PROJECT IDENTIFICATION FORM (PIF)

PROJECT TYPE: Full-sized Project
TYPE OF TRUST FUND:GEF Trust Fund

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PART I: PROJECT INFORMATION

Project Title:	Reduction of GHG Emission in Thai Industries through Promoting Investments of the Production and Usage of Solid Bio-fuel		
Country(ies):	Thailand	GEF Project ID:[1]	5727
GEF Agency(ies):	UNIDO	GEF Agency Project ID:	130318
Other Executing Partner(s):	1. Ministry of Industry (MoI), 2. Foundation of Institute for Small and Medium Enterprises Development (ISMED) 3. Energy Research Institute (ERI)	Submission Date: Resubmission Date:	03/07/2014 03/21/2014
GEF Focal Area (s):	Climate Change	Project Duration (Months)	48
Name of parent program (if applicable): • For SFM/REDD+ ☐ • For SGP ☐ • For PPP ☐	NA	Project Agency Fee ($):	365,750

A. INDICATIVE FOCAL AREA STRATEGY FRAMEWORK[2]:

Focal Area Objectives	Trust Fund	Indicative Grant Amount ($)	Indicative Co-financing ($)
CCM – 3 Promote investment in renewable energy technologies	GEFTF	3,850,000	20,090,000
Total Project Cost		3,850,000	20,090,000

B. INDICATIVE PROJECT DESCRIPTION SUMMARY

Project Objective: To reduce GHG emission in Thai industries and power plants by promoting the use of industrial-grade solid biofuels as energy source

Project Component	Grant Type[3]	Expected Outcomes	Expected Outputs	Trust Fund	Indicative Grant Amount ($)	Indicative Cofinancing ($)
1. Capacity development and knowledge management	TA	Improved awareness, knowledge and capacity on solid bio-fuel production and usage in the country	1.1. An information and learning platform (I&LP) on solid bio-fuel production and usage established 1.2. Technical capacity of policy makers, solid bio-fuel producers, users, RE / technical institutions, banks / financial	GEFTF	330,000	1,290,000

[1] Project ID number will be assigned by GEFSEC.
[2] Refer to the reference attached on the Focal Area Results Framework and LDCF/SCCF Framework when completing Table A.
[3] TA includes capacity building, and research and development.

			institutions developed			
2. Policy framework development for promoting investments in solid bio-fuel production and usage	TA	Improved policy, regulatory and investment environment	2.1. National strategy developed 2.2. Soft loan facility (around USD 12 million) established	GEFTF	400,000	500,000
	INV		2.3. Pellet user incentive scheme established	GEFTF	2,000,000	13,000,000
3. Demonstration of solid bio-fuel production and utilization	TA	Increased use of industrial grade solid bio-fuels	3.1. Sustainable biomass value chain models setup 3.2. Biomass resource assessed and logistics planned for transporting wastes 3.3. Solid bio-fuel pelletizing systems installed for a cumulative 160 tpd capacity 3.4. Supply chain and market linkages established 3.5. Experiences and information dissemination workshops conducted	GEFTF	260,000	1,000,000
	INV				600,000	3,000,000
4. Monitoring and evaluation (M&E)	TA	Effectiveness of the outputs assessed, corrective actions taken and experience documented	4.1. Mid-term M & E report 4.2. End of project M & E report 4.3. Publications and website created	GEFTF	80,000	450,000
Subtotal					3,670,000	19,240,000
Project Management Cost (PMC)[4]				GEFTF	180,000	850,000
Total Project Cost					3,850,000	20,090,000

[4] To be calculated as percent of subtotal.

C. INDICATIVE CO-FINANCING FOR THE PROJECT BY SOURCE AND BY NAME IF AVAILABLE, ($)

Sources of Cofinancing	Name of Cofinancier	Type of Cofinancing	Amount ($)
National Government	MoI	Grant	1,500,000
National Government	MoI	In-kind	540,000
National Government	ISMED	Grant	800,000
National Government	ISMED	In-kind	700,000
National Government	ERI	Grant	800,000
National Government	ERI	In-kind	600,000
Private Sector	Selected Industries/Manufacturers (names unknown at this stage)	Investment	3,000,000
Others	Commerce International Merchant Bankers (CIMB) Bank	Grant	12,000,000
GEF Agency	UNIDO	Grant	60,000
GEF Agency	UNIDO	In-kind	90,000
Total Cofinancing			20,090,000

D. INDICATIVE TRUST FUND RESOURCES ($) REQUESTED BY AGENCY, FOCAL AREA AND COUNTRY[1]

GEF Agency	Type of Trust Fund	Focal Area	Country Name/Global	Grant Amount ($) (a)	Agency Fee ($) (b)[2]	Total ($) c=a+b
(select)	(select)	(select)				0
Total Grant Resources				0	0	0

[1] In case of a single focal area, single country, single GEF Agency project, and single trust fund project, no need to provide information for this table. PMC amount from Table B should be included proportionately to the focal area amount in this table.

[2] Indicate fees related to this project.

E. PROJECT PREPARATION GRANT (PPG)[5]

Please check on the appropriate box for PPG as needed for the project according to the GEF Project Grant:

	Amount Requested ($)	Agency Fee for PPG ($)[6]
• No PPG required.	-- 0--	--0--
• (upto) $50k for projects up to & including $1 million		
• (upto)$100k for projects up to & including $3 million		
• (upto)$150k for projects up to & including $6 million	150,000	14,250
• (upto)$200k for projects up to & including $10 million		
• (upto)$300k for projects above $10 million		

PPG AMOUNT REQUESTED BY AGENCY(IES), FOCAL AREA(S) AND COUNTRY(IES) FOR MFA AND/OR MTF PROJECT ONLY

[5] On an exceptional basis, PPG amount may differ upon detailed discussion and justification with the GEFSEC.

[6] PPG fee percentage follows the percentage of the GEF Project Grant amount requested.

Trust Fund	GEF Agency	Focal Area	Country Name/ Global	(in $)		
				PPG (a)	**Agency Fee** (b)	**Total** c = a + b
(select)	(select)	(select)				0
Total PPG Amount				**0**	**0**	**0**

MFA: Multi-focal area projects; MTF: Multi-Trust Fund projects.

PART II: PROJECT JUSTIFICATION

A. PROJECT OVERVIEW

A.1. Project Description

1) Global Environmental Problems, Root Causes and Barriers

Thailand is the world's 24th largest carbon polluter with average annual emissions of 321.3 million t CO_2[7]. According to the 2nd National Communication submitted to the United Nations Framework on Climate Change Convention (UNFCCC) in April 2011, the energy sector contributed to 69.6% of the total emission in the country followed by agriculture (22.6%) and industry sector (7.2%)[8]. In the industrial sector, the emission from coal/lignite use alone contributed to around 30% of the total[9]. Thailand Greenhouse Gas Management Organization (TGO) reported that GHG emissions in manufacturing industries grew by 18.8% during 2002-2010.

