FY2016 Project for Ministry of the Environment Japan

FY2016
Feasibility Study of JCM project for CO2 drastic reduction
Feasibility Study on Biomass Power Generation Fueled With Legally Cultivated Crop Residues in Pesisir Selatan Regency, West Sumatra Province, Indonesia
Report

March 2017

NTT Data Institute of Management Consulting, Inc.

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1.1 The outline of Sumatra Island

(1) Basic information

A) Overview of Sumatra Island[1]

Sumatra Island is a region of the Republic of Indonesia, which consists of Sumatra Island, Java Island, Kalimantan Island, Sulawesi Island and other peripheral islands that belong to the Greater Sunda Islands.
Sumatra Island is also known as Sumatera with a population of 49 million and a land area of 47,000 sq. km making it the largest island in the world.

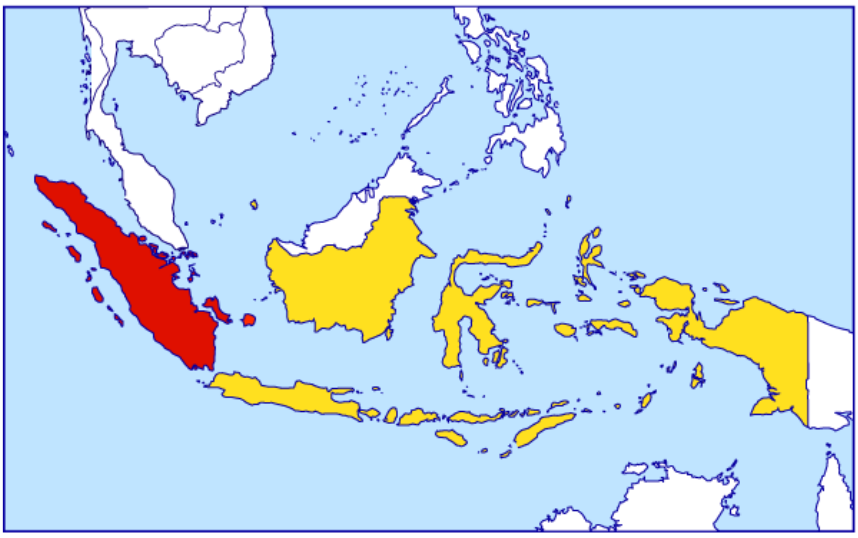


Figure 1 Location of Sumatra Island in Indonesia[2]

a. Geography

Sumatra Island is located over the equator, as an elongated form from north-west to south-east. The south-west of the island faces the Indian Ocean and the north-east area faces the Straits of Malacca and South China Sea. The island is 1,790 km long and 435 km wide. The western and eastern coasts are surrounded by small islands. Along the western coast are the volcanic Barisan Mountains, with Mount Kerinci (3,805m) as the peak.

There is a large alluvium plain at the eastern part of eastern to southern island. This was formed by several large rivers such as the Musi River, Batang Hari, Indragiri and Kampar which originated from its huge mountain ranges. Most the plain is marshland which is covered by tropical forest. At these large rivers, several plans are ongoing for hydroelectric power plants. At the south of Medan is Lake Toba, which is a caldera lake resulting from the largest volcanic eruption on earth 2 million years ago. Most of the Sumatra population

[1] http://www.support-in-indonesia.com/indonesia_sumatera.html
[2] http://www.sera9.com/ttvasia/ttvasia-id/id-Area-Sumatra.html

is concentrated around the central highlands. Most the eastern part is marshland with a small population. Aceh Darussalam is located to the north which has been a trade center for centuries. It is also the earliest region that accepted the Islamic religion.

Figure 2　Map of Sumatra Island

b.　Industry

The main industry on Sumatra Island are the large-scale plantations that grow tobacco, tea, rubber, palm oil and so on. Also the island is rich in natural resources such as oil, natural gas, tin, bauxite and coal. Over half the island is covered by tropical forest and logging and land development is being undertaken. The primary sector of industry accounts for 22% of the GDP, higher than the national average of Indonesia (15%). Mining accounts for 18.4%. In recent years the market is expanding due to a growing economy.

c.　Climate

The island climate is tropical monsoon with a short dry season, except for the mountain highlands.

The annual average temperatures is 26-29 degrees Celsius. The annual precipitation is 2,333 ml. However, the Western coast has a much higher precipitation (4,000 ml) due to the influence of the south-west Monsoon climate.

d.　Nature

Due to this hot and humid climate and abundant rainfall, the island is rich flora. Also there are many unique animal species such as the

Sumatran tiger, Sumatran rhinoceros, Sumatran elephant and Sumatran orangutan. The total area of the tropical rainforest is well over 2million ha which contains the Gunung Leuser National Park (860,000 ha), Kerinai Seblat National Park (1,380,000 ha) and the Bukit Barisan National Park (360,000 ha). These areas of rain forests are all conservation areas. In these tropical rain forests, there over 10,000 plant species (including 17 unique species), 200 mammal species (including 15 unique species) and 580 avian species (including 21 unique species). This region has been selected for "Global 200" which the WWF has selected as an eco-region to conserve the region with highest priority.

e. Administrative division
Sumatra Island 10 administrative wards
1. Aceh Daruussalem (capital: Banda Aceh)
2. Banka-Belitung Islands Province (capital: Pankal Pinang)
3. Bengkulu (capital: Bengkulu)
4. Jambi Province (capital: Jambi City)
5. Lampung Province (capital: Bandar Lampung)
6. Riau (capital: Pekanbaru)
7. Riau Islands Province (capital: Tanjung Pinang)
8. West Sumatra Province (capital: Padang)
9. South Sumatra Province (capital: Palembang)
10. North Sumatra Province (capital: Medan)

A) Outline of Pesisir Selatan Regency

Pesisir Seletan Regency is the main survey region of the project. The following is the outline of the region:

Figure 3 logo mark of Pesisir Selatan Regency;

A traditional style of architecture of the Minanghkabau people where the roof shapes are based upon buffalo horns

a. Geography

Pesisir Selatan Regency belongs to the West Sumatra Province which is located on the west coast of central Sumatra Island.

b. Population

Its population was 442,681 in 2013, a rise of 6000 over previous year and is still growing. There is a World Heritage site in this region, but economic growth is necessary due to population growth.

c. Industry

The main industry is agriculture with rice and corn cultivation. However, productivity is not so high and is the lowest in West Sumatra. In particular, the quality control of rice and corn after harvest is very difficult due to inadequate humidity and temperature control, resulting in low product quality and market value which inhibits the economic growth of this region.

The Kerinci Seblat National Park (KSNP) is registered as a World Heritage site although there several issues such as poaching, illegal logging and expansion of cultivation. Appropriate economic development is much needed for this region.

d. Kerinci Seblat National Park

Pesisir Selatan is located on the west coast of central Sumatra and 51% of this region is the Kerinci Seblat National Park. The KSNP is the largest National Park in Indonesia and together with two other National Parks forms the Tropical Rainforest Heritage of Sumatra(TRHS; reference no 1167), which is the largest of its kind in South-East Asia.

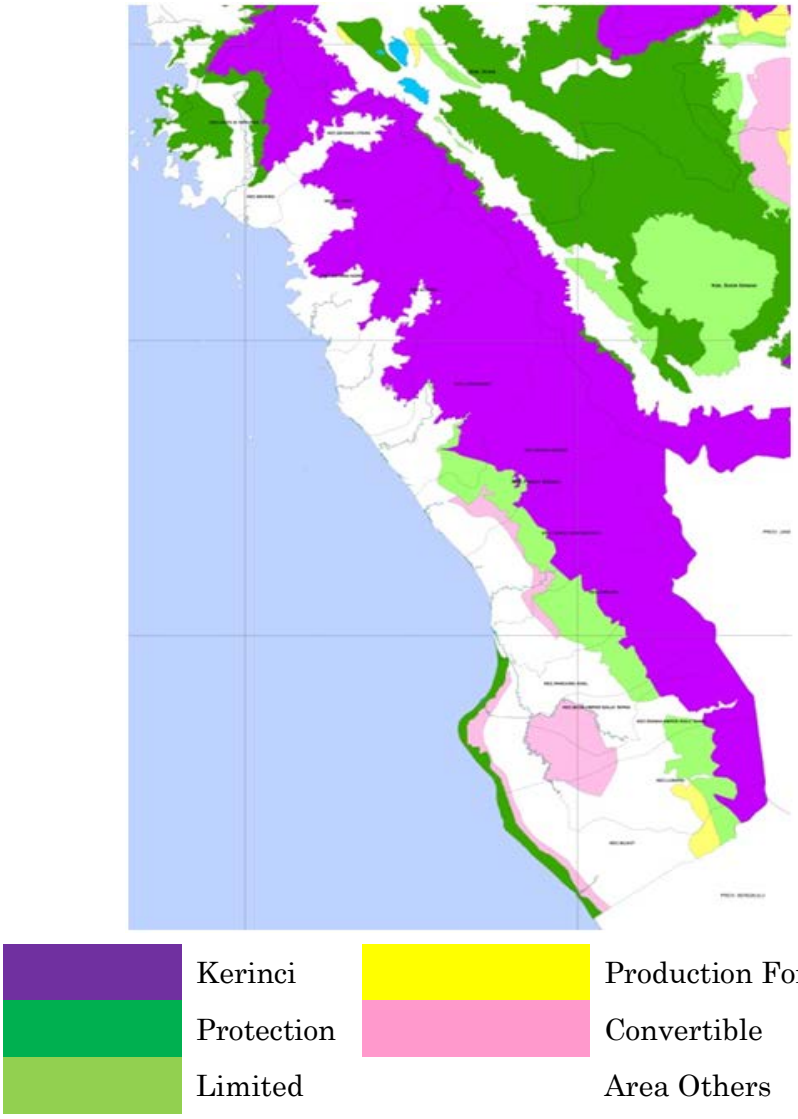


Figure 4 map showing land classification on the western Sumatra Island

1.2 Policies of the Indonesian government for reducing greenhouse gas emissions

(1) Current status of greenhouse gas emission in Indonesia

According to the International Energy Agency (IEA) the greenhouse gas emission of Indonesia is 380 million tons as of 2009, which is the 15th in the world. This is far less compared to China's 6.9 billion tons and the United States 5.2 billion tons.

On the other hand, Wetland International reported in 2006 that Indonesia was the world's third highest for greenhouse gas emissions after China and the United States considering forest fires and peat decomposition.

President Yudhoyono established the Dewan National Perubahan Iklim (National Council of Climatic Change) which consists of cabinet members, government officials and experts. The Council submitted a report "Indonesia's Greenhouse Gas Abatement Cost Curve, Jakarta, August 2010" which stated that Indonesia is the world's third largest producer of greenhouse gas emissions.

Being the world's third largest is due to peat gases, Lands Use, Land Use Change and Forestry (referred to as LULUCF) which was included in the total greenhouse gas emissions in 2005 of 2.1 billion tons and is estimated to increase to 3.3 billion tons by 2030. On the other hand, the potential reduction of greenhouse gas emissions from peat land and LULUCF is estimated to be 1.8 billion tons by 2030, which accounts for over 75% of the total emission (DNPI, 2010).According to the above report, the greenhouse gas emission of Indonesia was 2.1 billion tons in 2005 when converted into CO2 emission. This includes emission of 840 million tons from logging, forest destruction, and fires which accounted for 41% of the total. Furthermore, 770 million tons of emission (37% of the total) from peat land is added. Thus the report estimated that the total emissions will increase to 3.3 billion tons by 2030.

However, if 5 appropriate measures are taken (which will not cost so much, it is possible to reduce emissions by 190 million tons by 2030. These are: 1) control of forest logging, 2) fire prevention of the peat land, 3) improvement of peat land, 4) sustainable forest management and 5) restoration of deteriorated forest.

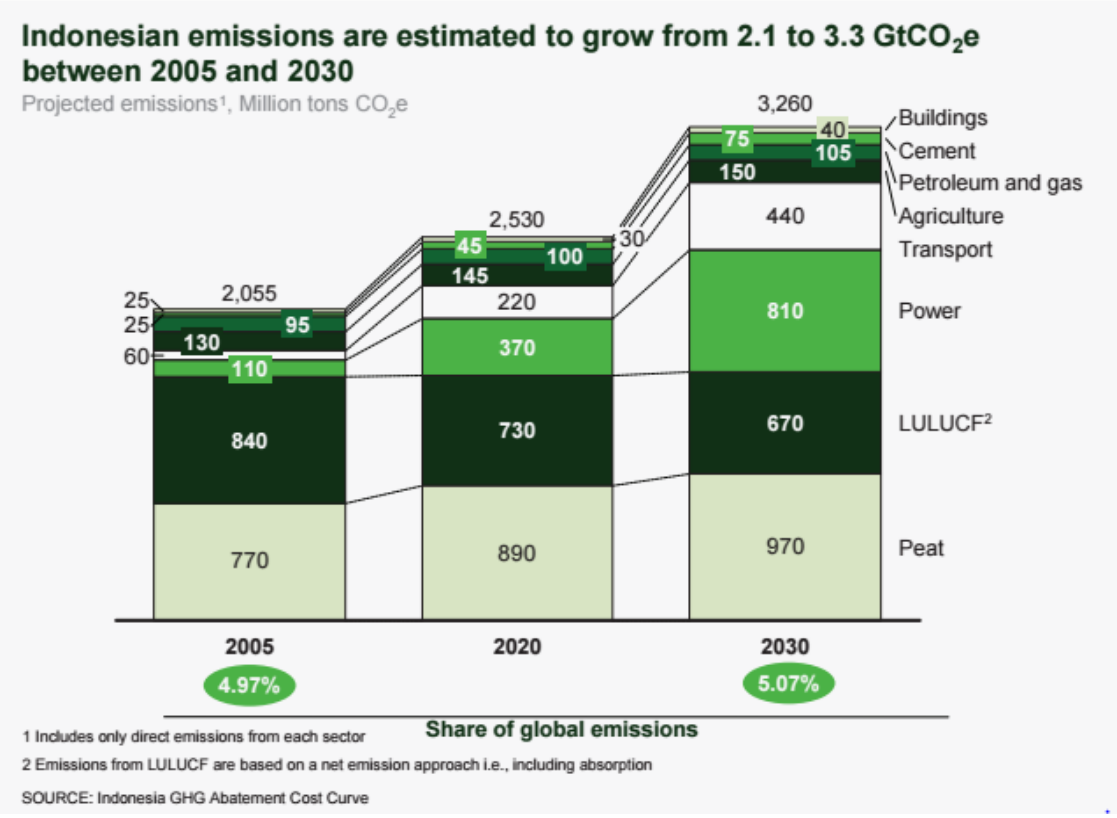


Figure 5 EstimatedCO2 emissions e from 2005 to 2030 in Indonesia[3]

Indonesia declared to take measures to reduce the greenhouse gas emissions in 2010, the first country to do so among developing nations. The goal was set to reduce greenhouse gas emissions by 26% by 2020, compared to no measures being taken. Also the President issued regulation to decrease these emissions in 2011 (RAN-GRK). Furthermore, individual sector plans were set to reduce emissions and signed in by President Yudhoyono. With these measures, Indonesia would be able to reduce the total estimated emissions by 26% by 2020. If the advanced nations extended some form of funding or other support, the emission reduction could reach a maximum of 41%.

[3] Dewan Nasional Perubahan Iklim Indonesia(2010) Indonesia's greenhouse gas abatement cost curve

1.3 The current work and challenges of the Indonesian Government to reduce the greenhouse gas emission

(1) Biomass waste piled up out in the open or burned off

The survey target area of this project, the South Pesisir Regency, is a large granary area where the cultivation of rice and corn crops is repeated throughout the year. This generates a large amount of biomass waste, such as rice husks, rice straw, and corn stalks and cores. However, this biomass waste is currently being either piled up out in the open or burned off, and is not necessarily being processed properly.

