



PROJECT IDENTIFICATION FORM (PIF)

PROJECT TYPE: Medium-Sized Project
THE GEF TRUST FUND

Submission Date: 13 January 2010

PART I: PROJECT IDENTIFICATION

GEF PROJECT ID: 4184 PROJECT DURATION: 36 months

GEF AGENCY PROJECT ID: XX/THA/09/XXX

COUNTRY: Thailand

PROJECT TITLE: Promoting small biomass power plants in rural Thailand for sustainable renewable energy management and community involvement

GEF AGENCY: UNIDO

OTHER EXECUTING PARTNER: Forest Industry Organization (FIO), and the Department of Alternative Energy Development and Efficiency (DEDE)

GEF FOCAL AREA: Climate Change

GEF-4 STRATEGIC PROGRAM: CC-SP4: Promoting Sustainable Energy Production from Biomass

NAME OF PARENT PROGRAM/UMBRELLA PROJECT: N/A

INDICATIVE CALENDAR	
Milestones	Expected Dates mm/dd/yyyy
Work Program (for FSP)	March 2010
CEO Endorsement/Approval	February 2011
Agency Approval Date	March 2011
Implementation Start	April 2011
Mid-term Evaluation	
Project Closing Date	April 2014

A. PROJECT FRAMEWORK

Project Objective: To promote an on-grid small biomass based power plant as a means of sustainable management and use of biomass in rural Thailand.

Project Components	Type*	Expected Outcomes	Expected Outputs	Indicative GEF Financing		Indicative Co-Financing		Total (\$) c = a + b
				(\$ a)	%	(\$ b)	%	
1. Installation and sustainable operation of on-grid small biomass power plants	TA and INV	1. Biomass power plant introduced and accepted by local community as alternative to fossil-based electrification 2. Organisational capacity strengthened in installation, operation and management of small scale biomass power plants with community involvement	<ul style="list-style-type: none"> o Economic and financial viability of the plant analysed. o Based on the above analysis a pilot plant with an installed capacity of 1.2 MW (400 kW x 3) in-stalled and the electricity generated sold to the national grid o FIO staff and local communities mobilized and trained for fuel wood management, plant operational management and maintenance o FIO staff trained for entrepreneurship development o Manual for fuel wood management drafted and toolkits for trainings on fuel wood management, operation, and maintenance developed o Manuals for operation and maintenance developed 	800,000	27	2,150,000	73	2,950,000

2. Capacity building for communities to replicate and adopt a community-based wood-fired power plant	TA	Local capacity strengthened to develop and replicate a community-based small biomass power plant	<ul style="list-style-type: none"> ○ An information/learning centre established ○ Information management capacity strengthened (publications and database set up) ○ A training course manual and toolkits including LCA for GHG emission balance developed for a training on a community-based biomass power plant, in partnership with local academic institutes ○ Trainings organized for local communities, local authorities, and local academics interested in the development and replication of a community-based small biomass power plant 	50,000	11	400,000	89	450,000
3. Policy change to promote community based biomass power plants	TA	Policies to facilitate and promote the spreading and replication of community-based small scale power plants in Thailand improved and necessary related regulations amended	<ul style="list-style-type: none"> ○ Policy intervention tools developed based on scientific assessment of policy, technical and market barriers as well as international best practice and experience learned from the project ○ Biomass sustainability production indicators developed ○ Implementation of the policy recommendations according to the tools. ○ Policy makers aware of the advantages of small biomass power plants and its applications 	45,000	13	300,000	87	345,000
4. Project management				80,000	35	150,000	65	230,000
Total project costs				975,000	25	3,000,000	75	3,975,000

• INV = Investment; TA = Technical Assistance; STA = Scientific & Technical Analysis.

B. INDICATIVE CO-FINANCING FOR THE PROJECT BY SOURCE and by NAME (in parenthesis) if available, (\$):

Sources of Co-financing	Type of Co-financing	Project
Project Government Contribution	In-kind	1,695,600 ¹
Project Government Contribution	Cash	704,400 ²
GEF Agency(ies) (UNIDO)	Cash	100,000
Bilateral Aid Agency(ies)		300,000 ³

¹ In kind contribution from FIO would include land and construction costs of power house, biomass drying and fuel preparation areas.