The impact of climate change such as higher surface temperatures, floods, droughts, severe storms and sea level rise, is more likely to put Thailand's food production at risk, especially the rice. A World Bank study concluded that the 2011 flood in Thailand caused an overall economic damage of USD 45.7 Billion until December 2011. It was also claimed that this disaster is ranked as the world's fourth most expensive natural disaster as of 2011, surpassed only by the 2011 earthquake and tsunami in Japan, 1995 Kobe earthquake and Hurricane Katrina in 2005[10].

In 2012, Thailand's energy consumption was 73,316 ktoe, which was a 3.9% increase from the previous year. Energy consumption by different economic sectors is shown in Table 1. The highest energy consumption was seen in the industrial sector followed by the transportation sector. Within the industry sector, 47.5% of the final energy consumption came from fossil fuels. In electricity generation, around 77% came from fossil fuels[11]. The electricity generation was predominantly fossil fuel based with only 7.6% of the total power plant capacity accounting for renewable energy (RE) (2,786 MW). Heat consumption stemming from RE reached 4,886 ktoe, accounting for 15% of total heat consumption in Thailand (Figures 1 and 2)[12].

Table 1: Energy consumption in different sectors

Fuel Source	Final Energy Consumption (in ktoe)					
	Agriculture	Industry**	Residential	Commercial	Transportation	Total
Coal and its products	-	5,794	-	-	-	5,794
Petroleum products	3,765	4,070	2,161	1,195	23,996	35,187
Natural Gas	-	2,884	-	2	2,228	5,114
Electricity*	25	7,742	2,735	4,102	6	14,610
Renewable Energy	-	4,882	-	4	-	4,886

[7] As per statistics of World Resources Institute
[8] 2nd National Communication submitted to United Nations Framework on Climate Change Convention (UNFCCC), April 2011
[9] Figure from Energy Policy and Planning Office, Ministry of Energy, www.eppo.go.th
[10] The World Bank Supports Thailand's Post-Floods Recovery Effort". World Bank. 13 December 2011. Retrieved 25 January 2012.
[11] Energy in Thailand, Facts & Figures 2012, DEDE
[12] Energy in Thailand, Facts & Figures 2012, DEDE

Tradition renewable energy	-	1,538	6,187	-	-	7,725
Total	3,790	26,910	11,083	5,303	26,230	73,316

*-- *including off grid power generation* ** - *including mining, construction and manufacturing*

On the other hand, as an agricultural based economy, Thailand is also rich in biomass resources acquired through the agricultural wastes and organic-industrial wastes. A study[13] conducted in the year 2011, estimated the excess biomass available to be 33.8 million metric tons or 11,810 ktoe per year (Table 1). Another study conducted in Thailand in 2012 by the Department of Alternative Energy Development and Efficiency (DEDE), estimated the excess biomass availability to be around 26 million metric tons or 8,600 ktoe per year. From these two studies, it is thus clear that, there is excess biomass available in market after meeting the present biomass demands which will ensure sustainability solid bio-fuel production.

During the PPG stage, a study including an environmental impact assessment (EIA) will be conducted to understand the differentiation of biomass, impact on environment, biomass prices and sustainability of its supply if the demand increases. Also a environmental assessment on deforestation in the wood sector will be undertaken during PPG stage on various schemes to minimize deforestation to make sure that wood waste will only come from certified forestry sources.

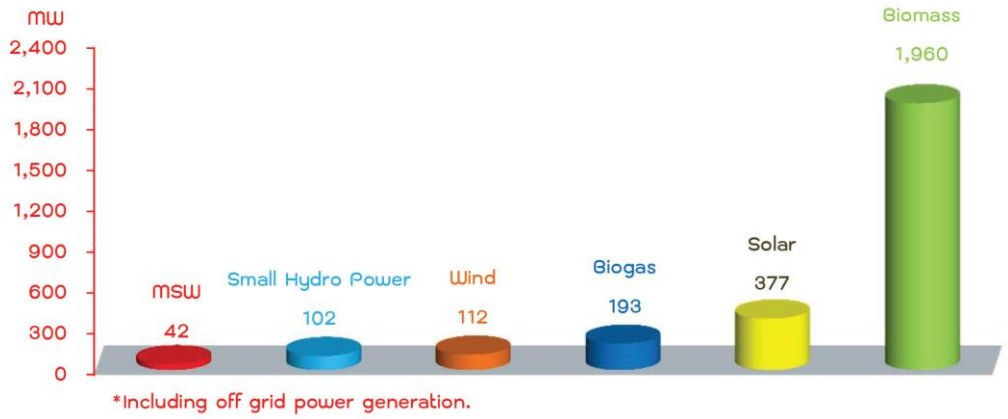


Figure 1: Status of RE in electricity generation

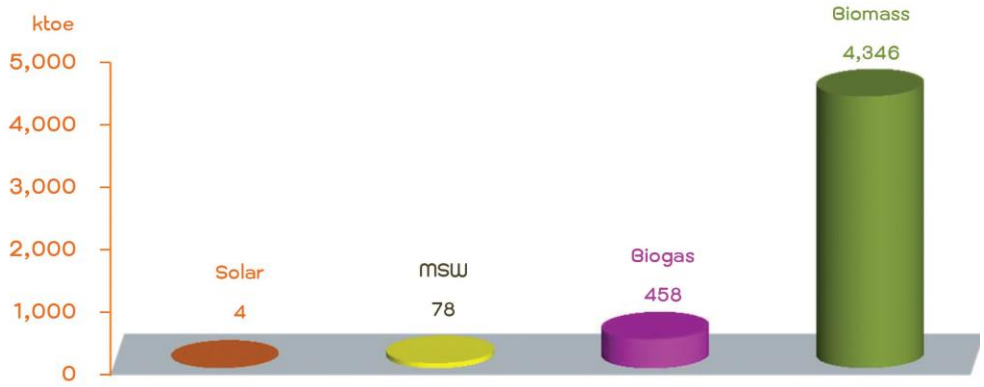


Figure 2: Status of RE in heat generation

There has been an increasing awareness and demand on the use of biomass for thermal and electricity

[13] Potential Crops Residues and Industrial Wastewater as Renewable Energy Resources for Thailand, Thailand Institute of Scientific and Technological Research (TISTR)

generation at power plants and industries. However, the higher fuel cost compared to the conventional fossil fuels and some practical difficulties in using biomass hamper the switching from traditional fossil fuels. Some of the difficulties are high moisture content (25-50%), low heating value, low bulk density, high volume, presence of impurities, etc. Low bulk density and high volume of biomass results in higher transportation costs, which eventually adds up to the manufacturing cost. Under this context, solid bio-fuels offer cost effective alternatives owing to their higher heating value, improved bulk density and ready-to-use form. However, with the present levels of technology penetration in Thailand and transportation methods (both for raw material and finished solid bio-fuel), solid bio-fuel is more expensive when compared to that of coal products (based on the equivalent calorific value basis)[14].

