved in the four pilot cities e.g. from the activities under output 1.2.1 to 1.2.4 or other cities will be included. In particular, government staff involved in successful examples will be invited to serve as guest speakers during the course. Periodic post-training evaluation surveys will be undertaken to gather feedback on the effectiveness of the training programme.

*GEF support is required for the technical assistance in developing the Low Carbon Cities training course, including training needs assessment and post-training evaluations and the work involved in conducting the training courses.*

140. Output 2.1.6: Expanded and improved Low Carbon Cities Network- This output entails the expansion and improvement of the Low Carbon Cities Network (LCCN) aimed at disseminating information, sharing of lessons learned and coaching each other on low carbon activities and investments. The activities will built upon the LCCN established under the PLCC project supported by the EU.

- Design and conduct of the Low Carbon Cities Network (LCCN) outreach program – This will mainly be for reaching out to prospective cities and encouraging additional members to join, hence expanding the city network from 16 to 32 members. The Low Carbon Cities training course developed & provided under output 2.1.5 as well as the PMR project of TGO will be used as a platform to reach out to cities and encourage new cities to join;
- Organization and conduct of LCCN meetings for cities to share experiences on low carbon activities - The meeting frequency of the network will be increased from 2 to at least 4 times per year in order to allow for more time for learning from each other and share experiences in more detail. The knowledge products and case studies prepared under output 2.1.7 will be shared among the members of the network. Key practitioners who were involved in the realization of the low carbon projects



will be invited as resource speakers to deliver presentations during the LCCN meetings.

- Design and implementation of information sharing scheme – This will involve the conduct of on-the-job coaching services (peer-to-peer learning) to other members of the LCCN network members, coordinated by the LCCN network secretariat at NMLT. In addition, key practitioners will be invited to share their experiences at national events/workshops.
- Development of a LCCN sustainable follow-up program – This will entail the preparation of recommendations for the continuation of the LCCN and strategic financing options to ensuring continuity. Included here is the establishment and strengthening links to regional and global networks for experience sharing such as: C40, ICLEI, World Mayors Forum on Climate Change and Green Climate Cities Network. This will build on the ongoing relationship that NMT/LCCN already has with these international networks, be it either in the form of active cooperation with ICLEI, or, as a platform through which Bangkok Metropolitan Administration (BMA) reaches out to Thai cities to share its experience as a member of the C40 network. GEF assistance will help in transitioning this relationship into a formal partnership.

*GEF support is required for the design and conduct of an outreach program, organising meetings (between cities and on-the-job coaching) to share experiences and the preparation of the recommendations on continuity of the network.*

141. It is worth mentioning that the outcomes from component 1 and 2, together, will guide the scaling up strategy which involves sharing of best practices and lessons learned by the 4 pilot cities with other cities as well as improving the enabling environment for low carbon developments using the experiences gained through the pilot cities. The Low Carbon Cities Network (LCCN) will be the primary channel through which the pilot cities will effectively communicate lessons with other cities. City staff will be trained to strengthen their capacities on low carbon planning through the CITC by showcasing successful planning examples that would have been tried and tested in Khon Kaen, Nakorn Ratchasima, Samui and Klaeng. Improving the enabling environment by providing support to institutional frameworks and incentives to facilitate integrated urban planning and management in additional cities, demonstration of bankable business plans and participation of the private sector will further inform the scaling up strategy.

142. Output 2.1.7: Designed, developed and implemented awareness campaign on climate change and low carbon developments – this output will entail the design, development and implementation of awareness campaigns in cities on climate change in general and low carbon urban developments in particular. To deliver this output, the following activities will be carried out:

- Preparation of a Communication Strategy and Action Plan - This plan will be prepared in close cooperation with the LCCN and provide a concrete set of actions to increase awareness on low carbon urban planning in the 4 pilot cities and the other cities in the LCCN. The plan will aim to promote the project, disseminate knowledge products and raise general public awareness on low carbon urban development in cities. This will include regular preparation of articles for newspapers, radio reports for community radio, and video pieces (infographics) for use on social media and TV (local television as well as national television). Regular

surveys among decision makers, citizens and practitioners will be undertaken to assess the impact of communications and knowledge products. The communications products will highlight the benefits for local people of low carbon urban development planning. The awareness campaign in the cities will be implemented in cooperation with local universities and civil society.

- Preparation and dissemination of knowledge products for practitioners and decision-makers in cities – This will be on the design, implementation, and financing of low carbon urban system infrastructure investment projects. This activity will identify and document key learnings derived from the project. It will be implemented in close cooperation with LCCN. The knowledge products will be shared on a web-portal (to be developed), linked to TGO's and/or NMLT current website. The knowledge products will also be used in the Low Carbon Cities Course developed under output 2.1.5.
- Dissemination of lessons-learned and documentation of best practices (national and international) – This will be on the development of integrated urban systems for low carbon cities. In cooperation with universities, low carbon technology companies and other stakeholders, detailed case studies will be prepared showing the best practices in low carbon urban development planning. Products will be prepared to target key audiences from general public, planners and decision makers, and practitioners.

*GEF support is required for the technical assistance in the preparations and implementation of the communication strategy and action plan; and in the preparation and dissemination of knowledge products.*

## 2.6 Key Indicators and Risks

### Indicators & Risks

143. The project success indicators are shown in the Project Result Framework and in Table 12 below. Progress towards these target values will be monitored throughout implementation.

Indicator	Target
No. of cities that have approved and adopted low carbon development plans by 2017	4
Percentage of participating cities where evidence-based low carbon planning is integrated with normal urban development planning processes by EOP, (%)	100
No. of cities which have completed carbon footprints in selected sectors and have institutionalized the process by 2018	4
No. of low carbon demonstration projects implemented as a result of technical and investment assistance in participating cities by EOP	19
No. of low carbon projects designed based on or influenced by the results of the demonstration projects and the low carbon city plans by EOP	8
Total amount of new investment leveraged through local plans of participating cities for low carbon projects by EOP, (USD)	16 million
No. of new policies facilitating low carbon investments in cities endorsed and approved by line agencies by EOP	2

Table 12: Project success indicators

144. The overall project risk is low to medium. While all possible efforts have been made in the design of the project to mitigate perceived project risks, there are inevitably some unavoidable residual risks that will have to be carefully monitored and managed to ensure project success. The key risks to the project implementation and the realisation of outcomes will be monitored throughout the implementation of the project. The Project Result Framework includes an overview of critical assumptions anticipated during project preparation. A risk assessment, also used to inform the project design, was prepared during project preparation and during the stakeholder consultation workshops at city and national level. The risk assessment is included in Annex I: Risk Analysis. This Risk Log will serve as a management tool and will be reviewed and updated during implementation.
145. The two main assumptions of the project to ensure the realization of its objective are:
- There is continued support from the central and local government for low carbon development. To sustain their willingness to change, the project will need to complement, improve and build upon the government policies and align the activities with the priorities of the cities. In addition, the project will involve high level decision makers in the activities of the project, especially in public events, and inform high level decision makers regularly.
  - There is continued economic growth in the country. Currently the economic growth is lower than expected due to political unrest in 2014. It is expected that economic growth will pick up again in the coming years.

## ***2.7 Financing Modality (co-financing)***

146. The project utilises GEF funding to motivate the alternative scenario through technical assistance and capacity building. However, GEF funds do not cover all these costs and existing public and private support will be available for intended activities. This will include cash funding from UNDP, government agencies and cities, and also in-kind contributions, such as staff time, office space, and other shared resources, see Table 13 below. During project formulation commitments were received for cash and in-kind contributions from all the participating cities as well as TGO and UNDP. These co-financing letters are included in Annex III: Co-financing. All cities have included sufficient co-finance to support the proposed activities in which they are involved.
147. The project will work with local authorities to mainstream low emission development into local planning, programme and projects. This will include putting in place the enabling partnerships, policy and regulatory mechanisms and for demonstration of sustainable transport and waste management projects in the 4 cities. The co-financing for these activities is included in the commitment letters from the cities.
148. By supporting the local level in this way, the project also intends to convince and attract private sector service providers to invest and scale-up their low carbon city services.

Source of funds	Amount Year 1 [USD]	Amount Year 2 [USD]	Amount Year 3 [USD]	Amount Year 4 [USD]	Total [USD]
GEF	694,415	1,394,846	792,596	268,143	3,150,000

<b>Co-financing</b>					
UNDP	277,500	7,500	7,500	7,500	300,000
TGO	100,000	100,000	100,000	100,000	400,000
Khon Kaen	23,760,873	9,092,400	6,570,655	4,380,436	43,804,364
Nakorn Ratchasima	10,368,416	25,921,041	46,289,456	21,105,249	103,684,162
Klaeng	1,215,326	2,734,483	1,215,325	911,494	6,076,628
Samui	2,803,586	7,008,964	9,812,549	8,410,757	28,035,856
<b>Sub-total Co-finance</b>	<b>38,525,701</b>	<b>44,864,388</b>	<b>63,995,485</b>	<b>34,915,436</b>	<b>182,301,010</b>
<b>TOTAL GEF+ Co-finance</b>	<b>39,220,116</b>	<b>46,259,234</b>	<b>64,788,081</b>	<b>35,183,579</b>	<b>185,451,010</b>

Table 13: Summary of co-financing

## 2.8 Cost Effectiveness

149. This Project has been designed as a series of interlinked components and activities to remove the barriers for the adoption of low carbon development in cities in Thailand through interventions that will improve the overall capacity of stakeholders. In the absence of the project's interventions the adoption of low carbon developments in cities in Thailand will continue to be ad-hoc and hence inefficient. Cooperation between different government agencies at local, regional and central level as well as between departments at the local level will remain poor. Collection of data for planning, for accounting of GHG emissions, for making a cost-benefit analysis for the investments and for monitoring & evaluation will remain limited and top-down planning without community involvement will undermine support for the low carbon developments in the cities. Also the limited sharing of lessons-learned with other cities will hamper replication. Therefore the baseline activities discussed in section 1.5 are expected to contribute marginally to low carbon developments in cities and it will take more years to achieve the benefits in terms of energy savings and GHG reductions. GEF incremental activities in this project are built on the baseline activities, and they will provide vital support to cities in realizing low carbon developments.
150. The GEF contribution of USD 3,150,000 will result in cumulative direct GHG emission reductions (till end of lifetime of the investments) of 1,359,852 tonnes CO<sub>2</sub>eq. This translates into a GEF unit abatement cost (UAC) of USD 2.32 per tonne CO<sub>2</sub>eq. When comparing the estimated UAC of this project against the UAC of the "Promotion of Low Carbon City across Municipalities in Celebration of His Majesty the King's 84th birthday" (PLCC project), it is found that the GEF project is more cost effective. The PLCC project offers a UAC of US\$305 per tonne CO<sub>2</sub>eq<sup>49</sup>. This Project is also more cost effective than the other GEF project implemented in Thailand related to the urban sector, the "Promoting Energy Efficiency in Commercial Buildings in Thailand (PEECB)" project. The UAC of this project is estimated at US\$37.3 per tonne CO<sub>2</sub>eq.
151. The Project will also strengthen planning processes at city level and generate lessons and knowledge on effective implementation and management of low carbon urban projects. This will catalyse more low carbon investments in these 4 cities and other

<sup>49</sup> The PLCC project is estimated to reduce 84,000 kg of CO<sub>2</sub>eq and the budget for the project is US\$275,000.

cities in Thailand after the completion of the project, e.g. through sharing of lessons-learning via the LCCN. As such, the project will also generate indirect emission reductions. The total indirect emission reductions are estimated at a range of 10,526,790 to 22,820,230 tonnes CO<sub>2</sub>e.

152. In addition, the project will support the preparations of bus rapid transport systems (BRT) in Khon Kaen and Nakorn Ratchasima. It is not expected that the BRT systems will be commissioned during the project implementation period, therefore GHG emissions reductions from the BRT systems are not included. For 2015 and 2016 the detailed design of the BRT systems will be carried out. However, during the project implementation preparatory actions will be taken to prepare and sensitise citizens for the BRT systems. For example a bus re-route will be implemented in NMR and a city shuttle bus system introduced in KK, along the roads where the BRT systems will be realized. So the project will contribute to GHG emission reductions from the BRT systems when they will be realized. At this stage they can however not be quantified.

## ***2.9 Sustainability and Replicability and Impacts***

### **Sustainability**

153. Sustainability of this project will be ensured through:

- An expanded and enhanced LCCN (more cities will join the network), so information is shared among more cities;
- Enhancing the capacity of stakeholders and government staff who will have the knowledge to plan, implement and manage low carbon projects;
- Recording and disseminating lessons learned and best practice examples, so that other cities can follow the examples. Demonstration projects will help decision makers understand the benefits of low carbon development.
- Strengthening low carbon development planning practices in cities and aligning them with national planning processes. This will be achieved by improving cooperation and coordination in cities between departments and different agencies, as well as with government agencies at regional and central level, e.g. via the working groups established in the project ;
- Strengthening institutional capacities to collect data for planning and monitoring, so that decision making is evidence-based. The project provides tools for more effective planning;
- Implementing the projects in close collaboration with academic institutes and private sector entities, so there is an exchange of knowledge between practitioners and academic institutions;
- Improving access for cities to national and international sources of climate finance, both market based mechanisms as well as national funds;
- Leading cities through a process of integrated low carbon planning and showing real examples of integrated low carbon planning. Integration will be shown vertically (e.g. cooperation between local, regional and national government agencies), horizontally (e.g. cooperation between different stakeholders at city level), and between different sectors (e.g. integrating energy efficiency considerations in waste management projects or including climate resilience features in the design of urban systems).

Through these project actions, the likelihood of sustainability of low carbon urban development practices is increased.

### Replicability

154. The implementation of low carbon investments in the cities will provide valuable operational experience and data that will boost the confidence of other cities and investors that low carbon investments can successfully be developed in Thailand. The implementation will be accompanied with capacity building of the various stakeholders, so that implementation can also happen in other cities. To encourage replication of these investments, the lessons learned will be documented and shared within the Low Carbon Cities Network. During the 4 years of the project, the cities will also supported in resource mobilization from domestic or international sources of finance, so that after the Project, planning and implementation of low carbon urban development projects can still continue and multiply.

### Impacts

155. There are socio-economic benefits of the proposed shift to low carbon development approaches. These impacts include:
- Increased liveability of cities, improved air quality and waste management: By improving the effectiveness of urban systems, especially transport and waste, and moving to low carbon options the GHG emissions will be reduced. By reducing GHG emissions also a reduction in emissions of other harmful substances can be expected, including a reduction in emissions of volatile organic compounds, fine particles (PM10/PM2.5) and odour. By the sustainable transport projects, the speed of traffic and quality of bus services in cities will be improved, resulting in improved passenger comfort, better fuel efficiency, and lower emissions. By the same token, the waste management projects will ameliorate local air quality and odour and reduce contamination of surface and groundwater.
  - Reduced dependence on fossil fuels: Thailand is heavily dependent on imported fossil fuels and electricity for its energy supply. Currently around 56% of the total energy demand is met from imported resources<sup>50</sup>. Of the total oil consumption, 85% is imported. As a consequence, the economy is sensitive to global energy prices. This affects the overall and perceived risks in the economy and the financial risk of investments.
  - Green jobs and market diversification: In particular Samui has prioritised tourism as a key motivating factor leading them to a low carbon approach. They aim to become a 'green' island. By attaining a green status Samui aims to differentiate itself and use the objective as a motivator to tackle the current issues on waste management and transport on the island. Via its green status Samui aims to also attract more tourists, creating more jobs on the island, some of which will relate to 'green' transport and 'green' waste management. The four cities are also promoting recycling and composting at community scale. It is therefore expected that the project will lead to more green jobs. Recycling offers local communities the potential to generate income, while diverting materials away from landfills. Each of

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<sup>50</sup> "Thailand's Renewable Energy Development-Plan", Presentation by Dr. Twarath Sutabutr, DEDE, Ministry of Energy, Thailand, 2 September 2013.



the waste management projects will improve the living conditions of poorer communities and the working conditions of waste management workers.

- Good governance: the project will enhance good governance at the municipal level through the strengthening of planning processes that address climate change and urban systems management issues with stronger participation of key stakeholder groups. Planning effective and sustainable urban infrastructure investments requires an understanding of the needs and preferences of a wide range of stakeholders regarding service delivery, costs, and corresponding social impacts. Therefore, public participation will be an integral part of the project. Public consultations will be held for all investment projects. It is expected that civil society organizations will play an important role in ensuring public participation and involvement in the low carbon urban developments.
- Gender benefits are expected primarily through an increased awareness of the need for, and participation of community and marginal groups in local level planning and implementation of projects. E.g. also for trainings, careful consideration will be given to the gender balance of the participants. Also in case green jobs are created, gender considerations will be seriously taken into account and it will be ensured that a gender balance is maintained.

### III. PROJECT RESULTS FRAMEWORK:

<b>This project will contribute to achieving the following Country Programme Outcome as defined in UNPAF 2012-2016/CP 2012-2016:</b>	Thailand is better prepared to coherently address climate change and environmental security issues through the enhancement of national capacity and policy readiness.
<b>Country Programme Outcome Indicators:</b>	Indicator 1.1: Number of policies and plans relating to renewable energy and energy efficiency technology issues approved, integrated and implemented by relevant government agencies at various levels.
<b>Primary applicable Key Environment and Sustainable Development Key Result Area:</b>	1. Mainstreaming environment and energy and 2. Catalysing environmental finance
<b>Applicable GEF Strategic Objective and Program:</b>	Promote Energy Efficient, Low-Carbon Transport and Urban Systems
<b>Applicable GEF Expected Outcomes:</b>	Sustainable transport and urban policy and regulatory frameworks adopted and implemented; Increased investment in less-GHG intensive transport and urban systems; GHG emissions avoided
<b>Applicable GEF Outcome Indicators:</b>	Number of cities adopting sustainable transport and urban policies and regulations; Volume of investment mobilized; Tonnes of CO <sub>2</sub> equivalent avoided.

	Indicator <sup>51</sup>	Baseline	Targets End of Project	Source of verification	Risks and Assumptions
<b>Project Goal:</b> Reduction of future GHG emissions from cities in Thailand	Cumulative direct GHG emission reductions resulting from the technical assistance and investments by end-of-project (tCO <sub>2</sub> eq.)	0	177,708	Project final report Annual monitoring reports from the PMU and participating cities	Economic growth in the country will continue. Central and local government support for low carbon development will continue
<b>Project objective:</b> Promotion of sustainable urban systems management in Khon Kaen, Nakorn Ratchasima, Samui and Klaeng to achieve low carbon growth	Cumulative direct fuel savings resulting from the technical assistance and investments in the transport sector in the 4 participating cities by EOP (GJ)	0	788,093 <sup>52</sup>	Project final report Annual monitoring reports from the PMU and participating cities	Economic growth in the country will continue, Central and local Government support for low carbon development will continue
	Annual amount of waste gainfully used (recycled, composted, anaerobically digested or for waste-to-energy) in the 4 participating cities by EOP (tonnes/year)	46,272	389,352 <sup>53</sup>	Project final report Annual monitoring reports from the PMU and participating cities	Economic growth in the country will continue, Central and local Government support for low carbon development will continue
	Total number of new green jobs	0	40 <sup>54</sup>	Project final report	Economic growth in the

<sup>51</sup> Unless otherwise stated, indicators apply to participating cities only.

<sup>52</sup> Based on the direct savings in the use of diesel and gasoline achieved by the investments and technical assistance in the 4 project cities till end of the project. For details on fuel savings and GHG emission reduction calculations see Annex II.

<sup>53</sup> Based on the target annual amount of waste anaerobically digested in NR, composted in KK and Samui, recycled in NR, KK, Samui and Klaeng and used for waste-to-energy in NR and KK by EOP. For details on waste management targets and GHG emission reduction calculations see Annex II and paragraph 1.5.



	Indicator <sup>51</sup>	Baseline	Targets End of Project	Source of verification	Risks and Assumptions
	created in the waste management sector and sustainable transport sector in the cities by EOP			Annual monitoring reports from the PMU and participating cities	country will continue. Central and local government support for low carbon development will continue
<b>Outcome 1.1:</b> Increased number of Thai cities that have formulated and implemented low carbon sustainable urban development plans	No. of cities that have approved and adopted low carbon development plans by 2017	0 <sup>55</sup>	4	Project reports	Continued cities and government support for low carbon development
	Percentage of participating cities where evidence-based low carbon planning is integrated with normal urban development planning processes by EOP	0%	100%	Local development plans of the cities and Strategic Action Plans	Cities will complete a planning cycle during the project (planning cycle is usually 3 years)
	No. of cities which have completed carbon footprints in selected sectors and have institutionalized the process by 2018	0 <sup>56</sup>	4	Project reports, Inventory reports	
<b>Outcome 1.2:</b> Increased number of Thai cities with energy efficient urban systems	No. of low carbon demonstration projects implemented as a result of technical and investment assistance in participating cities by EOP	0	19 <sup>57</sup>	Project reports, commissioning reports	-There is adequate administrative and logistical support from the government in the timely implementation of low carbon urban projects. -Negative experiences with low carbon investments in other places will not negatively influence the feasibility of the demonstration projects -Citizens support low carbon development in their cities as a priority compared to other development needs and will use the services -Cities and private sector partners deliver projects according to schedule.
	No. of low carbon projects designed based on or influenced by the results of the demonstration projects and the low carbon city plans by EOP	0	8 <sup>58</sup>	Project reports	

<sup>54</sup> For the target it is assumed that in each of the 4 cities at least 10 additional green jobs are created in the waste management sector and sustainable transport sector.

<sup>55</sup> Khon Kaen has currently a low carbon action plan, this is however a stand-alone plan not completely integrated with its local development plan. Other cities don't have a low carbon action plan or a local development plan in which low carbon considerations are integrated.

<sup>56</sup> KK and Klaeng have done some calculations on GHG emissions within the city in the past, but this covers only a few sectors and is not very robust.

<sup>57</sup> For the complete list of all low carbon projects, see annex II.

<sup>58</sup> It is assumed that during the project in each city two additional low carbon interventions/activities will be identified and implemented as result of the work done under the project (either following the example of the demonstration projects, or as part of the low carbon development planning cycle).