Since methane gas may be generated when stored biomass waste is left for a long period of time, long-term abandonment leads to the waste fermenting, reaching high temperatures and spontaneously combusting, thus becoming a source of greenhouse gases. Regardless of whether due to spontaneous combustion or burning-off in fields, the smoke hazard (haze) generated by the combustion of biomass waste has become an international issue that is also being viewed as a problem by neighboring Malaysia and Singapore.

Figure 6 Burned corn stover

Figure 7　Burning smoke spreads in the national park

(2) Heritages in danger

As previously mentioned, South Pesisir Regency is the survey target area of this project, and Kerinci Seblat National Park accounts for 51% of its area. However, this national park was designated as a World Heritage in Danger in 2012. The main reasons for this were the development of roads and the destruction of forests through illegal logging of forest areas. Some residents who have lived in the area prior to it becoming a national park have not left the sites inside the national park, and after having cleared forest and sold timber, have been cultivating palm and corn, thus destroying the ecosystem. Where forest has been cleared, there are many sites where the ground is exposed, and there is the danger of landslides, etc., in the event of rain. When exploiting the forests, they are also engaging in activities such as slash-and-burn farming, and this can also result in large-scale forest fires.

Such illegal activity is a big challenge currently being faced by the rangers in charge of protecting the national park, but it is not a problem that can be solved overnight, because there are many people who will lose their jobs if they are made to leave the forests. In the future, there is a need to aim for growth throughout the local economy.

Figure 8 The surface is exposed by illegal tree cutting

(3) Electrification percentage

As of 2010, the electrification rate of Sumatra Island is about 62.5%, which is an electrification rate higher than other areas except for Java and Bali. The Sumatran power system, with the northern and southern parts having been interconnected and synchronized by 150 kV transmission lines on August 14, 2007, is relatively developed. Furthermore, as shown in the figure below, PLN is promoting transmission line improvement plans for 275 kV and 500 kV in the future. However, although the power grid network is relatively developed, it is a region where it is difficult to supply electric power, and the author also experienced repeated power failures during the field survey stay.

PLN, which is primarily responsible for power development in Indonesia, has not been able to respond adequately to the rapidly growing demand for electricity, and the power supply system, indispensable for consumer and industry, is inadequate. This has become a bottleneck in Indonesia's economic growth. In addition, the electrification rate of Indonesia remains at 71.2% (2011), and it is said that about 20 million households (around 80 million people) cannot access public electricity. Because reduction of the burden on citizens is a fundamental part of current power-related policies, PLN, which is responsible for power development, cannot pass the costs of generation (increased fuel costs) on to the end customer, and structural problem is occurring whereby the unit price of power generation is higher than the unit price of retail. Also, since PLN has fallen into a state of chronic shortage of funding, it is said that it will also be difficult for them to create a power source that meets the demand for electricity in the future by themselves. Therefore, the Government has improved the legal system, by revising its electricity laws and enacting a feed-in tariff, etc., as well as formulating a crash program for an emergency power generation plan, and there are growing expectations for entry of private capital.

Figure 9 Sumatra island power transmission network development plan[4]

[4]出典：PLN、「2012-2021 電源開発計画（RUPTL）」2012 年 12 月

Table 1 Electrification rate of each state in Sumatra Island (2012)

州名	人口(千人)	世帯数(千世帯)	電化率(%)
アチェ州	4,693.9	1,105.1	88.55
北スマトラ州	13,215.4	3,112.5	84.61
西スマトラ州	4,957.7	1,182.5	72.98
南スマトラ州	7,701.5	1,870.2	63.09
ブンクル州	1,766.8	445.5	71.02
リアウ諸島州	811.5	192.1	72.13
ランプン州	7,767.3	1,985.0	65.29
バンカ・ブリトゥン州	1,298.2	324.6	73.94
リアウ州	5,929.2	1,394.7	56.52
ジャンビ州	3,242.8	800.4	58.05
合計	51,384.3	12,412.6	71.69

The economic growth rate is expected to reach 7.1%, the annual average electricity demand growth rate is 8.2%, and the electricity demand is expected to reach 65.4 TWh in 2021. In addition, the electric power system of Sumatra is planned to have a supply reserve capacity of 59% in 2021, and plans to supply many new power sources with fossil fuel system power supply[5].

Table 2 Power supply plan for Sumatra Isrand

人口成長率	年間平均 経済成長率	年間平均 電力需要成長率	2021 年時点 電力需要(MW)	2021 年時点 電力需要(GWh)
1.8%	7.1%	10%	10,516MW	55,272GWh

[6]

[5]出典:PLN、「PLN Statistics 2012」2013 年 3 月
[6] PLN、「2012-2021 電源開発計画(RUPTL)」2012 年 12 月

2.1 Outline of the project (purpose and target areas)

(1) The purpose of the project

As a result of rice and corn cultivation within a World Heritage site, a huge amount of biomass waste is not used efficiently, and by utilizing the biomass waste as fuel for a power plant, it is possible to reduce CO2 emission and at the same time supply stable electricity for polishing rice. This project will enable such implementation.

(2) Target area of the project

The project will introduce renewable energy by using biomass waste.

2.2 Applicable technologies and related laws and regulations

A) Applicable technologies

A) Outline of the thermal power plants using biomass waste

Introduction of biomass thermal power plants using rice husk was studied for the project. The biomass waste is a renewable and organic resource derived from plants and animals; the most representative is waste from livestock, household waste, wood chips and rice husk. As the carbon in biomass waste is originally created through photosynthesis by plants using CO2 in the air, even the CO2 emitted through burning will not increase atmospheric CO2 due to the principle of carbon neutral.

B) Record of the implementation of applicable technologies

For this project we were able to receive technological support from Meidensha Corporation, which built a biomass thermal power plant in Thailand in May 2003 using rice husk with a power output of 9.95 MW. By utilizing the technological know-how of Meidensha it will be possible to realize power generation by using low calorie biomass waste. This company's power plant using rice husk is the largest of its kind in Thailand.

C) Superiority of Japanese technology

Meidensha Corporation possesses the comprehensive EPC achievements from a long-term stable operation, technological and design expertise to maximize energy efficiency, the procurement of equipment and construction plus verification tests. Therefore it will be possible to conduct the survey and verification test with high precision.

The plant under consideration is a stoker furnace which is already in use. It is assumed that the initial investment can be controlled and the running costs are relatively low. Therefore, even if the low calorie waste is used this will not become a problem.

B) Related laws and regulations

A) Environmental Control Law

The Environmental Control Law (number 32) was established in 2009 in Indonesia which is equivalent to the Environmental Basic Law in Japan. Prior to this law, the Environmental Control Basic Law was established in1982 and was revised in1997 and named the "Environmental Control Law".

The law consists of 17 chapters and 127 articles: general rules, purpose and goals, plans utilization, control, environmental control program and monitoring program (UKL-UPL), disaster prevention, control hazardous and toxic matters, rights duties and prohibitions, public involvement, supervisory and administrative actions, handling of environmental disputes, investigation and verification, penalty rules, observations measures and conclusion.

When the previous law (enacted in 1982) was revised, the environmental regulations for corporate activities and penalty regulations were enforced as well as upgrading the regulations for handling disputes and the introduction of public rights for access to environmental information.

When the law was revised again in 2009, the rights and penalty regulations of the environmental authority was further reinforced. After this revision, the authority was given the right to conduct investigations together with the police and could arrest law breakers.

As for specific control such as air or water pollution, these were specified by governmental decree. The legal framework for the environment reflects the power distribution to local governments which was accelerated since1998. For waste management, the law was enacted in 2008, not the government decree.

As for water pollution, the governmental decree (2001 decree #82) to prevent water pollution and control water management was issued.

There are also the governmental decrees to prevent air pollution (1999), the decree to manage hazardous waste (2014), the decree for the environmental impact assessment (2012) and the local government law (2004).

The environmental values necessary to conduct such decrees are further stipulated by Ministerial decrees or regulations or by target facilities in detail.

B) Prevention of air pollution

The regulations to prevent air pollution in Indonesia is in the governmental decree in 1999 number 41.

This decree stipulates the air pollution control as follows: the Ministry of Environment creates the guidelines to set air pollution standards, set the standard of emissions from fixed sources or mobile sources as well as setting technological guidelines to control air pollution, and the Ministry has the duty to implement such guidelines. Also the Ministry must create the policies to deal with Ozone Depletion Substances (ODS)

The governor of a Province can issue a decree to control air pollution by assessing the National or Provincial pollution standards. However, such decrees must be reviewed every five years. For example, the Special Capital Territory of Jakarta, East Java and Kalimantan can set their own air pollution standard.

Governors and mayors implement the regional environmental control under the supervision of the governor of the Province.

C) Environmental impact assessment

Environmental impact assessment the environmental impact assessment system (AMDAL) was introduced in 1986 based on article 16 of the Environmental Control Law of 1983, which stipulates that any businesses or projects that may impact the environment greatly must conduct an environmental impact assessment. In 1993, the government decree of environmental impact assessment (number 51) made a fundamental revision of the system, such as simplification of the initial screening process and the enforcement of the rights of the Environmental Impact Agency when several Ministries and Agencies are involved for assessment. The decree was revised in1999 and again in 2012 (2012 government decree No. 27).

As for the type and scale of businesses or activities subject for the environmental impact assessment, it is stipulated in the Regulation by the Minister of Environment for businesses and activities which require Environmental Impact Assessment (2012, No. 5).

2.3 Project Member

The member of this project is shown as below:

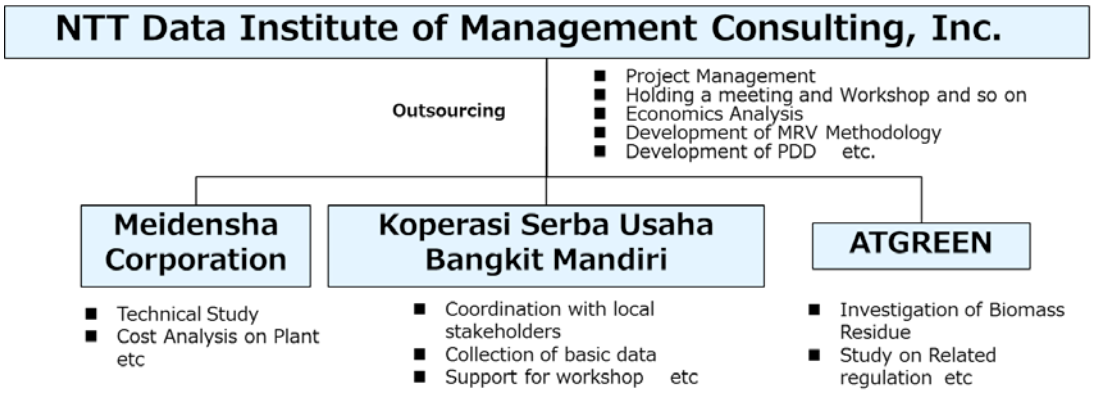


Figure 10 Project Member

2.4 Method of survey studies and time frame

(1) Survey study

The survey method of this project is shown below:

Table 3 the method of this survey

No.	Issues to be solved by study	Commitment (Due date)	Actor	Organization	Contents
1	Confirmation of retrievable biomass waste amount	Confirm irretrievability of A sufficient amount of biomass waste for project implementation	NTT , ATGREEN	Local cooperative	・Confirm status of rice milling in operation ・Confirm the terms of a contract on collecting chaff of local cooperative and farmer
2	Confirmation of retrievable biomass waste quality	Confirm composition and calorie of biomass waste	NTT, ATGREEN	Local cooperative	・Confirm retrievable biomass waste quality by sampling and composition analysis
3	Confirmation of collecting method biomass waste	Get information of collecting method and cost for biomass waste in each district	NTT, ATGREEN	Local cooperative	・Investigation of biomass waste emission source ・Study of collecting method of biomass waste
4	Confirmation of land installable land for plant	Confirm place, area and Utility where it would be possible to establish without national park area	NTT MEIDENSHA	Local cooperative	・Confirm place, area and Status of development where it would be possible to establish without national park area ・Confirm procurable utility (e.g. water) at the site
5	Confirmation of control and procedure on installation plant	Confirm necessary procedure in construction at the study target area	NTT MEIDENSHA	Local cooperative and so on	・Confirm legal system on environmental assessment, construction approval plant perating approval and so on.
6	Confirmation of status of development of transmission network	Confirm status of transmission network rail in the study target area	NTT MEIDENSHA	Local cooperative	・Survey of candidate sites for installation of plants
7	Study of applicable technologies	consider applicable technologies based on the results of No. 1, 2, 3.	MEIDENSHA	-	・Estimate electricity generated ・Fundamental design of plant ・Calculate initial cost and running cost
8	Confirmation of the legal system on electricity sales	Confirm information of Feed-in tariff and the detail conditions	NTT	PLN	・Confirm information of Feed-in tariff and the detail conditions
9	Economic efficiency study, Commercialization evaluation, Calculate CO2 GHGs reduced	Implement commercialization evaluation and calculate CO2 GHGs reduced calculate based on the results of No. 6, 7	NTT	-	・Implement comprehensive assessment through payback period and IRR ・Study MRV
10	Discover financial supporter for the on-site project implementation	Discover financial supporter by the end of the project	NTT	Domestic company	・Extract financial supporter at the on-site project implementation
11	Confirmation of fund-raising method and financial condition of main organization for JCM project	After No.8, confirm financial condition of main organization for JCM project and fund-raising method for of JCM industrialization	NTT	local company	・Confirm financial condition of main organization for JCM project and fund-raising method for of JCM industrialization
12	Confirmation of order and contract method	Confirm whether bidding is necessary or not, and possibility of private contract	NTT	local company	Confirm whether bidding is necessary or not, and possibility of private contract
13	Extraction of representative company at the JCM industrialization	Extract representative company at the JCM industrialization	NTT	Domestic company	・Descript operation program so that conduct a invitation candidate organization

(2) Time frame

The implementation time frame is shown below:

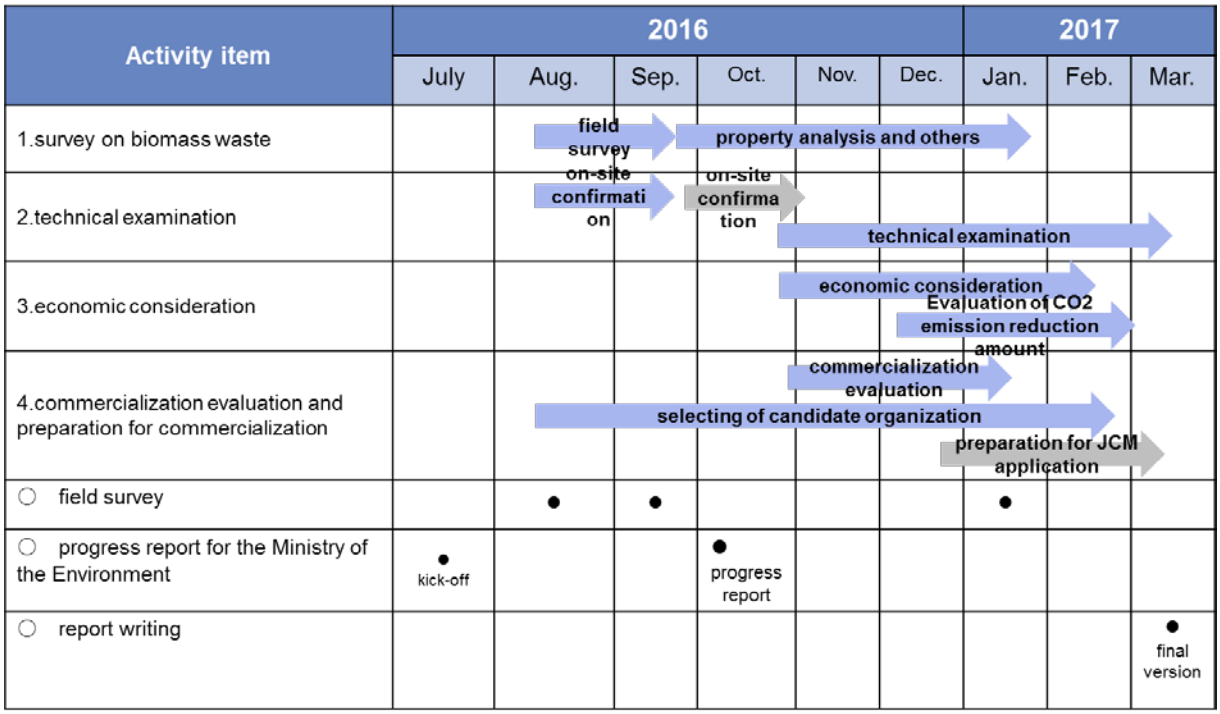


Figure 11 Gantt chart for project management

3.1 Survey of biomass waste

(1) Confirmation of the existing biomass waste

In order to confirm the amount of biomass waste we conducted a field survey twice (first from Aug. 1st-9th 2016 and second from Sept. 21st-24th 2016). During these surveys we confirmed the status of how the corn cobs are generated, stored, disposed of and utilized. We also carried out auditory surveys.