² Investment from FIO would include a soft loan expected to receive from Ministry of Energy under Energy Conservation Fund which promotes a small-decentralized renewable energy system.

Multilateral Agency(ies)		
Private Sector		200,000 ⁴
NGO		
Others		
Total Co-financing		3,000,000

C. INDICATIVE FINANCING PLAN SUMMARY FOR THE PROJECT (\$)

	Previous Project Preparation Amount (a)	Project (b)	Total c = a + b	Agency Fee
GEF financing	0	975,000	975,000 ³	97,500
Co-financing	0	3,000,000	3,000,000	
Total	0	3,975,000	3,975,000	97,500

D. GEF RESOURCES REQUESTED BY AGENCY (IES), FOCAL AREA(S) AND COUNTRY(IES)¹

N/A. The project is for a single focal area, single country and single GEF Agency.

PART II: PROJECT JUSTIFICATION

A. THE ISSUE, HOW THE PROJECT SEEKS TO ADDRESS IT, AND THE EXPECTED GLOBAL ENVIRONMENTAL BENEFITS TO BE DELIVERED:

The issue: Thailand's National Strategy on Climate Change B.E. 2551-2555 (2008-2012) launched in 2008 by the Ministry of Natural Resources and Environment (MONRE) states that the total green house gas emission has reached 344.2 million tonnes of CO_{2eq} in 2003 increasing 20% of the emissions in 1994. The energy sector, in which power generation is included, has become the largest source of CO₂ emissions in the country, accounting for more than half of the country's total CO₂ emissions in recent years. The strategy also indicates that in 2003 the energy sector alone emitted 193.2 million tonnes of CO_{2eq}, which accounted for 56.1% of total CO₂ emissions, a significant 48.7% increase from the 129.87 million tonnes of CO_{2eq} in 1994. The obvious challenge for Thailand is therefore to mitigate its GHG emissions without hampering its economic growth. The growth of renewable energy consumption and production would positively contribute to the reduction of the country's GHG emissions. The Government has recently set out in the National Renewable Energy Master Plan that aims at increasing the proportion of renewable energy input to the country's total energy supply mix from the existing 6.4% to 20.3% in 2022, which will reduce CO₂ emissions by 42 million tonnes per year.

In 2008, the total power generation of Thailand was around 148,200 GWh, of which 70.0% was produced from natural gas and 20.8% from coal and lignite. Hydroelectricity, fuel oil and diesel accounted for 4.7%, 1.0% and 0.2% of total power generation respectively, while 1.9% was imported. Renewable energy accounted for only 1.4% of the total power generation despite policies stipulating its greater use. Power demand is projected to continue to grow with a diversification of fuel source mix. Natural gas is expected to remain a major source. In 2007, 9% of natural gas was imported at a cost of 79,761 million Baht. 3% of coal was imported at a cost of 29,407 million Baht.

Thailand has abundant biomass resources, in particular solid biomass from agriculture. It is estimated there is a potential of generating up to 4,400 MW of electricity from biomass. Currently, the electricity produced from solid biomass

³ Currently, a proposal to Finland's EEP is being developed in response to a call for proposal opened on 15 October 2009 aiming to bid for at least 300,000 USD to co-finance the project.

⁴ It is expected some in-kind contribution from a biomass gasification system contractor such as a provision of trainings and manuals. More detailed discussion will be conducted during PPG phase.

⁵ Total project amount, \$1,075,000 includes \$975,000 and an agency fee of \$97,500. Total requested amount from GEF under Thailand's RAF 4 for Climate Change is \$ 1,100,000 inclusive of \$ 975,000 and \$25,000 (PPG) and agency fees. PPG including agency fee will be submitted in parallel to PIF.

accounts for a mere 1,610 MW. Therefore, it is estimated that there is still a potential for more than 3,500 MW from untapped biomass resources. To achieve the government's targets set for the renewable energy in the overall supply mix and CO₂ emissions reduction, biomass-based power plants should be promoted and developed by all concerned agencies.