	Indicator <sup>51</sup>	Baseline	Targets End of Project	Source of verification	Risks and Assumptions
					-Cities & Government budgets for low carbon investments are replenished
<b>Outcome 2.1:</b> Increased volume of investments in energy efficient urban systems by government and private sector	Total amount of new investment leveraged through local plans of participating cities for low carbon projects by EOP	0	USD 16 million <sup>59</sup>	Project reports	-Cities & Government budgets for low carbon investments are replenished
	No. of new policies facilitating low carbon investments in cities endorsed and approved by line agencies by EOP	0	2 <sup>60</sup>	Project reports, policy recommendations	

<sup>59</sup> It is expected that 2 projects per year per city during the last 2 years of the project (average investment amount per project \$1 million) will be leveraged.

<sup>60</sup> Policy recommendations are envisaged in the following two areas: 1) inclusion of low carbon investment in the performance evaluations (KPIs) of city staff (cooperation with Ministry of Interior), 2) legal revisions in order that cities are able to receive revenues from carbon credit sales (cooperation with Ministry of Interior.)

## Total budget and work plan

<b>Award ID:</b>	86188	<b>Project ID(s):</b>	93514
<b>Award Title:</b>	Achieving Low Carbon Growth in Cities through Sustainable Urban Systems Management in Thailand		
<b>Business Unit:</b>	THA10		
<b>Project Title:</b>	Achieving Low Carbon Growth in Cities through Sustainable Urban Systems Management in Thailand		
<b>PIMS no.</b>	4778		
<b>Implementing Partner (Executing Agency)</b>	Thailand Greenhouse Gas Management Organisation (TGO – Public Organisation) Ministry of Natural Resources and Environment		

GEF Outcome/ Atlas Activity	Responsible Party/	Fund ID	Donor Name	Atlas Budgetary Account Code	ATLAS Budget Description	Amount Year 1 (USD)	Amount Year 2 (USD)	Amount Year 3 (USD)	Amount Year 4 (USD)	Total (USD)	See Budget Note:
	Implementing Agent										
<b>OUTCOME 1.1:</b> Increased number of Thai cities that have formulated and implemented low carbon sustainable urban development plans	<b>TGO</b>	<b>62000</b>	<b>GEF</b>	71300	Local Consultants	61,145	66,036	-	-	127,181	1
				71600	Travel	6,794	7,337	-	-	14,131	2
				72100	Contractual services - Companies	114,000	134,000	32,000	5,000	285,000	3
				75700	Training, Workshops and Confer	32,000	32,000	8,000	7,000	79,000	4
					Sub-total	213,939	239,373	40,000	12,000	505,312	

<b>OUTCOME 1.2:</b> Increased number of Thai cities with energy efficient urban systems	<b>TGO</b>	<b>62000</b>	<b>GEF</b>	71300	Local Consultants	54,016	56,100	115,490	72,695	298,301	5
				71600	Travel	3,221	3,367	10,699	6,396	23,683	6
				72200	Equipment and Furniture	256,539	803,076	403,616	-	1,463,231	7
				75700	Training, Workshops and Confer	18,000	18,000	2,339	-	38,339	8
					Sub-total	331,776	880,543	532,144	79,091	1,823,554	

<b>OUTCOME 2.1:</b> Increased volume of investments in energy efficient urban systems by government and private sector	<b>TGO</b>	<b>62000</b>	<b>GEF</b>	71300	Local Consultants	45,200	87,135	91,457	83,557	307,349	9
				71600	Travel	4,000	8,095	3,995	3,495	19,585	10
				72100	Contractual services - Companies	41,500	104,000	81,000	31,000	257,500	11
				75700	Training, Workshops and Confer	20,700	26,000	29,000	11,000	86,700	12
					Sub-total	111,400	225,230	205,452	129,052	671,134	

<b>Project management</b> (including M&E costs)	<b>TGO</b>	<b>62000</b>	<b>GEF</b>	71200	International Consultants	-	26,000	-	26,000	52,000	13
				71300	Local Consultants	25,108	12,500	-	12,500	50,108	14
				71600	Travel	3,892	2,000	-	2,000	7,892	15
				74599	UNDP Cost Recovery Charge – DPC	3,000	3,000	3,000	3,000	12,000	16
				74100	Professional Services	2,800	1,700	9,500	-	14,000	17
				75700	Training, Workshops and Confer	2,500	4,500	2,500	4,500	14,000	18
					Sub-total	37,300	49,700	15,000	48,000	150,000	

	<b>PROJECT TOTAL</b>	<b>694,415</b>	<b>1,394,846</b>	<b>792,596</b>	<b>268,143</b>	<b>3,150,000</b>	
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## Summary of Funds:

	Amount [USD]	Amount [USD]	Amount [USD]	Amount [USD]	Total [USD]
	Year 1	Year 2	Year 3	Year 4	
GEF	694,415	1,394,846	792,596	268,143	3,150,000
UNDP	277,500	7,500	7,500	7,500	300,000
Khon Kaen	23,760,873	9,092,400	6,570,655	4,380,436	43,804,364
Nakorn Ratchasima	10,368,416	25,921,041	46,289,456	21,105,249	103,684,162
Klaeng	1,215,326	2,734,483	1,215,325	911,494	6,076,628
Samui	2,803,586	7,008,964	9,812,549	8,410,757	28,035,856
TGO	100,000	100,000	100,000	100,000	400,000
<b>TOTAL</b>	<b>39,220,116</b>	<b>46,259,234</b>	<b>64,788,081</b>	<b>35,183,579</b>	<b>185,451,010</b>

## Budget notes:

- 1) Technical backstopping team of local consultants. Backstopping on planning processes in 4 cities (waste management experts and sustainable transport experts).
- 2) Travel costs for local consultants to support planning processes in 4 cities.
- 3) Contractual services for: a) preparing recommendations on GHG inventory guideline for cities and updating GHG inventory guideline for cities, b) preparing GHG inventories for 4 cities and providing support in institutionalising inventory procedures, c) Supporting preparations of local development plan with low carbon considerations integrated and preparing low carbon action plans in 4 cities and facilitating stakeholder consultations, d) Preparing sector specific plans in waste management sector and sustainable transport sector for 4 cities, e) carrying out waste source surveys in 4 cities, f) Developing monitoring frameworks for WTE and integrated waste management facilities including facilitation of stakeholder consultations.
- 4) Training on a) GHG inventories to cities and regional staff of concerned ministries, b) Low Carbon Cities course and low carbon planning, c) environmental impacts of waste-to-energy plants and integrated waste management facilities and monitoring frameworks.
- 5) Local consultants to: a) support establishing a business model & cooperation between communities, government and waste recycling companies in KK, Samui and NR, b) Technical backstopping team of local consultants. Backstopping on design, commissioning, management and implementation of low carbon urban development projects in the 4 cities (waste management experts and sustainable transport experts).
- 6) Travel costs of local consultants to support cities in design, commissioning, management and implementation of low carbon urban development projects.
- 7) Incremental investments in climate-resilient infrastructure and equipment for the composting plant in KK, 32 in-vessel composting units for the expansion of the community based composting programmes in KK and Samui, 12 pneumatic road tubes including software/database to analyse the data to enhance the traffic control pilots in KK and NR, 5 bicycle parking areas with cover & racks and LED lighting to complement the cycle path in KK and bicycle promotion in Klaeng, incremental costs for 4 modern bus-stops in KK and Klaeng, methane measurement kit to detect leakages of anaerobic digester in NR, refurbishment of digester and stirrer in NR, 20 GPS tracking devices for busses and software/mobile application for tracking busses for the bus reroute project in NR, 5 tuk tuks and the compartmentalization of 5 existing waste collection trucks to enhance collection services of segregated waste in NR, incremental costs for the purchase of four energy efficient pumps in the water pumping station in Klaeng, 2 conveyor belts for separation of waste in Klaeng and Samui, safety features for the bikeway in Samui, 40 GPS tracking devices for trucks and software/database to monitor the traffic zoning project in Samui,
- 8) Trainings on waste management, recycling and composting to communities in KK, NR and Samui, and organising stakeholder consultations.
- 9) Local consultants to a) prepare policy recommendations and conduct lobbying work for policy adoption to support low carbon investments, b) conduct an analysis of all existing financing schemes and propose recommendations for improvements, lead dialogue with Environmental Fund and prepare guidelines for

cities, c) support TGO and cities on climate change financing, capacity building on T-VER, NAMAs, d) to support the development of MRV system in the waste management sector in the cities linked with central level, including capacity building of city staff in formulation of MRV framework, e) prepare lessons learned reports as inputs to the meetings of the Low Carbon Cities Network, f) prepare regular communication products (news-updates, etc.) for the project based on developments in cities, g) prepare regular infographics and audio items to raise awareness on low carbon development in cities.

10) Travel costs for local consultants to prepare communication products, to support cities on developing MRV systems and to support cities on climate financing schemes.

11) Contractual services to a) analyse current and future national and international sources of climate finance and prepare an easy-to-understand guideline in Thai, b) facilitating stakeholder consultations for preparing policy recommendations to support low carbon investments, c) prepare MRV framework in 4 cities and facilitate stakeholder consultations, d) Develop outline for the Low Carbon Cities course and develop training materials for the Low Carbon Cities course, e) with NML to expand and improve Low Carbon Cities Network, f) develop infographics/video and audio clips for awareness raising on low carbon developments in cities and benefits of low carbon investments.

12) Trainings on a) (carbon) market mechanisms for climate change and NAMAs to cities, b) MRV for NAMAs, and c) trial out of low carbon cities course, providing "Low Carbon Cities" training course to cities and private sector staff.

13) International consultant for mid-term evaluation and final evaluation.

14) Local consultant for mid-term evaluation and final evaluation, First year of salary of project coordinator and project assistant will be paid by the project. Afterwards, TGO & cities will pay the salaries.

15) Travel costs for mid-term and final evaluation and first year travel costs for project coordinator and project assistant;

16) DPC will include financial services, procurement of goods and services, HR and issuance of contracts, travel, etc. The draft LOA will be submitted along with LPAC minutes at the DOA stage.

17) Micro-assessment, spot check and audit

18) Mid-term evaluation and final-evaluation workshops.

## IV. MANAGEMENT ARRANGEMENTS

### Project Organization Structure

156. The management arrangements for the project are depicted in Figure 8 below.

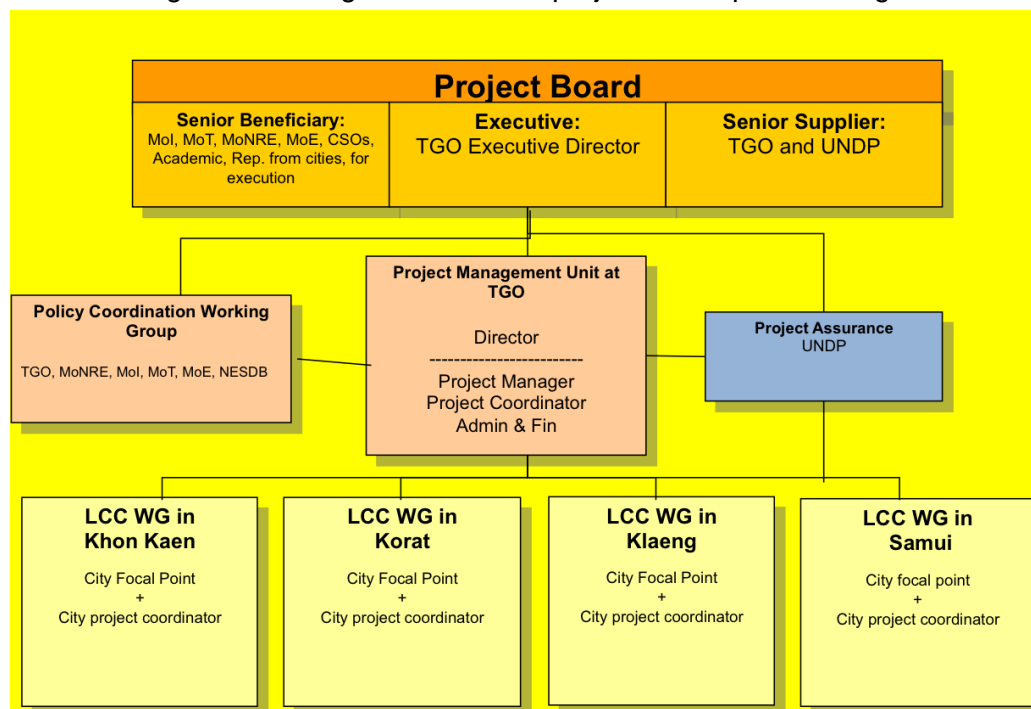


Figure 8: Project management structure

157. TGO is the government institution responsible for the implementation of the project and will act as the Implementing Partner. UNDP is the Implementing Agency for the project. The project will be implemented under is a National Implementation Modality (NIM) project, in line with the Standard Basic Assistance Agreement (SBAA, 2006) between the UNDP and the Royal Thai Government and the Country Programme Document (2012-2016).

158. The overall responsibility for the project implementation by TGO implies the timely and verifiable attainment of project objectives and outcomes. TGO will provide support to, and inputs for, the implementation of all project activities.

159. A Project Board (PB) will be established at the inception of the project to monitor project progress, to guide project implementation and to support the project in achieving its listed outputs and outcomes. It will be chaired by TGO, as the key governmental agency in charge of planning and setting of targets for greenhouse gas emission reductions in Thailand and providing support to other government agencies on carbon emission reduction activities, will ensure that other governmental agencies are duly consulted and involved as per their mandate such as the Ministry of Interior, Ministry of Energy, Ministry of Transport, Ministry of Environment and Natural Resources, and pilot municipalities/cities Khon Kaen, Nakorn Ratchasima, Samui and Klaeng. The PB can also include representatives of national and regional organizations like universities and CSOs, by ensuring, however, that the PB will



remain sufficiently lean to facilitate its effective operation. Other participants will be invited into the PB meetings at the decision of the PB. The PB will meet regularly (at least twice a year) to review project progress, discuss and agree on project work plans. One of the key tasks of the PB will be to ensure coordination and synchronization the all activities supported by the project. In this respect, the PB will serve as a platform for key project stakeholders and beneficiaries to regularly get together and design a joint strategy of work on the project.

160. Close coordination between TGO and the four pilot cities will be further enhanced by several means, including: a) the city coordination office based in each city, b) the Low Carbon Cities Network established under het PLCC project with NMLT, c) the capacity building programmes of CITC under TGO.
161. The PB will review and approve annual project reviews and work plans, technical documents, budgets and financial reports. The PB will provide general strategic and implementation guidance to the PM. It will make decisions by consensus. The specific rules and procedures of the PB will be decided upon at the project inception meeting. PB is responsible for making management decisions for a project in particular when guidance is required by the Project Manager. The PB plays a critical role in project monitoring and evaluations by assuring the quality of these processes and products, and using evaluations for performance improvement, accountability and learning. It ensures that required resources are committed and arbitrates on any conflicts within the project or negotiates a solution to any problems with external bodies. In addition, it approves the appointment and responsibilities of the Project Manager and any delegation of its Project Assurance responsibilities. Based on the approved Annual Work Plan, the PB can also consider and approve the quarterly plans (if applicable) and also approve any essential deviations from the original plans. In order to ensure UNDP's ultimate accountability for the project results, PB decisions will be made in accordance with standards that shall ensure management for development results, best value for money, fairness, integrity, transparency and effective international competition. In case consensus cannot be reached within the Board, the final decision shall rest with the UNDP Advisor of the Thai country office. The success of the project implementation is dependent upon strong project guidance, coordination and advocacy from the Project Board. The Project Management Unit (PMU) will be responsible for arranging PB meetings, providing materials to members prior to the meeting, and delineating a clear set of meeting objectives and sub-objectives to be met.
162. The final list of the Project Board members will be completed at the outset of project operations and presented in the inception report by taking into account the envisaged role<sup>61</sup> of different parties in the Board. The project manager will participate as a non-voting member in the Board meetings and will also be responsible for compiling a summary report of the discussions and conclusions of each meeting.
163. At the outset of project operations, a project inception report will be prepared in co-operation with the key stakeholders, and expert(s) engaged in leading or supporting the implementation of the project. The inception report will include detailed work plans for each subcomponent (output) of the project at the specific activity level and

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<sup>61</sup> Senior Supplier: individual or group representing the interests of the parties concerned which provide funding for specific cost sharing projects and/or technical expertise to the project.

Senior Beneficiary: individual or group of individuals representing the interests of those who will ultimately benefit from the project.

elaboration of the required resources and stakeholders to be involved for reaching the stated targets. These output specific work plans will provide the main basis for day-to-day management, implementation and monitoring of the progress of the project, complemented by the annual monitoring to be done at the Outcome level by the PIRs.

164. A National Project Director (NPD) will be appointed by TGO and will be the custodian of the Project Document and as such will be responsible for overseeing compliance with the agreed work plan and budget. The NPD will ensure that subsequent revisions to the Project Document are verified and approved by the PB and in accordance with the requirements of the Government and GEF. The NPD will be responsible for delivery of project objectives, for all project reporting including submission of Annual Work Plans (AWP), APR/PIRs and financial reports. The NPD will oversee the effective communications and coordination with all parties involved in the project and will verify that resources committed to the project are available. This includes in-kind commitments, which will be monitored and reported during project reviews. The NPD will report to the PB any issues, internal or external to the project, which are likely to have an effect on the delivery of results.
165. The day-to-day management of the project will be carried out by a Project Management Unit (PMU) under the overall guidance of the Project Board. The PMU will consist of a full time Project Manager, Project Coordinator and an Administrative Assistant, as elaborated in Figure 8 above. For successfully doing this, public outreach, establishment of the contacts and co-operation with the key local and international stakeholders and expert institutions as well as ability for adaptive management and new innovative approaches will be of utmost importance and will be emphasized in the recruitment. Furthermore, the project is will contract experts on an as needed basis to support the project inception phase and project implementation. Contacts with experts and institutions in other countries that have already gained experience in developing and implementing similar measures are also to be established. The Project Manager will report to UNDP and the Project Board. The Terms of Reference of the key project personnel are presented in Annex IV: Terms of reference for Project Staff of this Project Document.
166. The Project Manager will be tasked with the day-to-day management of project activities, as well as with financial and administrative reporting. The Project Manager will be responsible for project implementation and will be guided by Annual Work Plans and follow the RBM standards. The Project Manager will prepare Annual Work plans in advance of each successive year and submit them to the PB for approval. The Project Manager will be supported by an Admin/Finance Assistant and by a Project Coordinator. The Project Manager will have the authority to run the project on a daily basis on behalf of the Implementing Partner within the constraints laid down by the Board. PM's prime responsibility is to ensure that the project produces the planned outputs and achieves the planned indicators by undertaking necessary activities specified in the project document to the required standard of quality and within the specified constraints of time and cost. This will require linking the indicators to the work plan to ensure RBM.
167. To ensure effective coordination and implementation of the project activities at city level, in each city a high level city focal point will be appointed by the city in consultation with TGO. The City focal point will be responsible for ensuring effective

coordination with and cooperation from the different departments in the city. Furthermore, in each city a city project coordinator will support the implementation of the project activities in the cities.

168. To strengthen the link between cities, TGO and the NCCC, in particular with the aim to influence policies facilitating low carbon development in cities, a dedicated 'Policy Coordination Working Group' will be established to further strengthen the link between cities, TGO and the NCCC with the aim of facilitating policies supportive of low carbon development in cities. Members of the working group will include TGO, PCD under MoNRE, Department of Local Administration (DLA) under Ministry of Interior (MoI), Office of Transport Planning and Policy (OTP) under Ministry of Transport (MoT), Energy Policy & Planning Office (EPPO) under Ministry of Energy (MoE) and the National Economic and Sustainable Development Board (NESDB).
169. Project Assurance: UNDP will designate an Advisor to provide independent project oversight and monitoring functions, to ensure that project activities are managed and milestones accomplished. The UNDP Advisor will be responsible for reviewing Risk, Issues and Lessons Learned logs, and ensuring compliance with the Monitoring and Communications Plan. The UNDP-GEF Regional Technical Advisor will also play an important project assurance role by supporting the annual APR/PIR process.
170. In order to accord proper acknowledgement to GEF for providing funding, a GEF logo should appear on all relevant GEF project publications, including any hardware purchased with GEF funds. Any citation on publications regarding projects funded by GEF should also accord proper acknowledgement to GEF in accordance with the respective GEF guidelines.

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## V. MONITORING FRAMEWORK AND EVALUATION

171. The project will be monitored through the following M& E activities. The M& E budget is provided in Table 14 below.

### **Project start:**

172. A Project Inception Workshop will be held within the first 2 months of project start with those with assigned roles in the project organization structure, UNDP country office and where appropriate/feasible regional technical policy and programme advisors as well as other stakeholders. The Inception Workshop is crucial to building ownership for the project results and to plan the first year annual work plan.
173. The Inception Workshop should address a number of key issues including:
- Assist all partners to fully understand and take ownership of the project. Detail the roles, support services and complementary responsibilities of UNDP CO and BRH staff vis-à-vis the project team. Discuss the roles, functions, and responsibilities within the project's decision-making structures, including reporting and communication lines, and conflict resolution mechanisms. The Terms of Reference for project staff will be discussed again as needed.
  - Based on the project results framework and the relevant GEF Tracking Tool if appropriate, finalize the first annual work plan. Review and agree on the indicators, targets and their means of verification, and recheck assumptions and risks.
  - Provide a detailed overview of reporting, monitoring and evaluation (M&E) requirements. The Monitoring and Evaluation work plan and budget should be agreed and scheduled.
  - Discuss financial reporting procedures and obligations, and arrangements for annual audit.
  - Plan and schedule Project Board meetings. Roles and responsibilities of all project organization structures should be clarified and meetings planned. The first Project Board meeting should be held within the first 12 months following the inception workshop.
174. An Inception Workshop report is a key reference document and shall be prepared and shared with participants to formalize various agreements and plans decided during the meeting.

### **Quarterly:**

175. Progress made shall be monitored in the UNDP Enhanced Results Based Management Platform.
176. Based on the initial risk analysis submitted, the risk log shall be regularly updated in ATLAS. Risks become critical when the impact and probability are high. Note that for UNDP GEF projects, all financial risks associated with financing mechanisms are automatically classified as critical on the basis of their innovative nature (high impact and uncertainty due to no previous experience justifies classification as critical).