A) Rice Husk

The location of rice mills where rice husk is generated are shown below:

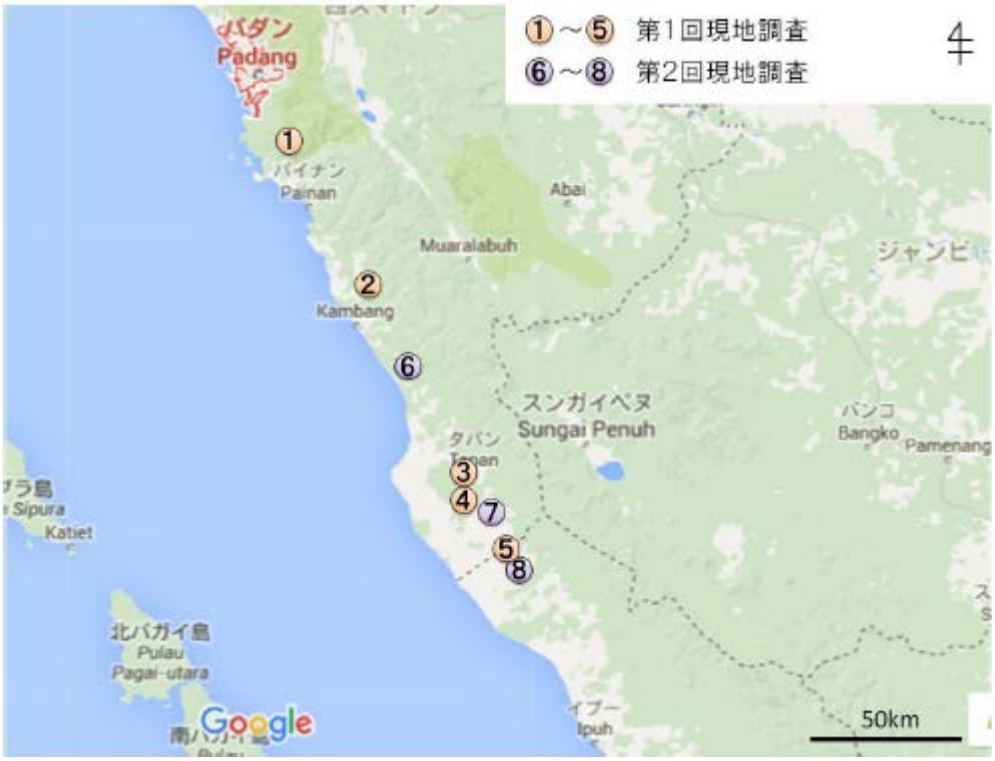


Figure 12 plotted the place where rice husk, rice straw produced

The amount of rice husk generated differs according to mill size. However, as the technology and facilities of the rice mills become more advanced and larger scale (See Table 2 location 3), small rice mills will become integrated into larger ones thus enabling an easier collection of rice husk. The utilization of rice husk is basically for burning in the field or in some cases where they are used as applied fuel. In cases where rice husk is burnt in fields, they are piled up.

The quality of Indonesian rice is not so good because of lack of polishing technology (not dried completely) and has a specific smell. Therefore, the national rice market is dominated by imports of rice from Thailand, which are cheaper (8,000 IDR/t) and of higher quality whereas the price of domestic rice (Pesisir Seletan produced) is 12,000 IDR/t. This project will help to increase a higher quality of Indonesian rice for consumption by Indonesians. Here is the potential to enhance the Indonesian economy on the whole.

We conducted an auditory survey of seasonal changes in rice husk generation.

1) Whether rice is double cropping or triple if sufficient irrigation, cultivated in each area over the year.
2) Appeals of agricultural cooperatives to local authorities for adjusting production season for all areas.
3) If the generation of rice husk becomes stagnant, deal with stored rice husk.

Table 4 situation on rice husk occurrence

	
Husk stock yard of Site①. It accumulates from the rice mill facility through the upper right pipe.	The field piling of Site⑤. It is found that it is left to the extent that weeds grow on the surface.
	
Incineration of Site②. Fire can not be seen, but smoked inside, and husk is always supplied.	Site④ Husk generation port and yard of the newly constructed rice mill.

B) Rice Straw

The generation of rice straw is shown at location 5 in Chart 1. They are stacked in each paddy field and incinerated on site. The path between paddy fields is very narrow and uneven. Therefore when collecting the rice straw consideration must be given as for the method of collection such as the use of stations.

Also for the operations of a fuel power plant, the pre-process of cutting the straw to the same length in order to avoid uneven drying of the fuel is necessary. But this will incur extra costs as well as causing a problem of mixing with other fuel materials with differing combustion characteristics. Therefore, the priority of collecting rice straw for this project is still too low.

Table 5 situation on rice straw occurrence

	
Piled out rice straw (pictured center) The footpath is very narrow like the left of the picture, it is a bad road.	Piled out rice straw
	
Rice straw burned beside rice paddy field burned (red circle part) dotted everywhere.	Because the road is narrow, a thresher circulates around each paddy field and separates paddy and rice straw.

C) Corn cob

Through the second field survey and auditory checks we studied the methods of collecting corn cobs.

In Pesisir Selatan the cultivation of rice and corn are double cropping (in some areas triple cropping).In particular, the cultivation of corn is heavily protected by the Indonesian government, as fertilizers and soil improvements are provided free of charge. The main use of the corn is for feed for domestic livestock. After the harvest, the corn is removed from the core and dried under the sun, packed in bags and shipped. In Northern Area 1, the corn is removed from the core manually. The core is then dried under the sun and used as cooking fuel. Below the Southern Area 1, there is much cultivation of corn, particularly in Ranah Pesisir. Also machinery is used for harvesting and the huge amount of corn cobs are not fully utilized and are discarded or burnt. There is a rental business for using such machinery, just like rice mills. It will be possible to collect the corn cobs efficiently in the Southern Area by using a similar scheme like rice mills. As for the seasonable change of supply of corn cobs, it is estimated to gain a stable supply throughout the year, just like the rice husk.

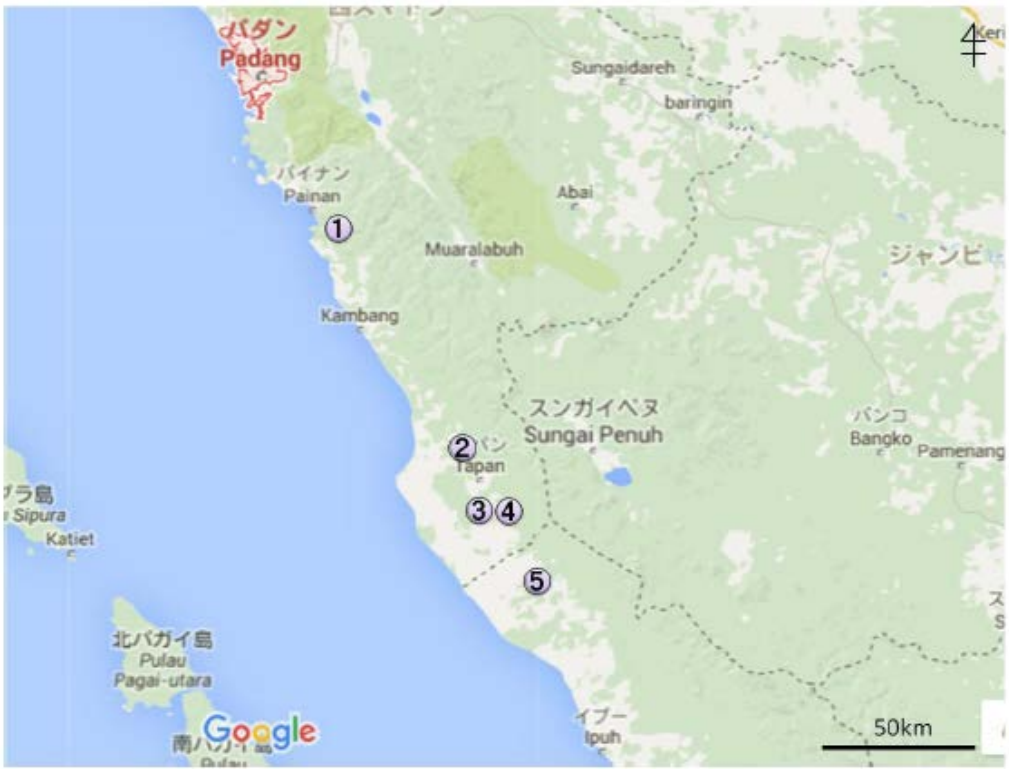


Figure 13 Map for Corn cob survey

Table 6 Current situation of Corn Cob

	
Region① Corn kernels is being sun-dried.	Region① corncob is being sun-dried. There are few defects in either case, and the size is large.
	
Region① Corn Cob preserved in bagging	Region① Usage of corncob as boiling cooking fuel
	
Region② Machine for stripping corn kernels	Region② A large amount of corn kernels are

	sun dried
	
Region③　Corncob dumped in a palm forest.	Region③Weathering has advanced and discoloration has occurred.
	
Region④　Even though it was not the eaves of a farmhouse, corncobs left casually unattended to	Region④　Corncobs are piled up on the ground directly

(2) Confirmation of the amount of collectable biomass

A) Target areas for the cultivation of collectable biomass waste.

In this project we conducted the calculation of collectable biomass waste based on the data collected from the local agricultural cooperatives as well as through our survey. At the main point of each area we were able to confirm the cultivation sites of rice and corn, the operations of threshing and the amounts of biomass waste.

Figure 14 Map of survey target area

B) Setting the collection rate

In this survey we conducted a simulation using the consistent rate of collection of rice husk and corn cobs for all areas, both 100% and 80% respectively. In the future, when realizing the project, we must ask farmer to supply biomass waste. Therefore a more precise collection rate is needed, considering the characteristics of each area, such as transportation distances and method.

Furthermore, the local cooperative's role will become more important in order to build up a good relationship with farmers so that they will supply biomass waste continually. In this project, we held a workshop in order to build consensus with each farmer and local authorities. The result of the workshop is shown later.

C) The definition of available biomass waste

In order to calculate the collectable biomass waste, the terms were defined as follows:

Table 7 Definition and calculation method of Abundance and Usable volume

Term	Definition	Calculation method
Abundance	It is the upper limit of the potential biomass waste theoretically required without considering various constraints and indicates the amount of biomass waste generated in one year in the area. (Abundance= Current consumption+ disposal volume+ unutilized consumption)	Hereinafter cited data from references. ・Padang Dalam Angka 2015 ・Kabupaten Mukomuko Dalam Angka 2016 ・Kabupaten Pesisir Selatan Dalam Angka 2016 ・Kabupaten Mukomuko Dalam Angka 2015 ・Kabupaten Padang Pariaman Dalam Angka 2016
Usable volume	It indicates the amount of biomass waste that can be expected to be recovered as the fuel of the combustion power generation plant among the abundance.	We set the proportion (recoverable rate) of recoverable amount among the abundance and calculate the usable volume under the following cases. ・Case① : Both recovery rate of husk and corncob are 100% (=Abundance) ・Case② : Both recovery rate of husk and corncob are 80% (※In the future, we recommend that they set a collection rate for each region after meeting with each regional authority)

D) Generated amount of biomass

Based on assumptions from 1 to 3, the biomass generation data which was collected from local agricultural cooperatives are shown below:

(3) Confirmation of collectable biomass waste quality

A) Fuel analysis evaluation

a. Result of analysis component

The fuel samples were collected in Indonesia and their analysis was conducted. Target samples were 3 types of rice husk and 2 corn cobs. The analysis was conducted with comparison to similar biomass fuel analysis in nearby South-East Asian countries. The results are shown below:

		本プロジェクト			参考プロジェクト					本プロジェクト		参考プロジェクト		
プロジェクト名	単位	Sumatra	Sumatra	Sumatra	Project-A	Project-B1	Project-B2	Project-B3	Project-C	Sumatra	Sumatra	Project-D		備考
バイオマス種別		もみ殻-1	もみ殻-2	もみ殻-3	もみ殻	もみ殻	もみ殻	もみ殻	もみ殻	トウモロコシ芯-1	トウモロコシ芯-2	トウモロコシ芯		
工業分析（測量ベース）														
水分	% by weight	11.10	10.2	9.8	9.02	13.14	10.99	12.75	9.00	27.0	28.10	12.46		A
灰分	% by weight	17.10	16.4	15.9	17.09	17.08	17.27	16.62	17.75	1.7	1.8	1.23		B
揮発分	% by weight	68.30	64.6	63.4	59.03	54.93	57.48	55.85	61.32	80.3	80.30	70.38		C
固定炭素	% by weight	15.60	16.4	15.9	14.86	14.85	14.26	14.78	11.53	18.0	17.9	15.92		D
硫黄	% by weight				0.05	0.09	0.10	0.09				0.29		
高位発熱量 (H-HV)	kcal/kg	3,537	3,651	3,382	3,466	2,952	3,157	3,112	3,455	3,308	3,623	3,736		
低位発熱量 (L-HV)	kcal/kg	3,234	3,377	3,072	3,175	2,825	2,902	2,821	3,251	2,992	3,251	3,585		E
元素分析														
水分	% by weight				9.02	9.39	9.34	9.44	9.00			9.76		
灰分	% by weight				17.09	17.52	17.59	17.25	17.75			1.27		
炭素	% by weight	41.71	39.41	38.20	36.27	46.34	36.18	38.18	37.13	46.79	47.90	49.39		
水素	% by weight	4.95	5.00	5.22	4.51	2.80	3.25	3.42	4.12	6.45	5.88	4.25		
窒素	% by weight	0.37	0.36	0.56	0.29	0.17	0.21	0.21	0.36	0.42	0.48	0.16		
全硫黄	% by weight	0.08	0.08	0.07	0.05	0.09	0.10	0.09	0.26	0.04	0.08	0.29		
酸素	% by weight	35.76	35.15	35.50	32.77	25.50	33.33	31.41	31.80	42.59	43.91	35.76		
灰組成分析														
Fe_2O_3	% by weight	0.31	0.13	0.06	0.30	0.63	0.53	0.14	0.27	0.38	0.57	1.33		
Al_2O_3	% by weight	0.48	0.13	0.07	0.10	1.04	1.24	0.44	0.35	1.71	0.74	2.45		
MgO	% by weight	0.73	0.36	0.29	0.60	0.39	0.39	0.42	0.33	2.16	2.00	3.56		
SiO_2	% by weight	89.40	90.2	89.7	18.40	89.37	82.36	87.49	81.00	22.7	38.5	56.41		F
CaO	% by weight	1.47	1.04	0.77	1.28	1.05	1.38	0.75	0.56	1.87	1.72	3.71		
K_2O	% by weight	2.28	2.06	2.93	1.03	5.57	3.48	4.61	1.30	46.9	38.2	18.17		G
Na_2O	% by weight	0.34	0.41	0.61	0.51	0.29	0.48	0.32	0.52	1.78	1.44	2.95		H
TiO_2	% by weight	0.07	< 0.01	< 0.01	0.04	0.09	0.01	0.07	<0.0001	0.03	0.04	0.25		
MnO_2	% by weight								0.11					
Mn_3O_4	% by weight	0.26	0.16	0.17	0.13	0.15	0.16	0.16		0.05	0.11	0.26		
SO_3	% by weight	0.22	0.19	0.12	0.12				0.31	2.26	1.81			
P_2O_5	% by weight	0.73	0.34	0.13	0.53				0.29	7.35	5.35			I
ClCx	% by weight								0.24					
NiO	% by weight								0.07					
CuO	% by weight								0.09					
ZnO	% by weight								0.21					
SrO	% by weight					0.05	0.57	0.29				1.56		

Figure 15 Biomass fuel analysis result

b. Evaluation analysis results

Based on the fuel analysis results (industrial analysis, element analysis and ash composition analysis) the evaluation was given to the planned use of biomass from the following points.