Local usage of the solid bio-fuel is not yet widely practiced. The main barriers include: (a) inadequate demand and supply information on solid bio-fuel, (b) inadequate information on existing projects, (c) higher fuel cost compared to that of coal, (d) lack of quality standards for the solid bio-fuel (production and end-usage), (e) reduction in biomass quality while storing and transporting prior to making solid fuels (f) lack of knowledge on co-firing and combustion system modifications for using solid bio-fuel and operation and maintenance of these systems, h) inadequate policy, regulatory framework and incentive mechanisms for production and usage of solid bio-fuels, i) lack of solid bio-fuel supply chain management.

The proposed project will address some of the above barriers to increase the usage of solid bio-fuels. Mitigation achieved through the proposed project for some of the barriers are listed under the "GEF alternative scenario and project".

2) Baseline scenario and baseline project

Thailand is a pioneer among Asian countries in establishing policies and undertaking projects and programs to promote RE. The Thai Government has been modifying and establishing many policies to promote the production and usage of liquid bio-fuels as an effort to deal with spiraling oil prices, which has led to the significant increase in the production and consumption of liquid biofuels. However, it has to be noted that these policies focus on liquid bio-fuels and there is no exclusive policy/strategy to promote solid bio-fuels. During PPG, a gap analysis will be conducted on policy aspects to identify the gap that would be bridged by this project.

Thai Government introduced the 'Green Industry Initiative' (GII) in 2011, which aims at the sustainable growth of industrial sector in accordance with ecology and social well-being[15]. It encourages the manufacturing enterprises in continuously improving their climate friendly production process and environmental management, including the usage of clean or low carbon fuels. Some of the challenges identified so far include, a) insufficient incentive, b) expensive technology and c) inadequate trust in the new technology.

The proposed project is developed on the above baseline initiative. The proposed project will demonstrate affordable RE technology, provide necessary incentives, capacity building and create awareness on solid bio-fuel production and usage machinery. This project will link up with certified energy intensive manufacturers under GII to promote the solid bio-fuel supply chain from the pellet producers to the pellet users. This will help them move up the compliance levels and enjoy the privileges/incentives under the

[14] As per DEDE Report on Supply Chain Study for Solid Biofuel Production, cost of solid bio-fuel is around 1.80 THB (saw dust based) and 2.40 THB (palm shell) and for lignite it is 1.80 THB and bituminous coal, 3 THB. However, the calorific value of saw dust based solid bio-fuel is around 11,760 kJ/kg which is only 50% of bituminous coal which has a calorific value of 24,780 kJ/kg. The calorific value of palm shell solid bio-fuel is 17,760 kJ/kg which is almost 40% lesser than the calorific value of bituminous coal. Hence, on the equivalent calorific value basis, solid bio-fuel is costlier than the conventional coal products.

[15] This initiative rewards the environmental friendly firms by certifying with 5 levels of green industry mark as follows: Level 1 - Green commitment; Level 2 – Green Activity; Level 3 – Green System; Level 4 – Green Culture; Level 5 – Green Network (Green Supply Chain). For further details please refer to http://www.greenindustrythailand.com/en/content.php?pagename=condition

initiative.

In addition to the Green Industry Initiative, the proposed project will also work with the ongoing Industrial Cluster Development Project started by the Department of Industrial Promotion (DIP) in the year 2003. The proposed project will work with successful clustered enterprises generating excess agricultural or organic wastes to become a group for solid bio-fuels producers.

DEDE Report *on Supply Chain Study for Solid Biofuel Production*[16] calculated the need for around 31 million tons of solid bio-fuel/year (17 million tons for electricity and 14 million tons for heat generation) by the year 2021 to achieve the RE target of 25% in 10 years mentioned in the Alternative Energy Development plan (AEDP), 2012-2021.

In the year 2010 – 2011, Department of Industrial Works (DIW), under MoI, undertook "*Study of production and use of wood pellets from organic-industrial waste (canned fruit and chilly-paste manufacturing)"*. The study showed a promising return on investment with the payback period of less than a year. Unfortunately, this potential has not been tapped and capitalized into commercial scale.

Existing Solid Bio-fuel Production in Thailand

A thorough web research was made on private firms producing solid bio-fuels in Thailand.

From the study of the website of the listed companies below, it is clear that raw materials for biomass solid fuels are abundant and demand is mainly from foreign countries.

1. Thai wood pellet company limited[17]
2. Sahachito Co., ltd[18]
3. Nova Science Co. Ltd/Global Bio Ltd[19]
4. The pellets CO., Ltd[20]
5. PAC-Energy Co., Ltd.
6. Greenwood 1993[21]

Most of the industries export their produce. The major consumer countries are Belgium, Denmark, the Netherlands, Sweden and the United States of America[22]. Among Asian countries, China and Korea are the major importers of solid biofuels.

Price of the produced solid bio-fuel seems to be a major barrier for entering into the local market. Due to the Renewable Heat Incentives available in most of the above mentioned countries, industries are ready to buy the solid bio-fuel at a much higher price, a price, which is not affordable locally.

The proposed project will expand on the above mentioned baseline activities in Thailand and focus on overcoming/removing the barriers in the deployment and commercialization of solid bio-fuel production and usage in industries.

In the absence of the GEF project:

1) If the GEF did not finance this project, solid bio-fuel usage within the country will not happen. The utilization requires modification of the existing fossil fuel usage system, which is not known at

[16] http://e-lib.dede.go.th/mm-data/Bib14837.pdf
[17] http://thaiwoodpellet.com/index.php/en/
[18] http://sahachito.com/index.html
[19] http://www.globalbioltd.com/index.html
[20] http://www.thepellets.co.th/
[21] http://www.greenwood1993.com/
[22] http://www.fs.fed.us/pnw/pubs/pnw_gtr861.pdf

present. This adoption involves additional investment also.

Moreover, the very few existing solid biofuel producers will continue to export to foreign markets such as Europe, China, Korea, etc. as they are doing now. May be few other export market oriented production units come up.

Hence, Solid bio-fuel usage in the local market will not happen in the near future.

2) Only little progress has been made so far in solid bio-fuel production. In the local usage of solid bio-fuel, the present scenario is far from promising. Under such context, impact on RE target due to solid bio-fuel usage in 2021 will be meager if GEF is not involved in this project.

3) Without proper incentives and motivation for changing their firing technology, it is difficult to convince the industries to modify their existing infrastructure. Hence the present trend of fossil fuel usage may continue to exist. Very rarely some development may happen in few industries.

4) The following points are expected to have an impact on solid bio-fuel production:
   a) Market linkage for solid bio-fuel production and usage
   b) Financial incentives for the establishment of the production units
   c) Demonstration of solid bio-fuel production

5) If there is no action taken, then Thailand will increase its CO_2 emission level owing to its increasing usage of coal/lignite in both the industrial[23] and power generation sector.