177. Based on the information recorded in Atlas, a Project Progress Reports (PPR) can be generated in the Executive Snapshot.
178. Other ATLAS logs can be used to monitor issues, lessons learned etc. The use of these functions is a key indicator in the UNDP Executive Balanced Scorecard.

**Annually:**

179. The Annual Project Review/Project Implementation Reports (APR/PIR) is prepared to monitor progress made since project start and in particular for the previous reporting period (30 June to 1 July). The APR/PIR combines both UNDP and GEF reporting requirements.
180. The APR/PIR includes, but is not limited to, reporting on the following:
- Progress made toward project objective and project outcomes - each with indicators, baseline data and end-of-project targets (cumulative)
  - Project outputs delivered per project outcome (annual).
  - Lesson learned/good practice.
  - AWP and other expenditure reports
  - Risk and adaptive management
  - ATLAS QPR
  - Portfolio level indicators (i.e. GEF focal area tracking tools) are used by most focal areas on an annual basis as well.

*Periodic Monitoring through site visits:*

- UNDP CO and the UNDP RCU will conduct visits to project sites based on the agreed schedule in the project's Inception Report/Annual Work Plan to assess first hand project progress. Other members of the PSC may also join these visits. A Field Visit Report/BTOR will be prepared by the CO and UNDP RCU and will be circulated no less than one month after the visit to the project team and PSC members.

*Mid-term of project cycle:*

181. The project will undergo an independent Mid-Term Evaluation at the mid-point of project implementation (July 2017). The Mid-Term Evaluation will determine progress being made toward the achievement of outcomes and will identify course correction if needed. It will focus on the effectiveness, efficiency and timeliness of project implementation; will highlight issues requiring decisions and actions; and will present initial lessons learned about project design, implementation and management. Findings of this review will be incorporated as recommendations for enhanced implementation during the final half of the project's term. The organization, terms of reference and timing of the mid-term evaluation will be decided after consultation between the parties to the project document. The Terms of Reference for this Mid-term evaluation will be prepared by the UNDP CO based on guidance from the Regional Coordinating Unit and UNDP-GEF. The management response and the evaluation will be uploaded to UNDP corporate systems, in particular the UNDP Evaluation Office Evaluation Resource Centre (ERC).

182. The relevant GEF Focal Area Tracking Tools will also be completed during the mid-term evaluation cycle.

*End of Project:*

183. An independent Final Evaluation will take place three months prior to the final Project Board meeting and will be undertaken in accordance with UNDP and GEF guidance. The final evaluation will focus on the delivery of the project's results as initially planned (and as corrected after the mid-term evaluation, if any such correction took place). The final evaluation will look at impact and sustainability of results, including the contribution to capacity development and the achievement of global environmental benefits/goals. The Terms of Reference for this evaluation will be prepared by the UNDP CO based on guidance from the Regional Coordinating Unit and UNDP-GEF.
184. The Terminal Evaluation should also provide recommendations for follow-up activities and requires a management response that should be uploaded to PIMS and to the UNDP Evaluation Office Evaluation Resource Center (ERC).
185. The relevant GEF Focal Area Tracking Tools will also be completed during the final evaluation.
186. During the last three months, the project team will prepare the Project Terminal Report. This comprehensive report will summarize the results achieved (objectives, outcomes, outputs), lessons learned, problems met and areas where results may not have been achieved. It will also layout recommendations for any further steps that may need to be taken to ensure sustainability and replicability of the project's results.

*Learning and knowledge sharing:*

187. Results from the project will be disseminated within and beyond the project intervention zone through existing information sharing networks and forums.
188. The project will identify and participate, as relevant and appropriate, in scientific, policy-based and/or any other networks, which may be of benefit to project implementation through lessons learned. The project will identify, analyse, and share lessons learned that might be beneficial in the design and implementation of similar future projects.
189. Finally, there will be a two-way flow of information between this project and other projects of a similar focus.

*Communications and visibility requirements:*

190. Full compliance is required with GEF and UNDP's Branding Guidelines. These can be accessed at <http://intra.undp.org/coa/branding.shtml>, and specific guidelines on UNDP logo use can be accessed at: <http://intra.undp.org/branding/useOfLogo.html>. Amongst other things, these guidelines describe when and how the UNDP logo needs to be used, as well as how the logos of donors to UNDP projects need to be used. For the avoidance of any doubt, when logo use is required, the UNDP logo needs to be used alongside the GEF logo. The GEF logo can be accessed at:



[http://www.thegef.org/gef/GEF\\_logo](http://www.thegef.org/gef/GEF_logo). The UNDP logo can be accessed at <http://intra.undp.org/coa/branding.shtml>.

191. Full compliance is also required with the GEF's Communication and Visibility Guidelines (the "GEF Guidelines"). The GEF Guidelines can be accessed at: [http://www.thegef.org/gef/sites/thegef.org/files/documents/C.40.08\\_Branding\\_the\\_GEF%20final\\_0.pdf](http://www.thegef.org/gef/sites/thegef.org/files/documents/C.40.08_Branding_the_GEF%20final_0.pdf).
192. Amongst other things, the GEF Guidelines describe when and how the GEF logo needs to be used in project publications, vehicles, supplies and other project equipment. The GEF Guidelines also describe other GEF promotional requirements regarding press releases, press conferences, press visits, visits by Government officials, productions and other promotional items.
193. Where other agencies and project partners have provided support through co-financing, their branding policies and requirements should be similarly applied.

#### *Audit Arrangement*

194. The Government will provide the UNDP Resident Representative with certified periodic financial statements, and with an annual audit of the financial statements relating to the status of UNDP (including GEF) funds according to the established procedures set out in the programming and finance manuals. The audit will be conducted according to UNDP financial regulations, rules and audit policies by the legally recognized auditor of the Government, or by a commercial auditor engaged by the Government.

Type of M&E activity	Responsible Parties	Budget US\$ <i>Excluding project team staff time</i>	Time frame
Inception Workshop and Report	<ul style="list-style-type: none"> <li>▪ Project Manager</li> <li>▪ UNDP CO, UNDP GEF</li> </ul>	Indicative cost: 10,000. Costs to be borne by IP (co-financing)	Within first three months of project start up
Measurement by Means of Verification of project results.	<ul style="list-style-type: none"> <li>▪ UNDP GEF RTA/Project Manager will oversee the hiring of specific studies and institutions, and delegate responsibilities to relevant team members.</li> </ul>	To be finalized in Inception Phase and Workshop.	Start, mid and end of project (during evaluation cycle) and annually when required.
Measurement by Means of Verification for Project Progress on <i>output and implementation</i>	<ul style="list-style-type: none"> <li>▪ Oversight by Project Manager</li> <li>▪ Project team</li> </ul>	To be determined as part of the Annual Work Plan's preparation.	Annually prior to ARR/PIR and to the definition of annual work plans
ARR/PIR	<ul style="list-style-type: none"> <li>▪ Project manager and team</li> <li>▪ UNDP CO</li> <li>▪ UNDP RTA</li> <li>▪ UNDP GEF Directorate</li> </ul>	Part of Project Management Budget	Annually
PB meetings	<ul style="list-style-type: none"> <li>▪ Project Manager</li> </ul>	Indicative cost: 10,000 (total for project period)	Following Inception Workshop and at least annually thereafter.



Type of M&E activity	Responsible Parties	Budget US\$ <i>Excluding project team staff time</i>	Time frame
Periodic status/ progress reports	<ul style="list-style-type: none"> <li>Project manager and team</li> </ul>	Part of Project Management Budget	Quarterly
Mid-term Evaluation	<ul style="list-style-type: none"> <li>Project manager and team</li> <li>UNDP CO</li> <li>UNDP RCU</li> <li>External Consultants (i.e. evaluation team)</li> </ul>	Indicative cost: 42,500	At the mid-point of project implementation.
Final Evaluation	<ul style="list-style-type: none"> <li>Project manager and team</li> <li>UNDP CO</li> <li>UNDP RCU</li> <li>External Consultants (i.e. evaluation team)</li> </ul>	Indicative cost: 42,500	At least three months before the end of project implementation
Project Terminal Report	<ul style="list-style-type: none"> <li>Project manager and team</li> <li>UNDP CO</li> <li>External Consultant</li> </ul>	Part of Project Management Budget	At least three months before the end of the project
Lessons Learned Report	<ul style="list-style-type: none"> <li>Project manager and team</li> <li>UNDP CO</li> <li>External Consultant</li> </ul>	Part of Project Management Budget	Yearly
Audit Interim/ NEX Audit (as per OAI requirements)	<ul style="list-style-type: none"> <li>UNDP CO</li> <li>Project manager and team</li> <li>National Audit Department</li> <li>Private sector auditors (if necessary)</li> </ul>	Indicative cost 14,000 (total for project period)	Yearly
Visits to field sites	<ul style="list-style-type: none"> <li>UNDP CO</li> <li>UNDP RCU (as appropriate)</li> <li>PB members</li> <li>Government representatives</li> </ul>	For GEF supported projects, paid from IA fees and operational budget	Yearly
<b>TOTAL indicative COST</b> Excluding project team staff time and UNDP staff and travel expenses		US\$ 109,000	

Table 14: Monitoring and evaluation work plan and budget

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## VI. LEGAL CONTEXT

195. The Royal Thai Government and the United Nations Special Funds have entered into the Agreement to govern assistance from the Special Fund to Thailand, which was signed by both parties on 04 June 1960. Pending the finalization of the Standard Basic Assistance Agreement (SBAA) between UNDP and the Government, the Agreement will govern the technical assistance provided by UNDP Thailand under the Country Programme Document (2012-2016).
196. Under the UNDP-funded programmes and projects, the responsibility for the safety and security of the implementing partner and its personnel and property, and of UNDP's property in the implementing partner's custody, rests with the implementing partner in accordance with the aforementioned Agreement between the UN Special Fund and the Government of Thailand concerning Assistance from the Special Fund 1960.
197. The implementing partner shall:
- Put in place an appropriate security plan and maintain the security plan, taking into account the security situation in the country where the Programme is being carried;
  - Assume all risks and liabilities related to the implementing partner's security, and the full implementation of the security plan.
198. UNDP reserves the right to verify whether such a plan is in place, and to suggest modifications to the plan when necessary. Failure to maintain and implement an appropriate security plan as required hereunder shall be deemed a breach of this agreement.
199. The implementing partner agrees to undertake all reasonable efforts to ensure that none of the UNDP funds received pursuant to the Programme Document are used to provide support to individuals or entities associated with terrorism and that the recipients of any amounts provided by UNDP hereunder do not appear on the list maintained by the Security Council Committee established pursuant to resolution 1267 (1999). The list can be accessed via <http://www.un.org/Docs/sc/committees/1267/1267ListEng.htm>. This provision must be included in all sub-contracts or sub-agreements entered into under this Programme Document.

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**VII. ANNEXES**

## Annex I: Risk Analysis

### OFFLINE RISK LOG

**Project Title:** Achieving Low Carbon Growth in Cities through Sustainable Urban Systems Management in Thailand

#	Description	Date Identified	Type	Impact & Probability	Countermeasures / Management Response	Owner	Submitted, updated by	Last Update	Status (compared with previous evaluation)
1	The project will require a high degree of coordination among the four cities, line agencies, civil society, TGO, private sector and other partners. The involvement of many stakeholders could prevent efficient decision- making.		Institutional	I = 3 P = 2  L	As the implementing partner, TGO will play an important convening and coordinating role. TGO has already carried out this role through various initiatives. The Project Board will also play an important role in decision-making, guiding the project, and bringing all partners together.	NPM	Submitted by Project Proponent		
2	If the disbursement of co-financing by cities for the investments in the cities does not meet the scheduled timeframe, it could delay activities and negatively impact project implementation.		Institutional	I = 3 P = 2  L	The project team will regularly follow up with cities and make realistic work plans and timeframes. If obstacles are identified they will quickly be identified and via the project team addressed in the Project Board.	NPM	Submitted by Project Proponent		
3	Political environment, change of key senior staff within government agencies at national level (e.g. TGO, ONEP, and MoNRE) and change of key senior personnel (the Mayor and Councillor members) at the		Political	I = 3 P = 3  M	Regular communications between national agencies and with the city project team will be maintained, not only at the policy level but also with key personnel at the working level who will play a key role in terms of implementing the planned activities at the city level. Key decision makers will be involved at all stages of the project,	NPM	Submitted by Project Proponent		

#	Description	Date Identified	Type	Impact & Probability	Countermeasures / Management Response	Owner	Submitted, updated by	Last Update	Status (compared with previous evaluation)
	local government level could potentially affect the implementation of planned activities.				especially in public forums; Regular briefings and updates will be provided.				
4	Unrealistic expectations from cities about the level of support that the proposed project can provide could lead to a decline in their support and commitment.		Institutional	I = 3 P = 2  L	To mitigate this risk, the project team will keep fully abreast of project progress at each project site and maintain a good level of involvement and interaction with each site throughout the life of the project. The early briefing meetings with each site will emphasize the objectives of the project and components which would lead to the results of the project at the end.	NPM	Submitted by Project Proponent		
5	Unstable economic growth in Thailand or political unrest		Economic	I = 3 P = 3  M	The project activities are implemented outside Bangkok. The effects of political developments are lower outside Bangkok.	Project Manager	Submitted by Project Proponent		
6	Lack of commitment and low participation from the private sector and other stakeholders		Financial	I = 3 P = 3  M	The investments are partly made with government funding and partly from private sector. The approach is to prepare high quality studies and plans with involvement of all stakeholders to facilitate good investment decision making.	National Project Manager	Submitted by Project Proponent		

Note:

N: negligible; L: low; M: medium; H: high; C: Critical

P: Probability; I: Impact (from 1=very low to 5= very high)

Submitted by Project Manager \_\_\_\_\_

Approved by UNDP Programme Analyst \_\_\_\_\_

## ***Annex II: Detailed CO2 Emission Calculations***

1. This section elaborates the CO<sub>2</sub> emissions under baseline and project scenario of the investment activities included in the Project. The direct and indirect emissions reductions calculations are based on the available internationally accepted methodologies and tools. The key references applied are:
  - STAP Manual For *Calculating Greenhouse Gas Benefits of the Global Environment Facility Energy Efficiency Projects* (Version 1.0, March 2013) and GEF EE Tool v1.0;
  - STAP Manual for *Calculating Greenhouse Gas Benefits of Global Environment Facility Transportation Projects*, October 2011, including the GEF TEEMP model;
  - GEF Manual for *Calculating GHG Benefit of GEF Projects: Energy Efficiency and Renewable Energy Projects* (April 2008);
  - Relevant methodologies and tools approved for Clean Development Mechanism (CDM) by United Nations Framework Convention on Climate Change (UNFCCC):
    - AMS-III.F 'Avoidance of Methane Emissions through Composting', version 11.0<sup>62</sup>
    - AMS III.AO: 'Methane recovery through controlled anaerobic digestion' (version 1.0)<sup>63</sup>;
    - methodological tool 'Project and leakage emissions from anaerobic digestion' (version 01.0)<sup>64</sup>;
    - Methodological tool 'Emissions from solid waste disposal sites', (version 06.0.1)<sup>65</sup>.
2. There are 19 investment activities that will lead to direct GHG emission reductions during the Project implementation period. The direct project emissions and indirect emission reductions have been summarized in table 1 below with detailed calculations in the proceeding sections. The sections below the table are divided in 3 parts: Part A concerns waste management activities, Part B concerns Energy Efficiency; and, Part C concerns sustainable transport.

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<sup>62</sup>

[https://cdm.unfccc.int/filestorage/E/3/Q/E3QBKLVIDCR248PZY5XJ906U17GWFN/EB67\\_repan20\\_Revision%20of%20AMS-III.F\\_ver11.0.pdf?t=MUJ8bmkzZXhZfDCzaLid902sRJaTHzEJSGOM](https://cdm.unfccc.int/filestorage/E/3/Q/E3QBKLVIDCR248PZY5XJ906U17GWFN/EB67_repan20_Revision%20of%20AMS-III.F_ver11.0.pdf?t=MUJ8bmkzZXhZfDCzaLid902sRJaTHzEJSGOM)

<sup>63</sup>

[https://cdm.unfccc.int/filestorage/C/D/M/CDM\\_AMSU745LJQM81SDJJOJ2S4G7ID9EIKFGD/EB58\\_repan16\\_AMS-III.AO.pdf?t=bkZ8bnAzMmlqfDB1pegLy3GBByfAH9npHcdM](https://cdm.unfccc.int/filestorage/C/D/M/CDM_AMSU745LJQM81SDJJOJ2S4G7ID9EIKFGD/EB58_repan16_AMS-III.AO.pdf?t=bkZ8bnAzMmlqfDB1pegLy3GBByfAH9npHcdM)

<sup>64</sup> <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-14-v1.pdf>

<sup>65</sup> <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-04-v7.pdf>

Table 1: Summary of GHG Emission Reduction (tonnes of CO<sub>2</sub>eq) for the Project

Investment Activity	Composting in Khon Kaen and Samui	Anaerobic Digestion in Nakorn Ratchasima	Recycling in Khon Kaen, Nakorn Ratchasima, Klaeng and Samui	Waste-to-Energy in Khon Kaen and Nakorn Ratchasima	Energy Efficient water pumping in Klaeng	Promotion of cycling (non-motorized transport) in Khon Kaen, Klaeng and Samui	City shuttle bus in Khon Kaen and Klaeng	Bus reroute in Nakorn Ratchasima	Traffic management pilot in Khon Kaen, Nakorn Ratchasima and traffic zoning in Samui	Total
Related Project Outputs	Output 1.2.1 and 1.2.4	Output 1.2.2	Output 1.2.1, 1.2.2, 1.2.3 and 1.2.4	Output 1.2.1 and 1.2.2	Output 1.2.3	Output 1.2.1, 1.2.3 and 1.2.4	Output 1.2.1 and 1.2.3	Output 1.2.2	Output 1.2.1, 1.2.2 and 1.2.4	
Direct Emission Reductions by EOP (tCO <sub>2</sub> e)	4,803	13,748	30,893	72,491	330	69	1,632	3,443	50,299	177,708
Lifetime Direct Emission Reductions (tCO <sub>2</sub> e)	66,702	183,518	164,996	535,891	1,652	343	8,161	21,348	377,241	1,359,852
Total Indirect Emission Reductions (BU) (tCO <sub>2</sub> e)	624,804	550,555	1,737,628	3,215,346	4,955	3,359	100,467	213,481	4,076,195	10,526,790
Total Indirect Emission Reductions (TD) (tCO <sub>2</sub> e)	988,153	1,380,906	3,796,278	4,032,571	20,040	632,549	1,036,264	1,036,264	9,897,205	22,820,230



## **PART A: WASTE MANAGEMENT**

### **1) Organic waste composting in Khon Kaen and Samui**

1. The direct GHG emission reductions from composting are calculated based on the CDM methodology AMS III.F. 'Avoidance of methane emissions through composting' (version 11.0), which is applicable for projects that result in emission reductions of less than or equal to 60,000 tCO<sub>2</sub>eq annually. The CDM tool for 'Emissions from solid waste disposal sites' (version 06.0.1) is applied for calculation of baseline emission. There is no financing mechanism established and so, post-project direct emissions are not considered. In order to calculate indirect emission reductions, the BU and TD approaches are used to estimate a possible range of impacts as per the GEF and STAP manuals.
2. The cumulative emission reductions estimated during the Project intervention from 2016 – 2019 are presented below:

Table 2: Annual Direct Emissions Reductions from composting in Khon Kaen from 2016 – 2019

<b>Emissions (tCO<sub>2</sub>e)</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>EOP TOTAL</b>
Baseline Emissions	0	720	1,924	3,068	5,713
Project Emissions	0	374	748	923	2,046
<b>Total Emission Reductions</b>	<b>0</b>	<b>346</b>	<b>1,176</b>	<b>2,145</b>	<b>3,667</b>

Table 3: Annual Direct Emissions Reductions from composting in Samui from 2016 – 2019

<b>Emissions (tCO<sub>2</sub>e)</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>EOP TOTAL</b>
Baseline Emissions	0	237	623	881	1,740
Project Emissions	0	123	241	241	605
<b>Total Emission Reductions</b>	<b>0</b>	<b>114</b>	<b>382</b>	<b>640</b>	<b>1,136</b>

Table 4: Lifetime Direct Project Emission Reductions from composting in Khon Kaen and Samui

<b>Emission Reductions (tCO<sub>2</sub>e)</b>	<b>TOTAL</b>	
	<b>Khon Kaen</b>	<b>Samui</b>
Average Annual Emissions Reduction	3,508	938
Average useful lifetime of investment (year)	15	15
<b>Lifetime Direct Emission Reductions</b>	<b>52,631</b>	<b>14,071</b>

Table 5: Key variables and data used in the estimation of Direct Project Emissions Reductions

<b>No.</b>	<b>Variables</b>	<b>Values</b>	<b>Remarks</b>
1.	Model correction factor to account for model uncertainties	0.85	Emissions from solid waste disposal sites, CDM tool version 06.0.1, page 9, Table 3 Application B for humid/wet condition
2.	Fraction of methane captured at SWDS and flared (tCO <sub>2</sub> /MWh)	0	Emissions from solid waste disposal sites, CDM tool version 06.0.1, page 13
3	Oxidation factor	0.1	Emissions from solid waste disposal sites, CDM tool version 06.0.1, page 10
4	Fraction of methane in SWDS gas	0.5	Emissions from solid waste disposal sites, CDM tool version 06.0.1, page 9
5	Fraction of degradable	0.5	Emissions from solid waste disposal sites, CDM tool

No.	Variables	Values	Remarks
	organic carbon (DOC) by volume		version 06.0.1, page 10
6	Fraction of DOC by weight	0.15	Emissions from solid waste disposal sites, CDM tool version 06.0.1, page 11 (% wet waste) for food, food waste, beverages and tobacco is 15%
7	Methane correction factor	0.8	Emissions from solid waste disposal sites, CDM tool version 06.0.1, page 10 0.8 for SWDS not meeting the criteria of managed SWDS and which have depths of greater than or equal to 5 meters
8	Amount of organic waste prevented from disposal due to dumping	1.00	Emissions from solid waste disposal sites, CDM tool version 06.0.1, page 14 100% of the food waste dumped to the landfill
9	Decay rate of waste type j	0.4	Emissions from solid waste disposal sites, CDM tool version 06.0.1, page 12 Tropical (MAT>20°C), Wet (MAP> 1000mm) Food, food waste, sewage sludge, beverages and tobacco is 0.4
10	Default value for the specific quantity of electricity consumed per tonne of waste composted (MWh/t)	0.01	Project and leakage emissions from composting, CDM tool version 01.0.0, page 8
11	Emission factor of methane per tonne of waste composted (tCH <sub>4</sub> /t)	0.002	Project and leakage emissions from composting, CDM tool version 01.0.0, page 8
12	Default emission factor of nitrous oxide per tonne of waste composted (wet basis) (tN <sub>2</sub> O/t)	0.0002	Project and leakage emissions from composting, CDM tool version 01.0.0, page 8
13	Global warming potential of nitrous oxide (tCO <sub>2</sub> e/tN <sub>2</sub> O)	310	Project and leakage emissions from composting, CDM tool version 01.0.0, page 9
14	Global warming potent of methane (tCO <sub>2</sub> e/tCH <sub>4</sub> )	21	Project and leakage emissions from composting, CDM tool version 01.0.0, page 9
Khon Kaen			
15	Total amount of waste disposed off at disposal site (tonnes per year)	77,380	Provided by KK city through questionnaire survey by Mr. Tasanai Prajuobmon, Director of public health and environment, Khon Kaen Municipality, September 2014.
16	food waste as percentage of total waste, which is landfilled (%)	58.6	Provided by KK city through questionnaire survey by Mr. Tasanai Prajuobmon, Director of public health and environment, Khon Kaen Municipality, September 2014.
17	Percentage which can be segregated from food waste (%)	30	Estimation by project waste management consultant and city expert based on characteristic of waste and resident's behaviour
18	Additional amount of organic waste composted by 2019 (t/day)	23	Provided by KK city through questionnaire survey by Mr. Tasanai Prajuobmon, Director of public health and environment, Khon Kaen Municipality, September 2014.
Samui			
19	Total amount of waste disposed off at disposal site (tonnes per year)	62,050	Provided by Samui city through questionnaire survey by Mr. Kammoon Nasompong, Director of public health and environment, Samui Municipality, September 2014.
20	food waste as percentage of total waste, which is landfilled (%)	40.0	Provided by Samui city through questionnaire survey by Mr. Kammoon Nasompong, Director of public health and environment, Samui Municipality, September 2014.
21	Percentage which can be	30	Estimation by project waste management consultant

No.	Variables	Values	Remarks
	segregated from food waste		and city expert based on characteristic of waste and resident's behaviour
22	Additional amount of organic waste composted by 2019 (t/day)	6	Provided by Samui city through questionnaire survey by Mr. Kammoon Nasompong, Director of public health and environment, Samui Municipality, September 2014.