1. Water content (A)

As for rice husk, the value was about 10% for almost all areas and therefore there was no major difference. On the other hand, corn cobs showed a double amount of value to the reference. However if the water content is less than 30%, there is no need to add a special design to the boiler combustion.

It will be possible to reduce the water content by cutting the core at the power plant or by drying under the sun in harvesting area.

2. Ash content (B)

The ash content of rice husk was within 15-20%, which is representative for general rice husk. Also, there was not much difference between areas. Likewise the corn cobs did not show much difference between areas.

3. Volatility(C) and fixed carbon (D)

Both rice husk and corn cobs did not show much difference by area and showed similar results to general products.

4. Low level of power output (E)

The power output of the rice husk was between 3,000 - 3,400 kcal/kg with not much difference between areas. As for corn cobs, these showed lower output compared to referenced results, but this is considered to be the presence of water content.

5. Ash composition-silica (F)

The silica content in the ash of rice husk was between 80 - 90% and there was not much difference by area. As for corn cobs, they showed lower values compared with referenced results. It is assumed to be affected by the quality of the soil.

6. Ash composition-potassium (G)

Generally speaking, the ash of corn cobs contain more potassium than rice husk. Even so, it showed higher value than the referenced result. This can be due to the lower silica content shown above.

7. Ash composition-sodium (H), phosphorus (I)

Generally speaking, the ash of the rice husk contains higher amounts of sodium and phosphorus compared to corn cobs. There was little difference by area.

(4) Confirmation of collection methods of biomass waste

The agricultural cooperatives have the following 2-phased plan to collect the rice husk for use as fuel.

The first phase is to purchase the rice from local farmers near the advanced rice mill, where the combustion plant will be built in Lunang. The rice will be prior to polishing and the farmers will bring the rice to the mill. After polishing, the rice will be of higher quality and at the same time rice husk can be collected.

The second phase is to upgrade the rice mills which belong to cooperative members other than Lunang. This will improve the yield and quality of rice and at the same time enables collection of rice husk.

The scheme must be able to pay some money to cooperative members according to volume of collection of biomass waste. Under this scheme, the agricultural cooperative will be able to collect a stable and efficient amount of rice husk. At the same time it provides benefits to the members of the agricultural cooperatives who obtain more income from the higher quality rice as well as money from the rice husk which had been disposed.

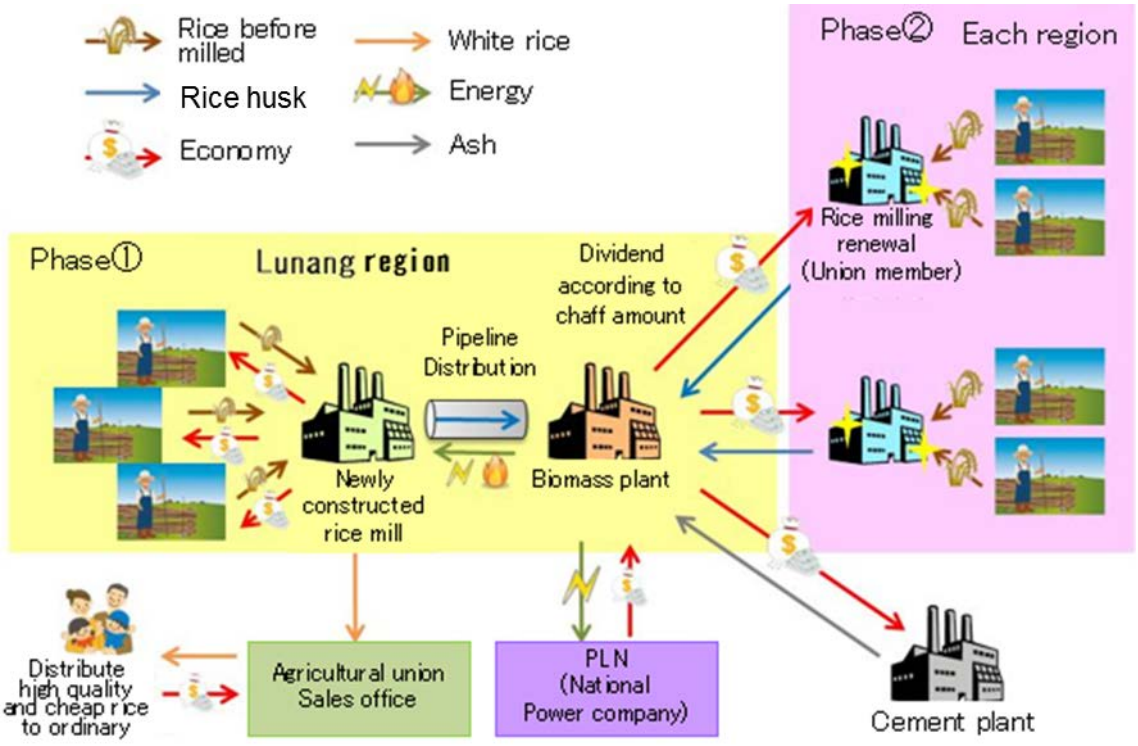


Figure 16 central located fuel recovery scheme

(5) Assumed collection area of biomass fuel

The assumed area of this survey is about 300 km in diameter, extending from north to south. If the collection of rice husk and corn cobs can reach 100% in the above area, we will be able to achieve our goal of reducing GHG (greenhouse gas) by 100,000t of CO2 per year. If the power plant is built at the center of the assumed area, the radius of the collection will be 150km and may produce a large power plant. (In Japan, if the FIT system is used, the radius of the general collection area is 50km for a wooden biomass combustion power plant) Also, the main roads connecting the assumed area are narrow and winding and there are many pit holes in the roads. Therefore, if the biomass waste is all collected from Fig. 4 for one power plant, it will cost a lot of money for collection and this will cause not only a rise in collection costs, but also the stable supply of fuel will become difficult.

Considering points 1 and 2, if the power plants are built at two locations within the assumed area (plant No.1 and plant No.2), the assumed collection area is shown in Fig. 5 and the estimated power output and GHG reduction is shown in Table 7 and Fig. 6. Assuming that plant No.1 will be located in Lunang area (case 3: collection rate 100%, case 4: collection rate 80%) and plant No.2 is located in Sutera area where a large substation is located (based on auditory input from local cooperative members), the assumed outcome will be as follows (case 5: collection rate 100%, case 6: collection rate 80%). As a result, the assumed collection radius will be 75km and 65km respectively. and the scale of power output from each plant can be maintained at over 4MW. Therefore from the viewpoint of efficient fuel collection, there is high benefit to build a power plant at two locations in the assumed area.

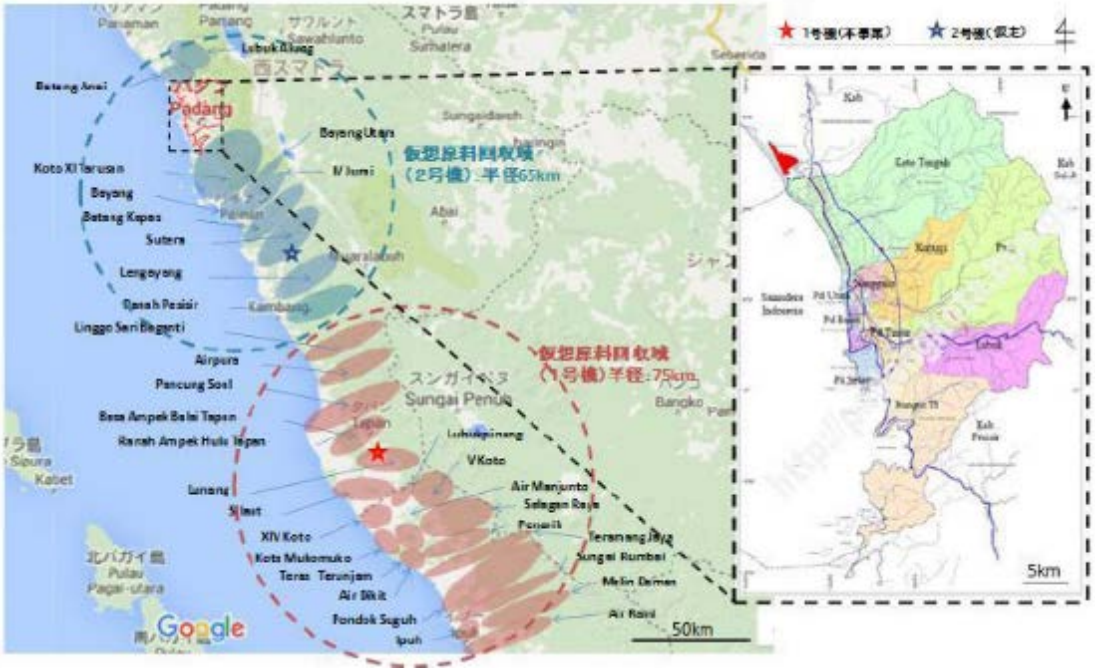


Figure 17 assumed biomass fuel recovery area in this project

3.2 Technological considerations

(1) Confirmation of possible site for building a plant

A) Confirmation of site

In this project, we are planning to construct two plants in the South and North of Pesisir Selatan Regency. Among them, the information on candidate sites for plant construction in the south where sufficient site confirmation was possible will be organized as follows.

For the information on the northern plant construction site, the summary is stated in the 3 rd field survey minutes.

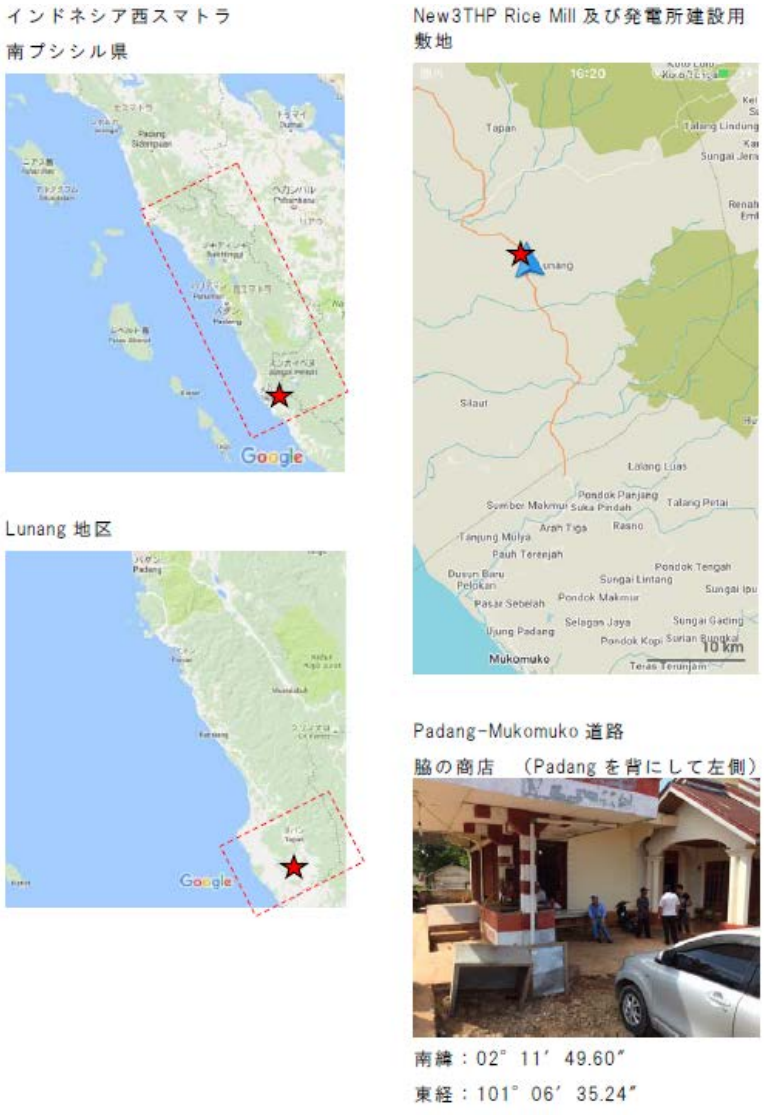


Figure 18 geographic information for site in south

B) Water resources

There is the Kasai River, 280m south of an existing mill, running east to west. The water from this river can be used for the power plant, although we only observed visually the river width was at about 2-3 m, a depth of 0.2m, a velocity of 0.3m per second and estimated flow of 400t/hr. The water is clear. It is possible to dig a canal from the river to a power plant reservoir and then there will be sufficient flow.

The water level is 7-8m lower than the main road, so a pump may be needed for the reservoir at the plant.

We also visited the Batan Kubun River which runs 2-3km to the east of the main road, flowing inland.

This river is like the rivers in the mountainous areas in Japan, with clear water and strong velocity and both banks are covered with stones. From visual observation, the width was 20m, the average depth was 0.5m, velocity of 2m/sec and the estimated flow was 72,000t/hr. This was during the dry season.

Figure 19 Batan Kunbun River

(2) The status of the planned construction site.

The planned site for the power plant is located 150m away from an edible bird nest construction on the main road of JI Padang-Mukomuko, and west of the New 3TPH Rice Mill. According to the landowner the total land area is about 220m x 230m or 50,600 sq. m which is mainly covered with low bushes.

It has never been used and no official survey has been done. However a red pole in the map is the landmark. The visual observation of the east site was about 2m lower than the Rice Mill site and the west site was slightly higher.

As a measure against heavy rains, it will be necessary to cover the site with soil.Along the site, a road is being constructed with 6-8m of covered soil. The ground is very weak. This road is bending southwards (see attached map) but according to the landowner it will be possible to secure a 220m straight site. As there is no clear boundary, there is flexibility in securing the site.

Figure 20 Satellite image of the planned site

(3) Construction plan

Based on the result of checking the site, I drew a simple design plan.

Figure 21 draft image for construcion

(4) Confirmation of regulations and procedures for building the plant

A) Compulsory regulations

The investment of foreign capital in the power generation project in Indonesia is regulated by Presidential Decree No. 36 (Negative List), and restrictions as listed in the table below are imposed. At present, discussions on revision of negative lists are being made, and it is necessary to pay attention on a continuous basis.

Table 8 Negative list of foreign capital entry by business field

Business Field	Condition
Very Small scale Power generation （＜1MW）	Reserved for Cooperative, Micro / Small Business > cannot join
Small scale Power generation （1-10MW）	Partnership ->unlimited
Power generation （＞10MW）	Up to 90%
Geothermal power plant operation and maintenance service	Up to 95%
Geothermal power generation	Up to 95%

B) Overview of procedures

Indonesia's environmental impact assessment system is stipulated by the "Environmental protection and management law (EPMA No. 32, 2009)". Procedures from the initial stage of the project plan to the post closure of the project, that is, from the Strategic Environmental Assessment (SEA), the business environment assessment, to the monitoring and the environmental audit, are stipulated by this law. Those planning operators are first requested to perform assessment Screening based on the procedure announced in Annex II of the MoE Regulation of Type of Business Plan / Activity Required Environmental Impact Assessment No. 5, 2012.

After that, the business operator creates a business outline in accordance with the style of Annex V of the same ministerial ordinance and submits it to the Ministry of the Environment. Based on the submitted project summary, the Ministry of the Environment will check the location, classify the project, and identify the examiner.