Therefore, the target of the project is to promote solid biofuel co-firing with coal/lignite, in the industries leading to reduction in CO_2 emission.

3) GEF alternative scenario and project

Thermal load demand in industries is currently met through fossil fuels such as coal, lignite and fuel oil. Even though, Thai industries are increasingly use biogas to meet their thermal energy requirements, this, is possible only in industries which generates considerable BOD rich waste water. Industries such as cement, glass, etc. do not generate waste water suitable for biogas generation. Under such context, the only attractive alternative choice for fossil based thermal energy generation is biomass especially agro residues and sustainably produced biomass, which is available in excess in the country. Use of biomass requires comparatively minor modification of existing heat generation facilities.

Therefore, the proposed project aims at promoting solid bio-fuel and reducing fossil fuel usage in industries by removing barriers from both the producer and the user side for usage of industrial-grade solid bio-fuels. The project will employ two prong strategies:

On one hand, the project aspires to remove technological barriers of both the pellet producers and the pellet users; On the other hand, it aims at removing policy and financial barriers to expedite the investment in production as well as the usage of the solid bio-fuels. Eventually, the project will be able to settle the entire supply chain of solid bio-fuels starting from a pellet producer to pellet user including the equipment suppliers. By achieving this, the project will reduce GHG emissions as well as promote the use of available agricultural waste. Through the various outputs, the proposed project intends to mitigate the following barriers:

[23] Majority users include cement factory (in clinker and cement kilns), pulp and paper industries (coal fired boilers), food processing industries (coal fired boilers), lime industries (lime kilns), tobacco and small to medium size agricultural process industries (drying process)

Barrier	Mitigation through
High cost of solid bio-fuel when compared to that of coal	- Pellet-user incentive - Demonstration of reliable and affordable technology
Reduction in biomass quality while storing and transporting prior to making solid bio-fuel production	- Establishment of sustainable supply chain and market linkages, including storage facilities (for both raw materials & solid bio-fuel)
Lack of supply chain management for solid bio-fuel	- Establishment of a sustainable supply chain and market linkage including storage facilities
Inadequate information on demand and supply of solid bio-fuel	- Establishment of I & LP for effective information dissemination
Inadequate capacity and knowledge on solid bio-fuel production, co-firing and operation and maintenance of these systems	- Establishment of I & LP - Trainings to various stakeholders under the project
Inadequate policy, regulatory framework and incentive system	- Separate national solid bio-fuel strategy - Soft-loans for investment in solid bio-fuel (both production and usage) - Pellet-user incentive

Under the GEF 4 cycle, the GEF is implementing a biomass gasification project in Thailand using waste from bamboo industry. Though the project is currently under implementation, lessons learnt so far encourage the usage of pelletization of solid biofuel wastes and its use for energy purpose in industries.

Outputs and activities of each of the project components (PCs) are described below:

PC 1: Capacity development and knowledge management

Under this project component, I & LP for promotion of solid bio-fuel production and usage will be created at a University or an institution. This arrangement will reduce the infrastructure development cost and operating cost of I & LP. The exact university or institution to host the platform will be identified during the PPG stage. Any interested individual, institutions and organizations can access the platform to receive assistance or information on solid bio-fuel production and usage. However, organized trainings will be conducted on necessary fee basis.

The sustainability of the I & LP would be ensured through the following means:

- Well trained staff members of the university/institution would be managing the I & LP and hence, there would be no additional manpower cost.
- An appropriate fee would be charged for the training activities. This amount would be used to manage and maintain the activities of the platform.

I & LP will have a strong network with GIPO, ERI and ISMED, as they play a key role in knowledge management for this project (Refer section A.2 for roles of GIPO, ERI and ISMED in detail).

The staff of the host university or institution, will be trained in the operation and management of I & LP

beforehand. Necessary and appropriate training materials for different recipients will be prepared. Available guidebooks and strategies on solid bio-fuel production and usage will be customised for adapting to the local conditions. This will benefit the potential investors. Any information regarding solid bio-fuel, including technology and regulatory issues can be obtained from this platform.

Capacity will be developed among the policy makers. Without appropriate supporting policy and regulatory environment, no technology promotion can be achieved. Therefore, it is essential to engage policy makers by providing tailored training to at least 50 personnel over the project duration. Specific trainings aimed at industries/power plants will also be conducted for at least 50 people. Only when the industries/power plant staffs are educated on the potential of solid bio-fuel production and usage, they will be able to take initiatives for their own industries.

In addition to the trainings, various campaigns and workshops will be held to raise awareness on production and usage of solid bio-fuel. Awareness raising materials will be developed and tested and they will be subsequently used for awareness raising purposes.

Around 50 individuals from banks and financial institutions will also be trained in assessing/conducting due diligence on the solid bio-fuel projects. Trainings for banks/financial institutions will be conducted at the earliest as a priority in order to enhance their knowledge and increase their confidence in financing the projects.

Trainings for various target groups such as local engineering and O&M institutions will be provided (at least 50 people) to facilitate sustainable operation of the demonstration and replication projects.

The key decision makers from different RE/technical institutions, who are involved in the standardization of production and end-usage (at least 50 numbers) will be trained and equipped with the necessary technical capacity for supporting, developing and implementing such projects.

PC 2: Policy framework development for promoting investments in solid bio-fuel production and usage

This component aims at creating a favourable policy, regulatory and investment environment on solid bio-fuel production and usage.

During PPG, a gap analysis will be conducted on policy aspects to identify the gap that would be bridged by this project. The project envisages a comprehensive national strategy that would help the promotion of solid bio-fuel. The strategy would be linked to the Green GDP strategy of MoI.

As of now, the level of investments in solid bio-fuel production in Thailand is very low. One major reason for this is the lack of conducive environment for investments. Hence, to mitigate this, a specific soft loan for promoting investments in solid bio-fuel production and usage machinery will be created. Around USD 12 million will be mobilized for this soft loan. Initial discussions indicate that some banks, such as Commerce International Merchant Bankers (CIMB) Bank, are interested in participating and co-financing under this component. However, during the PPG stage, the project will invite all banks through the Association of Banks of Thailand and would identify an appropriate bank to work with.

Lack of incentive schemes to encourage the use of solid bio-fuels when compared to that of coal is another barrier. To mitigate this, an exclusive pellet user (end user) incentive scheme to encourage the use of solid bio-fuels to replace fossil fuels will be created. The scheme intends to convert the usage of solid biofuels as more cost effective one when compared to that of coal (on the equivalent calorific value basis). This would increase the confidence among the solid bio-fuel users and mitigate their perceived risk. Initially around USD 1 million will be mobilized by MoI for this purpose. During the PPG stage, more co-financing would be sourced out.

In addition to the co-financing from Thai counterparts, GEF grant (around USD 2 million) will be used to provide incentives to industries, which are willing to change their process and use solid bio-fuels. This incentive will be used for both the demonstration and replication projects.