3. Further assumptions are based on the following:

- 100% of the food waste dumped to the landfill
- There is no wastewater co-composted by the project activity
- There is no manure composted by the project activity
- There is no project emissions of methane from run-off wastewater (PERO,y) as the project is not a co-composting project
- The baseline for estimation of GHG emission is unmanaged deep landfill (> 5 meters)
- There is no methane captured and combusted at the final disposal site
- In the project scenario, only food waste will be composted;
- In the project scenario, 100% of compost is used for agriculture;

4. The estimates of indirect impacts uses the BU and TD approaches as per the STAP and GEF Manuals and are presented below.

Table 6: Total Indirect Project Emission Reductions (BU and TD)

Emission Reductions (tCO <sub>2</sub> e)	TOTAL	
	Khon Kaen	Samui
Direct Project Emission Reductions	52,631	14,071
Replication factor, RF	10	7
<b>Total Indirect Project Emission Reductions / CO<sub>2</sub> indirect BU</b>	526,309	98,495
Technical and economic potential GHG savings, P10	1,646,921	
GEF causality factor, CF	60%	
<b>Total Indirect Project Emission Reductions / CO<sub>2</sub> indirect TD</b>	988,153	

5. Handling of organic waste is an important issue in Thailand and the projects are envisaged to be replicated in several cities. It is therefore, estimated that there is a maximum potential for at least 10 projects in similar scale in local authorities in Northern regions of Thailand as KK as a hub in the Northern region, and around 7 other cities in the South of Thailand. Samui is a popular tourist destination in southern Thailand. Successful project implementation in the Samui could be a good example for other tourist cities in southern Thailand. There is general promotion of composting at national level but there is no concrete national target for composting, nor at city level. The GEF project will greatly enhance the visibility and effectiveness of the composting projects and is expected to play a positive role in ensuring replication. Therefore, a level 3 causality factor (60%) is adopted based on an estimation that the GEF contribution is modest according to the general guidelines provided in the STAP Manuals. The technical and economic potential GHG savings (P10) is based on the total amount of organic waste (total economic/technical potential) which realistically could be composted in other cities in Thailand during the influence period of 10 years.

Table 7: Summary of Project Emission Reductions

Emission Reductions (tCO <sub>2</sub> e)	TOTAL	
	Khon Kaen	Samui
Direct Project Emission Reductions by EOP	3,667	1,136
Lifetime Direct Reductions	52,631	14,071
Total Indirect Project Emission Reductions (BU)	526,309	98,495
Total Indirect Project Emission Reductions (TD)	988,153	

## 2) Anaerobic Digestion in Nakorn Ratchasima

6. The direct GHG emission reductions from anaerobic digestion are calculated based on CDM methodology AMS III.AO: 'Methane recovery through controlled anaerobic digestion' (version 1.0) and the latest version of methodological tool such as 'Project and leakage emissions from anaerobic digestion' (version 01.0). Also, the CDM tool on emissions from solid waste disposal sites, version 06.0.1 is applied for calculation of baseline emission. There is no financing mechanism established and so, post-project direct emissions are not considered.

7. The cumulative emission reductions estimated during the Project intervention from 2016 – 2019 are presented below:

Table 8: Annual Direct Emissions Reductions from anaerobic digestion in Nakorn Ratchasima from 2016 – 2019

Emissions (tCO <sub>2</sub> e)	2016	2017	2018	2019	EOP TOTAL
Baseline Emissions	0	1,900	5,073	8,814	15,787
Project Emissions	0	349	697	993	2,039
<b>Total Emission Reductions</b>	<b>0</b>	<b>1,551</b>	<b>4,376</b>	<b>7,821</b>	<b>13,748</b>

Table 9: Lifetime Direct Project Emission Reductions from anaerobic digestion in Nakorn Ratchasima

Emission Reductions (tCO <sub>2</sub> e)	TOTAL
	Nakorn Ratchasima
Average Annual Emissions Reduction	12,235
Average useful lifetime of investment (year)	15
<b>Lifetime Direct Emission Reductions</b>	<b>183,518</b>

Table 10: Key variables and data used in the estimation of Direct Project Emissions Reductions

No.	Variables	Values	Remarks
1.	Model correction factor to account for model uncertainties	0.85	Emissions from solid waste disposal sites, CDM tool version 06.0.1, page 9, Table 3 Application B for humid/wet condition
2.	Fraction of methane captured at SWDS and flared (tCO <sub>2</sub> /MWh)	0	Emissions from solid waste disposal sites, CDM tool version 06.0.1, page 13
3	Oxidation factor	0.1	Emissions from solid waste disposal sites, CDM tool version 06.0.1, page 10
4	Fraction of methane in	0.5	Emissions from solid waste disposal sites, CDM tool

No.	Variables	Values	Remarks
	SWDS gas		version 06.0.1, page 9
5	Fraction of degradable organic carbon (DOC) by volume	0.5	Emissions from solid waste disposal sites, CDM tool version 06.0.1, page 10
6	Fraction of DOC by weight	0.15	Emissions from solid waste disposal sites, CDM tool version 06.0.1, page 11 (% wet waste) for food, food waste, beverages and tobacco is 15%
7	Methane correction factor	0.8	Emissions from solid waste disposal sites, CDM tool version 06.0.1, page 10 0.8 for SWDS not meeting the criteria of managed SWDS and which have depths of greater than or equal to 5 meters
8	Amount of organic waste prevented from disposal due to dumping	1.00	Emissions from solid waste disposal sites, CDM tool version 06.0.1, page 14 100% of the food waste dumped to the landfill
9	Decay rate of waste type j	0.4	Emissions from solid waste disposal sites, CDM tool version 06.0.1, page 12 Tropical (MAT>20°C), Wet (MAP> 1000mm) Food, food waste, sewage sludge, beverages and tobacco is 0.4
10	Default value for the specific quantity of electricity consumed per tonne of waste composted (MWh/t)	0.01	Project and leakage emissions from composting, CDM tool version 01.0.0, page 8
11	Emission factor of methane per tonne of waste composted (tCH <sub>4</sub> /t)	0.002	Project and leakage emissions from composting, CDM tool version 01.0.0, page 8
12	Default emission factor of nitrous oxide per tonne of waste composted (wet basis) (tN <sub>2</sub> O/t)	0.0002	Project and leakage emissions from composting, CDM tool version 01.0.0, page 8
13	Global warming potential of nitrous oxide (tCO <sub>2</sub> e/tN <sub>2</sub> O)	310	Project and leakage emissions from composting, CDM tool version 01.0.0, page 9
14	Global warming potent of methane (tCO <sub>2</sub> e/tCH <sub>4</sub> )	21	Project and leakage emissions from composting, CDM tool version 01.0.0, page 9
15	Total amount of waste disposed off at disposal site (tonnes per year)	73,000	Provided by NRM city through questionnaire survey by Ms. Kanokwan Wannasuk, Sanitation technical officer, Nakorn Ratchasima Municipality, September 2014.
16	Average biogas generation rate (Nm <sup>3</sup> biogas/tonne of waste input)	52	The city's report on existing AD operation system
17	Fraction of methane in biogas (Nm <sup>3</sup> CH <sub>4</sub> /Nm <sup>3</sup> biogas)	0.6	EB66 'methodological tool project and leakage emissions from anaerobic digesters', CDM tool, page 7
18	Density of methane (tCH <sub>4</sub> /Nm <sup>3</sup> CH <sub>4</sub> )	0.00067	EB66 'methodological tool project and leakage emissions from anaerobic digesters', CDM tool, page 7
19	Electricity consumption (MWh/tCH <sub>4</sub> )	1.54	EB66 'methodological tool project and leakage emissions from anaerobic digesters', CDM tool, page 8
20	Electricity Emission factor of Thailand (tCO <sub>2</sub> e/MWh)	0.5994	TGO, 2010: Emission factor for electricity generation of Thailand
21	Emission Factor of methane leakage (default)	0.028	EB66 'methodological tool project and leakage emissions from anaerobic digesters', CDM tool, page 7
22	Emission Factor of methane (default) emission from composting of digestate (tCH <sub>4</sub> /tonne waste treated)	0.002	CDM tool: Project and leakage emission from composting version 01.0.0, page 8
23	Emission Factor of nitrous oxide emission from	0.0002	CDM tool: Project and leakage emission from composting version 01.0.0, page 9

No.	Variables	Values	Remarks
	composting of digestate (tN <sub>2</sub> O/tonne waste treated)		
24	Additional amount of organic waste digested by EOP (t/day)	70	Provided by NRM city through questionnaire survey by Ms. Kanokwan Wannasuk, Sanitation technical officer, Nakorn Ratchasima Municipality, September 2014.

8. Further assumptions are based on the following:

- 100% of the food waste dumped to the landfill (in baseline situation)
- The baseline for estimation of GHG emission is unmanaged deep landfill (> 5 meters)
- There is no methane captured and combusted at the final disposal site (baseline)
- In the project scenario, only food waste will be anaerobically digested (wet digestion)
- In the project scenario, 100% of solid digestate from anaerobic digestion is sent to composting and then used for agriculture
- There is no flare of excess gas
- 100% of biogas is used for electricity generation.

9. The estimates of indirect impacts uses the BU and TD approaches as per the GEF and STAP Manuals and are presented below.

Table 11: Total Indirect Project Emission Reductions (BU and TD)

Emission Reductions (tCO <sub>2</sub> e)	TOTAL
Direct Project Emission Reductions	183,518
Replication factor, RF	3
<b>Total Indirect Project Emission Reductions / CO<sub>2</sub> indirect BU</b>	<b>550,555</b>
Technical and economic potential GHG savings, P10	1,726,133
GEF causality factor, CF	80%
<b>Total Indirect Project Emission Reductions / CO<sub>2</sub> indirect TD</b>	<b>1,380,906</b>

10. Handling of organic waste is an important issue in Thailand and the project is envisaged to be replicated in several cities. However, operation of a large scale anaerobic digester is challenging for cities compared to e.g. composting and therefore it is estimated that a similar scale AD project could be replicated in 3 big cities in Thailand that do not implement a large scale composting projects and have sufficient financial resources at the moment to invest in and operate a large scale AD facility, such as Chiang Mai, Samut Prakan, and Songkhla. A level 4 causality factor (80%) is adopted for the calculations according to the general guidelines provided in the STAP Manuals based on the current situation that Thailand has been promoting waste-to-energy including AD. GEF project activities will ensure the value proposition and experience with the AD is highly visible to other cities and it is expected that these lessons will contribute to replication. The technical and economic potential GHG savings (P10) is based on the total amount of organic waste (total economic/technical potential) which realistically could be digested in other cities in Thailand during the influence period of 10 years.

Table 12: Summary of Project Emission Reductions

Emission Reductions (tCO <sub>2</sub> e)	TOTAL
Direct Project Emission Reductions by EOP	13,748
Lifetime Direct Reductions	183,518
Total Indirect Project Emission Reductions (BU)	550,555
Total Indirect Project Emission Reductions (TD)	1,380,906

### 3) Recycling in Khon Kaen, Nakorn Ratchasima, Klaeng and Samui

11. The direct GHG emission reductions from recycling are calculated based on a methodology developed by the National Municipal League of Thailand in 2013 under the 'Program for data collection and calculation of carbon emission reduction from the four strategies for the low carbon municipality program of Thailand' and recommended by the Department of Environmental Quality Promotion (DEQP) under MonRE. There is no financing mechanism established and so, post-project direct emissions are not considered. In order to calculate indirect emission reductions, the BU and TD approaches are used to estimate a possible range of impacts as per the GEF and STAP manuals.

12. The cumulative emission reductions estimated during the Project intervention from 2016 – 2019 are presented below:

Table 13: Annual Direct Emissions Reductions from recycling in Khon Kaen from 2016 – 2019

Emissions (tCO <sub>2</sub> e)	2016	2017	2018	2019	EOP TOTAL
Total Emission Reductions	524	1,572	2,620	2,785	7,500

Table 14: Annual Direct Emissions Reductions from recycling in Nakorn Ratchasima from 2016 – 2019

Emissions (tCO <sub>2</sub> e)	2016	2017	2018	2019	EOP TOTAL
Total Emission Reductions	635	1,905	3,175	3,764	9,478

Table 15: Annual Direct Emissions Reductions from recycling in Klaeng from 2016 – 2019

Emissions (tCO <sub>2</sub> e)	2016	2017	2018	2019	EOP TOTAL
Total Emission Reductions	29	86	143	166	424

Table 16: Annual Direct Emissions Reductions from recycling in Samui from 2016 – 2019

Emissions (tCO <sub>2</sub> e)	2016	2017	2018	2019	EOP TOTAL
Total Emission Reductions	950	2,849	4,748	4,946	13,491

Table 17: Lifetime Direct Project Emission Reductions from recycling in Khon Kaen, Nakorn Ratchasima, Klaeng and Samui

Emission Reductions (tCO <sub>2</sub> e)	TOTAL			
	Khon Kaen	Nakorn Ratchasima	Klaeng	Samui
Average Annual Emissions Reduction	2,635	3,518	156	4,691
Average useful lifetime of investment (year)	15	15	15	15
Lifetime Direct Emission Reductions	39,529	52,766	2,333	70,368



Table 18: Key variables and data used in the estimation of Direct Project Emissions Reductions

No.	Variables	Values	Remarks
Khon Kaen			
1.	Total amount of MSW disposed off at disposal site (tonnes per year)	77,380	Provided by KK city through questionnaire survey, by Mr. Tasanai Prajuobmon, Director of Public Health and Environment, Khon Kaen Municipality, September 2014.
2.	Percentage paper (%)	6.26	
3.	Percentage glass (%)	2.57	
4.	Percentage steel (%)	0.3	
5.	Percentage aluminium (%)	0.10	
6.	Percentage plastic (%)	23.40	
Nakorn Ratchasima			
7.	Total amount of MSW disposed off at disposal site (tonnes per year)	73,000	Provided by NRM city through questionnaire survey, by Ms. Kanokwan Wannasuk, Sanitation technical officer, Nakorn Ratchasima Municipality in September 2014.
8.	Percentage paper (%)	7.18	
9.	Percentage glass (%)	1.63	
10.	Percentage steel (%)	1.74	
11.	Percentage aluminium (%)	0.43	
12.	Percentage plastic (%)	33.82	
Klaeng			
13.	Total amount of MSW disposed off at disposal site (tonnes per year)	8,030	Provided by KL city through questionnaire survey which was filled in by Ms. Nuchanard Sukawadee, Director of Public Health and Environment, Klaeng Municipality in September 2014.
14.	Percentage paper (%)	0.50	
15.	Percentage glass (%)	1.00	
16.	Percentage steel (%)	0.00	
17.	Percentage aluminium (%)	0.00	
18.	Percentage plastic (%)	44.10	
Samui			
19.	Total amount of MSW disposed off at disposal site (tonnes per year)	62,050	Provided by Samui city through questionnaire survey by Mr. Kammoon Nasompong, Director of Public Health and Environment, Samui Municipality in September 2014.
20.	Percentage paper (%)	10.65	
21.	Percentage glass (%)	15.30	
22.	Percentage steel (%)	3.10	
23.	Percentage aluminium (%)	0.72	
24.	Percentage plastic (%)	29.36	
General			
25.	Percentage which can be segregated for paper (%)	50	Estimation by project waste management expert based on characteristic of waste and resident's behaviour
26.	Percentage which can be segregated for glass, steel, aluminium (%)	50	
27.	Percentage which can be segregated for plastics (%)	10	
28.	Default emission reduction factor for recycling of paper (tCO2/tonne of paper)	0.95	Municipal League of Thailand, 2013, Program for data collection and calculation of carbon emission reduction from the four strategies for the low carbon municipality program of Thailand (Calculation Tool available in Thai language)
29.	Default emission reduction factor for recycling of steel (tCO2/tonne of steel)	0.49	
30.	Default emission reduction factor for recycling of glass (tCO2/tonne of glass)	0.79	
31.	Default emission reduction factor for recycling of aluminium (tCO2/tonne of aluminium)	0.43	
32.	Default emission reduction factor for recycling of plastic (tCO2/tonne of plastic)	0.7	

13. Further assumptions are based on the following:

- Five types of recyclables are accounted for: paper, glass, steel, aluminium and plastics;

- Around 50% of paper, glass, steel and aluminium currently disposed of in landfill can be segregated for recycling;
- Around 10% of plastic waste currently disposed of in landfills can be segregated for recycling.

14. The estimates of indirect impacts uses the BU and TD approaches as per the STAP and GEF Manuals and are presented below.

Table 19: Total Indirect Project Emission Reductions (BU and TD)

Emission Reductions (tCO <sub>2</sub> e)	TOTAL			
	Khon Kaen	Nakorn Ratchasima	Klaeng	Samui
Direct Project Emission Reductions	39,529	52,766	2,333	70,368
Replication factor, RF	11	7	8	13
<b>Total Indirect Project Emission Reductions / CO<sub>2</sub> indirect BU</b>	<b>434,823</b>	<b>369,360</b>	<b>18,667</b>	<b>914,778</b>
Technical and economic potential GHG savings, P10	9,490,694			
GEF causality factor, CF	40%			
<b>Total Indirect Project Emission Reductions / CO<sub>2</sub> indirect TD</b>	<b>3,796,278</b>			

15. Recycling business in Thailand is mainly driven by communities and private sector (small and large companies) for profit making from the economic value of the recyclables. When it can be shown that profit can be made, adoption of practices by communities and private sector might go quickly. It is estimated that in total 11 cities in upper North-east Thailand, 7 cities in lower North-East Thailand, 8 cities in the eastern/middle region and 13 cities in the southern regions could replicate successful models. The GEF project will deliver valuable lessons and raise visibility for the baseline that will not be possible otherwise, even though this activity is mainly handled by private sector. Therefore, level 2 causality factor (40%) is adopted for the calculations according to the general guidelines provided in the STAP Manuals. It is estimated that the impact from the GEF intervention will be modest, and substantial indirect emission reductions can be attributed to the baseline. The technical and economic potential GHG savings (P10) is based on the total amount of recyclable waste (total economic/technical potential) which realistically could be recycled in other cities in Thailand during the influence period of 10 years.

Table 20: Summary of Project Emission Reductions

Emission Reductions (tCO <sub>2</sub> e)	TOTAL			
	Khon Kaen	Nakorn Ratchasima	Klaeng	Samui
Direct Project Emission Reductions by EOP	7,500	9,478	424	13,491
Lifetime Direct Reductions	39,529	52,766	2,333	70,368
Total Indirect Project Emission Reductions (BU)	434,823	369,360	18,667	914,778
Total Indirect Project Emission Reductions (TD)	3,796,278			

#### 4) WTE in Khon Kaen and Nakorn Ratchasima

16. The direct GHG emission reductions from energy generation from waste-to-energy plants are calculated based on GEF Manual for Calculating GHG Benefit of GEF Projects: Energy Efficiency and Renewable Energy Projects. There is no financing mechanism established and so, post-project direct emissions are not considered. In order to calculate indirect emission reductions, the BU and TD approaches are used to estimate a possible range of impacts as per the GEF and STAP manuals.

