CLIMATE TECHNOLOGY CENTRE & NETWORK

CTCN Technical Assistance
Request Submission Form

Please fill in the form in the grey spaces, by following the instructions in italic.

Country:	*Indonesia*	**Date**	*January 9th, 2015*

Title	*The Development of Anaerobic Digester Technology for Palm Oil EFB Waste in Indonesia*

Contact information:

Please fill in the table below with the requested information. The request proponent is the organization that the request originates from, if different from the National Designated Entity (NDE).

	National Designated Entity	**Request Proponent**
Contact person:	*Dr. Widiatmini Sih Winanti*	*Prof. Dr. Udin Hasanudin*
Position:	*Secretary of Technology Transfer Working Group as Head of NDE Indonesia Secretariat*	*Senior Lecturer*
Organization:	*National Council on Climate Change*	*University of Lampung*
Phone:	*+62 21 3511400*	*+62 813 6932 247*
Fax:	*+62 21 3511401*	
Email:	*widiatmini@yahoo.com*	*udinha65@gmail.com*
Postal address:	*Gedung 1 BPPT, Lantai 15-16 Jalan M.H. Thamrin No. 8; Jakarta 10340 Indonesia*	*Jalan Prof Dr Soemantri Brodjonegoro No; 1 Bandar Lampung, Lampung, 35145 Indonesia*

Geographical focus:

{Select below the most relevant geographical level for this request:}

☐ *Community-based*
☐ *Sub-national*
☒ *National*
☐ *Multi-country*

{If the request is related to the sub-national or multi-country level, please indicate here the areas concerned (provinces, states, countries, regions, etc.)}

Theme:

{Select below the most relevant theme(s) for this request:}

☐ *Adaptation to climate change*
☒ *Mitigation to climate change*
☐ *Combination of adaptation and mitigation to climate change*

Sectors:

{Please indicate here the main sectors related to the request. e.g. energy, industry, transport, waste, agriculture/fisheries, forestry, water, ecosystem/biodiversity, coastal zones, health, education, infrastructure/human settlement, tourism, businesses, early warning/disaster reduction, institutional design and mandates, cross-sectoral}

Energy, Waste, Industry

Problem statement *(up to one page):*

Indonesia is the biggest crude palm oil producer in the world and contributed as much as 60% from world palm oil production. The distribution of palm oil plantations in Indonesia spread across the large islands such as Kalimantan and Sumatera, with total area 7,873,840 ha. Total palm oil industry in Indonesia is estimated 608 industries with production capacity 34,280 tons fresh fruit bunch (FFB)/ hour. As the nature of production activities, the palm oil industry generates waste; both solid and liquid waste. The common liquid waste of the palm oil industry is the Palm Oil Mill Effluent (POME), while solid wastes consist of Empty Fruit Bunches (EFB), frond, trunks, and mezzo-scarp fibers. The estimated potency of palm oil waste can be seen as follow;

TOTAL AREA IN INDONESIA (ha)	*PRODUCTION CAPACITY (tones ffb/hour)*	*TOTAL SOLID WASTES*		*POME (m3/hours)*	*TRUNK WASTE (ha/year)*
		EFB (tones/year)	*FROND (tones/year)*		
7,873,840	*34,280*	***39,369,200***	*81,887,936*	*17.145*	*314,954*

Source: Ministry of Agriculture, 2012.

One of the palm oil waste treatment potencies is bio-waste conversion to energy and the opportunity comes from EFB utilization. The utilization is estimated to generate electricity up to 800-1000 MW. Currently, EFB is utilized as electricity sources through burning technology in biomass power generator. However, the most difficult barrier of utilizing EFB as a raw material in biomass power generator is high moisture content (over 60%). Therefore, it is needed a huge energy for reducing its moisture content. On the other hand, EFB is also utilized as mulch (land cover) on palm oil plantation that requires high cost for transportation and directly emit GHG. It also can be utilized to produce compost.

With the high moisture content, anaerobic digester technology is more appropriate than burning technology to be applied in biomass power generator. This anaerobic digester technology transforms EFB into biogas and organic fertilizer. As a renewable energy, biogas can be optimized as an electricity sources. Currently, there is lack of knowledge on the best anaerobic digester for EFB processing technology especially for the large scale as well as its effectiveness and efficient.

Considering all those mentioned problems, some actions are required to tackle the problem toward EFB conversion to energy. The actions requested to CTCN will be technology transfer for the Development of Anaerobic Digester Technology to treat the EFB waste. The technology is expected to enhance the recent EFB waste management, especially in supporting national energy policy & target. This assistance is targeted to local expert (R&D institution – universities), the industry as the impacted party, and any related stakeholder involved. It may cover two main component:

- *The identification of the best technology for EFB waste processing;*
  - *This component is proposed to find the best technology that suitable with the current condition of EFB waste management in Indonesia. An initial mapping should be addressed first to give clear baseline condition on palm oil solid waste management in Indonesia,*

followed by identification of the technology both national and internationally.