More details on the above mentioned the strategy, incentive scheme and soft loan, participating banks and the modalities and procedure for the soft loan will be discussed and designed during the PPG stage.

Sustainability of the loan and incentive schemes: Thai government is expected to allocate fund for enhancing RE capacity. Moreover, various donors/banks and financing institutions are expected to support the Thai government in the coming years. A part of this money will be channeled for this purpose, to ensure the financial sustainability of the soft loan and incentive schemes, until such time when the technologies are viable without any financial support or when the market forces take over.

PC 3: Demonstration of solid bio-fuel production and utilization

This component aims to setup the necessary supply chain and market linkage after thorough biomass resource assessment. It would also promote private investments in solid bio-fuel production and encourage industries to technologically adopt fuel mixing and co-firing.

Sustainable biomass value chain analysis will be conducted and appropriate models will be set up for solid biofuel from agricultural and organic wastes. The value chain model includes technological capacities, mapping out the wastes in selected location (to be decided later during the project implementation) and economic performance and competitiveness. This project will work with industrial clusters (see baseline scenario) with a focus on agro processing industries which produce considerable amount of solid wastes. These wastes will be converted into pellets which will be used in the premises of the cluster itself.

For collecting and transporting the biomass from factories to solid bio-fuel production units, the available resources need to be mapped and a very careful planning has to be done. Due to the huge and bulky volume of biomass to be carried to the solid bio-fuel manufacturing locations, the cost of transportation will impact the production cost and will also result in project emission. Such resource assessment in selected locations (which would be decided later during the PPG stage) will include the following:

- Comprehensive sustainable biomass resource availability;
- Collection and selling of agricultural wastes by communities;
- Pre-treatment techniques required to reduce the high moisture content of biomass residues;
- Logistic and transport of the wastes.

One important factor in the success of solid bio-fuel production and usage would be the successful establishment of a supply chain that connects both the pellet producers and the pellet users. Hence, under the component, market linkage would be developed considering the logistic and transport of solid bio-fuels in the form of special solid bio-fuel depots, which would be one stop centre for the sale and purchase of solid bio-fuels. One such centre in each province can be created by identifying the interested individuals or agencies. These centres may motivate the establishment of few more centres in the future by similar interested parties. This will strengthen the market linkage between the suppliers and end-users of the biofuels.

Commercial pelletization units for a capacity of 2 ton/hour (40 tpd) will be installed and commissioned in at least 4 different places of Thailand for a cumulative capacity of 160 tpd with private sector participation[24].

[24] The number of units and the raw material for solid bio-fuel production will be finalized during the PPG stage.

The production and supply chain model of each place will be analyzed and tailored to suit each place. For instance, a pellet producer can be either a group of farmers who own agricultural wastes, or a potential investor jointly investing with a community. Location and details of the models will be analyzed, designed and agreed upon during PPG phase. Table 2 depicts the excess biomass availability in Thailand.

Table 2: Excess residue biomass in Thailand

Crops	Annual Production ('000 tons/year)[25]	Types of residue biomass (RBM)[26]	Total RBM ('000 tons/year)	Excess available RBM after consumption ('000 tons/year)	Potential energy ktoe/year
Palm	5,405	Fibre	805	-	-
		Fruit Bunches	1,162	523	220
		Stalk	1,470	-	-
		Shell	697	174	76
Sugar Cane	16,938	Top and leaves	9,964	7,971	3,266
		Bagasse	15,020	-	-
Cassava	16,938	Stalk, top and leaves	2,049	615	252
		Rootstock	1,541	1,541	669
Rice	24,636	Husk	5,568	1,392	468
		Straw	29,317	14,658	3,537
Corn	4,216	Stalk and leaves	3,761	3,385	1,387
		Corncob	797	239	102
Soybean	240	Stalk and leaves	282	127	58
Pineapple	1,997	Rhizome	1,174	1,174	351
Coconut	1,499	Shell	370	148	57
		Peel and spathe	847	678	286
		Stalk, bunch	844	844	306
Wood	5,124	Firewood	1,271	-	-
		Sawdust	174	-	-
		Wood wastes	518	414	146
			Total	**33,883**	**11,181**

From table 2, it is thus clear that excess biomass solid bio-fuel is available after meeting the present biomass demands. This ensures the sustainability of the production units. However, during the PPG stage, a study would be conducted to understand the impact on biomass price and its sustainability if the demand of biomass increases.

Potential solid bio-fuel production projects will be screened using the "Biofuels Screening Toolkit", prepared under UNDP/GEF global project "Establishing Sustainable Liquid Biofuels Production Worldwide (A Targeted Research Project)", to identify potentially critical issues. The evaluations will be

[25] Office of Agricultural Economics, Ministry of Agriculture and Cooperatives
[26] Department of Alternative Energy Development and Efficiency, Ministry of Energy

done for 3 sustainability indicators, namely: a) environmental, b) economic and c) social. Potential solid bio-fuel projects will use this toolkit (wherever applicable) for evaluation. Initial targets would be solid bio-fuel from palm waste, corn cob, wood waste, etc.

To prevent illegal logging, it is important to ensure that this project will not impact on illegal deforestation. Hence a research study will be initiated on various schemes to minimize deforestation to make sure that wood waste will only come from certified forestry sources.

This project seeks to replace a part of the coal used in industries (as primary targets). Under this output, technical support will be provided for utilization of biomass pellets mixed along with coal.

Data from the Department of Primary Industries, MoI, showed that more than 80% of coal used in Thailand is for power generation, around 11% is for cement factories and the rest are for various industries such as food & beverages, pulp and paper. Table 3 summarizes the coal consumed in the manufacturing sector:

Table 3: Coal consumption by manufacturing sector in 2012 (in ktoe)

Manufacturing sectors	Bituminous	Anthracite	Coke	Lignite	Briquettes and other coal	Total
Food and beverage	-	-	-	8	615	623
Textiles	2	-	-	9	63	74
Paper	47	-	-	62	72	181
Chemical	15	-	-	8	71	94
Non-Metallic*	231	145	-	742	3,352	4,470
Base metal	-	60	132	-	-	192
Other	-	-	-	-	160	160
Total	**295**	**205**	**132**	**829**	**4,333**	**5,794**

Note: * Non-metallic industries = Glass, Ceramic, Tiles, Cement, Concrete, Plaster, Stone cutting, other. Out of these, cement is the major coal consumer.
Source: Thailand Energy Efficiency Situation 2012 by DEDE

Industries would be the prime targets for coal replacement. Solid bio-fuel would be suitable for use in their energy mix for fuel diversity and cost effectiveness. Non-metallic industries and food & beverage industries will be first targeted owing to the huge fuel switching potential. During PPG stage, the exact industries will be identified. In addition to the industries, other potential users of the solid bio-fuel could be the oil and gas based small and very small power producers (SPPs and VSPPs).

Detailed project design reports for the plants producing and using solid biofuel would be developed, for which, the detailed feasibility study reports would be prepared during the PPG stage. Also, the list of solid bio-fuel producers and users will be finalized during the PPG stage.