17. The cumulative emission reductions estimated during the Project intervention from 2016 – 2019 are presented below:

Table 21: Annual Direct Emissions Reductions from WTE in Khon Kaen from 2016 – 2019

Emissions (tCO <sub>2</sub> e)	2016	2017	2018	2019	EOP TOTAL
Total Emission Reductions	0	12,602	12,602	12,602	37,805

Table 22: Annual Direct Emissions Reductions from WTE in Nakorn Ratchasima from 2016 – 2019

Emissions (tCO <sub>2</sub> e)	2016	2017	2018	2019	EOP TOTAL
Total Emission Reductions	0	0	11,562	23,124	34,686

Table 23: Lifetime Direct Project Emission Reductions from WTE in Khon Kaen and Nakorn Ratchasima

Emission Reductions (tCO <sub>2</sub> e)	TOTAL	
	Khon Kaen	Nakorn Ratchasima
Average Annual Emissions Reduction	12,602	23,124
Average useful lifetime of investment (year)	15	15
<b>Lifetime Direct Emission Reductions</b>	<b>189,027</b>	<b>346,864</b>

Table 24: Key variables and data used in the estimation of Direct Project Emissions Reductions

No.	Variables	Values	Remarks
General			
1.	Electricity Emission factor of Thailand (tCO <sub>2</sub> e/MWh)	0.5994	TGO, 2010: Emission factor for electricity generation of Thailand
2	Operation hours/load factor of WTE plants (%)	60	Assumed based on the experiences with the WTE plants in Phuket and Samui and by considering waste characteristics, weather and realistic time required for maintenance.
Khon Kaen			
3	Installed capacity of WTE plant (MW)	4.9	Provided by KK city through questionnaire survey, by Mr. Tasanai Prajuobmon, Director of Public Health and Environment, Khon Kaen Municipality in September 2014. Based on design capacity of the incinerators planned to be installed in the pilot cities.
4	Capacity used for internal use (MW)	0.9	
5	Tonnes of waste processed per day [ton/day]	450	
Nakorn Ratchasima			
6	Installed capacity of WTE plant (MW)	9	Provided by NRM city through questionnaire survey, by Ms. Kanokwan Wannasuk, Sanitation technical officer, Nakorn Rachasima Municipality in September 2014.
7	Capacity used for internal use (MW)	1.66	

No.	Variables	Values	Remarks
8	Tonnes of waste processed per day [ton/day]	900	

18. The estimates of indirect impacts uses the BU and TD approaches as per the STAP and GEF Manuals and are presented below.

Table 25: Total Indirect Project Emission Reductions (BU and TD)

Emission Reductions (tCO <sub>2</sub> e)	TOTAL	
	Khon Kaen	Nakorn Ratchasima
Direct Project Emission Reductions	189,027	346,864
Replication factor, RF	6	6
<b>Total Indirect Project Emission Reductions / CO<sub>2</sub> indirect BU</b>	<b>1,134,161</b>	<b>2,081,185</b>
Technical and economic potential GHG savings, P10	10,081,428	
GEF causality factor, CF	40%	
<b>Total Indirect Project Emission Reductions / CO<sub>2</sub> indirect TD</b>	<b>4,032,571</b>	

19. WTE is a priority for the Thai government. In several cities in Thailand there is potential for WTE plants. 17 plants are being planned in the coming 5 years, in Nakorn Si Thammarat, Prajuab Kirikhan, Petchaburi, Surat Thani, Nakorn Pathom, Samutsakorn, Nakorn Rachasima, Udornthani, Khonkaen, Ubonrachathani, Choburi, Nakornsawan, Phitsanulok, Kanchanaburi, Lampang, Chiangmai, Kampaengpetch. It is assumed that 1/3 of these projects would replicate the green practices of GEF project, so a replication factor of 6 is assumed. There is strong policy and financial support on WTE from the government which coupled with the advantages of available green technologies piloted through the Project is likely to have a modest indirect impact. Therefore level 2 causality factor (40%) is adopted for the calculations, according to the general guidelines provided in the STAP Manuals. The technical and economic potential GHG savings (P10) is based on the total amount of waste (total economic/technical potential) which realistically could be incinerated in other cities in Thailand during the influence period of 10 years.

Table 26: Summary of Project Emission Reductions

Emission Reductions (tCO <sub>2</sub> e)	TOTAL	
	Khon Kaen	Nakorn Ratchasima
Direct Project Emission Reductions by EOP	37,805	34,686
Lifetime Direct Reductions	189,027	346,864
Total Indirect Project Emission Reductions (BU)	1,134,161	2,081,185
Total Indirect Project Emission Reductions (TD)	4,032,571	

## **PART B: Energy Efficiency**

### **5) EE in water pumping station Klaeng**

20. The direct GHG emission reductions from energy efficiency measures in the water pumping station in Klaeng are calculated based on the STAP Manual For Calculating Greenhouse Gas Benefits of the Global Environment Facility Energy Efficiency Projects (Version 1.0, March 2013) and GEF EE Tool v1.0. There is no financing mechanism established and so, post-project direct emissions are not considered. In order to calculate indirect emission reductions, the BU and TD approaches are used to estimate a possible range of impacts as per the GEF and STAP manuals.

21. The cumulative emission reductions estimated using the GEF EE Tool v1.0 during the Project intervention from 2016 – 2019 are presented below:

Table 27: Annual Direct Emissions Reductions from EE in water pumping station from 2016 – 2019

<b>Emissions (tCO<sub>2</sub>e)</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>EOP TOTAL</b>
<b>Total Emission Reductions</b>	<b>0</b>	<b>110</b>	<b>110</b>	<b>110</b>	<b>330</b>

Table 28: Lifetime Direct Project Emission Reductions from EE in water pumping station

	<b>TOTAL</b>
<b>Emission Reductions (tCO<sub>2</sub>e)</b>	<b>Klaeng</b>
Average Annual Emissions Reduction	110
Average useful lifetime of investment (year)	15
<b>Lifetime Direct Emission Reductions</b>	<b>1,652</b>

Table 29: Key variables and data used in the estimation of Direct Project Emissions Reductions

<b>No.</b>	<b>Variables</b>	<b>Values</b>	<b>Remarks</b>
1.	Electricity Emission factor of Thailand (tCO <sub>2</sub> e/MWh)	0.5994	TGO, 2010: Emission factor for electricity generation of Thailand
2.	Electricity use currently kWh/month	34,920	Provided by KL city through questionnaire survey which was filled in by Ms. Nuchanard Sukawadee, Head of Municipality Clark's Office, Klaeng Municipality in September 2014.
3.	Current capacity of water pumping station (m3 per month)	288,000	
4.	New capacity water pumping station (m3 per month)	576,000	
5.	Expected savings from more EE pumps (%)	20	

22. The estimates of indirect impacts use the BU and TD approaches as per the STAP Manual and GEF EE Tool v1.0 are presented below.

Table 30: Total Indirect Project Emission Reductions (BU and TD)

<b>Emission Reductions (tCO<sub>2</sub>e)</b>	<b>TOTAL</b>
Direct Project Emission Reductions	1,652
Replication factor, RF	3
<b>Total Indirect Project Emission Reductions / CO<sub>2</sub> indirect BU</b>	<b>4,955</b>
Technical and economic potential GHG savings, P10	25,050
GEF causality factor, CF	80%
<b>Total Indirect Project Emission Reductions / CO<sub>2</sub> indirect TD</b>	<b>20,040</b>

23. Taking energy efficiency measures by cities is not high on the political agenda in Thailand. There are no policies and no incentive schemes to support taking EE measures in cities, e.g. in water pumping stations. Therefore a conservative replication factor of 3 has been chosen, assuming that 3 cities might replicate the successful model. If a successful example is shown, the success can be largely attributed to the GEF intervention. The GEF project will play a key role in promoting the upsides of EE measures in public facilities like water pumping stations in cities. The GEF project's contribution to indirect emission reductions is dominant, therefore a level 4 causality factor is adopted and a CF value of 80% is used in the calculations according to the general guidelines provided in the STAP Manuals. The technical and economic potential GHG savings (P10) is based on the total amount of energy (total economic/technical potential) which realistically could be saved in other cities of similar size in Thailand during the influence period of 10 years.

Table 31: Summary of Project Emission Reductions

<b>Emission Reductions (tCO<sub>2</sub>e)</b>	<b>TOTAL</b>
Direct Project Emission Reductions by EOP	330
Lifetime Direct Reductions	1,652
Total Indirect Project Emission Reductions (BU)	4,955
Total Indirect Project Emission Reductions (TD)	20,040

## **PART C: Sustainable Transport**

### **6) Promotion of cycling (cycle paths) in Khon Kaen, Klaeng and Samui**

24. The direct GHG emission reductions from the promotion of cycling are calculated based on the STAP Manual for Calculating Greenhouse Gas Benefits of Global Environment Facility Transportation Projects and the GEF TEEMP model (City Sketch Analysis) for GHG emission reductions from sustainable transport projects. There is no financing mechanism established and so, post-project direct emissions are not considered. In order to calculate indirect emission reductions, the BU and TD approaches are used to estimate a possible range of impacts as per the GEF and STAP manuals.

25. The cumulative emission reductions estimated during the Project intervention from 2016 – 2019 are presented below:

Table 32: Annual Direct Emissions Reductions from cycling in Khon Kaen from 2016 – 2019

Emissions (tCO <sub>2</sub> e)	2016	2017	2018	2019	EOP TOTAL
<b>Total Emission Reductions</b>	0	10	10	10	31

Table 33: Annual Direct Emissions Reductions from cycling in Klaeng from 2016 – 2019

Emissions (tCO <sub>2</sub> e)	2016	2017	2018	2019	EOP TOTAL
<b>Total Emission Reductions</b>	0	5	5	5	15

Table 34: Annual Direct Emissions Reductions from cycling in Samui from 2016 – 2019

Emissions (tCO <sub>2</sub> e)	2016	2017	2018	2019	EOP TOTAL
<b>Total Emission Reductions</b>	0	7.5	7.5	7.5	23

Table 35: Lifetime Direct Project Emission Reductions from cycling in Khon Kaen, Klaeng and Samui

Emission Reductions (tCO <sub>2</sub> e)	TOTAL		
	Khon Kaen	Klaeng	Samui
Average Annual Emissions Reduction	10	5	7.5
Average useful lifetime of investment (year)	15	15	15
<b>Lifetime Direct Emission Reductions</b>	<b>157</b>	<b>73</b>	<b>113</b>

Table 36: Key variables and data used in the estimation of Direct Project Emissions Reductions

No.	Variables	Values	Remarks
Khon Kaen			
1.	Total length of bikeway (km)	4	Provided by KK city through questionnaire survey, by Mr. Tasanai Prajuobmon, Khon Kaen Municipality, chief of subdivision of construction control, Bureau of Public Works at Khon Kaen Municipality, in September 2014.
2.	Mode share (%) for cycling	From 0% in 2016 to 1% in 2019	Estimated base on the discussions with the city officials (incl. Mr. Tasanai Prajuobmon, chief of subdivision of construction control, Bureau of Public Works at Khon Kaen Municipality) and field visit results (September 2014). The assumptions were

No.	Variables	Values	Remarks
			made that mode share of cycling will increase from 0 to 1% (shift from Two Wheeler).
3	Increase in number of bicycle trips per day by 2019 (trips/day)	200	Estimated base on the discussions with the city officials (incl. Mr. Tasanai Prajuobmon chief of subdivision of construction control, Bureau of Public Works at Khon Kaen Municipality) and field visit results. The assumptions were made that 1% of Two Wheeler will shift to use bicycle.
Klaeng			
4	Mode share (%) for cycling	From 4% in 2016 to 12% in 2019	Estimated base on the discussions with the city officials (incl. Ms. Nuchanard Sukawadee, Head of Municipality Clark's Office, Klaeng Municipality) (September 2014) and field visit results. The assumptions were made that mode share of bicycle will increase from 4 to 12%.
5	Increase in number of bicycle trips per day by 2019 (trips/day)	200	
Samui			
6	Mode share (%) for Cycling	From 0% in 2016 to 3% in 2019	Estimated based on the discussions with the city officials, including Ms Supinya Srithongkul, deputy mayor at Samui municipality and field visits (September 2014). The assumptions were made that mode share of bicycle will increase from 0 to 3% (from Two Wheeler).
7	Increase in number of bicycle trips per day by 2019 (trips/day)	400	Estimated based on the discussions with the city officials, including Ms Supinya Srithongkul, deputy mayor at Samui municipality and field visits (September 2014)
8	Total length of bikeway (km)	5	Provided by Samui city through questionnaire survey Ms Supinya Srithongkul, deputy mayor at Samui, Samui Municipality in September 2014.

26. Further assumptions are based on the following:

- Average speed in base year and future year, no. of trips/day, mode share per vehicle category, average trip lengths and average occupancy per vehicle category for Khon Kaen are derived from Khon Kaen's Traffic and Transportation Master Plan.
- Average speed in base year and future year, no. of trips/day, mode share per vehicle category, average trip lengths and average occupancy per vehicle category for Samui are derived from a feasibility study for Phuket LRT by the Office of Transport and Traffic Policy and Planning, Ministry of Transportation. It was assumed that the situation in Phuket is comparable to Samui, as Phuket is also an Island with similar number of visits.
- Average speed in base year and future year, no. of trips/day, mode share per vehicle category, average trip lengths and average occupancy per vehicle category for Klaeng is derived from a case study of Klaeng's shuttle bus project. This case study was part of the development of the master plan for sustainable transport system and mitigation of climate change impacts by the Office of Transport Policy and Planning (OTP).
- Information on fuel share per vehicle category and number of vehicle registrations and type of fuel is referenced from the Transport Statistics Sub-Division, Planning Division, Department of Land Transportation in Thailand (DLT).
- Default values from the TEEMP model on fuel efficiency and CO2 emission factors have been used.



27. The estimates of indirect impacts uses the BU and TD approaches as per the STAP and GEF Manuals and are presented below.

Table 37: Total Indirect Project Emission Reductions (BU and TD) from 2020 – 2029

Emission Reductions (tCO <sub>2</sub> e)	TOTAL		
	Khon Kaen	Klaeng	Samui
Direct Project Emission Reductions	157	73	113
Replication factor, RF	12	14	4
<b>Total Indirect Project Emission Reductions / CO<sub>2</sub> indirect BU</b>	<b>1,886</b>	<b>1,021</b>	<b>452</b>
Technical and economic potential GHG savings, P10	1,054,248		
GEF causality factor, CF	60%		
<b>Total Indirect Project Emission Reductions / CO<sub>2</sub> indirect TD</b>	<b>632,549</b>		

28. Promotion of non-motorized transport is gaining interest in Thailand. However, there are no policies or incentive schemes yet.<sup>66</sup> It is assumed that the project in Khon Kaen can be replicated 12 times<sup>67</sup>, as there are 12 cities with similar size, the project in Klaeng 14 times as there are 14 comparable cities<sup>68</sup> and the project in Samui 4 times<sup>69</sup>, as there are 4 similar cities with significant tourism. The GEF project will play a key role in demonstrating the benefits of cycling and cycle paths in cities as an alternative to motorized transport such as motorbikes. GEF project activities are expected to contribute to replication and modest impact. Therefore a level 3 causality factor is adopted and a CF value of 60% is used in the calculations according to the general guidelines provided in the STAP Manuals. The technical and economic potential GHG savings (P10) is based on the total number of people living in cities in Thailand, their average number of trips and the total amount of fuel (total economic/technical potential) which realistically could be saved in these cities by realizing bikeways during the influence period of 10 years.

<sup>66</sup> All cities in Thailand are in need of solutions reducing traffic congestion, including: (1) good public transport, (2) increasing use of non-motorized transport options, and (3) improved traffic management. However, many cities struggle as there are no good examples available in Thailand. GEF support will be crucial in making the projects a success and showcasing the successes and benefits to other cities. For transport projects therefore a GEF causality factor level 3 (60%) is selected, where the GEF contribution is substantial, but modest indirect emission reductions can be attributed to the baseline.

<sup>67</sup> There are 9 municipalities with the same size as KK municipality (population greater than 100,000). These 9 municipalities are Nonthaburi, Pak Kred, Had Yai, Nakhon Ratchasima, Udon Thani, Chiang Mai, Surat Thani, Chao PhaYa Surasak, and Nakhon Sri Thammarat. Total population in 2014 in these municipalities was 1,354,275 (based on the records from Department of Provincial Administration (DOPA)), while in KK municipality the total number of population was 115,928 (which is nearly 12 times). Therefore, a replication factor of 12 is applied, assuming the project can be replicated nearly 12 times.

<sup>68</sup> There are 15 municipalities with the same size as Klang municipality (population between 16,000 to 18,000). Total population in 2014 in these municipalities was 263,405 (Based on the records from Department of Provincial Administration (DOPA)), while Klaeng municipality has a total population of 17,764 (approximately 14 times). Therefore, a replication factor of 14 is applied, assuming the project can be replicated 14 times.

<sup>69</sup> Samui municipality has population of about total 63,592. The assumptions for the replication factor (RF) for samui include: (1) cities must have number of population similar to Samui, (2) the area is tourist attraction and the physical land use is a coastal area which is similar to Samui. There are 4 municipalities that fall into these criterion which are: Phuket, Huahin, Rayong, and Song Khla. These municipalities had a total population of 266,035 population (based on records from Department of Provincial Administration (DOPA)). It is about 4 times the population in Samui. Therefore, a replication factor of 4 is applied, assuming the project can be replicated 4 times.

Table 38: Summary of Project Emission Reductions

Emission Reductions (tCO <sub>2</sub> e)	TOTAL		
	Khon Kaen	Klaeng	Samui
Direct Project Emission Reductions by EOP	31	15	23
Lifetime Direct Reductions	157	73	113
Total Indirect Project Emission Reductions (BU)	1,886	1,021	452
Total Indirect Project Emission Reductions (TD)	632,549		

## 7) City Shuttle Bus in Khon Kaen and Klaeng

29. The direct GHG emission reductions from the city shuttle bus services are calculated based on calculated based on the STAP Manual for Calculating Greenhouse Gas Benefits of Global Environment Facility Transportation Projects and the GEF TEEMP model (City Sketch Analysis) for GHG emission reductions from sustainable transport projects. There is no financing mechanism established and so, post-project direct emissions are not considered. In order to calculate indirect emission reductions, the BU and TD approaches are used to estimate a possible range of impacts as per the GEF and STAP manuals.

30. The cumulative emission reductions estimated during the Project intervention from 2016 – 2019 are presented below:

Table 39: Annual Direct Emissions Reductions from city shuttle bus services in Khon Kaen from 2016 – 2019

Emissions (tCO <sub>2</sub> e)	2016	2017	2018	2019	EOP TOTAL
Total Emission Reductions	0	488	488	488	1,463

Table 40: Annual Direct Emissions Reductions from city shuttle bus services in Klaeng from 2016 – 2019

Emissions (tCO <sub>2</sub> e)	2016	2017	2018	2019	EOP TOTAL
Total Emission Reductions	0	56	56	56	169

Table 41: Lifetime Direct Project Emission Reductions from city shuttle bus services in Khon Kaen and Klaeng

Emission Reductions (tCO <sub>2</sub> e)	TOTAL	
	Khon Kaen	Klaeng
Average Annual Emissions Reduction	488	56
Average useful lifetime of investment (year)	15	15
Lifetime Direct Emission Reductions	7,315	846

Table 42: Key variables and data used in the estimation of Direct Project Emissions Reductions

No.	Variables	Values	Remarks
Khon Kaen			
1.	Mode share (%) for Bus by 2019	From 13% in 2016 to 15% in 2019	Estimated based on the discussions with the city officials, including Mr. Thawatchai Wanasubdamrongkul, chief of subdivision of construction control, Bureau of Public Works at Khon Kaen Municipality, and field visit results (September 2014). It is expected that the project will help to shift

No.	Variables	Values	Remarks
			people from traveling by car (1%) and Two Wheeler (1%) to traveling by bus by 2019.
2.	Additional No. of trips per day (person-trips) with shuttle bus by 2019	8,000 <sup>70</sup>	Estimated based on the discussions with the city officials, including Mr. Thawatchai Wanasubdamrongkul, chief of subdivision of construction control, Bureau of Public Works at Khon Kaen Municipality, and field visit results (September 2014).
Klaeng			
3	Mode share (%) for Bus by 2019	From 2% in 2016 to 10% in 2019	Estimated based on the discussions with the city officials (incl. Ms. Nuchanard Sukawadee, Head of Municipality Clark's Office, Klaeng Municipality, Klaeng Municipality) and field visit results (September 2014). The assumptions were made that mode share of city bus will increase from 2 to 10% by 2019. It is expected that the operations will help to shift people from traveling by car (5%) and Two Wheeler (3%) to traveling by bus.
4	Additional no. of trips per day (person-trips) with shuttle bus by 2019	1,500	Estimated based on the discussions with the city officials (incl. Ms. Nuchanard Sukawadee, Head of Municipality Clark's Office, Klaeng Municipality) and field visit results (September 2014).

31. Further assumptions are based on the following:

- Average speed in base year and future year, no. of trips/day, mode share per vehicle category, average trip lengths and average occupancy per vehicle category for Khon Kaen are derived from Khon Kaen's Traffic and Transportation Master Plan.
- Average speed in base year and future year, no. of trips/day, mode share per vehicle category, average trip lengths and average occupancy per vehicle category for Klaeng is derived from a case study of Klaeng's shuttle bus project. This case study was part of the development of the master plan for sustainable transport system and mitigation of climate change impacts by the Office of Transport Policy and Planning (OTP).
- Information on fuel share per vehicle category and number of vehicle registrations and type of fuel is referenced from the Transport Statistics Sub-Division, Planning Division, Department of Land Transportation in Thailand (DLT).
- Default values from the TEEMP model on fuel efficiency and CO2 emission factors have been used.

32. The estimates of indirect impacts uses the BU and TD approaches as per the STAP and GEF Manuals and are presented below.

<sup>70</sup> Currently, in KK municipality 635,000 trips per day are made, with 13% are traveling by buses (82,550 trips/day). The city expects the additional number of passengers using the shuttle bus at new service route which is on the truck line (BRT route planning) to be approximately 8,000 passengers/day in 2019.