(5) Confirmation of status of power lines

As of 2010, the electrification rate of Sumatra Island is about 62.5%, which is higher than other areas except for Java and Bali.

The power system of Sumatra Island connected northern and southern areas on Aug. 14th, 2007 with 150Kv grids and has already been synchronized. Furthermore, the plan to upgrade the grid system was made by PLN to 275Kv and 500Kv. The site area is 260km distant from the PLN grid and 150Kv is not available. The power supply is poor with only 20Kv and voltage is a major issue. The power lines are overhead distribution lines of PLN with 20Kv located near the main roads. Currently, there is no 20Kv power line from the main road to the Mill. Therefore the test was conducted for the Mill facility with temporary D/G.

(6) Study of applicable technologies

Aspects to be considered based on the analysis results of biomass characteristics. The following aspects must be considered for the combustion of the boiler based on the evaluation obtained by analysis studies.

A) Control of combustion temperature

As the corn cobs contain phosphorus and potassium compounds, which have a low melting point, it is necessary to design the furnace not to increase the combustion temperature too high. If combustion is at high temperature, the low melting point ashes will become attached to the water walls and water pipes of the heat-resistant concrete of the furnace and solidification will occur forming clinkers. This clinker will prevent an efficient heat exchange and deteriorate the efficiency of the total system.

B) Abrasion resistance

The ash of rice husk is far better than other biomass fuel, with a main composition of silica. As silica has high abrasive potential, sufficient volume and abrasion resistance must be considered in design to transport these ashes from the boiler to a conveyor.

C) Pre-processing corn cobs

As the water content of corn cobs is quite high, the core size is 20-30cm, it is necessary to cut cores to 2-3cm before combustion. Therefore a facility to cut cores is necessary.

D) Type of boiler

The type and characteristics of the boiler for this project that is applicable for a biomass power plant of 10Mv (7-19Mv) class, is shown below:

E) Combustion process

As the biomass contains a large amount of water content, the combustion will be conducted according to following processes. After combustion, the ashes remain as burnt residue.

F) Type of boiler

a. Stoker (mobile) type

Material for burning will be constantly supplied to the top of the Stoker and air blown from the bottom to create combustion.

b. Fluidized type of combustion

From below the silica sand layer, pressurized air is evenly distributed and turns the silica sand to fluid which combusts the fuel.

G) Treatment of exhaust gases

Compared with fossil fuels such as coal and oil, biomass fuel contains less ashes, Sulphur and chlorine, but nitrogen content is higher. The emission of hazardous gasses in the exhaust is small due to direct combustion and removal treatment is easy. So in general, environmental safety is high.

As for soot and dust, dust collection is necessary. A dust collector can be multi-cyclone, electrostatic precipitation (ESP) or by filter or a combination of these. Selection criteria must meet requirements of the environmental regulations of the applicable area or nation.

H) Comparison of boiler types

Most 10MW class boilers delivered in the past to South-East Asian countries are Stoker combustion type.

In this project, we propose rice husk and corn cobs for biomass fuel. However, they differ in terms of water content, components and compounds. Therefore a conclusion was that the Stoker type and step grade type should be used to deal with such biomass fuel. The reasons are as follow.

- For continuous and constant operations at the power plant, the possibility of the furnace becoming unstable due to external factors is low.
- It is suitable for the combustion of mixed biomass fuel.
- As the biomass contains very little Sulphur, there is no need to equip with a desulphurization facility.
- Operations are relatively easy.
- Initial investment cost is relatively small.

Table 9 feature of planning technology

	Stoker furnace (step grade type.)
System image	
law of combustion	There is a fire grid (step grade stalker) where the fire bed moves, and the treated matter is dried, burned and after burned while being moved over the grate, and completely burned.
Movement of solid fuel	move on the stalker (variable speed depending on the position of the grate)
Solid burning	on stalker
Combustion controllability	insensitivity
Low air ratio combustion	difficulty
Mass transfer in furnace	slow
Moisture of fuel	drying
Acceptance of Mixed fuel	suitable
Fuel pretreatment	unnecessary
Desulfurization performance	none (external installation)
Supplementary fuel supply at startup	unnecessary
installation area	large
applicable boiler capacity	< 100 t/h
initial price	slightly high(1.2)
auxiliary power supply	small(1.05)
application example of biomass fuel in Southeast Asia	move on the stalker (variable speed depending on the position of the grate)

I) Conditions of boiler steam

The general condition for boiler steam in South-East Asian countries and the influence of the above-mentioned boiler combustion are shown below:

- Main steam pressure is 45 bar G (General steam pressure design in South-East Asia)
- Main steam temperature is 410 degrees C(General temperature when high temperature combustion is continued)
- Preset temperature Main steam volume(It is set according to the fuel distribution)

J) Setting effective fuel volume for the boiler

As there was little seasonal changes of biomass fuel (distribution volume) in the study area, it was assumed that the biomass fuel will be constant throughout the year. The loss of fuel volume was set at 5% from distribution calculation as the dust from the rice husk must be removed after delivery to the power plant, as well as loss due to cutting corn cobs. After that, calculations of input fuel volume per hour into the boiler assumed that the plant will operate 7.920 hours (330 days). The production area of biomass fuel in this project is quite large from north to south. Therefore making three plant cases as follow:

Table 10 Options for plant construction site, number of construction

case	Place of construction	remarks
1	North and South	All the fuel can be used
2	North and South	Flexible distribution amount
3	South only	Exclude some fuel in South

The details of the study results are shown in Attachment-1 (Fuel Availability Variation). Also the size of the plant and mass balance data based on availability of fuel are shown in Attachment-2 (Plant Output Table).An extract is shown below:

Table 11 Plant scale of each case

case	CAPACITY [kW]		CAPACITY [t/h]		Remarks
	GROSS	NET	GROSS	NET	
1 (south)	5,612	6,100	32.2	35	
1 (north)	11,151	11,700	61.9	65	
2 (south)	9,097	9,900	50.5	55	
2 (north)	7,851	9,900	43.6	55	
3 (south)	16,207	16,500	88.4	90	

3.3 Economic considerations

(1) Confirmation of laws and regulations related to power selling

A) New law for electricity

In September 2009, issue No. 30 of 2009 "Electricity Law" (hereinafter referred to as the New Electricity Law) was enacted. This law follows the former Electricity Law (1985 No. 15) enacted in 1985, and, from the wording that "the power supply business is under jurisdiction by the state and the government will implement", it is stipulated that the state is responsible. On the other hand, however, as the New Electricity Law also stipulates that "To further improve national capacity in electricity supply, other state-owned enterprises, public enterprises, private enterprises, cooperatives, and civil society have opportunities to implement electricity supply business unless they hurt national interests", it has become possible for private enterprises to enter the power supply business as well.

B) Fixed price purchasing system

In Indonesia, Fixed price purchase system, or a Feed In Tariff (hereinafter, FIT) has been introduced to accelerate the introduction of renewable energy. The target purchased is electric power generated by utilizing sunlight, hydraulic power, wind power, biomass, solid waste, and geothermal energy, and a purchase price has a different table for each energy source and scale of power generation. In the case of renewable energy of 10 MW or less, the operator does not have to bid in the development process and it is possible to conclude a sales contract directly with PLN.

This project is classified as biomass power generation. The details of purchase conditions etc. on biomass power generation etc. are stipulated in Permen ESDM No. 21 Thn 2016. According to the law, different purchase prices are set in two cases. One is to sell the total amount of generated electricity and the other to sell surplus with mainly self-consumption. Each price table is shown below.

Table 12 Price table for selling all the electricity generated from the plant

No	Location /Area of Biomass Power Generation	Purchasing Price (cent USD/kWh)				F Factor
		Capacity ≤ 20 MW		20 MW <Capacity ≤ 50 MW	Capacity > 50 MW	
		Low Voltage	Medium or High Voltage	High Voltage	High Voltage	
1	Java Island	16,00 x F	13,50 x F	11,48 x F	10,80 x F	1.00
2	Sumatera Island	16,00 x F	13,50 x F	11,48 x F	10,80 x F	1.15
3	Sulawesi Island	16,00 x F	13,50 x F	11,48 x F	10,80 x F	1.25
4	Kalimantan Island	16,00 x F	13,50 x F	11,48 x F	10,80 x F	1.30
5	Island of Bali, Bangka Belitung and Lombok	16,00 x F	13,50 x F	11,48 x F	10,80x F	1.50
6	Archipelago of Riau, Nusa Tenggara and other island	16,00 x F	13,50 x F	11,48 x F	10,80x F	1.60
7	Molucca and Papua Island	16,00 x F	13,50 x F	11,48 x F	10,80x F	1.70

C) Latest trends

When the discussion with the Indonesian JCM secretariat was implemented during the field research in February 2017 field meeting, it was revealed that the purchase conditions of renewable energy was changed in the Ministry of Energy and Mineral Resources Ministerial Ordinance No. 2017 (Permen ESDM Nomor 12 Tahun 2017), which was issued in January 2017. The original text of the ministerial ordinance was received and is under creating its abstract.

(2) Negotiations for selling conditions with PLN

A) Outline

Permen ESDM No. 21 Thn 2016 stipulates that if an operator applies for selling power, PLN must purchase according to the price shown in the table. In this project we consider to sell all power generated at the biomass power plant.

Discussions were held with the person in charge of biomass energy of MOMRE during the first field survey and explaining this project. He said their organization will support this project by collecting necessary information to realize the project and commented that although the law stipulates that PLN must purchase the power at a set price in the table, but in reality there may be negotiations about the selling price with PLN. In Indonesia, applicable cases for FIT is increasing, not just with biomass energy.

B) Response of PLN at local workshop

Since we carried out activities as a project feasibility study, it was basically about the stage of introducing project ideas on discussions with PLN. For this reason, PLN's response to project implementation was largely favorable.

With regard to the FIT system, it is said that internal discussion is ongoing. We will negotiate while sharing information on the details of the project to realize this project.

(3) Study of economic aspects and business evaluation

Based on the estimate of the plant maker who cooperated in the survey in this project, economic consideration was carried out. Prerequisites for consideration are as follows.

Table 13 precondition for economic calculation

Category	Detail	Amount
CAPEX	Land cost	Result of the hearing survey
	Cost for Civil work	Result of the hearing survey
	Cost for Plant Construction	Quotation from EPC vendor
OPEX	Maintenance cost (per year)	Quotation from EPC vendor
INCOME	Selling power to PLN by using Feed In Tariff	15USCent/kWh (from the figure of Permen ESDM No. 21 Thn 2016)

A) case1

It is just for a reference value, assuming that it is possible to sell the total amount of electricity generated in accordance with the fixed price set in the FIT entered into force in 2016, the project IRR for 15 years is expected to be around 25%, the investment recovery period is expected to be around 4 years .

B) case2

It is just for a reference value, assuming that it is possible to sell the total amount of electricity generated in accordance with the FIT entered into force in 2016, the project IRR for 15 years is expected to be around 24%, the investment recovery years are expected to be around 4 years .

C) case3

It is just a reference value, assuming that it is possible to sell the total amount of electricity generated in accordance with the FIT that is effective in 2016, the project IRR for 15 years is expected to be around 34%, and the investment recovery period is expected to be less than 4 years .

(4) MRV methodology and monitoring system

A) MRV methodology

CO2 emission from the biomass power output is compared with reference emissions of CO2 when the power is procured from the power grid, and therefore the emission will be zero. The emission from the project will be deducted from the reference emission, and the difference will be the reduction amount.

By implementing this project a reduction of methane gas is also expected, generated by biomass waste. However, this factor is not included in the study.

ERy = REy - PEy

ERy: the reduction amount of CO2 during the project period (y) t CO2/y

REy = EGy * Efgrid

REy: reference emission

EGy: net power output by biomass generation which replaces the grid

EFgrid: CO2 emission coefficient of all of Indonesian power grid which will be replaced by this project (For the above calculation, the emission of Indonesia for 2015, 0.86 t CO2/MWh is used)

Determination of EGy

EGy=EGGEN – EGAUX

EGGEN: total power output of biomass power system

EGAUX: power consumption by biomass power system

PEy= 0

In this survey the main emission reduction is CO2 emission originating from the energy sector, although awareness of the following gas emissions. In order to estimate CO2 emission reduction conservatively, the following items for MRV methodology are not included.

・the reduced amount of CO2 emission from burning waste in the fields

・the amount of GHG (methane, etc.) emission (or reduction) from piles of fermenting waste

・the amount of CO2 emission (or reduction) derived from the diesel fuel used for rice polishing process

・the amount of CO2 emission increase due to collection of biomass material for this project.

B) Monitoring system

As for the monitoring of the CO2 reduction amount, it is assumed that the staff of the SPC focuses on the monitoring. Supported by Japanese companies that will become consortium members as necessary. The staff will engage in daily data collection and personnel in charge of managers or higher will be responsible for data confirmation and monitoring procedures. For project planning, execution, monitoring results, and reporting, it is considering that the person responsible for operation of SPC will do.

C) Possibility of reducing emissions of greenhouse gases (especially energy origin carbon dioxide)

Since we examined the construction scale of the plant 3 cases this time, we calculated for each case also in considering possibility of CO 2 emission reduction by energy origin. The details of the examination results are shown below.

a. Case1 : Construction of plants with different capacities at two places in north and south

The annual operation time of the plant was calculated assuming 24 hours × 330 days = 7,920 hours excluding the number of days required for inspection and maintenance of the plant. Regarding the grid emission coefficient on Sumatra Island, the emission coefficient of Sumatra Island, 0.782 tCO 2 / MW, released by the Indonesian JCM Secretariat in FY 2014 was used.

Table 14 Calculation result of CO2 emission reduction for Case1

	North	South	Sum	unit
Gross power outlet	7,200	13,800	21,000	kW
Self-consumption amount	1,100	2,100	3,200	kW
NET power outlet	6,100	11,700	17,800	kW
Actual NET power outlet	5,612	11,151	16,763	kW
Annual power generation amount (24h*330days)	44,447,040	88,315,920	132,762,960	kWh/year
CO2 emission reduction amount	34,758	69,063	103,821	t-CO2/year

b. Case 2: Construction of the same capacity plant in two locations north and south.

The annual operation time of the plant was calculated assuming 24 hours × 330 days = 7,920 hours excluding the number of days required for inspection and maintenance of the plant. Regarding the grid emission coefficient on Sumatra Island, the emission coefficient of Sumatra Island, 0.782 tCO 2 / MW, released by the Indonesian JCM Secretariat in FY 2014 was used.

Table 15 Calculation result of CO2 emission reduction for Case2

	North	South	Sum	unit
Gross power outlet	11,600	11,600	23,200	kW
Self-consumption amount	1,700	1,700	3,400	kW
NET power outlet	9,900	9,900	19,800	kW
Actual NET power outlet	9,097	7,851	16,948	kW
Annual power generation amount (24h*330days)	72,048,240	62,179,920	134,228,160	kWh/year
CO2 emission reduction amount	56,342	48,625	104,966	t-CO2/year

c. Case 3: Construction of a plant at one location in the south

The annual operation time of the plant was calculated assuming 24 hours × 330 days = 7,920 hours excluding the number of days required for inspection and maintenance of the plant. Regarding the grid emission coefficient on Sumatra Island, the emission coefficient of Sumatra Island, 0.782 tCO 2 / MW, released by the Indonesian JCM Secretariat in FY 2014 was used.

Table 16 Calculation result of CO2 emission reduction for Case3

	South	Unit
Gross power outlet	19,400	kW
Self-consumption amount	2,900	kW
NET power outlet	16,500	kW
Actual NET power outlet	16,207	kW
Annual power generation amount (24h*330days)	128,359,440	kWh/year
CO2 emission reduction amount	100,377	t-CO2/year

(5) Estimated project cost and Cost effectiveness for CO2 reduction

A) Estimated project cost

Total project cost was calculated based on the information obtained in this survey. The results are shown below.

a. case1 : Construction of plants with different capacities at two places in north and south

Plant design was carried out according to the amount of biomass generated by region. Of the two plants, one is a large-scale one that operates with a scale economy and another one is a small scale. As a result, construction costs can be kept to a certain extent.