The Forest Industry Organisation (FIO) is a state-owned enterprise under MONRE. FIO has a mandate to be the principal organization for developing sustainable commercial plantations and biomass development from these. Its forest plantation sites cover an area of 192,000 hectares nationwide. Various kinds of economically valuable trees are planted in the 240 plots of land designated by the Royal Forest Department. These trees, when they reach their maturity after around 30 years, are cut on a rotation basis. Currently, their main use is for furniture manufacture. Recently, FIO has adopted a policy of using the residues left over in the plantation process as fuel for energy generation. From the most recent report, biomass volume from an FIO plantation site is estimated to be around 15.6–37.5 tonnes per hectare, which is in addition to the amount of the country's estimated biomass resource available from agricultural activities. Due to this, sustainability of biomass production is assured. With its 240 plantation sites nationwide, FIO potentially has a strong position in sphere heading replication of the project in the national efforts to reduce CO₂ emissions, through its promotion of small-scale biomass power plants using woodchips and wood residues as fuel. To this effect, FIO has conceptualised an initiative, the "One community – One plantation – One biomass power plant" initiative, whose aim is to develop and implement, with community involvement, small-scale biomass power plants in 99 candidate plantation sites in 28 provinces. The main purpose is to promote the planting by communities of fast growing trees and the use of the waste wood as fuel for small biomass power plants at the community level. Based on a preliminary study, the initiative, if implemented, is estimated to have biomass capacity of 17,500 tonnes a year, which can generate nearly 200 MW.

Nonetheless, based on a preliminary analysis, the main constraints and barriers for FIO to implement this initiative include:

- 1) **Lack of technical capacity:** FIO personnel lack technical knowledge and experience about, and exposure to, the holistic operation and management of small-scale biomass gasification systems.⁶
- 2) **Commercialization of technology:** gasification technology in Thailand has yet to reach the right level of commercialisation, which is a critical hindrance for promoting private investments in biomass power plants. The plants will need to be financially viable, which means being able to sell the electricity generated at a price that enables proper operation and maintenance for long-term sustainability.
- 3) **Lack of entrepreneurship skills:** The fact that FIO personnel lack the necessary entrepreneurial skills to manage and run the plants efficiently to ensure their long-term sustainability both technically and financially is also a constraint.
- 4) **Learning platform:** there is no comprehensive information site or learning hub for FIO staff to learn about the holistic operation and management of community-based biomass power plants. Lack of a systematic learning programme or platform for any interested person to learn and obtain advice is a major barrier.
- 5) **Finance:** as a state-owned entity, FIO needs endorsement from the Ministry of Finance (MoF) to certify its loan agreements with any financial institution. Given the fact that the investment required for setting up a small-scale biomass power plant is relatively large, if FIO does not have the technical capacity, qualified personnel, and experience in plant management, it is unlikely that MoF will endorse any FIO loan agreements for this kind of initiative.

Therefore, there is an urgent need for FIO's organizational capacity to be strengthened in the installation, operation and management of small-scale biomass power plants with community involvement, as well as for the entrepreneurial skills of its staff to be built up. The holistically managed demonstrations backed up by a systematic learning programme as identified in this proposed project will help FIO to overcome the barriers identified above and scale up the biomass-based plant to its 99 sites across the country.

The proposed response: Focusing on the niche to promote small biomass power plants in rural Thailand, this proposed project encourages the use of biomass wastes and residues that are underutilized for the production of dedicated energy services in modern efficient technologies. Specifically, the project aims to strengthen and complement FIO's ongoing efforts to remove the barriers identified above by focusing on two significant areas: (a) the holistic management of a small biomass power plant with community involvement; and (b) replication of community-based biomass power plants in rural

⁶ This includes not only knowledge about the operation and maintenance of such power plants but also about the gathering, preparation and management of the fuel wood itself, as well as community mobilisation.