Table 43: Total Indirect Project Emission Reductions (BU and TD) from 2020 – 2029

Emission Reductions (tCO <sub>2</sub> e)	TOTAL	
	Khon Kaen	Klaeng
Direct Project Emission Reductions	7,315	846
Replication factor, RF	12	15
<b>Total Indirect Project Emission Reductions / CO<sub>2</sub> indirect BU</b>	<b>87,774</b>	<b>12,693</b>
Technical and economic potential GHG savings, P10	1,711,316	
GEF causality factor, CF	60%	
<b>Total Indirect Project Emission Reductions / CO<sub>2</sub> indirect TD</b>	<b>1,036,264</b>	

33. Providing city shuttle bus services is not very common in Thailand. There are no policies or incentive schemes to encourage cities to provide this kind of services to citizens. At the same time, municipalities are interested in the services as a means to reduce congestion, so some projects might be implemented in the baseline. Based on the characteristics of the cities, it is assumed that the project in Khon Kaen can be replicated 12 times<sup>71</sup> and the project in Klaeng 15 times<sup>72</sup>. The GEF project will be imperative in presenting the benefits of shuttle bus services in cities as an alternative to using cars and motorbikes. The GEF project's contribution to indirect emission reductions is expected to be modest. Hence, a level 3 causality factor is adopted and a CF value of 60% is used in the calculations according to the general guidelines provided in the STAP Manuals. The technical and economic potential GHG savings (P10) is based on the total number of people living in cities in Thailand, their average number of trips and the total amount of fuel (total economic/technical potential) which realistically could be saved in these cities by realizing shuttle bus services during the influence period of 10 years.

Table 44: Summary of Project Emission Reductions

Emissions (tCO <sub>2</sub> e)	TOTAL	
	Khon Kaen	Klaeng
Direct Project Emission Reductions by EOP	1,463	169
Lifetime Direct Reductions	7,315	846
Total Indirect Project Emission Reductions (BU)	87,774	12,693
Total Indirect Project Emission Reductions (TD)	1,036,264	

## 8) Bus rerouting in Nakorn Ratchasima

34. The direct GHG emission reductions from the bus rerouting project are calculated based on the STAP Manual for Calculating Greenhouse Gas Benefits of Global Environment Facility Transportation Projects and the GEF TEEMP model (City Sketch Analysis) for GHG emission reductions from sustainable transport projects. There is no financing mechanism established and so, post-project direct

<sup>71</sup> There are 9 municipalities with the same size as KK municipality (population greater than 100,000). These 9 municipalities are Nonthaburi, Pak Kred, Had Yai, Nakhon Ratchasima, Udon Thani, Chiang Mai, Surat Thani, Chao PhaYa Surasak, and Nakhon Sri Thammarat. Total population in 2014 in these municipalities was 1,354,275 (based on the records from Department of Provincial Administration (DOPA)), while in KK municipality the total number of population was 115,928 (which is nearly 12 times). Therefore, a replication factor of 12 is applied, assuming the project can be replicated nearly 12 times.

<sup>72</sup> There are 16 municipalities with the same size as Klang municipality (population between 16,000 to 18,000). Total population in 2014 in these municipalities was 263,405 (Based on the records from Department of Provincial Administration (DOPA)), while Klaeng municipality has a total number of population of 17,764 (approximately 15 times). Therefore, a replication factor of 15 is applied, assuming the project can be replicated 15 times.

emissions are not considered. In order to calculate indirect emission reductions, the BU and TD approaches are used to estimate a possible range of impacts as per the GEF and STAP manuals.

35. The cumulative emission reductions estimated during the Project intervention from 2016 – 2019 are presented below:

Table 45: Annual Direct Emissions Reductions from bus rerouting in Nakorn Ratchasima from 2016 – 2019

Emissions (tCO <sub>2</sub> e)	2016	2017	2018	2019	EOP TOTAL
<b>Total Emission Reductions</b>	<b>0</b>	<b>689</b>	<b>1,377</b>	<b>1,377</b>	<b>3,443</b>

Table 46: Lifetime Direct Project Emission Reductions from bus rerouting in Nakorn Ratchasima

	<b>TOTAL</b>
<b>Emission Reductions (tCO<sub>2</sub>e)</b>	<b>Nakorn Ratchasima</b>
Average Annual Emissions Reduction	1,377
Average useful lifetime of investment (year)	15
<b>Lifetime Direct Emission Reductions</b>	<b>21,348</b>

Table 47: Key variables and data used in the estimation of Direct Project Emissions Reductions

No.	Variables	Values	Remarks
1	Mode share (%) for Bus	From 20% in 2016 to 25% in 2019	Estimated based on the discussions with the city officials, including Mr. Netiwit Ruerngsukpattana, Chief of the Bureau of Public Works at Nakhon Ratchasima Municipality, and field visit results (September 2014). The aim is to improve the existing mode share of bus from 20% to 25% by 2019. This five percent modal shift consists of 3% shift from car and 2% shift from Two Wheeler.

36. Further assumptions are based on the following:

- Average speed in base year and future year, no. of trips/day, mode share per vehicle category, average trip lengths and average occupancy per vehicle category for Nakorn Ratchasima is derived from the Nakhon Ratchasima Master Plan for Urban Public Transportation Report (BRT report).
- Information on fuel share per vehicle category and number of vehicle registrations and type of fuel is referenced from the Transport Statistics Sub-Division, Planning Division, Department of Land Transportation in Thailand (DLT).
- Default values from the TEEMP model on fuel efficiency and CO<sub>2</sub> emission factors have been used.

37. The estimates of indirect impacts uses the BU and TD approaches as per the GEF and STAP Manuals and are presented below.

Table 48: Total Indirect Project Emission Reductions (BU and TD) from 2020 – 2029

<b>Emission Reductions (tCO<sub>2</sub>e)</b>	<b>TOTAL</b>
	<b>Nakorn Ratchasima</b>
Direct Project Emission Reductions	21,348
Replication factor, RF	10
<b>Total Indirect Project Emission Reductions / CO<sub>2</sub> indirect BU</b>	<b>213,481</b>
Technical and economic potential GHG savings, P10	1,711,316
GEF causality factor, CF	60%
<b>Total Indirect Project Emission Reductions / CO<sub>2</sub> indirect TD</b>	<b>1,036,264</b>

38. Bus rerouting is not often done in Thailand. It is not a priority for the city and challenging to implement due to the various stakeholders involved. Also the national government does not have policies to encourage implementation of this kind of measures. There are 9 municipalities with the same size as NK municipality (population greater than 100,000). These 9 municipalities are Nonthaburi, Pak Kred, Had Yai, Khon Kaen, Udon Thani, Chiang Mai, Surat Thani, Chao PhaYa Surasak, and Nakhon Sri Thammarat. Total population in 2014 from these municipalities is 1,335,763 (Based on the records from Department of Provincial Administration (DOPA)), while NK municipality's total number of population is 134,440 (10 times). Therefore, a replication factor of 10 is applied, assuming the project can be replicated 10 times. The GEF project will play a key role in highlighting the benefits of bus rerouting. Therefore a level 3 causality factor has been attributed (GEF project's contribution to indirect emission reductions is substantial but modest indirect emission reductions can be attributed to the baseline) and a CF value of 60% is used in the calculations. The technical and economic potential GHG savings (P10) is based on the total number of people living in cities in Thailand, their average number of trips and the total amount of fuel (total economic/technical potential) which realistically could be saved in these cities by implementing bus rerouting projects during the influence period of 10 years.

Table 49: Summary of Project Emission Reductions

<b>Emission Reductions (tCO<sub>2</sub>e)</b>	<b>TOTAL</b>
	<b>Nakorn Ratchasima</b>
Direct Project Emission Reductions by EOP	3,443
Lifetime Direct Reductions	21,348
Total Indirect Project Emission Reductions (BU)	213,481
Total Indirect Project Emission Reductions (TD)	1,036,264

## 9) Promotion of traffic management pilot in Khon Kaen and Nakorn Ratchasima and traffic zoning in Samui

39. The direct GHG emission reductions from traffic management are calculated based on the STAP Manual for Calculating Greenhouse Gas Benefits of Global Environment Facility Transportation Projects and the GEF TEEMP model (City Sketch Analysis) for GHG emission reductions from sustainable transport projects. There is no financing mechanism established and so, post-project direct emissions are not considered. In order to calculate indirect emission reductions, the BU and TD approaches are used to estimate a possible range of impacts as per the GEF and STAP manuals.

40. The cumulative emission reductions estimated during the Project intervention from 2016 – 2019 are presented below:

Table 50: Annual Direct Emissions Reductions from traffic management pilot in Khon Kaen from 2016 – 2019

Emissions (tCO <sub>2</sub> e)	2016	2017	2018	2019	EOP TOTAL
<b>Total Emission Reductions</b>	0	0	13,115	13,115	26,230

Table 51: Annual Direct Emissions Reductions from traffic management pilot in Nakorn Ratchasima from 2016 – 2019

Emissions (tCO <sub>2</sub> e)	2016	2017	2018	2019	EOP TOTAL
<b>Total Emission Reductions</b>	0	0	11,038	11,038	22,077

Table 52: Annual Direct Emissions Reductions from traffic zoning in Samui from 2016 – 2019

Emissions (tCO <sub>2</sub> e)	2016	2017	2018	2019	EOP TOTAL
<b>Total Emission Reductions</b>	0	0	996	996	1,992

Table 53: Lifetime Direct Project Emission Reductions from traffic management in Khon Kaen, Nakorn Ratchasima and traffic zoning in Samui

Emission Reductions (tCO <sub>2</sub> e)	TOTAL		
	Khon Kaen	Nakorn Ratchasima	Samui
Average Annual Emissions Reduction	13,115	11,038	996
Average useful lifetime of investment (year)	15	15	15
<b>Lifetime Direct Emission Reductions</b>	<b>196,722</b>	<b>165,576</b>	<b>14,943</b>

Table 54: Key variables and data used in the estimation of Direct Project Emissions Reductions

No.	Variables	Values	Remarks
Khon Kaen			
1.	Average Speed in the city by 2019 (km/hour)	From 15 in 2016 to 17 km/hour by 2019	Estimated base on the discussions with the city officials, including Mr. Thawatchai Wanasubdamrongkul, chief of subdivision of construction control, Bureau of Public Works at Khon Kaen Municipality, and field visit results (September 2014). It is expected that the average speed will increase about 2 km/hour in the city by 2019.
Nakorn Ratchasima			
2	Average Speed in the city by 2019 (km/hour)	From 18 in 2016 to 23 km/hour by 2019	Estimated based on the discussions with the city officials, including Mr. Netiwit Ruerngsukpattana, Chief of Bureau of Public Works at Nakhon Ratchasima Municipality, and field visit results (September 2014). It is expected that the average speed will increase about 5 km/hour in the city by 2019
Samui			
3	Average Speed in the city by 2019 (km/hour)	From 30 in 2016 to 36 km/hour by 2019	Estimated based on the discussions with the city officials, including Ms Supinya Srithongkul, deputy mayor at Samui municipality and field visits (September 2014). It is expected that the average traffic speed will increase with about 6 km/hour in the city by 2019

41. Further assumptions are based on the following:

- Average speed in base year and future year, no. of trips/day, mode share per vehicle category, average trip lengths and average occupancy per vehicle category for Khon Kaen are derived from Khon Kaen's Traffic and Transportation Master Plan.
- Average speed in base year and future year, no. of trips/day, mode share per vehicle category, average trip lengths and average occupancy per vehicle category for Samui are derived from a feasibility study for Phuket LRT by the Office of Transport and Traffic Policy and Planning, Ministry of Transportation. It was assumed that the situation in Phuket is comparable to Samui, as Phuket is also an Island with similar number of visits.
- Average speed in base year and future year, no. of trips/day, mode share per vehicle category, average trip lengths and average occupancy per vehicle category for Nakorn Ratchasima is derived from the Nakhon Ratchasima Master Plan for Urban Public Transportation Report (BRT report).
- Information on fuel share per vehicle category and number of vehicle registrations and type of fuel is referenced from the Transport Statistics Sub-Division, Planning Division, Department of Land Transportation in Thailand (DLT).
- Default values from the TEEMP model on fuel efficiency and CO<sub>2</sub> emission factors have been used.

42. The estimates of indirect impacts uses the BU and TD approaches as per the STAP and GEF Manuals and are presented below.

Table 55: Total Indirect Project Emission Reductions (BU and TD)

Emission Reductions (tCO <sub>2</sub> e)	TOTAL		
	Khon Kaen	Nakorn Ratchasima	Samui
Direct Project Emission Reductions	196,722	165,576	14,943
Replication factor, RF	12	10	4
<b>Total Indirect Project Emission Reductions / CO<sub>2</sub> indirect BU</b>	<b>2,360,661</b>	<b>1,655,763</b>	<b>59,771</b>
Technical and economic potential GHG savings, P10	16,344,525		
GEF causality factor, CF	60%		
<b>Total Indirect Project Emission Reductions / CO<sub>2</sub> indirect TD</b>	<b>9,897,205</b>		

43. There are no policies and incentives from the national government to support cities in implementing traffic control measures. However, cities in Thailand are considering implementing measures to reduce traffic congestion, but making the projects successful is a challenge. Based on city characteristics, it is assumed that the project in Khon Kaen can be replicated 12 times<sup>73</sup>, the project in Nakorn Ratchasima 10 times<sup>74</sup> and the project in Samui 4 times<sup>75</sup>. Therefore a level 3 causality factor is

<sup>73</sup> There are 9 municipalities with the same size as KK municipality (population greater than 100,000). These 9 municipalities are Nonthaburi, Pak Kred, Had Yai, Nakhon Ratchasima, Udon Thani, Chiang Mai, Surat Thani, Chao PhaYa Surasak, and Nakhon Sri Thammarat. Total population in 2014 in these municipalities was 1,354,275 (based on the records from Department of Provincial Administration (DOPA)), while in KK municipality the total number of population was 115,928 (which is nearly 12 times). Therefore, a replication factor of 12 is applied, assuming the project can be replicated nearly 12 times.

<sup>74</sup> There are 9 municipalities with the same size as NK municipality (population greater than 100,000). These 9 municipalities are



adopted as GEF's impact on indirect emission reductions is expected to be modest. A corresponding CF value of 60% has been used. The technical and economic potential GHG savings (P10) is based on the total number of people living in cities in Thailand, their average number of trips and the total amount of fuel (total economic/technical potential) which realistically could be saved in these cities by implementing traffic management projects during the influence period of 10 years.

Table 56: Summary of Project Emission Reductions

Emission Reductions (tCO <sub>2</sub> e)	TOTAL		
	Khon Kaen	Nakorn Ratchasima	Samui
Direct Project Emission Reductions by EOP	26,230	22,077	1,992
Lifetime Direct Reductions	196,722	165,576	14,943
Total Indirect Project Emission Reductions (BU)	2,360,661	1,655,763	59,771
Total Indirect Project Emission Reductions (TD)	9,897,205		

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Nonthaburi, Pak Kred, Had Yai, Khon Kaen, Udon Thani, Chiang Mai, Surat Thani, Chao PhaYa Surasak, and Nakhon Sri Thammarat. Total population in 2014 from these municipalities is 1,335,763 (Based on the records from Department of Provincial Administration (DOPA)), while NK municipality's total number of population is 134,440 (10 times). Therefore, a replication factor of 10 is applied, assuming the project can be replicated 10 times

<sup>75</sup> Samui municipality has population of about total 63,592. The assumptions for the replication factor (RF) for samui include: (1) cities must have number of population similar to Samui, (2) the area is tourist attraction and the physical land use is a coastal area which is similar to Samui. There are 4 municipalities that fall into this criterion which are: Phuket, Huahin, Rayong, and Song Khla. These municipalities had a total population of 266,035 (based on records from Department of Provincial Administration (DOPA)). It is about 4 times the population in Samui. Therefore, a replication factor of 4 is applied, assuming the project can be replicated 4 times.

### ***Annex III: Co-Financing***

1. A summary of the co-financing is provided in Table 15 below.

<b>Sources of Co-financing</b>	<b>Name of Co-financier (source)</b>	<b>Type of Co-financing</b>	<b>Co-financing Amount (US\$)</b>
GEF Agency	UNDP	Cash	30,000
GEF Agency	UNDP	In-kind	270,000
National Government	TGO	In-kind	400,000
Local Government	Samui	Cash	26,780,654
Local Government	Samui	In-kind	1,255,202
Local Government	Nakorn Ratchasima	Cash	102,162,752
Local Government	Nakorn Ratchasima	In-kind	1,521,410
Local Government	Khon Kaen	Cash	42,512,056
Local Government	Khon Kaen	In-kind	1,292,308
Local Government	Klaeng	Cash	5,266,816
Local Government	Klaeng	In-kind	809,812
<b>Total Co-financing</b>			<b>182,301,010</b>

Table 15: Summary co-financing

2. Co-financing letters (6) are included below.

## Co-financing Letter TGO

14 พ.ค. 2015 16:05 TGO 021438401

หน้า 1



องค์การบริหารจัดการก๊าซเรือนกระจก (องค์การมหาชน)  
THAILAND GREENHOUSE GAS MANAGEMENT ORGANIZATION (PUBLIC ORGANIZATION)  
ศูนย์ราชการ อาคารรัฐประหารบิณฑ์ ชั้น 9 อาคาร 900 ถนนวิภาวดีรังสิต แขวงจตุจักร เขตจตุจักร กรุงเทพฯ 10210 Thailand  
The Government Complex, Rajaprasannaabhai Bldg., 9th Fl., 120 Chaengwattana Rd., Lat Sai, Bangkok 10210, Thailand  
Tel. +66 2141 9790 Fax +66 2143 8400 www.tgo.or.th

TGO 02/ 213

14 May 2015

Dear Mr. Luc Stevens,

**Subject: Co-financing confirmation for the Project on 'Achieving Low Carbon Growth in Cities through Sustainable Urban Systems Management in Thailand'**

On behalf of Thailand Greenhouse Gas Management Organization (Public Organization: TGO), I am pleased to express our commitment to the above-mentioned project. This project is closely aligned with the Royal Thai Government's plan on the reduction of greenhouse gases (GHG) emissions and increase of carbon sinks based on sustainable development through 1) promoting a low-carbon mode of urban management; 2) promoting low-carbon solid waste management; and 3) promoting low-carbon services.

TGO has been working closely with United Nations Development Programme (UNDP) in the preparation process of the project proposal and the project document. The project will be complementary to the works of TGO, with regard to the promotion of GHG reduction activities at both project and policy level for environmentally sustainable development, economy and society.

The co-financing contribution from TGO to the project is equivalent to USD. 400,000

The commitment will support the implementation during the project's entire lifetime (4 years).

Yours sincerely,

(Mrs. Prasertsuk Chamommam)  
Executive Director

Mr. Luc Stevens  
UN Resident Coordinator and  
UNDP Resident Representative  
12<sup>th</sup> Floor, UN Secretariat Building  
Rajadamnoen Nok Avenue  
Bangkok 10200

Strategy Office  
Tel: +66(0) 2141 9813-17  
Fax: +66 (0) 2143 8401

## Co-financing Letter UNDP

United Nations Development Programme



Empowered lives.  
Resilient nations.

Ref. 059/15/IGSD

21 April 2015

Dear Ms. Dinu,

**Co-financing Commitment to the GEF-funded Project on  
Achieving Low Carbon Growth in Cities through Sustainable Urban Systems  
Management in Thailand**

I am pleased to acknowledge that the Global Environment Facility (GEF) has approved a project preparation grant of US\$ 100,000 for the above-mentioned project in February 2014 and an indicative grant of US\$ 3,150,000 once the project document has been approved in 2015.

In support of the project's objectives and outcomes, and in accordance with the United Nations Partnership Framework with the Royal Thai Government (2012-2016), I would like to confirm a co-financing in the amount of US\$ 300,000 during the project's entire cycle of 4 years. This support includes US\$270,000 from Low Emission Capacity Building Project for the Nationally Appropriate Mitigation Actions (NAMA), and US\$ 30,000 from the core resource of UNDP Thailand.


Yours sincerely,

A handwritten signature in blue ink, appearing to read 'Eric Stevens', is written over a horizontal line.

Eric Stevens  
UN Resident Coordinator  
UNDP Resident Representative

Ms. Adriana Dinu  
Executive Coordinator  
UNDP-GEF  
One United Nations Plaza  
10<sup>th</sup> Floor, FF Building  
304 East 45<sup>th</sup> Street  
New York NY 10017  
USA

## Co-financing letter Nakorn Ratchasima



ที่ นร ๕๒๐๐๓/ ๒๖๕๖๑

สำนักงานเทศบาลนครนครราชสีมา  
ถนนโพธิ์กลาง ตำบลในเมือง  
อำเภอเมือง จังหวัดนครราชสีมา

๒๒ ธันวาคม ๒๕๕๗

เรื่อง การสมทบงบประมาณ (Co-financing) โครงการ Achieving Low Carbon Growth in Cities through Sustainable Urban System Management in Thailand

เรียน ผู้แทนโครงการพัฒนาแห่งสหประชาชาติ ประจำประเทศไทย (UNDP Thailand)

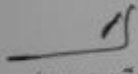
เทศบาลนครนครราชสีมา จังหวัดนครราชสีมา มีความยินดีที่จะส่งหนังสือยืนยันการสมทบงบประมาณ (Co-financing letter) ต่อโครงการ Achieving Low Carbon Growth in Cities through Sustainable Urban System Management in Thailand ซึ่งเป็นความร่วมมือระหว่างโครงการพัฒนาแห่งสหประชาชาติ (UNDP) องค์การบริหารจัดการก๊าซเรือนกระจก (องค์การมหาชน) และเทศบาลนครนครราชสีมา

โครงการมีเป้าหมายสนับสนุนเทศบาลขนาดใหญ่สี่แห่งในประเทศไทย ในการวางแผนและดำเนินการพัฒนาเมืองอย่างยั่งยืน โดยคำนึงถึงระดับความต้องการพลังงาน การปล่อยก๊าซเรือนกระจกของเสีย ระบบคมนาคมขนส่ง

จึงขอสมทบงบประมาณที่สอดคล้องกับการทำกิจกรรมในโครงการนี้ ตามแผนพัฒนาท้องถิ่น เป็นจำนวน ๓,๓๙๗,๗๓๐,๐๐๐ บาท (หรือ USD ๓๐๓,๖๘๔,๑๖๒ โดยประมาณ) โดยการสมทบงบประมาณจะเป็นการสนับสนุนการดำเนินกิจกรรมตลอดระยะเวลาของโครงการ (๕ปี)

จึงเรียนมาเพื่อโปรดทราบ

ขอแสดงความนับถือ

  
(นายบุญเหลือ เจริญวัฒน์)  
รองนายกเทศมนตรี ปฏิบัติราชการแทน  
นายกเทศมนตรีนครนครราชสีมา

สำนักการช่าง  
ส่วนช่างสุขาภิบาล  
โทร.๐-๔๔๐๓-๔๖๐๐ ต่อ ๑๓๕๕  
โทรสาร ๐ ๔๔๐๓ ๔๗๑๕

## **Translation Co-financing letter Nakorn Ratchasima**

Ref. Nor Moor 52009/10504

Nakhonratchasima City Municipality  
Phoklang Road, Nai Muang Road  
Muang District Nakhonratchasima

22 December 2014

Subject: Co-financing for the project titled "Achieving Low Carbon Growth in Cities through Sustainable Urban System Management in Thailand"

Attention: Resident Representative of UNDP Thailand

Nakhonratchasima City Municipality is pleased to submit the co-financing letter to support the implementation of the project "Achieving Low Carbon Growth in Cities through Sustainable Urban System Management in Thailand". This project is the cooperation between UNDP Thailand and Thailand Greenhouse Gas Management Organization (Public Organization), together with other stakeholders including Nakhonratchasima City Municipality.