After completion of substantial activities, the project performance monitoring will be conducted to study the technical, financial, environmental and socio-economic performance of the projects. Full scale project demonstration site visit and seminars will be organized and the project experiences will be disseminated to various interested stakeholders in order to increase the replication potential of the project.
Case studies will be prepared and presented to raise more investment in solid bio-fuel projects, using the trained capacity that is created.

PC 4: Monitoring & Evaluation (M&E)

The project will be subjected to midterm and final evaluations. The project will be monitored from the beginning and a midterm evaluation will be carried out and follow up corrective actions will be taken. An independent final evaluation will be conducted three months prior to the terminal review meeting. The final evaluation will look at the impact and sustainability of results, including the contribution to capacity development and the achievement of global environmental benefit goals. The final evaluation will also provide recommendations for the follow-up activities.

Various dissemination tools such as leaflets, website, etc., will be used for effective dissemination. Methodologies/tools will be developed to use the collated information for better planning and decision making. An annual report and periodical newsletter on best practices, information on country level projects and key indicators of progress made under the project will be prepared and distributed to the key stakeholders and agencies.

4) Incremental/Additional cost reasoning

As of now, the present energy requirements in industries are met through coal usage. The project aims to replace a part of this coal usage through solid bio-fuels. GEF funding will be used for meeting the incremental cost of solid bio-fuels production and usage.

GEF provides a grant of only USD 330,000, which is approximately 10.3% of the total incremental cost of USD 3,200,000.

5) Global environmental benefits[27]

The direct global environmental benefit is calculated from the use of 160 tpd of biomass pellets produced from the project to replace 32,000[28] tons of coal use per year (300 working days per year) equivalent to 22,340 toe[29]. As a result, the direct GHG emission avoided is around 89,813 t CO_2e per year[30]. For a lifetime of around 10 years, the total direct emission reduction would be around 898,125 t CO_2e. This initial estimate will be refined during the PPG stage.

Based on the information from Energy Policy and Planning Office in the year 2012, Ministry of Energy (MoE), the total consumption of coal and lignite (both imported and domestic) by the country's industrial sector was around 12,237,000 tons, which is 33% of the total coal and lignite consumption. This figure shows very high potential for replication for replacing coal and lignite by solid bio-fuel.

It is expected that, due to this market transformation, many others would also initiate and develop 10 similar projects of at least 40 tpd capacity each (for a cumulative capacity of 400 tpd) within a time span of maximum 10 years after the project closure. This would result in the reduction of imported coal usage by around 80,000 tons/year. This will lead to an indirect GHG emission reduction of 199,582 t CO_2e/year. For a lifetime of 10 years, this would be around 1,995,820 t CO_2e. A more detailed assessment of potential CO_2 emission reductions and investment opportunities for replication will be carried out during the PPG phase.

The total GEF resources of around USD 3.85 million will be used to mitigate CO_2 emissions at a rate of USD 4.3/t CO_2 directly and around USD 2/t CO_2 indirectly. These initial estimates will be refined during

[27] Calculated based on coal replacement only (primary targets of bio-fuel usage)
[28] Heating value of biomass pellet (palm shell) and imported coal are taken as 17.58 MJ/kg (DEDE Report on Supply Chain Study for Solid Biofuel Production) and 26.37 MJ/kg (Thailand Energy Statistics 2012 (Preliminary), DEDE), respectively
[29] 1 Ton of Oil Equivalent, toe, = 42.244 GJ, Energy Situation- Annual Report, DEDE
[30] Emission factor of imported coal is 94,600 ton of TJ of coal burnt (2006 IPCC Guidelines for National Greenhouse Gas Inventories)

the PPG phase.

6) Innovativeness, Sustainability and Potential for Scaling up

Innovativeness

Solid bio-fuel industry is a growing industry. The existing solid bio-fuel private investments in Thailand are export market oriented. This is due to the fact, that: a) produced solid bio-fuel is costlier for the local market, b) lack of motivation for the local market to shift toward solid bio-fuel usage and c) the existing fossil fuel users to shift to the solid biofuel need to invest in the utilization system.

The innovation is that the proposed GEF project has a holistic approach and targets both the production and local usage of solid bio-fuel in Thai industries. It aims to create an entire supply chain of solid bio-fuels starting from a pellet producer to pellet user including the equipment suppliers. This is the innovative approach and without this, it is difficult to attain a balance between the production and usage of solid biofuel.

The project will boost both the pellet producer and user sides, as well as create enabling investment environment and strengthen human and institutional capacities.

Sustainability

I&LP will sustain the promotional and development activities within the sector. Also, soft loan and incentive system will be setup to attract new investments.

Capacities of GIPO, ISMEN & ERI will be built throughout the duration of the project implementation. Thereafter, they will embrace the technical knowledge on solid biofuels in both the production and usage sides. They will continue to provide technical guidance to a wider group of manufacturers and enterprises, and in particular, to those manufacturers who are clients of MoI's Green Industry Initiative.

Each demonstration project will be operated and maintained by the private investor through their own operation and maintenance (O&M) staff.

Local engineering and O&M companies will be trained in O&M of solid bio-fuel plants through I&LP. Also, the O&M staff of the demonstration projects will be trained by the respective suppliers. Through such arrangements, the demonstration projects will continue to sustainably operate after the project implementation is over.

Scaling up

Besides capacity building, solid bio-fuel usage will be scaled up, as a result of the following:

- Successful implementation and operation of the demonstration projects: *This will lead to gain in confidence among private investors (solid bio-fuel producers) and industries (solid bio-fuel end users).*
- Soft loan facility (for USD 12 million) for promoting investments in solid bio-fuel production and usage machinery: *Replication projects can utilize the loan under this facility.*
- Establishment of solid bio fuel end-user incentive scheme: *This would promote the use of solid bio-fuel usage substituting coal products.*
- Supply chain and market linkages established: *Establishment of special solid bio-fuel depots, will result in one stop centre for sale and purchase of solid bio-fuels. This convenient option will give thrust to the private investors for adopting solid bio-fuel (both production and usage).*

- National strategy developed: *Any national strategy from the central government is expected to create a sizable impact on the market. For e.g., renewable energy (RE) promotion has supported the emergence of a decentralized electricity generation from the projects that are not owned and operated by large utilities. By the end of 2011, over 260 RE plants were operational under the Small power producer (SPP) and Very small power producer (VSPP) schemes, with a cumulative generating capacity of around 1 GW*[31]*. Similarly a thrust on solid bio-fuel usage, result in significant achievements in the sector.*

The project mitigates various barriers which currently prevents the scaling up of solid bio-fuel usage. Barriers and mitigation measures has been described above.

A.2. Stakeholders

UNIDO will have an overseeing function and monitor performance of the whole project, while the ISMED will be the executing counterpart.