Thailand. The project will undertake a demonstration of a holistically managed small-scale biomass power plant, including the gathering and preparation of the biomass fuel, the operation and maintenance of the conversion technology, and the financial management of the plants to ensure their long-term financial viability. The demonstration site will serve as a learning centre for any potential community to learn from and replicate. The demonstration envisages a provision of lessons learned for policy improvement to enable community-based, biodiversity friendly biomass power plant replications and scaling up. Woodchips from FIO's plantation sites will be the main fuel source for the demonstrations. . According to Power Purchase Agreement of Provincial Electricity Authority (PEA), if a power plant is located in the national grid area, the electricity produced will be sold to the national grid hence strengthening the grid's reserve capacity. In particular, it proposes to implement the following four components:

Component 1: Technical assistance in the economic and financial viability of biomass power plant, Life Cycle Analysis of CO₂ emission from biomass and the installation and management of a power plants with community mobilization and involvement. Local communities will be mobilized to participate and trained for fuel wood management including biomass fuel gathering and preparation. This part is to ensure that communities are involved and benefit from the project. Woodchip collection and sale to FIO allows income generation to local communities in the range of 300-350 Baht per day per person. With sustainable cropping, plantation forests can give rise to a steady, year-round supply of biomass residue resources for the plant.

UNIDO will work closely with Department of Alternative Energy Development and Efficiency (DEDE), Ministry of Energy to successfully install and commission three sets of a 400 kW biomass gasification system (3 x 400 kW). Toolkits for training on fuel wood management, operation, and maintenance will be developed. UNIDO and DEDE will provide trainings to the concerned FIO staff and communities at a selected site. The site selection will be identified during PPG phase.

At the same time, FIO staff will be trained in plant operational management and maintenance. Training on entrepreneurship development for plant management and financial management will be provided by UNIDO and the Department of Industrial Promotion, Ministry of Industry, to ensure its efficiency and long-term viability in the operation.

Component 2: Capacity development to build up a learning hub on community-based small biomass power plants for communities to replicate and adopt a model plant at other locations. The replication will be promoted in three ways. First, learning centres will be established in the project site developed under component 1. Information systems to support the learning centres will be developed. A training course, including manuals and toolkits, will also be developed for training on community-based biomass power plants, in partnership with local academic institutions. A demonstration of efficient and powerful biomass power plants will provide FIO and communities with a good understanding of the usefulness of gasification systems. The success of the biomass power plant operations will increase the acceptance level of the communities, especially when the financial sustainability of the plant has been proved. Based on an initial investment analysis, a 1.2 MW installed plant needs around 60 million Baht investment in total. The main revenue will rely on an income from selling electricity to the national grid based on power purchase agreement and add-on incentive from Ministry of Energy. An average feed in tariff inclusive of add-on incentive would be around 3.8 Baht/kWh during peak hour and around 2.0 Baht/kWh during off peak. Therefore, the plant will generate an average avenue of 12 million Baht per year to a community, especially in those areas where agriculture is poor. The payback period would yield at 7 years. The figures offer sufficient incentives for communities to adopt the model and scale it up in other areas. Second, trainings and systematic learning programmes organized for interested local communities, local authorities, and those who are interested in the development and replication of a community-based small biomass power plant will be conducted. Third, FIO has a very high potential to replicate the model plants to others of its plantation sites once the capacity of FIO has been strengthened, initially to its 99 candidate sites in 28 provinces.

Component 3: Policy alignment to facilitate the promotion of community-based small-scale power plants in Thailand. Since the Thai government is committed to the promotion of renewable energy and the reduction of CO₂ emissions as described, the last component will provide policy recommendation to facilitate and promote the spread and replication of community-based small-scale power plants in Thailand. Also, sustainability indicators for biomass production will be developed. Policy intervention tools will be developed based on international best practice and experience learned from the project's final evaluation, and will be mainstreamed into the plans and practices of related governmental agencies. Awareness of the advantages of small-scale biomass power plants and their applications will be channelled to

policymakers, in particular to those who are responsible for the implementation of the National Renewable Energy Master Plan and the National Strategy on Climate Change.

Therefore, the project aims to put forward a set of policy recommendations to stimulate the development of community-based biomass power plant based on lessons learned from the project implementation. For instance despite the incentive scheme for a community based power plant, thus far there has been no biomass power plant run by a community level. Based on a preliminary analysis of the Department of Alternative Energy Development and Efficiency (DEDE), some barriers to the development of community-based small scale biomass power plant in Thailand include:

1) Rural people lack good understanding about the electrical generation through gasification system and its usefulness. Some have negative attitude towards the efficiency of wood-based electricity generated from this system. Additionally, most of rural communities do not acquire qualified persons to operate the system thus unable to manage the systems efficiently.