The project aims to support four municipalities in Thailand: Khon Kaen Municipality, Nakhonratchasima Municipality, Samui Municipality, and Klang Municipality, to plan and carry out their development programs in a sustainable manner taking into consideration energy requirements, GHG emissions and the energy and environmental impacts of such programs. The project includes actions aimed at facilitating the improvements in waste management and transport sectors.

Nakhonratchasima City Municipality would like to confirm the co-financing from its local development plan budget of THB. 3,397,700,000 (approximately USD. 103,684,162). This budget is in line with the objectives of this project. The co-financing amount will support the implementation of the activities throughout the project duration of four years.

Yours sincerely,

(Mr. Boonlue Charoenwat)  
Deputy Mayor  
Nakhonratchasima City Municipality

Bureau of Public Works  
Subdivision of Sanitary Work  
Tel. 0-4423-4600 ext 1354  
Fax.0-4423-4715

## Co-financing Letter Khon Kaen

ที่ ขก ๕๒๐๓/ ๑๖๖๕๒



เทศบาลนครขอนแก่น

๑ ถนนประชาธิปไตย อ.เมือง ขก. ๔๐๐๐๐

๑/๐ ธันวาคม ๒๕๕๗

**เรื่อง** การสมทบงบประมาณ (Co-financing) โครงการ Achieving Low Carbon Growth in Cities Through Sustainable Urban System Management in Thailand

**เรียน** ผู้แทนโครงการพัฒนาแห่งสหประชาชาติ ประจำประเทศไทย (UNDP Thailand)

เทศบาลนครขอนแก่น จังหวัดขอนแก่น มีความยินดีที่จะส่งหนังสือยืนยันการสมทบงบประมาณ (Co-financing letter) ต่อโครงการ Achieving Low carbon Growth in Cities through Sustainable Urban System Management in Thailand ซึ่งเป็นความร่วมมือระหว่างโครงการพัฒนาแห่งสหประชาชาติ (UNDP) องค์การบริหารจัดการก๊าซเรือนกระจก (องค์การมหาชน) และเทศบาลนครขอนแก่น

โครงการนี้มีเป้าหมายที่จะสนับสนุนเทศบาลสี่แห่งในประเทศไทย ได้แก่ เทศบาลนครขอนแก่น เทศบาลนครราชสีมา เทศบาลนครสมุทร และเทศบาลตำบลแกลง ในการวางแผนและดำเนินการพัฒนาเมืองอย่างยั่งยืน โดยคำนึงถึงระดับความต้องการพลังงาน การปล่อยก๊าซเรือนกระจก และผลกระทบต่อพลังงาน และสภาพสิ่งแวดล้อม โดยมุ่งเน้นที่พัฒนาระบบจัดการของเสีย และระบบการขนส่ง

เทศบาลนครขอนแก่น ขอยืนยันการสมทบงบประมาณที่สอดคล้องกับการทำกิจกรรมในโครงการนี้ ตามแผนพัฒนาท้องถิ่น เป็นจำนวน ๑,๕๓๕,๕๖๙,๐๑๖.๑๖ บาท (ประมาณ USD ๕๓,๘๐๔,๓๐๔) โดยการสมทบงบประมาณจะเป็นการสนับสนุนการดำเนินกิจกรรมตลอดระยะเวลาของโครงการ (๕ ปี)

จึงเรียนมาเพื่อโปรดพิจารณา

ขอแสดงความนับถือ

(นายธีระศักดิ์ ชัยบุญพันธุ์)

นายกเทศมนตรีนครขอนแก่น

สำนักการสาธารณสุขและสิ่งแวดล้อม

ฝ่ายพัฒนาการจัดการสิ่งแวดล้อม

โทรศัพท์ ๐๔๓ ๒๒๕๕๑๔

โทรสาร ๐๔๓ ๒๒๕๕๑๔

Date: ๑-๑๒-๒๕๕๗	
Dr. [Signature]	Dr. [Signature]
SK	SK

## Translation Co-financing Letter Khon Kaen

Ref. Kor Gor 5203/7642

At Khon Kaen Municipality  
1 Prachasamran Road  
Mueng, Khon Kaen 40000

30 December 2014

Subject: Co-financing for the project titled “Achieving Low Carbon Growth in Cities through Sustainable Urban System Management in Thailand”

Attention: Resident Representative of UNDP Thailand

Khon Kaen Municipality is pleased to submit the co-financing letter to support the implementation of the project “Achieving Low Carbon Growth in Cities through Sustainable Urban System Management in Thailand”. This project is the cooperation between UNDP Thailand and Thailand Greenhouse Gas Management Organization (Public Organization), together with other stakeholders including Khon Kaen Municipality.

The project aims to support four municipalities in Thailand: Khon Kaen Municipality, Korat Municipality, Samui Municipality, and Klang Municipality, to plan and carry out their development programs in a sustainable manner taking into consideration energy requirements, GHG emissions and the energy and environmental impacts of such programs. The project includes actions aimed at facilitating the improvements in waste management and transport sectors.

Khon Kaen Municipality would like to confirm the co-financing from its local development plan budget of THB 1,435,469,016.16 (approximately USD 43,804,364). This budget is in line with the objectives of this project. The co-financing amount will support the implementation of the activities throughout the project duration of four years.

Yours sincerely,

(Mr. Theerasak Theethaphan)  
Mayor

Bureau of Public Health and Environment  
Division of Environmental Management Promotion

Tel 043 225514  
Fax 043 225514



## Co-financing Letter Samui



ที่ สฎ ๕๒๕๐๕/๓๕๔๙

สำนักงานเทศบาลนครเกาะสมุย  
ถนนท้าวสุริยภักดี สฎ ๘๔๑๔๐

๑๙ ธันวาคม ๒๕๕๗

เรื่อง การสมทบงบประมาณ (co-financing) โครงการ Achieving Low Carbon Growth in Cities through Sustainable Urban System Management in Thailand

เรียน ผู้แทนโครงการพัฒนาแห่งสหประชาชาติ ประจำประเทศไทย (UNDP Thailand)

เทศบาลนครเกาะสมุย จังหวัดสุราษฎร์ธานี มีความยินดีที่จะส่งหนังสือยืนยันการสมทบงบประมาณ (co-financing letter) ต่อดครงการ Achieving Low Carbon Growth in Cities through Sustainable Urban System Management in Thailand ซึ่งเป็นความร่วมมือ ระหว่างโครงการพัฒนาแห่งสหประชาชาติ (UNDP) องค์การบริหารจัดการก๊าซเรือนกระจก (องค์การมหาชน) และ เทศบาลนครเกาะสมุย

จึงขอสมทบงบประมาณที่สอดคล้องกับการทำกิจกรรมในโครงการนี้ ตามแผนพัฒนาเทศบาลนครเกาะสมุย เป็นจำนวน ๔๑๘,๗๓๕,๐๐๐ บาท (หรือ ๒๘,๐๓๕,๘๕๖ USD โดยประมาณ) โดยการสมทบงบประมาณจะเป็นการสนับสนุนการดำเนินกิจกรรมตลอดระยะเวลาของโครงการ (๔ ปี) โดยงบประมาณที่ได้จัดสรรเพื่อทำกิจกรรมต่างๆ ที่เกี่ยวข้องตามแผนพัฒนาเทศบาลนครเกาะสมุยอยู่แล้ว

จึงเรียนมาเพื่อโปรดทราบ และดำเนินการต่อไป

ขอแสดงความนับถือ

(นายรามณรงค์ ใจกว้าง)  
นายกเทศมนตรีนครเกาะสมุย

งานรักษาความสะอาด  
กองสาธารณสุขและสิ่งแวดล้อม  
โทร. ๐-๗๗๙๕๒-๑๔๖๒ ต่อ ๑๗๗  
โทรสาร. ๐-๗๗๙๕๒-๑๔๖๒ ต่อ ๑๕๓

## Translation Co-financing letter Samui

Ref. Sor Dor 52505/3549

Samui Municipality  
Taweerat Pakdee Road,  
Surat Thani 84140

19 December 2014

Subject: Co-financing for the project titled “Achieving Low Carbon Growth in Cities through Sustainable Urban System Management in Thailand”

Attention: Resident Representative of UNDP Thailand

Samui Municipality is pleased to submit the co-financing letter to support the implementation of the project “Achieving Low Carbon Growth in Cities through Sustainable Urban System Management in Thailand”. This project is the cooperation between UNDP Thailand and Thailand Greenhouse Gas Management Organization (Public Organization), together with other stakeholders including Samui Municipality.

The project aims to support four municipalities in Thailand: Khon Kaen Municipality, Korat Municipality, Samui Municipality, and Klang Municipality, to plan and carry out their development programs in a sustainable manner taking into consideration energy requirements, GHG emissions and the energy and environmental impacts of such programs. The project includes actions aimed at facilitating the improvements in waste management and transport sectors.

Samui Municipality would like to confirm the co-financing from its local development plan budget of THB. 918,735,000 (approximately USD. 28,035,856). This budget is in line with the objectives of this project. The co-financing amount will support the implementation of the activities throughout the project duration of four years.

Yours sincerely,

(Mr. Ramnet Jaikwang)  
Mayor, Samui Municipality

Section of Offices Cleanliness  
Division of Public Health and Environment  
Tel. 0-7742-1422 ext 177  
Fax.0-7742-1422 ext 153

## Co-financing Letter Klaeng

ที่ รย ๕๒๑๐๕/ ๖๙๖๙



สำนักงานเทศบาลตำบลเมืองแกลง  
ถนนเทศบาล ๒ อ.แกลง รย ๒๑๑๑๐

๒๕ ธันวาคม ๒๕๕๙

เรื่อง การสมทบงบประมาณ (co-financing) โครงการ Achieving Low Carbon Growth in Cities through Sustainable Urban System Management in Thailand

เรียน ผู้แทนโครงการพัฒนาแห่งสหประชาชาติ ประจำประเทศไทย (UNDP Thailand)

เทศบาลตำบลเมืองแกลง จังหวัดระยอง มีความยินดีที่จะส่งหนังสือยืนยันการสมทบงบประมาณ (co-financing letter) คือโครงการ Achieving Low Carbon Growth in Cities through Sustainable Urban System Management in Thailand ซึ่งเป็นความร่วมมือระหว่างโครงการพัฒนาแห่งสหประชาชาติ (UNDP) องค์การบริหารจัดการก๊าซเรือนกระจก (องค์การมหาชน) และเทศบาลตำบลเมืองแกลง นั้น

โครงการมีเป้าหมายในการสนับสนุนเทศบาลขนาดใหญ่สี่แห่งในประเทศไทยในการวางแผนและดำเนินการพัฒนาเมืองอย่างยั่งยืน โดยคำนึงถึงระดับความต้องการพลังงาน การปล่อยก๊าซเรือนกระจกและผลกระทบต่อพลังงาน และสภาพสิ่งแวดล้อม โดยโครงการจะมุ่งเน้นที่พัฒนาระบบจัดการของเสีย ระบบคมนาคมขนส่ง

จึงขอสมทบงบประมาณที่สอดคล้องกับการทำกิจกรรมในโครงการนี้ ตามแผนพัฒนาท้องถิ่น เป็นจำนวน ๑๕๕,๒๒๕,๕๒๐ บาท (หรือ ๖,๐๙๖,๖๒๕ USD โดยประมาณ) โดยการสมทบงบประมาณจะเป็นการสนับสนุนการดำเนินกิจกรรมตลอดระยะเวลาของโครงการ (๔ปี)

ขอแสดงความนับถือ

(นายสันติชัย ตั้งสวนิช)

นายกเทศมนตรีตำบลเมืองแกลง

กองสาธารณสุขและสิ่งแวดล้อม

โทร. ๐-๓๘๖๘-๕๒๒๒ ต่อ ๑๑๒

โทรสาร ๐-๓๘๖๘-๕๒๐๕

[www.muangklaeng.com](http://www.muangklaeng.com)

## **Translation Co-financing Letter Klaeng**

Ref. Ror Yor 52015/1763

Klang Municipality  
Tessaban Road 2  
Klang, Rayong 21110

25 December 2014

Subject: Co-financing for the project titled “Achieving Low Carbon Growth in Cities through Sustainable Urban System Management in Thailand”

Attention: Resident Representative of UNDP Thailand

Klang Municipality is pleased to submit the co-financing letter to support the implementation of the project “Achieving Low Carbon Growth in Cities through Sustainable Urban System Management in Thailand”. This project is the cooperation between UNDP Thailand and Thailand Greenhouse Gas Management Organization (Public Organization), together with other stakeholders including Klang Municipality.

The project aims to support four municipalities in Thailand: Khon Kaen Municipality, Korat Municipality, Samui Municipality, and Klang Municipality, to plan and carry out their development programs in a sustainable manner taking into consideration energy requirements, GHG emissions and the energy and environmental impacts of such programs. The project includes actions aimed at facilitating the improvements in waste management and transport sectors.

Klang Municipality would like to confirm the co-financing from its local development plan budget of THB. 199,229,420 (approximately USD. 6,076,628). This budget is in line with the objectives of this project. The co-financing amount will support the implementation of the activities throughout the project duration of four years.

Yours sincerely,

(Mr. Santichai Tangsavanich)  
Mayor, Klang Municipality

Division of Public Health and Environment  
Tel: 0-3867-5222 ext. 112  
Fax: 0-3867-1209  
[www.muangklang.com](http://www.muangklang.com)

## ***Annex IV: Terms of reference for Project Staff***

### **A. National Project Director (NPD)**

**Duties and Responsibilities:** The National Project Director is a senior staff member of TGO. His/her main responsibility is to coordinate project activities among the main parties to the project: the government line agencies, cities, CSO, other stakeholders and UNDP. Specifically, s/he works in close collaboration with the National Project Manager as well as UNDP and the responsibilities include: a) Provides effective direction for project implementation in line with the activities stated in the project document; b) Ensure that the project document and project revisions requiring Government's approval are processed through the Project Board, in accordance with established procedures; c) Approve work plans and execution of activities in discussion with TGO and UNDP; d) Mobilize national institutional mechanisms for smooth progress of project; e) Review and approve project outputs and reports; f) Provide direction and guidance to the project team for the successful implementation of the project; g) Recommend any new foreseeable activities, for approval; h) Approve financial transaction where appropriate, in line with the established TGO or UNDP procedures; i) Report project progress and financial status for endorsement by the PB.

### **B. National Project Manager (NPM):**

**Duties and Responsibilities:** The NPM will be responsible for implementation of the project, including mobilization of all project inputs, supervision of project staff, consultants and oversight of sub-contractors. The PM will be the leader of the Project Team and shall liaise with the government, UNDP, and all stakeholders involved in the project. S/he will be specifically responsible for (a) overall management of the project, (b) work closely with project stakeholders and ensure the project deliveries as per project document and work plan, (c) ensure technical coordination of the project and the work related to legal and institutional aspects, (d) mobilize all project inputs in accordance with UNDP procedures and GEF principles, (e) finalize the ToR for the consultants and subcontractors, (f) supervise and coordinate the work of all project staff, consultants and sub-contractors, (g) ensure proper management of funds consistent with TGO & UNDP requirements, and budget planning and control, (h) prepare and ensure timely submission of monthly reports, quarterly consolidated financial reports, quarterly consolidated progress reports, annual, mid-term and terminal reports, and other reports as may be required by UNDP; (i) submit the progress reports and key issue report to the PB, (j) prepare quarterly and annual work plan, (k) provide regular input to UNDP corporate system ATLAS for financial and program management on project progress, financial status and various logs, (l) arrange for audit of all project accounts for each fiscal year (m) undertake field visit to ensure quality of work, and (n) undertake any activities that may be assigned by UNDP and PB.

### **C. Project Coordinator (PC):**

**Duties and Responsibilities:** Under the direct supervision of the Project Manager, the project coordinator will be assigned a) to coordinate activities with the cities, in particular the city coordinators, b) develop and implement a monitoring system to capture the project activities and results under the supervision of Project Manager; c) provide support to the cities when required, d) ensure regular reporting by the city coordinators in an uniform format, d) liaise with project stakeholders regarding planned activities, e) provide inputs to workshops and events at city level, (f) prepare the ToRs for mid-term and final evaluation in accordance to UNDP and GEF

guidelines, (g) design and implement a system to identify, analyze, and disseminate lesson learned in each city, (h) assist the PM in preparation of various progress report, (i) coordinate with consultants and other stakeholders, (j) facilitate exchange of experiences by supporting and coordinating participation in any existing network of UNDP/GEF projects sharing common characteristics, (k) identify and participate in additional networks, for example scientific or policy-based networks that may also yield lessons that can benefit project implementation and (l) any other related activities as assigned by Project Manager.

#### **D. Finance & Admin Assistant (FAA):**

**Duties and Responsibilities:** The finance & administrative assistant will be responsible to provide overall administration and financial services of the project such as processing payments, projects logs etc. as per TGO requirements. S/he will be responsible to provide financial reporting. S/he will also perform (a) word processing, drafting routine letters/messages/reports, mailing (b) arrange travel, itinerary preparation for project related travels, (c) assist to arrange workshops/seminar/training programs and mailings, (d) make appointments and schedule meeting, (e) assist in work-plan and budgeting, (f) photocopying, binding and filing, (g) maintenance of all office equipment and keeping inventory/records of supplies and their usage and any other duties assigned by Project Manager or concerned officials, (h) support the finance and admin assistants at city level, (i) Coordinate and assist in project documentation and follow ups from the respective project coordinator/manager (i.e. Quarterly Reports, APR/PIR reports and other project related documents).

#### **E. Project Coordinators at city level (PCC):**

**Duties and Responsibilities:** Under the direct supervision of the Project Manager and focal points at city level, the project coordinators at city level will be assigned a) to coordinate activities within the cities, b) monitoring the project activities and results, c) ensure regular reporting to the project coordinator at central level, d) liaise with project stakeholders regarding planned activities, e) provide inputs to workshops and events, (f) identify, analyze, and disseminate lesson learned in each city, (g) coordinate with consultants, project coordinator at central level and other stakeholders, and (h) any other related activities as assigned by Project Manager or Project Coordinator at central level. The Project Coordinators at city level will closely work together with the project coordinator at central level.