GIPO will be the project steering committee chair. The GIPO will be tracking the whole project to ensure that the project is in line with the MoI's Green Industry and Green GDP initiative. It may also take responsibility for some project outputs. ISMED will be another executing agency. ISMED will execute some activities in particular to value chain analysis and application. ISMED's extended and strong network with industries will play a key part in bringing the project into place.

ERI will work closely with these international technical experts to be hired for the project. The ERI team will receive knowledge transfers from the experts and will become trainers on solid bio-fuel production, standardization and usage. The private sector will work with the project to receive technical supports to produce and utilize the biomass pellets, which will replace fossil fuel.

Eligible women candidates will be involved as trainers and technical consultants. Terms of reference will be prepared to encourage qualified women applicants and experts, to mainstream the gender relation in the proposed project. Moreover, women will also be encouraged to participate as trainees in various capacity building sessions.

During PPG stage, the project will seek more collaboration with stakeholders including DEDE and others, such as, those i) involved in collecting biomass and agricultural residues, ii) existing pellet producers and iii) manufacturers and enterprises who use coal.

A.3 Risk

Component	Risk	Proposed Mitigation Measure	Risk Level
Technical Risk	Solid bio-fuel production and utilization technology is not common in Thailand and may not yield the desired results	Solid bio-fuel production and utilization is a well-known technology in many countries. A very few export oriented production units are already available in Thailand. Demonstration projects will be chosen only after careful feasibility studies to ensure technical and financial viability. Under the project, necessary trainings will be provided for various stakeholders (policy makers, potential investors, technical institutions, O&M companies, etc.). This capacity building will help mitigate the perceived risk.	Low

[31] http://cdkn.org/wp-content/uploads/2013/05/Thailand-MIT_InsideStory.pdf

Financial Risk	Financial/credit constraints prevent investors from investing in the project	UNIDO and other executing partners will mobilize investors and enterprises to invest in the demo projects. The financial incentives (soft loans) will encourage the investors in developing the solid bio-fuel production units. GEF/UNIDO participation is expected to help the successful mobilization of financing in the form of both equity and loan for demonstration projects as well as replication projects.	Moderate
Sustainability Risk	Failure to achieve the expected project outcome	The installations will be done only after conducting a proper sustainable biomass resource assessment study in order to ensure supply of wastes from industries. Local engineering and O&M companies will be trained in O&M of solid bio-fuel plants. Also, the O&M staff of the demonstration projects will be trained by the respective suppliers. By making investors, pellet suppliers and pellet users fully aware of the potential for solid bio-fuels and equipping them with the capacity and tools to realize and reap the benefits of such potential, the project will produce a benign environment that will lead to achieving the expected project outcome.	Moderate
Implementation risk	Implementation failure	UNIDO has significant experience in developing and implementing biomass projects and it has a good knowledge of the key variables that determine the success and the failure of project implementation.	Low
Climate Change Risk	Flood at the project sites caused by climate change Decreased availability of biomass availability due to climate change	The demonstration plant buildings and site offices will be located on an elevated area to prevent flooding. All buildings and structures will be designed and built appropriately to avoid flooding. Projects will be designed with climate change adaptation in mind. The demonstration projects are designed to focus on waste residues and wherever relevant, sustainable forest management. Solid bio-fuel production units would not restrict to one single type of biomass, but would target different type of wastes from wood and agro related industries[32]. This ensures the sustainability of the plant operation.	Low

A.4. Coordination

The project will build on the experiences and achievements of the following projects to ensure that it is complimentary to them.

[32] Please refer to Part II, a) Global Environmental Problems, Root Causes and Barriers of this document for more details on wood and agro wastes availability in the country.

The Green Industry Project Initiative of the MoI: It promotes energy conservation in production processes, efficient use of resources, use of clean and RE technologies, green productivity development, eco-design and eco-products, green label or eco-label, life-cycle GHG inventory and reduction of GHG emissions.

Thailand's Greenhouse Gas Management Organization (TGO): It has the objectives of promoting climate change mitigation, specifically in industries. In particular, the proposed project will complement the TGO's initiative aimed at labeling carbon footprint of Thai industrial products.

Establishing Sustainable Liquid Biofuels Production Worldwide (A Targeted Research Project): This is a UNEP/GEF global project. It aims to identify and fully assess the innovative, cost-effective and sustainable systems for the production of liquid biofuels, in order to enable GEF to set clear policies and priorities in this area and embark on the investment-oriented projects. The project was jointly implemented with the Food and Agricultural Organization (FAO) and the United Nations Industrial Development Organization (UNIDO) and provides recommendations to the GEF through the development of a "*Biofuels Screening Toolkit"* to be applied while screening biofuel projects. The Biofuels Screening Toolkit aims at providing a tool for initial screening of biofuel projects to identify potentially critical issues. The evaluations are done for 3 sustainability indicators, namely a) environmental, b) economic and c) social. Potential solid bio-fuel projects will use this toolkit (wherever applicable) for evaluation.

Industrial Energy Efficiency (IEE) project: This is a UNIDO/GEF project, which is implemented since 2011 to bring maximum benefit to industries in Thailand. Some manufacturers who participate in the IEE project may be interested in taking part in this project too.

Promoting Small Scale Biomass Power Plants in Rural Thailand for Sustainable Energy Management and Community Involvement: This is a UNIDO/GEF project promoting biomass gasification. UNIDO will coordinate with Phrae Provincial Administrative Office (PAO), who is one of the executing agencies of the UNIDO/GEF project on. Phrae PAO may be interested to be a project partner, in particular, to set up the solid biofuel trade depot in the province. UNIDO is implementing this project using industrial waste and it is in advanced stage of implementation with detailed designs. The power plants are expected to be commissioned within the end of year 2014.

Promoting Renewable Energy in Mae Hong Son Province: This project is implemented in Thailand from 2010 to 2015 by UNDP in cooperation with the Ministry of Natural Resources and Environment (MoNRE) and the Thailand Environment Institute (TEI). This project intends to support the Thai Government in delivering a RE based (solar, hydro, biomass) rural electrification programme to all villages in Mae Hong Son Province.

The proposed project will also supplement the ongoing national efforts under the 11th National Economic and Social Development Plan (NESDP) 2012-2016, the National Industrial Development Master Plan (2012-2031), Alternative Energy Development Plan, AEDP (2012-2021) and Environmental Management Plan (EMP) 2012-2016, which are briefed in the next section.

The proposed project will seek close coordination with all above initiatives and other concerned stakeholders to ensure that relevant lessons and experiences are incorporated into the project. More in-depth consultation will be carried out during the PPG phase to identify possible collaborative activities.

B. DESCRIPTION OF THE CONSISTENCY OF THE PROJECT WITH:

B.1 National strategies and plans or reports and assessments under relevant conventions, if applicable, i.e. NAPAs, NAPs, NBSAPs, national communications, TNAs, NCSAs, NIPs, PRSPs, NPFE, Biennial Update Reports, etc.:

The proposed project will support the above government policies and strategies targeted to increase the usage of RE in the industrial sector.