2) High investment cost for setting up a new small scale biomass power plant in community.

3) Lack of a systematic learning programme or platform for any interested person to learn and obtain advice is a major barrier. Although there are few initiatives currently developed by DEDE, they focus only on gasification technology development with no comprehensive learning component for a purpose of future replication. There are some potential communities interested in taking a lead in an initiative “One community – One biomass power plant” promoted by the FIO but there is no comprehensive information site or learning hub for them to holistically learn about the operation and management of a community-based biomass power plant.

Component 4: The management of four components mentioned above.

In sum, the project will provide a combination of technical assistance, capacity building, appropriate technology development, community involvement, and entrepreneurial promotion, comprehensive learning systems, partnership with local institutes, replication of community-based small biomass power plants, and policy recommendations. This will sustain the project outcomes, increase the quantity of electricity generated from economically viable renewable sources, and promote the adoption of policies promoting on-grid renewable energy.

The global environmental benefits: With the support of the project, approximately 4,300 tonnes of CO_{2eq} emissions per year will be avoided through the implementation of the demonstration plant alone, based on the 1.2 MW installed capacity. A more detailed assessment of potential CO₂ emissions reduction, including the probable replications, will be carried out during the PPG phase. As mentioned, based on a preliminary study of FIO, at least 99 plantation sites will be included in the first phase of potential extension. Therefore, an exponentially additional CO₂ emissions avoided is anticipated due to a replication of the model to those 99 plantation sites in the first phase. This could be even further extended later to all 240 of FIO’s sites.

B. CONSISTENCY OF THE PROJECT WITH NATIONAL/REGIONAL PRIORITIES/PLANS:

The project will contribute substantively to Thailand’s commitments to renewable energy for the reduction of the country’s GHG emissions. In particular, the project will respond to the Government’s promotion of renewable energy as set out in Thailand’s National Renewable Energy Master Plan B.E. 2551-2565 (2008-2022) and it’s National Strategy on Climate Change B.E. 2551-2555 (2008-2012). This is the country’s first comprehensive response to removing existing barriers to climate change implementation in Thailand, and to promoting an integrated approach to addressing climate change in various sectors by the relevant agencies. In the National Renewable Energy Master Plan, noting that total energy consumption is expected to increase from 66,248 ktoe in 2008 to 97,300 ktoe by 2022 (the end date of the plan), the Government states that its aim is to increase the renewable energy in the overall energy supply mix from the existing 6.4% to 20.3% in 2022, which will reduce energy imports by 461,800 million Baht per year and reduce CO₂ emissions by 42 million tonnes per year. In the same Plan, the Government states that it expects biomass-generated electricity to grow from the current 1,610 MW to 3,700 MW in 2022. During the first phase of the Plan (2008-2011), the Government will emphasize the promotion of proven renewable energy technologies with high potential of resource availability including biomass power generation. In addition, according to a revised Power Development Plan by Electricity Generation Authority of Thailand (EGAT) of 11 February 2009, EGAT aims to double the share of renewable energy sources in the fuel mix of power generation from the current 1.4% to 3% in 2011. Therefore, the proposed project will substantially help the Thai government to meet its renewable energy target.

The project will work seamlessly with the revised power purchase agreement from Very Small Power Producers (VSPPs). The revised agreement, endorsed by the National Energy Committee on 9 March 2009, specifically aims to promote VSPPs from renewable energy sources by allowing more added-on incentive to each unit of electricity sold to the grid. For a small biomass power plant with an installed capacity less than 1 MW, the revised agreement pays an incentive of 0.5 Baht per kWh for 7 years, an increase from the previous incentive of 0.3 Baht per kWh. For a small biomass power plant with more than 1.0 MW installed capacity, the incentive remains 0.5 Baht per kWh. This aims to encourage more community based and small-scale biomass power plants in remote areas using agricultural waste or fast-growing trees as fuel.

With respect to the National Strategy on Climate Change, promoting clean technologies is one of its flagship programmes. The project's objective of encouraging a wider use of biomass energy will support this. In addition, the Strategy states clearly the importance of renewable energy in climate change mitigation efforts. As referred to in Strategy 2 – Promote GHG mitigation activities based on sustainable development – promoting the use of renewable energy in power generation is a key measure leading to an achievement of the objectives of the Strategy. The project will support this strategy.