On the other hand, as for the maintenance, since the measures are conducted according to the scale of each of the two, the cost of operation will be higher than in other cases.

Table 17 Estimated project cost for Case1

	Expense	Amount(1IDR=JPY0.008)
CAPEX	Land cost	JPY19,200,000
	Cost for Civil work	Under confirmation
	Cost for Plant Construction	JPY6,062,585,101
	SUM for CAPEX	JPY6,081,785,101
OPEX	Maintenance Fee（per year）	JPY181,877,553

b. Case 2: Construction of the same capacity plant in two locations north and south.

Plants of the same specification are installed at two locations in the north and south. Since the cost of design can be reduced by one, it is possible to reduce cost by a certain amount. However, by placing two medium-sized plants, the construction cost is higher compared to case 1. On the other hand, maintenance costs can be reduced to a lower level compared to case 1 because the management can be unified.

Table 18 Estimated project cost for Case2

	Expense	Amount(1IDR=JPY0.008)
CAPEX	Land cost	JPY19,200,000
	Cost for Civil work	Under confirmation
	Cost for Plant Construction	JPY6,492,240,051
	SUM for CAPEX	JPY6,511,440,051
OPEX	Maintenance Fee（per year）	JPY97,383,601

c. Case 3: Construction of a plant at one location in the south
The entire amount of biomass fuel to be generated is processed in one plant. Because it requires only one plant to introduce, it is economically the most advantageous case.

Table 19 Estimated project cost for Case3

	Expense	Amount(1IDR=JPY0.008)
CAPEX	Land cost	JPY9,600,000
	Cost for Civil work	Under confirmation
	Cost for Plant Construction	JPY4,688,384,028
	SUM for CAPEX	JPY4,697,984,028
OPEX	Maintenance Fee（per year）	JPY140,651,521

B) Cost effectiveness for CO2 emission reduction

When considering this project as a goal of reducing CO2 emissions, the cost to reduce CO2 by one ton was calculated in order to evaluate the CO2 emission reduction effect on project cost. The evaluation results of each of the three cases are shown below.

CO2 reduction effect at the time of project realization was calculated by multiplying the amount of CO2 emission reduction per year with the service life of the power plant for 15 years (Of the ministry ordinance concerning the useful life of depreciable assets etc. (Appended Table 2), electrical equipment facilities, and the value of the power generation facility). Case 3, which is able to keep the initial investment amount at a low price, is the most cost-effective scenario.

a. case1：Construction of plants with different capacities at two places in north and south

Table 20 result of cost efficiency for CO2 reduction of Case1

	Without subsidy	With subsidy (JPY 1 billion)
CAPEX	JPY6,081,785,101	JPY5,081,785,101
Amount of CO2 emission reduction in 15 years	1,557,315t-CO2 (103,821t-CO2/year*15years)	
Cost Effectiveness	JPY3,905/1t-CO2	JPY3,263/1t-CO2 (for Subsidy, JPY642/1t-CO2)

b. Case 2: Construction of the same capacity plant in two locations north and south.

Table 21 result of cost efficiency for CO2 reduction of Case2

	Without subsidy	With subsidy (JPY 1 billion)
CAPEX	JPY6,511,440,051	JPY5,511,440,051
Amount of CO2 emission reduction in 15 years	1,574,490t-CO2 (104,966 t-CO2/year*15year)	
Cost Effectiveness	JPY4,135/1t-CO2	JPY3,500/1t-CO2 (for Subsidy, JPY635/1t-CO2)

c. Case 3: Construction of a plant at one location in the south

Table 22 result of cost efficiency for CO2 reduction of Case3

	Without subsidy	With subsidy (JPY 1 billion)
CAPEX	JPY4,697,984,028	JPY3,697,984,028
Amount of CO2 emission reduction in 15 years	1,505,655t-CO2 (100,377t-CO2/year * 15year)	
Cost Effectiveness	JPY3,120/1t-CO2	JPY2,456/1t-CO2 (for Subsidy, JPY664/1t-CO2)

(1) Secondary effect (Co-benefit)

We expect the following three points on the co-benefit effect realized by this project.

A) Protection of World Heritage

In KSNP spreading in Pesisir Selatan Regency, it is continued to destroy nature such as poaching in the park, illegal logging, illegal farming and so on. In order to prevent further destruction activities in the future, also in this project, fuel used in the biomass power plant should be only those legitimately cultivated, and it is aiming not to accept crops illegally grown in the national park. Specifically, it is supposed to construct a mechanism that does not accept crops illegally grown by the following operations.

When this project is realized, it is assumed that SPC including local agricultural cooperatives will operate rice polishing machine / biomass power plant. As it is possible to identify the production area of rice brought in by utilizing the network of the union, polished rice will not be accepted if the rice is cultivated illegally in the national park. At the same time, for people who are currently farming in the national park, economic support will be provided by creating other roles, such as transporting the legally cultivated rice to the rice mill.

In addition, if power is sufficiently supplied by introducing the plant, efforts towards the tourism land in Pesisir Selatan Regency will be accelerated and the possibility that new employment will be created will also increase. As the choice of occupation increases due to the revitalization of economic activities, illegal farming will be eliminated from the viewpoint of economic rationality and finally protection of the national park will be realized.

B) Enforcement of power infrastructure for the total area

Since this project will construct a 10 MW power plant, regional energy security will be expected to improve. According to the statistical data of 2014, the Bunkul Province adjacent to the survey target area has peak demand electricity demand of 154 MW in the area, whereas, although there are supply from 101 MW of grid and 22 MW IPP supply, 31 MW of electricity is still in short.

I also experienced multiple instantaneous power outage during the field survey. A large-scale power outage occurred for a long time once, and, as it became impossible to supply power to base stations of mobile phones, the event occurred that the communication network was disconnected.

Although introducing a power plant in this project cannot cover the total amount of electricity shortage in the region, I am convinced that it will help to solve the problem of power shortage.

C) Increase in quality of agricultural products in the peripheral area

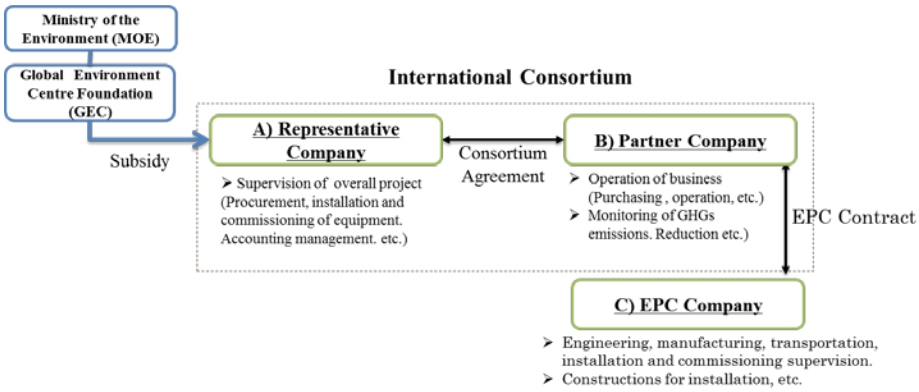
Pesisir Selatan Regency, where is the target area of this project, is a region where cultivation of rice and maize is thriving. However, the price of rice produced in Pesisir Selatan Regency is traded cheaper than the price of rice cultivated in other areas of Indonesia. This is because rice mills commonly used in the same area are poor in performance and do not dry sufficiently, so that the rice becomes a damp condition and it has a unique smell.

In this project, we are considering collecting biomass waste efficiently by concentrating rice produced in the surrounding area in a high-performance rice mill newly established in the Lunang area. By realizing this system, even rice in the area which had been commercialized by a low quality rice milling process will be concentrated in a high-performance rice mill and polishing process will be carried out. As a result, it is expected that it will be possible to improve the quality and value of rice produced in the surrounding area.

4.1 Project plan (implementation system, funding scheme, project time frame)

(1) Implementation system

The assured implementation system is as follows:



【Organization Plan】
A) NTT Data Institute of Management Consulting, Inc
B) SPC (Special Purpose Company) established by Koperasi Serba Usaha Bangkit Mandiri and Japanese company
C) Japanese engineering company (Meidensha)

Figure 22 Implementation system for this project

(2) Funding scheme

A) JCM Subsidy

This project is subject for JCM facility subsidy. When receiving JCM equipment subsidies, it is necessary to keep in mind that the upper limit of subsidies per project is 1 billion yen, and depending on the investment scale, 50% of the project cost is not necessarily obtained.

B) tax incentive measures

In order to promote the secondary crash program centered on renewable energy, the Government of Indonesia issued a tax incentive measures for power generation projects using renewable energy as of January 29, 2010, Ministry of Finance Ordinance No. 21, 2010 Announced. The target is a business that utilizes geothermal, wind power, biofuel, sunlight, hydraulic power, ocean current, ocean temperature difference, etc., 30% of investment amount is deducted from taxable income as a preferential treatment,

shortening of depreciation period, Exemption from VAT and import duties at the time of importing equipment etc is stipulated. This project is also considering use as it meets this condition.

4.2 Evaluation of project feasibility and preparation for the project

(1) Finding local sponsors for this project

On February 22, 2017, we held a workshop to introduce this project. We set up a place to invite investment to local financial institutions and investors after introducing this project.

Table 23 timetable for workshop on 22nd February, 2017

Time	Description
8.30-9.00	Registration
9.00-9.15	Opening and welcome remarks from Pesisir Selatan Regent
9.15-9.30	Welcoming of the Guests of Honour from Coordinating Ministry for Economic Affair
9.30-9.45	Greeting from West Sumatera Governor
10.00-10.15	Workshop introductory remarks from NTT Data IOMC
10.15-10.30	Coffee Break
10.30.11.00	Keynote speach Bioenergy, and Minister of Energy and Mineral Resources Regulation Number 21 of 2016, Key Drivers and Strategic Measures in Achieving Indonesia Millennium Development Goals
11.00.11.30	Recent Development of Large Scale Joint Crediting Mechanism Project In Indonesia From Indonesia JCM Secretariat
11.30-12.30	Lunch
12:30-13:00	How JCM Financing Scheme Based-Biomass Power Generation By Rice Hull and Grain Waste Works and be the Project Champion in Lunang and Lengayang Eco-Industrial Park Development from Meidensha Corporation
13.00-13.30	Roundtable discussion: Q & A and Suggestion
13.30-14.00	Financial feasibility of JCM Financing Based-Biomass Power Generation By Rice Hull and Grain Waste and Modern Rice Mill Plant which use By-Product and Energy Exchange strategy in Lunang and Lengayang Eco-Industrial Park Development From NTT Data IOMC
14.00-14.30	Roundtable discussion: Q & A and Suggestion
14.30-15.30	Individual discussions between participants
15.30-16.00	Istirahat Coffee break
16.00-16.30	Kesimpulan Conclusions and wrap-up

4.3 Challenges to project implementation

(1) Status of necessary infrastructure to be upgraded

A) Status of main road

From Padang city center to Padang port the road is 2 lane on each side, but after that the road is divided by a center line and sometimes the center line is absent. The width of one lane is 6-8 meters. About 40% of the road to Mukomuko runs through a mountainous area along the coast and sometimes very close to the coastline.

In other areas, the road runs 10-20 km inland from the coast and there are no tunnels and the winding road continues along this topography. The average vehicle speed is about 25km/h. In most parts of the curved roads there are 80 bridges of 60-80m in length to cross rivers from the mountains. The state of the paved road is poor between Lunang to Painan with a rough surface. Therefore speeds tend to be below 20km/h. The sharpest curve is a hairpin section from Painan to 10km from Mukomuko to the mountainous area. A 10 ton trailer can just manage to pass but the road is very steep. There are no trailer-type vehicles running in this area, and other than the section between Padang Port and Padang City there are no container vehicles. The size of container is limited to 20 feet, with no 40 feet containers. Can we use this road or be handled at the port.

The road between Lunang to Mukomuko is only one lane each side but the surface condition is good and there are fewer curves. The drive is less than an hour at a speed of 35km/h. As there is a need to transport equipment weighing over 50 tons from the port to the project site, much consideration must given to the condition of the roads.

B) Status of the port for landing the equipment

All palm oil produced in Pesisir is exported from Padang port. There are no ports near Lunang or Mukomuko with customs clearance. The sea near Mukomuko is shallow and fishing boats land on the beach. The survey of Padang port is not scheduled yet, but berths and cranes were observed. It will be necessary to study further in future.

(2) Funding

The most important issue for realizing this project is to discover players who contribute to SPC, the main body of project implementation. If the FIT can be utilized, although the project ability of this case is not bad, because the initial investment is large, we will continuously conduct proposal activities to invite investors in both Japan and Indonesia.

(3) Trends in unstable FIT-related policies

As mentioned in the previous section, the purchase price of renewable energy was changed according to the No. 2017 issue issued in January 2017. At present, active discussions are spreading, such as submission of opinion expressions requesting withdrawal from renewable energy industry groups concerning this law.

Since the main source of income when this project is realized is electricity sales income, changing the electricity purchase price has a big influence on whether or not the project is realized. We will utilize the network with local stakeholders constructed in this project to collect continuous information.

4.4 Future time line

（1） Period of construction

According to the estimate of the plant maker, the period required for construction is shown in the figure below; It is expected that it will take 25 months from the foundation work to the trial run and on-site training.

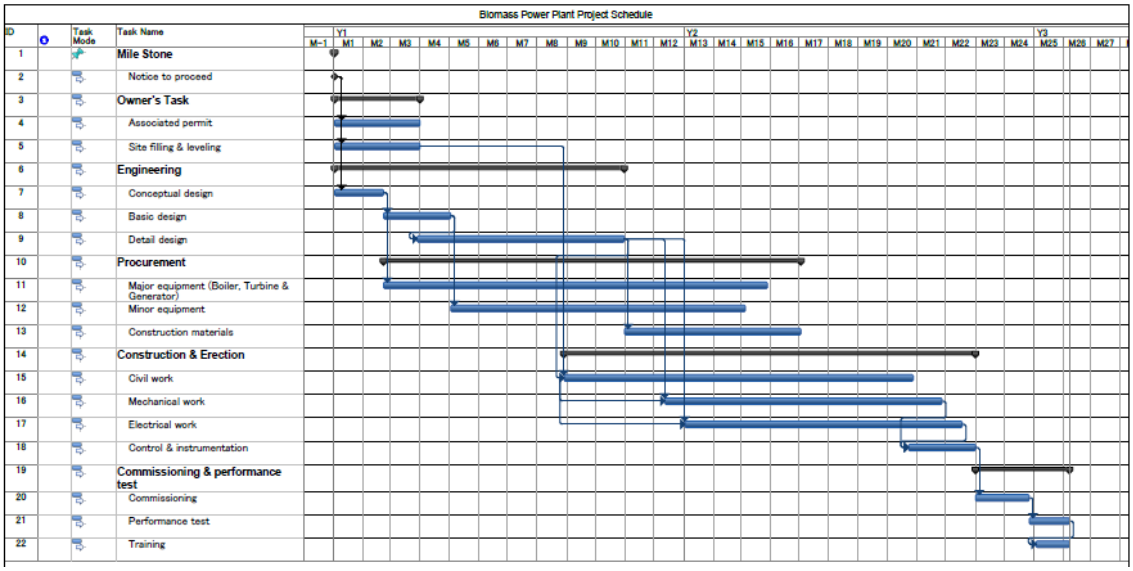


Figure 23 Construction schedule

（２） Concrete ideas for funding

Regarding the contents of future activities to realize this project, we are planning to make the following two points.

A) Strengthening of peripheral infrastructure for plant construction

At the 3rd site survey, we confirmed the site where the second plant will be built. The concern at this time was the vulnerability of infrastructure such as roads and harbors around the construction site. In order to carry out construction work, a heavy machine is required to transport the equipment. However, as a result of the interview survey, we confirmed the current load capacity of the surrounding roads, and it became clear that it is in a state not satisfying the numerical value demanded by the constructor.