## ***Annex V: Social and Environmental Screening***

## Project Information

<b>Project Information</b>	
1. Project Title	Achieving Low Carbon Growth in Cities through Sustainable Urban Systems Management in Thailand
2. Project Number	PIMS 4778
3. Location (Global/Region/Country)	Thailand

## Part A. Integrating Overarching Principles to Strengthen Social and Environmental Sustainability

<b>QUESTION 1: How Does the Project Integrate the Overarching Principles in order to Strengthen Social and Environmental Sustainability?</b>
<b><i>Briefly describe in the space below how the Project mainstreams the human-rights based approach</i></b>
The 'Achieving Low Carbon Growth in Cities through Sustainable Urban Systems Management in Thailand' project aims to improve the liveability in participating cities (Khon Kaen, Nakorn Ratchasima, Klaeng and Samui) by promoting more sustainable and inclusive urban development planning processes and management of urban systems. In the project, the concept of universality, inalienability, participation and inclusion are observed by ensuring project activities are non-discriminatory to any citizens, contractors, consultants and users of the facilities in the participating cities. Project implementing agency, partners and the participating cities are accountable in the observance of human rights approach during project implementation and per the applicable Rule of Laws.
<b><i>Briefly describe in the space below how the Project is likely to improve gender equality and women's empowerment</i></b>
The project promulgates the integration of gender and social responsive approach in the design and implementation. By taking in account different gender roles, needs and preferences the project will further harness the capacities of communities, particularly women, on low carbon development policies, planning and implementation of activities. Civil society engagement in the process is therefore critical to equitable outcomes. Civil society will be engaged during implementation stage.
<b><i>Briefly describe in the space below how the Project mainstreams environmental sustainability</i></b>
<p>The overall objective of the project is to facilitate the implementation of low carbon development initiatives in cities in Thailand. The project, therefore, will lead to positive local and global environment benefits. The Project contributes to reduced carbon emissions in the cities and will contribute towards the national commitment of reducing its GHG emissions in the range of 7%-20% below the business as usual (BAU) in 2020. Environmental sustainability is embedded in the project through the following outcomes:</p> <ol style="list-style-type: none"> <li>1. Increased number of Thai cities that have formulated and implemented low carbon sustainable urban development plans</li> <li>2. Increased number of Thai cities with energy efficient urban systems</li> <li>3. Increased volume of investments in energy efficient urban systems by government and private sector.</li> </ol>



## Part B. Identifying and Managing Social and Environmental Risks

<b>QUESTION 2: What are the Potential Social and Environmental Risks?</b> <i>Note: Describe briefly potential social and environmental risks identified in Attachment 1 – Risk Screening Checklist (based on any “Yes” responses). If no risks have been identified in Attachment 1 then note “No Risks Identified” and skip to Question 4 and Select “Low Risk”. Questions 5 and 6 not required for Low Risk Projects.</i>	<b>QUESTION 3: What is the level of significance of the potential social and environmental risks?</b> <i>Note: Respond to Questions 4 and 5 below before proceeding to Question 6</i>		<b>QUESTION 6: What social and environmental assessment and management measures have been conducted and/or are required to address potential risks (for Risks with Moderate and High Significance)?</b>	
Risk Description	Impact and Probability (1-5)	Significance (Low, Moderate, High)	Comments	Description of assessment and management measures as reflected in the Project design. If ESIA or SESA is required note that the assessment should consider all potential impacts and risks.
=> Risk due to climate change impacts on urban systems	I = Med P = Med	Moderate	-	The project has been designed to address climate change risks through comprehensive urban planning processes. These processes will consider climate resilient strategies.
=> Risk of exclusion of potentially affected stakeholders, in particular marginalized groups, in raising concerns and complains related to the investments in the cities (during planning, implementation or operation) that may affect them. This includes risk due to local community/individual grievances and human rights concerns.	I = Med P = Low	Low	The project comprises physical interventions such as construction of waste management facilities and bikeways. The construction process and facilities itself may potentially have impacts on local communities.	<p>There are several mechanisms in place in cities to respond to concerns and complaints from individuals/ local communities related to investments which may affect them. For example: stakeholder consultations during planning and implementation are currently taking place. Also, there are formal and informal communication channels via community leaders, village head-men, sub-district and district officials via which concerns can be raised and consequently addressed by the projects. These mechanisms will be strengthened during the project implementation, by involving the communities, CSOs and other stakeholders in the process.</p> <p>During the design of the GEF Project stakeholder consultations were organised in all four cities and at national level in Q4 of 2014 and representatives of different groups were invited and present during the meetings (included CSOs in each city). No human rights issues were raised during the consultations.</p>
	I = Low	Low	The project comprises	Although the construction of waste-to-energy facilities

=>Risk of large-scale infrastructure development and associated release of pollutants from the development of infrastructure to the environment with the potential for adverse local impacts	P = Low		physical interventions such as construction of waste management facilities and bikeways. The construction process may potentially have ramifications in the air, water quality and ambient noise levels, solid waste situation. The implications however are identified to be temporary but the construction will be compliant with the environment regulations of the country.	and integrated waste management plants don't seek GEF funding support and as such is outside of the SES policy, for conservativeness it has still been considered in the assessment to ensure the environmental soundness and sustainability of the project. Potential impacts are assessed as insignificant and temporary. The project proponents of these projects will conform to the environmental regulations, including preparation of EIAs, of Thailand. Overall, the project will lead to cumulative environment and health benefits pertinent to low carbon development.
=>Risk due to secondary or consequential development that could lead to indirect social implications	I = Low P = Low	Low	The increased and improved connectivity as a result of sustainable transport projects (e.g. the bus rerouting project in Nakorn Ratchasima) may result in indirect impacts such as enhanced commercial activities in and around the project locations. However, this is not envisaged to lead to any direct and significant impact on the communities.	This risk is considered and identified as insignificant. However, it has been raised here to enable monitoring and reassessment of the risk during mid-term evaluation.
<b>QUESTION 4: What is the overall Project risk categorization?</b>				
<b>Select one (see <a href="#">SESP</a> for guidance)</b>			<b>Comments</b>	
<b>Low Risk</b>			<b>X</b>	The project includes activities with low risks of adverse social or environmental impacts. As a precautionary approach, a few likely impacts associated with the baseline projects have been identified but they are considered as low and limited in scale. Moreover, EIAs will also be conducted for each baseline project as per the Government of Thailand standard requirement, <sup>76</sup> which also provides risk management measures. The identified risks can be managed through application of standard best practices which have already been put in place by the baseline project proponents as well as conforming to the social and environmental regulations

<sup>76</sup> See section 46 of the Enhancement and Conservation of National Environmental Quality Act 1992.

			of the country.
	<b>Moderate Risk</b>	<input type="checkbox"/>	
	<b>High Risk</b>	<input type="checkbox"/>	
	<b>QUESTION 5: Based on the identified risks and risk categorization, what requirements of the SES are relevant?</b>		
	Check all that apply		<b>Comments</b>
	<b>Principle 1: Human Rights</b>	<input type="checkbox"/>	NA
	<b>Principle 2: Gender Equality and Women's Empowerment</b>	<input type="checkbox"/>	NA
	<b>1. Biodiversity Conservation and Natural Resource Management</b>	<input type="checkbox"/>	NA
	<b>2. Climate Change Mitigation and Adaptation</b>	<input type="checkbox"/>	Climate resilient strategies have been integrated as part and parcel of the overall comprehensive urban development planning process.
	<b>3. Community Health, Safety and Working Conditions</b>	<input type="checkbox"/>	NA
	<b>4. Cultural Heritage</b>	<input type="checkbox"/>	NA
	<b>5. Displacement and Resettlement</b>	<input type="checkbox"/>	NA
	<b>6. Indigenous Peoples</b>	<input type="checkbox"/>	NA
	<b>7. Pollution Prevention and Resource Efficiency</b>	<input type="checkbox"/>	Monitoring and evaluation of the identified risks during annual project review and mid-term review.

## SESP Attachment 1. Social and Environmental Risk Screening Checklist

<b>Checklist Potential Social and Environmental Risks</b>		
<b>Principles 1: Human Rights</b>		<b>Answer (Yes/No)</b>
1.	Could the Project lead to adverse impacts on enjoyment of the human rights (civil, political, economic, social or cultural) of the affected population and particularly of marginalized groups?	No
2.	Is there a likelihood that the Project would have inequitable or discriminatory adverse impacts on affected populations, particularly people living in poverty or marginalized or excluded individuals or groups?	No
3.	Could the Project potentially restrict availability, quality of and access to resources or basic services, in particular to marginalized individuals or groups?	No
4.	Is there a likelihood that the Project would exclude any potentially affected stakeholders, in particular marginalized groups, from fully participating in decisions that may affect them?	No
5.	Are there measures or mechanisms in place to respond to local community grievances?	Yes
6.	Is there a risk that duty-bearers do not have the capacity to meet their obligations in the Project?	No

7.	Is there a risk that rights-holders do not have the capacity to claim their rights?	No
8.	Have local communities or individuals, given the opportunity, raised human rights concerns regarding the Project during the stakeholder engagement process?	Yes
9.	Is there a risk that the Project would exacerbate conflicts among and/or the risk of violence to project-affected communities and individuals?	No
<b>Principle 2: Gender Equality and Women's Empowerment</b>		
1.	Is there a likelihood that the proposed Project would have adverse impacts on gender equality and/or the situation of women and girls?	No
2.	Would the Project potentially reproduce discriminations against women based on gender, especially regarding participation in design and implementation or access to opportunities and benefits?	No
3.	Have women's groups/leaders raised gender equality concerns regarding the Project during the stakeholder engagement process and has this been included in the overall Project proposal and in the risk assessment?	No
3.	Would the Project potentially limit women's ability to use, develop and protect natural resources, taking into account different roles and positions of women and men in accessing environmental goods and services? <i>For example, activities that could lead to natural resources degradation or depletion in communities who depend on these resources for their livelihoods and well being</i>	No
<b>Principle 3: Environmental Sustainability:</b> Screening questions regarding environmental risks are encompassed by the specific Standard-related questions below		
<b>Standard 1: Biodiversity Conservation and Sustainable Natural Resource Management</b>		
1.1	Would the Project potentially cause adverse impacts to habitats (e.g. modified, natural, and critical habitats) and/or ecosystems and ecosystem services?  <i>For example, through habitat loss, conversion or degradation, fragmentation, hydrological changes</i>	No
1.2	Are any Project activities proposed within or adjacent to critical habitats and/or environmentally sensitive areas, including legally protected areas (e.g. nature reserve, national park), areas proposed for protection, or recognized as such by authoritative sources and/or indigenous peoples or local communities?	No
1.3	Does the Project involve changes to the use of lands and resources that may have adverse impacts on habitats, ecosystems, and/or livelihoods? (Note: if restrictions and/or limitations of access to lands would apply, refer to Standard 5)	No
1.4	Would Project activities pose risks to endangered species?	No
1.5	Would the Project pose a risk of introducing invasive alien species?	No
1.6	Does the Project involve harvesting of natural forests, plantation development, or reforestation?	No
1.7	Does the Project involve the production and/or harvesting of fish populations or other aquatic species?	No
1.8	Does the Project involve significant extraction, diversion or containment of surface or ground water? <i>For example, construction of dams, reservoirs, river basin developments, groundwater extraction</i>	No
1.9	Does the Project involve utilization of genetic resources? (e.g. collection and/or harvesting, commercial development)	No
1.10	Would the Project generate potential adverse transboundary or global environmental concerns?	No

1.11	<p>Would the Project result in secondary or consequential development activities which could lead to adverse social and environmental effects, or would it generate cumulative impacts with other known existing or planned activities in the area?</p> <p><i>For example, a new road through forested lands will generate direct environmental and social impacts (e.g. felling of trees, earthworks, potential relocation of inhabitants). The new road may also facilitate encroachment on lands by illegal settlers or generate unplanned commercial development along the route, potentially in sensitive areas. These are indirect, secondary, or induced impacts that need to be considered. Also, if similar developments in the same forested area are planned, then cumulative impacts of multiple activities (even if not part of the same Project) need to be considered.</i></p>	Yes
<b>Standard 2: Climate Change Mitigation and Adaptation</b>		
2.1	Will the proposed Project result in significant greenhouse gas emissions or may exacerbate climate change?	No
2.2	Would the potential outcomes of the Project be sensitive or vulnerable to potential impacts of climate change?	Yes
2.3	<p>Is the proposed Project likely to directly or indirectly increase social and environmental vulnerability to climate change now or in the future (also known as maladaptive practices)?</p> <p><i>For example, changes to land use planning may encourage further development of floodplains, potentially increasing the population's vulnerability to climate change, specifically flooding</i></p>	No
<b>Standard 3: Community Health, Safety and Working Conditions</b>		
3.1	Would elements of Project construction, operation, or decommissioning pose potential safety risks to local communities?	No
3.2	Would the Project pose potential risks to community health and safety due to the transport, storage, and use and/or disposal of hazardous or dangerous materials (e.g. explosives, fuel and other chemicals during construction and operation)?	No
3.3	Does the Project involve large-scale infrastructure development (e.g. dams, roads, buildings)?	Yes
3.4	Would failure of structural elements of the Project pose risks to communities? (e.g. collapse of buildings or infrastructure)	No
3.5	Would the proposed Project be susceptible to or lead to increased vulnerability to earthquakes, subsidence, landslides, and erosion, flooding or extreme climatic conditions?	No
3.6	Would the Project result in potential increased health risks (e.g. from water-borne or other vector-borne diseases or communicable infections such as HIV/AIDS)?	No
3.7	Does the Project pose potential risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during Project construction, operation, or decommissioning?	No
3.8	Does the Project involve support for employment or livelihoods that may fail to comply with national and international labor standards (i.e. principles and standards of ILO fundamental conventions)?	No
3.9	Does the Project engage security personnel that may pose a potential risk to health and safety of communities and/or individuals (e.g. due to a lack of adequate training or accountability)?	No

<b>Standard 4: Cultural Heritage</b>		
4.1	Will the proposed Project result in interventions that would potentially adversely impact sites, structures, or objects with historical, cultural, artistic, traditional or religious values or intangible forms of culture (e.g. knowledge, innovations, practices)? (Note: Projects intended to protect and conserve Cultural Heritage may also have inadvertent adverse impacts)	No
4.2	Does the Project propose utilizing tangible and/or intangible forms of cultural heritage for commercial or other purposes?	No
<b>Standard 5: Displacement and Resettlement</b>		
5.1	Would the Project potentially involve temporary or permanent and full or partial physical displacement?	No
5.2	Would the Project possibly result in economic displacement (e.g. loss of assets or access to resources due to land acquisition or access restrictions – even in the absence of physical relocation)?	No
5.3	Is there a risk that the Project would lead to forced evictions?	No
5.4	Would the proposed Project possibly affect land tenure arrangements and/or community based property rights/customary rights to land, territories and/or resources?	No
<b>Standard 6: Indigenous Peoples</b>		
6.1	Are indigenous peoples present in the Project area (including Project area of influence)?	No
6.2	Is it likely that the Project or portions of the Project will be located on lands and territories claimed by indigenous peoples?	No
6.3	Would the proposed Project potentially affect the rights, lands and territories of indigenous peoples (regardless of whether Indigenous Peoples possess the legal titles to such areas)?	No
6.4	Has there been an absence of culturally appropriate consultations carried out with the objective of achieving FPIC on matters that may affect the rights and interests, lands, resources, territories and traditional livelihoods of the indigenous peoples concerned?	No
6.4	Does the proposed Project involve the utilization and/or commercial development of natural resources on lands and territories claimed by indigenous peoples?	No
6.5	Is there a potential for forced eviction or the whole or partial physical or economic displacement of indigenous peoples, including through access restrictions to lands, territories, and resources?	No
6.6	Would the Project adversely affect the development priorities of indigenous peoples as defined by them?	No
6.7	Would the Project potentially affect the traditional livelihoods, physical and cultural survival of indigenous peoples?	No
6.8	Would the Project potentially affect the Cultural Heritage of indigenous peoples, including through the commercialization or use of their traditional knowledge and practices?	No
<b>Standard 7: Pollution Prevention and Resource Efficiency</b>		
7.1	Would the Project potentially result in the release of pollutants to the environment due to routine or non-routine circumstances with the potential for adverse local, regional, and/or transboundary impacts?	Yes

7.2	Would the proposed Project potentially result in the generation of waste (both hazardous and non-hazardous)?	No
7.3	Will the proposed Project potentially involve the manufacture, trade, release, and/or use of hazardous chemicals and/or materials? Does the Project propose use of chemicals or materials subject to international bans or phase-outs? <i>For example, DDT, PCBs and other chemicals listed in international conventions such as the Stockholm Conventions on Persistent Organic Pollutants or the Montreal Protocol</i>	No
7.4	Will the proposed Project involve the application of pesticides that may have a negative effect on the environment or human health?	No
7.5	Does the Project include activities that require significant consumption of raw materials, energy, and/or water?	No

### Final Sign Off

<b>Signature</b>	<b>Date</b>	<b>Description</b>
QA Assessor Sutharin Koonphol UNDP Thailand		UNDP staff member responsible for the Project, typically a UNDP Programme Officer. Final signature confirms they have “checked” to ensure that the SESP is adequately conducted.
QA Approver Rakshya Thapa, UNDP Bangkok Regional Hub		UNDP senior manager, typically the UNDP Deputy Country Director (DCD), Country Director (CD), Deputy Resident Representative (DRR), or Resident Representative (RR). The QA Approver cannot also be the QA Assessor. Final signature confirms they have “cleared” the SESP prior to submittal to the PAC.
PAC Chair		UNDP chair of the PAC. In some cases PAC Chair may also be the QA Approver. Final signature confirms that the SESP was considered as part of the project appraisal and considered in recommendations of the PAC.

## Annex VI: Project targets

Strategy	Objectively Verifiable Indicator Description	Baseline	Year 1	Year 2	Year 3	Target (EOP)
<b>Project Goal:</b> reduction of future GHG emissions from cities in Thailand	Cumulative direct GHG emission reductions resulting from the technical assistance and investments by end-of-project (tCO <sub>2</sub> eq.)	0	2,138	24,529	92,515	177,708
<b>Project objective:</b> Promotion of sustainable urban systems management in Khon Kaen, Nakorn Ratchasima, Samui and Klaeng to achieve low carbon growth	Cumulative direct fuel savings resulting from the technical assistance and investments in the transport sector in the 4 participating cities by EOP (GJ)	0	0	101,693	402,952	788,093
	Annual amount of waste gainfully used (recycled, composted, anaerobically digested or for waste-to-energy) in the 4 participating cities by EOP (tonnes/year)	46,272	47,856	154,956	266,736	389,352
	Total number of new green jobs created in the waste management sector and sustainable transport sector in the cities by EOP	0	5	15	25	40
<b>Outcome 1.1:</b> Increased number of Thai cities that have formulated and implemented low carbon sustainable urban development plans	No. of cities that have approved and adopted low carbon development plans	0	1	3	4	4
	Percentage of participating cities where evidence-based low carbon planning is integrated with normal urban development planning processes, %	0	25	50	75	100
	No. of cities which have completed city carbon footprints in selected sectors and have institutionalized the process	0	0	2	4	4
Output 1.1.1: GHG inventory for each of the project cities	No. of cities where carbon footprint has been prepared for selected sectors: - Waste management: KK, NR, S and KI - Sustainable transport: KK & NR	0	0	4	4	4
	No. of city officials trained on the carbon footprint process and organized into carbon footprint working groups	0	5	20	20	20
Output 1.1.2: Formulated integrated low carbon urban development and action plan in each of the project cities.	No. of integrated low carbon urban development and action plans prepared	0	1	3	4	4
	No. of individual sector specific plans prepared (e.g., waste management plans, sustainable transport plans) with inter-linkages with all other relevant sectors taken into account	0	0	4	6	8
Output 1.1.3: Formulated and implemented	No. of monitoring plans for waste management facilities developed and implemented	0	0	1	3	3



Strategy	Objectively Verifiable Indicator Description	Baseline	Year 1	Year 2	Year 3	Target (EOP)
monitoring frameworks for waste management activities in cities						
<b>Outcome 1.2:</b> Increased number of Thai cities with energy efficient urban systems	No. of low carbon urban demonstration projects implemented in participating cities	0	2	8	19	19
	No. of low carbon projects designed based on or influenced by the results of the demonstration projects and the low carbon city plans	0	0	2	5	8
Output 1.2.1 Operational low carbon urban system projects in Khon Kaen	Average daily quantity of organic waste composted in the central composting plant, tonnes	2	2	10	13	20
	No. of operating decentralized composting units (5 plants of 1 tonne per day)	0	0	1	5	5
	Average monthly quantity of waste recycled, tonnes	1,900	1,950	2,000	2,100	2,200
	Daily no. of cyclists utilizing the 4.8 km bikeway	0	0	50	150	200
	Average speed of vehicles in the roads where the traffic area management pilot is implemented, kph	15	14	13	16	17
	Annual amount of electricity produced by WTE plant (MWh/year)	0	0	21,000	21,000	21,000
	Daily number of passengers using the shuttle bus system (in preparation of BRT)	0	0	0	4,000	8,000
Output 1.2.2 Operational low carbon urban system projects in Nakorn Ratchasima	Average daily quantity of organic waste digested by the AD plant, tonnes	10	10	20	40	80
	Average monthly quantity of waste recycled, tonnes	750	850	950	1,050	1,150
	Annual amount of electricity produced by WTE plant (MWh/year)	0	0	0	0	21,000
	No. of existing bus routes changed as part of the bus rerouting project, in support of the BRT system	0	0	0	13	13
	Average traffic speed in the area where traffic area management pilot will be implemented, kph	15	14	13	16	18
Output 1.2.3 Operational low carbon urban system projects in Klaeng	Average monthly quantity of waste recycled, tonnes	11	13	18	23	31
	Total daily number of passengers using the shuttle bus system	400	400	600	900	1,500
	Annual volume of water distributed (m <sup>3</sup> )	288,000	288,000	288,000	576,000	576,000
Output 1.2.4 Operational low carbon urban system projects in Samui	Daily average volume of organic waste composted by community based composting facilities, tonnes	4	4	6	8	10
	Monthly quantity of waste recycled, tonnes	715	815	915	1,115	1,315
	Daily no. of cyclists utilizing the bikeway	0	0	50	150	200
	Average traffic speed in areas where the traffic area management pilot (zoning for heavy trucks) will be	30	28	27	33	36

Strategy	Objectively Verifiable Indicator Description	Baseline	Year 1	Year 2	Year 3	Target (EOP)
	implemented, kph					
<b>Outcome 2.1:</b> Increased volume of investments in energy efficient urban systems by government and private sector	Total amount of new investment leveraged through local plans of participating cities for low carbon projects, US\$ million	0	0	5	10	20
	No. of policy recommendations facilitating low carbon investments in cities endorsed and approved by line agencies	0	0	0	1	2
Output 2.1.1: Completed analysis on existing and forthcoming options on financial incentive schemes, both domestic and international including carbon offset initiatives, particularly the establishment of the Thai voluntary carbon market scheme.	No of guidelines on international and national sources of climate finance in Thai prepared and published.	0	0	1	1	1
Output 2.1.2: Financial incentives and institutional arrangement to replicate low-carbon urban development	No. of low carbon urban development projects that are financially assisted by government supported, or government-endorsed private sector, financing schemes in the 4 cities	0	0	2	5	8
	No. of policy recommendations facilitating low carbon investments in cities prepared, submitted and endorsed/approved by line agencies and reported to NCCC	0	0	0	1	2
	T-VER scheme fully operational	0	0	1	1	1
Output 2.1.3: A cadre of qualified technical specialists in the local governments of Thai cities capable of formulating, evaluating and implementing low carbon development projects and climate change mitigation actions	No. of projects from the participating cities under the t-VER scheme	0	0	1	2	4
	No. of cities which have provided inputs to the preparation of national NAMAs	0	0	1	2	4

Strategy	Objectively Verifiable Indicator Description	Baseline	Year 1	Year 2	Year 3	Target (EOP)
Output 2.1.4: Developed and operational monitoring, reporting and verification system for public offset	No. of MRV frameworks for specific sectors in the 4 cities developed and institutionalized	0	0	0	2	4
Output 2.1.5: Designed, developed and conducted training course on Low Carbon Cities	No. of trained officers who are actively involved in low carbon planning/decision making/approving/project implementation	0	10	20	30	40
	No. of trained private sector investors/practitioners actively involved in designing, financing and implementation of low carbon projects in cities	0	10	20	30	40
Output 2.1.6: Expanded and improved Low Carbon Cities Network	No. of cities that are officially members of the LCC Network	16	20	24	28	32
	No. of national and international events in which the results of the project and experiences of cities on low carbon investments have been shared	0	at least 2 per year	at least 2 per year	at least 2 per year	at least 2 per year
Output 2.1.7: Designed, developed and implemented awareness campaign on climate change and low carbon developments for citizens of cities using modern (social) media	No. of communication products on successful low carbon investments and activities in cities disseminated	0	at least 2 per year	at least 2 per year	at least 2 per year	at least 2 per year
	No. of lessons learned reports/best practice examples published	0	1	2	4	6
	No. of infographics/video/audio clips prepared, produced and disseminated for modern (social) media and community radio	0	0	2	4	6
	No. of audience reached with awareness campaigns in cities	0	2,000	10,000	20,000	40,000