Therefore, this project will help the Thai government to achieve both its renewable energy targets and climate change mitigation objectives as stated in both the Plan and the Strategy.

C. CONSISTENCY OF THE PROJECT WITH GEF STRATEGIES AND STRATEGIC PROGRAMS:

This project is consistent with Strategic Programme 4: Promoting sustainable energy production from biomass, as it aims to promote sustainable production and consumption of biomass in rural areas.

D. THE TYPE OF FINANCING SUPPORT PROVIDED WITH THE GEF RESOURCES:

A major part of the GEF financing will contribute to the establishment of a demonstration facility comprising two sets of a 400 kW biomass gasification system (2 x 400 kW). While an investment of a 400 kW biomass gasification system will be sought by FIO from Energy Conservation Fund under Ministry of Energy. The remaining of GEF resources will be also used for providing technical assistance in capacity building especially (1) FIO staff trainings; (2) the establishment of an information/learning centre; (3) trainings for local communities, local authorities, and local academics for the replication of community-based small biomass power plants; as well as (4) manuals, toolkits and other policy intervention tools.

E. COORDINATION WITH OTHER RELATED INITIATIVES:

The project's concept seems to be in line with a Mekong Energy and Environment Partnership (EEP) by the Government of Finland, based on an initial discussion held in early April. Currently, a proposal to Finland's EEP is being developed in response to a call for proposal opened on 15 October 2009⁷ aiming to bid for at least 300,000 USD to co-finance the project. In addition, the project's concept is in line with one of the priority areas of the New Energy and Industrial Technology Development Organization (NEDO)⁸ of Japan. FIO has had an initial discussion with NEDO office based in Bangkok for a potential collaboration on a small-scale biomass gasification learning centre in rural Thailand. More in-depth consultations will be carried out during the PPG phase to identify possible collaborative activities.

Furthermore, the project will be closely coordinated with another GEF funded project, "Promoting Renewable Energy in Mae Hong Son Province", to be implemented in Thailand by UNDP in cooperation with MONRE and the Thailand Environment Institute. This project aims at supporting the Thai Government in delivering a rural electrification programme to all villages in Mae Hong Son Province with electricity generated from renewable energy systems. This project will ensure coordination and information sharing, in particular, on lessons learned and the policy streamlining component. More in-depth consultations will be undertaken with the Biomass Clearing House, of the Energy for Environment Foundation established under the GEF funded UNDP project, in the PPG phase.

⁷ Detailed information and application form are currently available on the webpage of the Embassy of Finland Bangkok <http://www.finland.or.th/en>

⁸ NEDO was originally established as a semi-governmental organization on October 1, 1980. It was later reorganized as an Incorporated Administrative Agency on October 1, 2003. <http://www.nedo.go.jp>

The proposed project will work closely with all these initiatives and other concerned stakeholders to ensure that their valuable lessons and experiences are incorporated into the project.

F. THE VALUE-ADDED OF GEF INVOLVEMENT IN THE PROJECT:

The proposed GEF intervention will add very significant value to Thailand by providing the necessary resources and technical assistance to FIO in light of the promulgation of both the National Renewable Energy Master Plan and the National Strategy on Climate Change. The project will assist the Thai Government to keep up the momentum on renewable energy and CO₂ emissions reduction. This GEF support to Thailand will help her overcome the aforementioned barriers and constraints; and accelerate the ability of local communities to become more energy self-reliant and economically self-sufficient. GEF will play a key catalytic role in the project by strengthening FIO's organizational capacity, mainstreaming community-based approaches to renewable energy management, and capacity development of key stakeholders and related agencies. FIO has abundant biomass supply from its plantation sites but lacks of technical competency and experience in managing biomass power plant efficiently. With experience gained from this proposed project and the capacity strengthened, FIO has the potential to initially replicate the model to its other 99 priority plantation areas in 28 provinces, and later to all of its 240 plantation sites across the country. Through the activities of facilitating and demonstrating holistic community-based biomass power plants and the development of a successful Thai gasification package, replication of the model in other communities is likely to occur. Finally, GEF support will sustain the project in the long run. The major part of co-financing for the project comes from Thai counterparts. This justifies the assumption of strong country ownership for the project and prospects for it to be continued after GEF financing phases out.