Concerning this point, when we discussed with Pesisir Selatan Regerncy officials who attended the survey, we received a comment saying that, as Pesisir Selatan Regerncy secured a budget for strengthening infrastructure in FY 2017, it will be arranged to expand the road width and increase the load carrying weight around the potential construction site. It is said that the construction is expected to start around the summer 2017.

B) Focus on FIT-related policy trends and implementation of proposal activities to investors

Since the existence of the FIT system is indispensable for ensuring stable earnings of this project, we will continue to closely monitor related policy trends in the future. Meanwhile, we will consider measures to ensure sufficient business performance even at the purchase price of the revised FIT system, and will also continue to explore the possibility of realizing the project without being influenced by policy trends. Based on the above study results, we will make proposal activities to investors mainly in Japan. Even if investors are discovered, as there are still issues concerning the development of peripheral infrastructure as described in ①, we aim to openly submit applications for JCM equipment subsidies in FY 2018 at the shortest.

Attachment

Attachment1：meeting minutes for site survey
Attachment2：monthly report to MOEJ
Attachment3：Biomass waste generation calculation sheet
Attachment4：Received documents from Indonesian side
Attachment5：Documents for Meeting and Workshop

The first field survey minutes

August 2nd 2016

Arrival at Sumatra Island

Visit National Park Management Bureau – Confirmation of Rice Prices - Confirmation of Substation - Confirmation of the Rice Mill

9-10 a.m. Car transportation

- Leaving airport by car to the office of KSNP
  - We observed on the way, a concrete company, steel and die cast company, storage of coconut shells.
  - Rice was being cultivated up to the roadside. In Sumatra Island, rice is generally harvested after 3 months, thus enabling double and triple cropping.

	
Outfit of cement factory	Steel factory
	
Transported palm residue	Planted rice

10 a.m. - 1p.m. Meeting at the office of Kerici Seblat National Park in West Sumatra

- **Project presentation was given from NTT to KSNP and after we were given a briefing of the current**
- **Status of the National Park by KSNP.**
  - Study members from JCM Secretariat and Overseas Investment Ministry joined later and JCM
  - Secretariat explained about the JCM system to KSNP. We requested their cooperation to implement the project.
  - Secretariat members accompanied the field study until noon August 5th.

- **About the KSNP**
  - KSNP is located in the south-west of Sumatra Island, covering four provinces. The total land area is 1.4 million ha.
  - Illegal cultivation is conducted in 5-10% of this park. Agricultural produce differs from the mountainous areas to the plains; in mountainous areas, vegetables and rubber are grown and on the plains, rubber, palm oil, gambi (dye ingredient mainly exported to India) and corn is grown.
  - The illegal cultivation of the corn is carried out mainly in Airpura area. We will visit this site on August 4th.
  - UNESCO designated this National Park as being endangered World Heritage in 2015. The reason was due to road construction, illegal cultivation and logging and excavation.
  - KSNP also wishes to halt the illegal cultivation and is studying two approaches. These are to set up penalties and to provide alternative incomes from military service or transportation work. As for the military service, discussions are being held with the military force.
  - The agricultural cooperatives will check whether the biomass fuel suppliers are not engaged in illegal actions in the park when the biomass power plant has been constructed and operating. The cooperatives will only purchase the biomass fuel from farmers not engaged in illegal practices. (Illegal producers will receive no additional benefit from this project.)

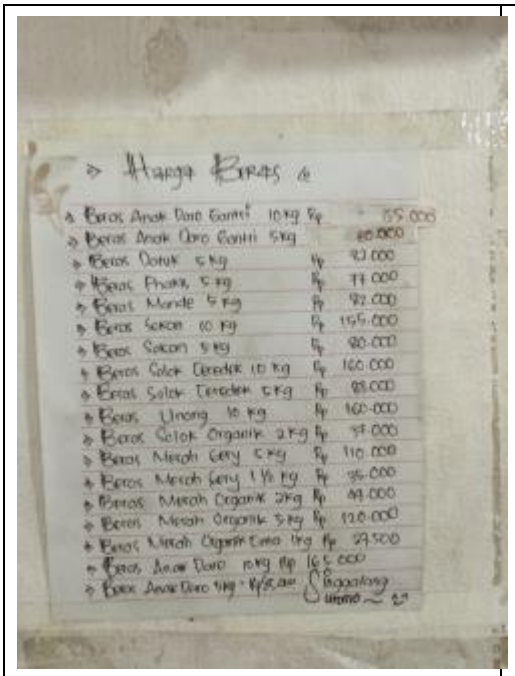
- **About project implementation in the vicinity of national park**

- The planned construction site of the biomass plant is in Lunang Area, which is 5km from the border of West Sumatra and South Sumatra.
- The construction of a power plant must abide by the Land Utilization of Indonesian Law, but the contact office for permission differs for forests and other areas.
- Lunang Area is within the National Park and is categorized as forest, therefore the permission must be obtained from the KSNP. If it is outside the forest area, permission from the Ministry of Industry is required.
- There is no problem for the use of roads for construction.
- As far as the the KSNP knows, there was a plan to build a biomass plant using wood chips, but the biomass plant using rice husk is the first attempt.
- The permission was given to the local entity to implement a micro hydroelectric power plant and the project is still ongoing.

2 p.m. - 6.30 p.m. Visit to various sites by car

- Confirmation of rice prices in the market.
  - Checked rice prices at the traditional market in Padang.
  - High quality Thai rice is imported at lower prices and the domestic rice of Sumatra Island is relatively expensive. (Thai rice is 8,000 IDR/kg whereas the rice from Pesisir Seletan is 12,000 IDR/kg)
  - The rice farmers in Thailand sell the rice husk for biomass fuel and thus obtain a double income. This enables them to lower the price of Thai rice.
  - High quality Indonesian rice is traded at a high price and has a certain demand. However, the price of
  - Pesisir Seletan is low quality because of lower specifications used for milling machine, resulting in insufficient drying and abnormal smell. Therefore they cannot compete with Thai rice
  - Mr. Fitra wishes to improve this situation. By changing the milling machine it can solve the odor problem. Mr. Fitra has great expectations for this biomass power generation project.

	
Rice market	Left one is from Pesisir Selatan

	
Price list for rice in supermarket	Many kind of rice are sold in supermarket but cannot find any rice from Pesisir Selatan

- Visit to the nearby power plant
  - There is a coal-fired thermal power plant owned by PLN (TELUK SIRIH POWER PLANT, 2 stations of 112MW) observed from a distance.
  - The thermal power plant uses equipment made in China. Due to the rising price of coal, CaCo2 is currently being used.
  - The power generated here is supplied to the Mukomuko Regency.

- Visit to Bungus Main Substation
  - We visited the substation for transforming the power generated from the TELUK SIRIH POWER PLANT to 150 v.
  - There are 243 power transmission towers in the Pesisir Selatan Regency.
  - PLN did not invest much in the Pesisir Selatan Regency from the cost benefit point of view. However, thanks to national policy, investment in a high voltage grid began in 2009 and the installation was completed in June, 2016.
  - The high voltage grid is installed from the TELUK SIRIH POWER PLANT to Kambang Main Substation.
  - Between Bungus Main Substation and Kambang Main Station the power is lowered at Kambang, thus making the grid inefficient.

	
Sign for power plant	Substation in Kambang

- Checking the rice mill in Koto X Town District
  - Samples were taken at the small family-managed rice mill and an auditory survey was conducted.
  - There about 20 rice mills in the Koto X Tarusan District.
  - There was a Yanmar milling machine operated with 25l of fuel.
  - Milling capacity of one machine is at maximum 1t/day and minimum 500kg/day.
  - In this District the rice is double cropping. In areas where irrigation is available it is triple cropping.
  - Currently the rice husk is either burnt in the field or used for brick-making.
  - Milling price is not set by money but by bartering; for 12kg of milling, the farmer will receive 11kg and 1kg is kept by mill owner.

	
Rice mill inside this house	Small scale rice mill

	
Pipe for discharging rice husks	Rice husk.

- Others
  - There is a government-owned cement company (Cement Padang) in the Pesisir Selatan Regency.
  - The coconut shells exported to Thailand are transported from Mukomuko Regency and Pesisir Regency to a port.
  - Along the road we observed a truck driver spraying water onto the coconut shells in order to increase their weight.

August 3rd

Fuel burning site -> Consultation with Pesisir Selatan Regency -> Checking new rice mill plant

8 a.m.: Observation

- We checked the fuel burning site of rice husk
  - 2 days amount of rice husk was piled in a hole and set on fire late at night.
  - Because the fire was below ground level, there was hardly any flame and only smoke was seen.
  - There was slight rain, but only the top 2cm was slightly wet and the rice husk beneath was dry.
  - Mr. Koizumi from ATGREEN obtained some samples.

	
Piled up rice husk	Some of rice husk burnt turned into ash

8.30 - 9 a.m.: Consultation with Pesisir Selatan Regency

- JMC Secretariat (Bak Keni) introduced the basic concept of JCM
- Mr. Fitra introduced the project.
- The vice president of the Regency suggested an expansion of the survey area, as the Lunang area has small potential for rice husk generation. He mentioned that the Lengayang District has higher potential.

9 a.m.: Move to the Mukomuko Regency -> Confirmation of the Kambang Main Substation -> The rice field and the milling plant

- 途中、Kambang Main Substation を確認した。
  - Mr. Fitra expressed a desire to build No. 2 plant near the Kambang area, after No. 1 biomass plant was built in Lunang.
- Confirmed rice cultivation in Lengayang which has high potential for rice husk production.
- Visited a small rice mill in Lengayang
  - Maximum capacity is 8t/d (minimum 6t/d) with 8h of operations per day.
  - Observed the site where the rice husk was burnt in the field and the ashes after burning being disposed.
  - In Lengayang District rice is double cropping.

<table>
<tr><td>  </td><td>  </td></tr>
<tr><td>Main substation in Kambang</td><td>Rice cropping field in Lengayang</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>Rice mill in Lengayang;
drying the rice with sun</td><td>Burning rice husk in rice mill.</td></tr>
</table>

- Confirmation of a new rice mill plant
  - This is a large-scale rice mill plant built in 2015 with a subsidy from the Indonesian government.
  - Milling capacity is 3t/h, therefore three tons of unpolished rice can tackled.
  - The government subsidy is only for capital investment. As the collection system for rice husk is incomplete, the operation is not stable.
  - The test operations will be conducted on August 4th, so we will visit this place again.
  - According to a farmer from Java, the use of rice husk is mainly for the following 5 purposes:
    - ✧ 1 fuel to bake bricks
    - ✧ 2 lay on the floors of chicken farms
    - ✧ 3 fuel for iron blasting
    - ✧ 4 mixed fuel for cement kiln
    - ✧ 5 mixed for animal feed
  - Question was asked about the system of the biomass power plant. We responded that when the rice husk was burned in the boiler, steam is produced which generates the turbine. Interest was shown in use of ashes.
  - The nearby water sources are the Kasai River, the Kunyang River and the Sumatera River.

- Others
  - The public road to the milling plant is not paved and the soil is mainly clay type. As we were moving after the rain, our car was trapped in the mud.
  - It is necessary to wear heavy duty shoes or boots when visiting this area.

	
Outfit for 3TPH rice mill	There was no connection with grid

	
Rice mill plant made by SATAKE	Car dived into muddy land

4th August, 2016

Confirmation of the milling plant -> Consultation with Lunang District Authority -> Confirmation of plant site

7.00 a.m.: Revisiting the milling plant

- Preparation was undergoing for the test operation.
- Staff seemed to be unfamiliar with the operation and took a lot of time in checking the status of equipment and components.

Consultation with Lunang District Authority

- Introduction of the project and request for cooperation in this project
- The district authority showed very positive approaches to the implementation of the project, such as what the government should do next for the realization of the project.

Confirmation of the small-scale rice mills in Lunang District

- Visited the family-managed rice mill and obtained samples of rice husk.
  - Although there is a large-scale milling plant in Lunang District, its operation is unstable, When the project is realized the plant will operate at full capacity, thus there will no need for small-scale rice mills. The agricultural cooperative has a plan to relocate those small-scale rice mills to other areas of the Lunang District.
  - The owner of the rice mill we visited is a member of a cooperative. He agreed to supply the rice husk free of charge after his rice mill is relocated to another area when the project starts.

	
Sampling in small scale rice mill	Moblie Rice Mill

Joined with the plant study team -> Confirmation of rice mill and water resources

- Conducted the confirmation of the plant site with the owner of a nearby rice mill plant and land.
  - Plan to secure 5ha land next to the milling plant of 3t/h capacity.
  - The 5ha land site is not currently developed and therefore is covered with trees and bushes.
  - The 5ha land site is lower than the milling plant and there is a need to add about 100.000 cubic meters of compressed soil.
  - The PLN power grid comes up to the main road. In the future, it will be necessary to bring the transmission line to the milling plant.
  - Currently the milling plant operates with kerosine and is not connected to the transmission line.

- Securing the water resources
  - Checked the Kunbung river and its source near the milling plant.
  - Although August is the dry season, because it is near the forest, the water retention is high.
  - Water is abundant and the river never dries up. The current water level (70cm) is the lowest.
  - Consideration will be given to building a dam near a branch of the Kunbung river, creating a river flow up to the biomass power plant. Consultations with the land owners will be needed as well as obtaining permission from the government.

	
Sufficient and clear water from river	Branch of the river

5th August, 2016

8.00 a.m.Consultation with Mukomuko Regency and PLN, Confirmation of power plant and ports

- NTT gave the project outline and Meidensha Corporation gave a presentation of its biomass power plant achievements to date.
  - There was a request from Mukomuko Regency to build a biomass plant using palm oil within Mukomuko Regency in the future.
  - Farmers who own land in Mukomuko Regency appealed that the rice husk from their land can be utilized for the biomass plant. They were very positive or their remaining rice husk be used for power generation.
  - Staff from the office of PLN Mukomuko also attended this meeting. He explained that there is a power shortage in Mukomuko and therefore PLN is very positive about the construction of the power plant.
  - On this day, there was a power failure over a wide area. The base station for mobile phones suspended its services and consequently we were unable to use our mobile phones.

2.00 p.m.　Confirmation of the PLN-managed power plant

- According to PLN, there are two power plants in Mukomuko; one is owned by PLN and another is owned by different company but leased to PLN.
  - We visited the latter power plant which is much bigger in scale.
  - There were 7 generators made by Mitsubishi Heavy Industry, but only 5 were in operation.

3.00 p.m.:　Confirmation of the ports in Mukomuko

- When building a plant, the securing of a transport route for materials and equipment is vital. However, the road from Pedang to the planned construction site in Lunang is poor quality and the bridges may not be able to stand up to heavy weights. Therefore we considered whether the materials might be transported by sea. Thus we studied the possible ports.
  - There are hardly any ports in Mukomuko Regency: only shallow seas and fishing villages exist.
  - We will study the transportation of materials by sea to the major port in Painan, and by land from there.
  - There is a plan to expand the main road between Pedang and Mukomuko with government assistance
  - During the survey period of this fiscal year, Mr. Fitra and others will appeal the

importance of this project to the government organization so that the budget may be allocated to reinforce the bridges.

	
Power generator	Beach in Mukomukoa

6th August, 2016

Confirmation of illegal cultivation sites within the National Park

-> Consultation with Agricultural Cooperative

7.00 a.m.　Move to Airpura area to check illegal cultivation sites

- Airpura area is the border between the National Park and ordinary areas. Together with rangers from the KSNP management bureau we confirmed the illegal cultivation sites.
  - The illegal cultivation is conducted in the following manner; after logging, rice is planted once, then corn, chili, palms (palm oil) are cultivated.
  - Currently there are only 4 rangers for an area of 8,800 ha. The shortage of manpower is serious which causes an inefficient management of the Nation Park.
  - Even when the rangers discover the illegal cultivation, they can only issue a warning not to expand the area further as the farmers tend to threaten using their tools as weapons.
  - We checked the illegal cultivation area within the National Park. However, even outside of the Park is also protected as a forest area, therefore agriculture cultivation is prohibited.
  - Currently, the government and related organizations do not have clear penalty regulations so it will be difficult to solve this issue.
  - The waste from illegally cultivated corn is burnt in the field, creating a lot of smoke. Neighboring countries like Malaysia and Singapore are protesting about the smoke haze. Therefore the Indonesian government is conducting satellite surveillance.
  - As palm plantations cause a great change in nearby vegetation, there is strong concern about palm cultivation.