Initial National Communication to UNFCCC (2000): It identified the following measures to enhance the GHG mitigation: a) demand-side management, b) fuel switching, c) energy conservation programs, d) solar energy, f) public campaigns on energy conservation and g) improving public transportation system

Incentives, Guarantee and Protection under the Investment Promotion Act (1977 and amended in 2009 and 2011): The incentives that are offered under this policy includes import duty exemption on machinery, 8-year corporate income tax exemption without being subject to a corporate income tax exemption cap, 50% reduction of corporate income tax on net profit for 5 year after expiry of tax holiday, double deduction of transportation, electricity and water supply costs for 10 years from the date of income derivation from promoted project and 25% deduction of the cost of installation or construction of facilities in addition to normal depreciation deduction.

Energy Industry Act (2007): It aims at promoting a) economical and efficient use of energy and resources in the energy industry operation, with due consideration of the environmental impact and the balance of natural resources, b) the use of RE in the electricity industry operation; c) adequate and secure energy service provision and d) competition in the energy industry and preventing abuse of dominance in the energy industry operation.

Thailand's National Capacity self-assessment (NCSA) to UNFCCC (2010): Based on national priorities for addressing climate change and environmental issues NCSA identified the following capacity needs: a) Greater coordination and communication, b) greater political will and high level support from industries, c) establish institutional arrangements for maintaining the continuity of climate change implementation strategies, projects and programmes, d) increase scientific knowledge through specialized training and education and e) increase communications with stakeholders through enhanced outreach strategies.

Second National Communication to UNFCCC (2011): It identified the following techniques, know-how and technologies to mitigate GHGs: a) analytical techniques to prioritize mitigation options for energy conservation and renewable energy, b) advanced technologies for energy conservation for electricity production and consumption, c) efficient technologies and systems for traffic and mass transport, especially for logistics, d) technologies for biomass and biogas energy production appropriate for local conditions, e) environment-friendly technologies for cement production, f) development of knowledge and infrastructure for innovation of clean technologies and g) technologies to mitigate GHG from rice paddy fields.

National Portfolio Formulation Exercise, NPFE (2011): It concluded that the challenges to Thailand are enhancement of the national GHG mitigation and maintenance of the national sustainable development path. It suggested the integration of various environmentally sound technologies to enhance energy conservation and energy efficiency, to promote bio-energy while ensuring food security and livelihood of farmers.

The National Industrial Development Master Plan (2012 – 2031) by MoI, prioritizes the RE sector as one of the 8 strategic sectors for achieving the goals under the plan. It also acknowledges the challenges and opportunities to move the sector forward as a part of the country's industrial development strategy.

11th National Economic and Social Development Plan, NESDP (2012-2016): This plan emphasizes on restructuring the country's production and consumption behavior in order to prepare for a transition towards a low-carbon and environmentally friendly economy.

Alternative Energy Development Plan, AEDP (2012-2021): Its target is to increase the share of the RE energy mix, to be at least 25% of the total energy consumption by the year 2021. With respect to biomass

for thermal energy utilization, AEDP focuses on the following strategies: a) promotion of the biomass pellets production, b) development of biomass co-generation (heat and power) and c) progress of renewable heat incentive (RHI).

Environmental Management Plan, EMP (2012-2016): There are six key priorities in this plan, including "Promotion of low carbon manufacturing and sustainable consumption and climate change". This priority aims at reforming manufacturing process and consumption behavior to low carbon basis. The action plans include: a) promoting sustainable consumption, b) low carbon manufacturing c) low carbon development of basic infrastructure and (d) sustainable RE management, e) low carbon agriculture f) sustainable tourism

Technology Needs Assessments, TNA (2012): The results of the technology prioritization are summarized as follows: a) Smart grid, b) Waste (to power generation), c) Second and third generation of biofuels, d) Energy efficiency in combustion in the industrial sector and e) Carbon capture and storage (CCS). It also concluded that Thailand needs an international support on technology knowledge transfer. It also suggested linking with international organizations and experts to ensure the proper application of the state of the art technologies.

B.2. GEF focal area and/or fund(s) strategies, eligibility criteria and priorities

The proposed project activities promote the use of solid biofuel for energy generation replacing coal. This area was selected due to its rapid scaling up and GHG emission reduction potential. This is in line with *GEF-5 climate change focal area strategic programme CCM-3: Promoting the investment in RE technologies.*

B.3 The GEF Agency's comparative advantage for implementing this project

The project is a technical assistance/capacity development intervention that fits within the climate change focal area objectives CCM-3. The GEF Council paper "Comparative Advantages of the GEF Agencies" (GEF/C.31/5rev.1) recognizes the comparative advantage of UNIDO in this objective.

UNIDO has been implementing RE projects, especially biomass projects under GEF 4 and GEF 5 cycles globally (e.g Nigeria - 5 MW rice husk power plant project, Pakistan - biomass project, Thailand - bamboo waste to energy project) and has considerable experience in this field. UNIDO through its Regional Office in Thailand has been implementing two GEF projects under GEF 4 cycle. The proposed project will benefit from the experiences gained and the administrative structures established for the UNIDO-GEF and other UNIDO projects in the country.

The proposed project is in alignment with the recently approved UNPAF 2012 – 2016 (the United Nations Partnership Framework, Thailand 2012-2016). UNIDO is also part of the UN country team, which is responsible for implementing the UNPAF which has six priority areas: (i) social protection; (ii) human rights and access to justice; (iii) strategic information; (iv) climate change; (v) international cooperation; and (v) creative economy. This project contributes to one of the expected *outcomes* under the joint partnership on Climate change*: Energy, industry and transport sector progressively contribute to the development of a low-carbon and a green economy.*

This outcome emphasizes the management of natural resources and the environment towards sustainability, as one of the key development strategies agreed upon the Royal Thai Government (11th National Economic and Social Development Plan).

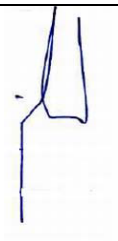
UNPAF shows its commitment to UN agencies in Thailand supporting the country on responding to the challenges of climate change without hampering its economic development by setting up the United Nations Joint Team (UNJT) on Climate Change (CC).

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):** (Please attach the Operational Focal Point endorsement letter(s) with this template. For SGP, use this OFP endorsement letter).

NAME	POSITION	MINISTRY	DATE *(MM/dd/yyyy)*
Mr.Chote Trachu	Permanent Secretary	Ministry of Natural Resources and Environment	11/13/2013

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 project identification and preparation.					
Agency Coordinator, Agency name	**Signature**	**DATE** *(MM/dd/yyyy)*	**Project Contact Person**	**Telephone**	**Email**
Mr. Philippe Scholtès, Officer-in-Charge, PTC, UNIDO GEF Focal Point		03/21/2014	Mr. Jossy Thomas, Project Manager, PTC/ECC/RRE	+43 -1-26026-3727	j.thomas@unido.org