G. RISKS THAT MIGHT PREVENT THE PROJECT OBJECTIVE FROM BEING ACHIEVED, AND RISK MITIGATION MEASURES THAT WILL BE TAKEN:

Risk	Risk Level	Proposed Mitigation Measure(s)
Future re-structuring of Government agencies may result in conflicting/ overlapping mandates, which might create a situation in which related agencies do not effectively work together	Moderate	A multi-sectoral consortium of project partners, including local academic institutes and community-based organisations to help avoid any likelihood of government agency non-cooperation.
Technologies for small-scale biomass power plants are not practically viable for electricity generation in rural areas	Low	Detailed technological feasibility studies to be carried out on identified sites in collaboration with DEDE
The gasification system is not economically or financially viable in rural areas	Moderate	Close collaboration with DEDE's ongoing initiative for gasification system development, to search for the most appropriate, financially viable gasification system for communities, focusing on productive energy production where the energy generated is used to create value for communities
Lack of funding for replicating the prototypes	Moderate	Mobilize stakeholders' participation, especially international financial institutions and manufacturers, at an early stage and in the project implementation process
Policy and institutional framework not in place	Low	National Renewable Energy Master Plan and National Strategy on Climate Change already exist. Also, institutional mechanisms such as DEDE and FIO will be fully engaged

H. THE EXPECTED COST-EFFECTIVENESS OF THE PROJECT:

It is estimated that approximately 42,600 tonnes of CO_{2eq} emissions will be avoided, worth around US\$25 of GEF resources/tonne of CO₂ emissions avoided based on a rough calculation of 10 year duration and 1.2 MW installed. According to DEDE's estimation, to generate 1 MW of electricity from domestic biomass energy can save almost 10 million Baht per year from importing natural gas. Detailed analysis of cost-effectiveness will be conducted during the PPG phase. In addition, the proposed project is expected to achieve its replication of community-based biomass power plants in at least 99 of the 240 FIO's plantation sites across Thailand, which will exponentially reduce GHG emissions of the country and the global in the long run.

FIO has an investment plan to replicate the similar modality to 99 plantation sites. Once FIO gains solid experience in operation and management of this demonstration of the small scale power plant, FIO would secure trust from Ministry of Finance as FIO's guarantor for the investment plan. The plan will include a joint investment with Provincial Electricity Authority of Thailand (PEA) to implement small biomass power plants in FIO's 99 plantation sites nationwide. FIO expects to invest 30% of the total investment which FIO will seek loan from a financial institute. Because FIO is a state-owned enterprise, Ministry of Finance has to be its guarantor.

I. THE COMPARATIVE ADVANTAGE OF UNIDO:

This project is a technical assistance/capacity development intervention that fits within the Climate Change focal area strategic programme SP-4. The GEF Council Paper "Comparative advantages of the GEF Agencies" (GEF/C.31/5 rev1) recognizes a comparative advantage to UNIDO in this strategic programme. UNIDO is especially well placed to implement this project because of its experience and expertise in dealing with modern biomass technologies and renewable energy based mini-grid projects.

PART III: APPROVAL/ENDORSEMENT BY GEF OPERATIONAL FOCAL POINT AND GEF AGENCY

A. RECORD OF ENDORSEMENT OF GEF OPERATIONAL FOCAL POINT ON BEHALF OF THE GOVERNMENT:

NAME	POSITION	MINISTRY	DATE (Month, day, year)
Mr. Saksit TRIDECH	Permanent Secretary	Natural Resources and Environment	MAY 25, 2009

B. GEF AGENCY CERTIFICATION

This request has been prepared in accordance with GEF policies and procedures and meets the GEF criteria for project identification and preparation.					
Agency Coordinator, Agency name	Signature	Date (Month, day, year)	Project Contact Person	Telephone	Email Address
Mr. Dmitri Piskounov Managing Director UNIDO GEF Focal Point		Jan. 8 1010	Mr. Jossy Thomas	+43-1- 26026- 3727	j.thomas@unido.org