- *The technology transfer for the best anaerobic technology for the EFB waste;*
  - *This component is proposed to enhance the capacity and quality of the local expert (R&D institution- universities) in developing the best technology for EFB waste management in Indonesia. Knowledge exchange of the selected technology is carried out through collaborating both local and international experts that include a demonstration project.*

Past and ongoing efforts *(up to half a page):*

There are many researches on the EFB utilization using anaerobic digester technology have been conducted by universities and research institutions in Indonesia. Several demo plants have also been implemented for municipal solid waste. Internationally, this technology has been implemented for other solid bio waste treatment for instance municipal, plantation, and agriculture waste.

The challenge is how to implement the anaerobic digester technology commercially for EFB waste treatment. Therefore, the CTCN technical assistance is expected to develop the commercial anaerobic digester for EFB waste treatment. It needs knowledge and technology transfer and how to find appropriate technology. All of this can also improve the local capacity.

Assistance requested *(up to one page):*

The request is basically a kind of technology transfer for the Development of EFB Waste Treatment using Anaerobic Digester Technology. In more detail, it will cover:

- *The identification of the best technology for EFB waste processing;*
  - *Mapping out the existing anaerobic digester technologies for EFB waste treatment national and internationally.*
  - *Determine the best technology for EFB waste treatment in Indonesia*
- *The technology transfer for the best anaerobic digester technology for EFB waste treatment;*
  - *Knowledge exchange through capacity building and expert collaborations*
  - *International collaboration research and development for EFB waste treatment in Indonesia*
  - *Developing a demo plant of EFB anaerobic digester including design for the best anaerobic digester for EFB waste treatment in Indonesia.*

The activities that will be conducted as the elaboration of the request may cover:

- *Survey and FGD on the current condition of anaerobic digester technology for EFB waste treatment in Indonesia*
- *Field visit, FGD, workshop, meet the technology provider and knowledge exchanges with related institutions or countries related to anaerobic digester technology*
- *Identification of the best technology option that can be used for palm oil EFB waste treatment, include technology required, specification of technology and service provider*
- *The technical assistance for the best design of anaerobic digester technology for EFB waste treatment*
- *Constructing EFB anaerobic digester demo plant with the partners.*
- *Develop the feasibility study for full scale plant*
- *Develop the proposal for implementing full scale project feasibility study*

- *Dissemination Workshop*

Expected benefits*(up to half a page):*

The Development of Anaerobic Digester Technology for EFB Waste in Indonesia is expected to shift the existing EFB waste treatment into more efficient and more benefit product. The EFB waste processing using the best technology would produce renewable energy and reduce the green house gas emission as detailed below;

- *Medium term, the CTCN support will reform the existing approaches on EFB waste treatment. There will be the availability of commercial technology for EFB waste treatment using best anaerobic digester technology that produce biogas to substitute the fossil fuel for power generation.*
- *Long term, this program will leverage the mass implementation of EFB waste treatment technology. Further, it contributes in reducing Indonesia's GHG emission and supports the energy mix strategy 23% in 2025, creating new business on power generation and increasing the electricity ratio for the remote area.*

Post-technical assistance plans *(up to half a page):*

- *Finding the partner for implementing the proposal for feasibility study full scale project to donor and international funding (GCF, GEF, etc).*
- *Implementation of the first full scale project*

Key stakeholders:

In the implementation of the project, coordination with other institutions/ stakeholder is importantly required especially to discuss the project implementation. Below is the table of stakeholders and their contributions according to their role to support the implementation of the assistance and to whom the result of these activities would be useful and given as beneficiaries.

Stakeholder	Role to support the implementation of the assistance
University of Lampung	*Project Proponent*
State-Owned Nusantara Plantation and Palm Oil Company	*Beneficiary of the project*
Ministry of Environment and Forestry	*Policy formulation and implementation of research and development*
Ministry of Energy and Mineral Resources	*Implementing the government of Indonesia policies and regulations related to the energy sector which encompasses renewable and non-renewable conventional sources of energy*
Indonesia's Oil Palm Research Institute	*Develop research and technology to obtain high quality oil palm wood and oil palm plywood*
National Council on Climate Change (NCCC)	*Policy formulation and implementation of research and development regarding climate change*
Center of Research and Development of Forestry Product, Ministry of Environment and Forestry	*Policy recommendation and R & D implementation*

Alignment with national priorities *(up to half a page):*

- *The palm oil EFB utilization can be considered as one of the options of waste treatment to reduce GHG emission that has become commitment of the Government of Indonesia in reducing GHG emission as much as 26% by own capacity and 41% with international support. This commitment as stated in the Presidential Regulation No. 61/ 2011 that has strong alignment with National Middle and Long-Term Development Plan.*
- *Presidential Regulation No.28/2008 about the national industrial policy, government can provide facilities in the form of fiscal incentives, non-fiscal incentives and other benefits.*
- *In the Technology Needs Assessment (TNA) for Climate Change Mitigation 2010, it is mentioned that one of the priorities is the waste to energy. One of the big potential wastes to energy is from palm oil plantations and industry, including EFB.*
- *Supporting the ISPO (Indonesian Sustainable Palm Oil) programs.*

Development of the request *(up to half a page):*

This proposal was initiated by University of Lampung based of the request from palm oil industries. The development of this proposal was supported by TPSA-BPPT as a CTN-Indonesia.

The stakeholders involved are University of Lampung, State-Owned Nusantara Plantation and Palm Oil Company, Indonesia's Oil Palm Research Institute and NCCC. Some consultations have been conducted among the stakeholders during the development of this proposal. This proposal was reviewed by the technical committee of the NDE that consists of related stakeholders and was approved by the head of NDE through steering committee meeting.

Expected timeframe:

This project is expected to be carried out in 1 year with the time schedule as follows

No.	Activities	Time (per 1 month)											
		1	2	3	4	5	6	7	8	9	10	11	12
1	*Survey and FGD on the current condition of anaerobic digester technology for EFB waste treatment in Indonesia*												
2	*Field visit, FGD, workshop, meet the technology provider and knowledge exchanges with related institutions or countries related to anaerobic digester technology*												
3	*Identification the best technology option that can be used for palm oil EFB waste treatment, include technology required, specification of technology and service provider*												
4	*The technical assistance for the best design of anaerobic digester technology for EFB waste treatment*												

5	*Constructing EFB anaerobic digester demo plant with the partners*					■	■	■					
6	*Develop the feasibility study for full scale plant*							■	■	■	■	■	
7	*Develop the proposal for implementing full scale project feasibility study*										■	■	
8	*Dissemination Workshop*												■

Background documents:

National policies have been formulated to overcome the impact of climate change from the sectors. These are as parts of the implementation of various endeavors to mitigate the climate change. The national related policies documents are listed below:

- *Technlogy Needs Assesment (TNA) for Adaptation and Mitigation, 2010 and 2012. (http://dnpi.go.id/portal/en/berita/berita-terbaru/328-tna-mitigasi-dan-adaptasi-perubahan-iklim)*
- *National Mitigation Action Plan for Reducing Greenhouse Gas Emission (RAN-GRK), 2011*
- *Indonesia Climate Change Sectoral Road Map, 2010. (http://old.bappenas.go.id/get-file-server/node/10619/)*
- *Palm Oil Industry Waste Management Guidelines, Ministry of Agriculture (http://pphp.deptan.go.id/xplore/view.php?file=PENGOLAHAN-HASIL/B3olahlimbahkelapasawit.pdf.)*
- *Research of Biogas from Palm Oil Waste, Ministry of Research and Technology (http://km.ristek.go.id/assets/files/LIPI/1069%20D%20S%20n/1069.pdf.)*
- *Waste Water Management in Palm Oil Mill, Ministry of Environment (www.env.go.jp/air/tech/ine/asia/indonesia/files/guide/guideline-in.pdf)*
- *Converting Waste Oil Pam Trees into a Resource, UNEP (www.unep.org/.../Waste%20Palm%20Tree%20study%20report%20publi...)*

Monitoring and impact of the assistance:

{Read carefully and tick the boxes below.}

☒ By signing this request, I affirm that processes are in place in the country to monitor and evaluate the assistance provided by the CTCN. I understand that these processes will be explicitly identified in the Response Plan in collaboration with the CTC, and that they will be used in the country to monitor the implementation of the CTCN assistance.

☒ I understand that, after the completion of the requested assistance, I shall support CTCN efforts to measure the success and effects of the support provided, including its short, medium and long-term impacts in the country.

Signature:

NDE name: NDE Indonesia

Date:	14 January 2015
Signature:	Head of NDE Indonesia Secretariat 

THE COMPLETED FORM SHALL BE SENT TO THE CTCN@UNEP.ORG
Need help? The CTCN team is available to answer questions and guide you through the process of submitting a request. The CTCN team welcomes suggestions to improve this form.
>>> Contact the CTCN team at ctcn@unep.org