Site of corn illegal cultivation in national park	Planted palm tree is also probrem
	
Air burning of corn residue inside KSNP	Landslide is also the problem

3.00 p.m. Move to KOPERASI office, meeting with concerned staff.

- Activities of cooperative are introduced;
  - The cooperative was founded in 2010 and started their activities in 2011.
  - The board consists of 5 members and there are 3 supervisors. The chairman of the board is Mr. Arsil, who is also a primary school teacher. The manager is Mr. Fitra. There is also 2 support staff.
  - The vision of the cooperative is improve the economic situation and the relationship between the members and the local community.

- The activities and assets of the cooperative are shown below:

  - 1. number of members: 142 as of 2015
  - 2. basic saving (entry fee): 75,000 IDR per person joining
  - 3. obligation saving (monthly fee): 10,000 IDR per person/month
  - 4. Volunteer saving: the amount is not specified. For this project when members supply the rice husk etc. proceeds will be placed into this account.
  - 5. Special saving: when a payment is made from this account, benefits are given as dividends.
  - 6. Business profit: profits generated from cooperative activities. For this project, the income from selling electricity will be put into this account.
  - 7. Profit: gains are distributed to members.

- 8. Donation: donations from government organizations, etc. There was a donation from the Ministry of Koperative in 2013 and from Pesisir Regency in 2014.

7th August, 2016

10.00 a.m. Meeting at the home of Mr. Fitra, after which whole day was for transfer.

- Confirm contents of consultation meeting on the 8th
- After lunch, move to Minangkabau International Airport.
- Transfer to Jakarta from Padang by air.

8th August, 2016

Meeting with JCM Secretariat -> Meeting with MONRE -> Wrap-up

8.30 a.m. Meeting with JCM Secretariat

- NTT gave a presentation about this project and the content of the feasibility study. The following comments were made by the Secretariat;
  - Mr. Dicky commented that similar biomass generation had been studied in Java using rice husk.
  - At that time, because the price of rice husk rose highly, it became difficult to maintain a stable supply of rice husk. Therefore careful consideration should be given for a secure supply of rice husk. In addition, transportation costs of rice husk may cause other problems.
  - In Indonesia, so-called "monuments" are built (although facilities are made, they do not get into operation) with subsidies from various organizations.
  - Negotiations with PLN will take time when selling power, therefore it is desirable to contact PLN at an early stage.
  - Mr. Dicky also said it is necessary to consult on any issues which may be problems affecting the project, as well as periodic reports.

10 a.m.Meeting with MOMRE (Ministry of Energy and Mineral Resources)

- NTT gave the presentation of the project and requested support for the realization of the project.
  - Obtained approval to proceed with feasibility study for the realization of the project.
  - It is the policy of MOMRE to support renewable energy and create a market through the FIT system.
  - As the generated power will be sold to PLN, there will be consultations and negotiations with PLN.
  - If conditions cannot be agreed with PLN, a member of MOMRE will also participate in consultations.
  - In a clause of the FIT system it is stipulated that PLN must purchase generated power, but sometimes PLN refuses to purchase the power where there is sufficient power supply or if the purchased price is too high. Under the new system, the electricity generated by a biomass power plant shall be purchased at 13.5 cent (USD)/1KW, disregarding plant size. This should be multiplied by the coefficient of 1.15 which is used for Sumatra. However, it will be necessary to find out the actual purchase value that PLN can afford.

1.00 p.m. Wrap-up meeting by all Japanese team member

The second field survey minutes

Visit to Biomass Power Plant in Thailand

September 20th 2016
1.40 - 4.00 p.m.

- About the two biomass power plants that Meidensha Corporation built in Thailand, each plant uses only rice husk as fuel, but it is possible to add in wood chips by 10-20%.
- Meidensha considers the maximum output of the biomass plant is10MW from a viewpoint of fuel supply.
- Rice husk demand is very high among the biomass power plants in Thailand and there is competition for the rice husk. When there is sometimes a shortage, rice husk will be imported from Cambodia.
- In Thailand, rice is a major export product and there are large-scale mills for export purposes in many places. Consequently there are many biomass power plants which utilize the huge amount of rice husk. Those plants are similar to the scheme for the Indonesian biomass plant.
- Rice husk is transported without compression. Therefore, the relative density of the bulk differs during movement or pressure. The difference is within 10%, but the structures of the conveyers also influence the density ratio.
- The annual operation is 24 hours for 330 days.
- The use of ash differs according to customers, but mainly it is used as an agent of soil-improvement or fertilizer. As the ash contains nitrogen and potassium phosphate, it is considered to make good fertilizer.
- It is possible to dry the rice husk by exhaust gases, but they must have been dried at the rice mill. The humidity must be checked when the rice husk is delivered. There are direct and indirect methods of drying. By using exhaust gases, 200-300 degrees C can be reached, but this increases initial costs.
- The average rice husk is for 3,000-4,000 kcal.
- At the power plant in Thailand, rice husk is stored at a storage yard, but the humidity does not differ much during storage.

Meeting with Pesisir Selatan Regency

September 22nd 2016
3.00-4.00 p.m.
at Pesisir Selatan Regency office in Painan

- Mr. Fitra gave a presentation of the biomass plant project using rice husk and corn cobs to the Pesisir Selatan Regency
- He suggested visiting the Kita-Kyushu Clean Center in Japan in order to understand the project better.
- Pesisir Selatan Regency showed great interest in the project and agreed to visit Japan so far. The itinerary will be set after confirmation of their requests.
- Pesisir Selatan Regency signed a MOU with the Ministry of Agriculture Indonesia for increased production of corn. Their goal is to produce high quality and high-yield corn. hen high quality corn is produced, they intend to export to Japan as well.
- After this meeting, when passing by the Sutera and Airpura areas, we heard that the government subsidy was given to purchase fertilizer and agricultural equipment for corn cultivation.
- In November a workshop is planned to obtain investors for this project, inviting domestic and other investors near Padang.

Meeting with Mukomuko regency

September 23rd, 2016
9.30 - 11.30 a.m.
At Mukomuko Regency Office

- NTT reported the background and current status of the project and also gave a summary of the previous survey in August.
  - Mukomuko Regency officer said that they have great expectations for this project and will give as much support as possible.

  - Following questions were raised from other participants. Some need for further considerations, but they should be regarded as a guideline for the next report. Generally, their questions are from the viewpoint of investing money, therefore we need to give a specific business plan as soon as possible. Who are the investors for this project? Clarification of the project implementation system and the role of the Mukomuko Regency.
  - What is the period of return on investment?
  - Is it alright to build the plants in Kambang and Lunang and supply rice husk there, but we hope to have a biomass power plant using palm oil in Mukomuko as well.

Second field survey -> Meeting with the cooperative

September 23rd-24th, 2016

- Based on the survey results of August, we agreed to use the rice husk and corn cobs as fuel. Also to solve the issue of collection routes, and we agreed to the possible construction of two plants.
  - Although there is concern about the increase of investment amount, they were positive about building 2 plants.
  - They expressed their desire to have No. 1 plant in Lunang and No. 2 plant in Kambang. As there is a large substation in Kambang area, it will be easier to send power by having this plant.
- As there is potential to collect the rice husk and corn cobs in southern regions including Mukomuko Regency, we received data of biomass residue in the southern region other than Lubuk Pinang.

- Visited 2 small-scale rice mills, one in Painan and the other in Airpura. They were both positive for supply of rice husk when the project is implemented.

- Emerging new areas in Kambang.
  - As the population is increasing between Kambang and Lunang, a new district will be established according to Indonesian law.

- Various issues concerning cattle in West Sumatra
  - There is much free-range cattle in West Sumatra. Sometimes they cross roads during the day or sleep on the road asphalt causing traffic jams. During this field study, we encountered many times such cattle causing traffic jams. Pesisir Selatan Regency is also troubled by the traffic jams caused by cattle.
  - In West Sumatra, there is a custom to give cattle as a betrothal gift of marriage, so most families keep cattle. Such cattle are free to wander around and do not get stolen nor run away.
  - Cattle manure remains on the roads and we are studying whether this might make good biomass fuel.
  - This will be a future issue for discussion.

	
Traffic jams by cattle	Sleeping cows on the road in night time.

Third field survey minutes

Meeting notes of Third Field Survey

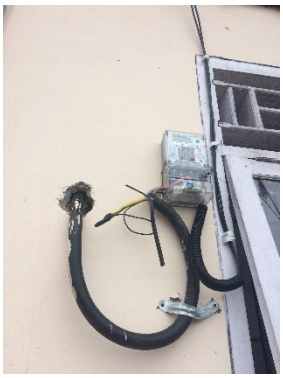
Tuesday, February 21, 2017
5：00～17:00
At west Sumatra

【Contents】

- Meeting with the governor of the prefecture at the prefectural governor 's official residence
  - Confirmation of the schedule of the day. Confirmed to act on the following schedule.
    - Confirmation of ports near Painan
    - Consultation with the landowner of the candidate site for the construction of the plant in the vicinity of Lunang's rice mill
    - Introduction of a business operator conducting foundation work in the vicinity of Lunang's rice mill
    - Confirmation of the second candidate site for plant construction in Kambang, Lengayang area
    - Confirming whether water can be secured for the second plant in Kambang, Lengayang area
    - Check status of Kambang substation
  - The governor of the prefecture was to accompany the investigation today in person.

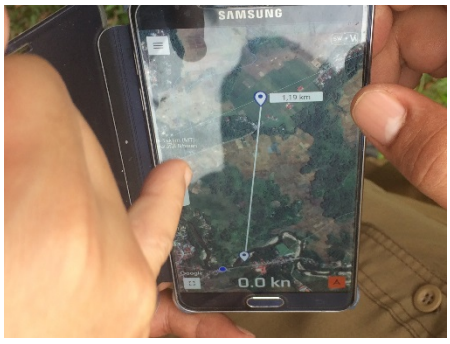
- Confirmation of ports near Painan
  - The site at Panasahan port was confirmed.
  - The port has a depth of 17 m and has been used to transport building materials so far.
  - After May 2017, it is planned to expand the port so that large vessels can enter the port.

- Meeting with the landowner of the candidate site for the construction of the plant near the rice mill in Lunang
  - At the time of visit last time (September 2016), the rice mill was only in trial operation, but started operation from 3 months ago (around December 2016).
  - The rice mill's energy source uses diesel fuel.
  - Rice milling to packaging took place at this rice mill, and the product is trading at 12,200 IDR / 1 kg.
  - The amount of rice husk generation has also increased with plant operation. Rice husk was piled up in the stockyard. Once in 3 months, as the stockyard became filled, it is said that the rice husk was burned and disposed.
  - Landlord asked for price rise on land around the candidate site for construction because there was an inquiry on purchase as residential land from other companies. According to the previous consultations, the case was discussing with the view that the land is provided free of charge for the reason that this case is a joint project in the area mainly of agricultural cooperatives, but we think that it will become necessary to consult again when realizing. The price offered by landlords this time is 200 million IDR per 1 ha (16 million yen / ha in terms of 1 IDR 0.008 yen conversion).

	
Packaged rice from 3TPH Rice mill	Risk husk mountain in 3TPH rice mill
	
3TPH rice mill had connection with grid	Power meter was attached to the rice mill plant

- Introduction of a business operator conducting foundation construction near the rice
  - From the governor of the prefecture, a company that performs civil engineering work in the area was introduced.
  - In the prefecture, basically the price per hectare is fixed.
  - Check the details as soon as possible due to the estimate given in Indonesian language.

- Confirmation of the second plant construction site in Kambang, Lengayang area
  - In the selection of the plant construction site, candidate sites were conducted in the northern region based on the factors of 1) whether it is possible to secure a coherent land of about 6 ha, and 2) the plant manufacturer's hope that it is important that the intake source is in the vicinity .
  - In the selection three candidate sites were confirmed. The first one was the area where it was originally expected to have a water source, but actually it was revealed that the wetlands spread only, and that it is scarce for the water source.
  - The second place is the vicinity of the river. Although it is possible to secure land for 6 ha, it is 11 km away from the substation, and it turned out that it is difficult to connect to the electricity grid.
  - In the third place, it is possible to secure land of 6 ha, there is a river flowing in front of the candidate site, the distance from the substation is 7 km, and the main road is close. As the third place is a place with a possibility of being available, the surrounding infrastructure was confirmed.

	
The other side of the river is a candidate site	GPS information

- Confirmation of infrastructure around the planned construction site of the second plant
  - The planned construction site was located on the other side of the river, if viewed from the location where the site confirmation was conducted. It is said that the end of this year a bridge will be built across the river. The specifications of the bridge are two lanes and it is 40 ton load capacity.
  - In relation to the construction of the plant, manufacturers have made clear that a stronger load bearing capacity is required for transporting needed heavy machinery and the like. For detailed orders, after arranging the information at the Japanese side, it was decided to contact the prefectural civil officials directly.

- Check status of Kambang substation
  - The substations held by LN was confirmed.
  - When constructing a plant, it is necessary to confirm by involving PLN stakeholders in the future whether the ability to handle the electric power supplied from the plant is sufficient for the substation equipment.

Minutes of the workshop held at the site

Wednesday, February 22, 2017
09:30~17:00
At Saga Murni Hotel in Painan

Contents:

- In order to report the contents of consideration carried out in this project and to seek further cooperation in the future, a workshop was held at a hotel conference room in Pinnang area of Sumatra, Indonesia on February 22.
- Timetable for workshop is as follows.

Time	Description
8.30-9.00	Registration
9.00-9.15	Opening and welcome remarks from Pesisir Selatan Regent
9.15-9.30	Welcoming of the Guests of Honour from Coordinating Ministry for Economic Affair
9.30-9.45	Greeting from West Sumatera Governor
10.00-10.15	Workshop introductory remarks from NTT Data IOMC
10.15-10.30	Coffee Break
10.30.11.00	Keynote speach Bioenergy, and Minister of Energy and Mineral Resources Regulation Number 21 of 2016, Key Drivers and Strategic Measures in Achieving Indonesia Millennium Development Goals
11.00.11.30	Recent Development of Large Scale Joint Crediting Mechanism Project In Indonesia From Indonesia JCM Secretariat
11.30-12.30	Lunch
12:30-13:00	How JCM Financing Scheme Based-Biomass Power Generation By Rice Hull and Grain Waste Works and be the Project Champion in Lunang and Lengayang Eco-Industrial Park Development from Meidensha Corporation
13.00-13.30	Roundtable discussion: Q & A and Suggestion
13.30-14.00	Financial feasibility of JCM Financing Based-Biomass Power Generation By Rice Hull and Grain Waste and Modern Rice Mill Plant which use By-Product and Energy Exchange strategy in Lunang and Lengayang Eco-Industrial Park Development From NTT Data IOMC
14.00-14.30	Roundtable discussion: Q & A and Suggestion
14.30-15.30	Individual discussions between participants
15.30-16.00	Istirahat Coffee break
16.00-16.30	Kesimpulan Conclusions and wrap-up

- An announcement on the scale of the plant assumed this time is presented from the plant maker.
- The NTT Data Management Institute Consulting, Inc explained the business model of this project and reported the results of the business simulation and it requested further local cooperation in the future.
- At the end of the workshop, the governor of the prefecture as a summary repeatedly emphasized that, as South Pusillan Province is still a region where power supply is still difficult, this project can be a very effective solution to solve this problem. In addition, he expressed the expectation for South Pusillil province to become the model area since the construction of large-scale power generation facilities utilizing biomass is the first effort in Indonesia.

  In response to this, it was decided that participants in the workshop will cooperate fully in considering the project realization.

Major discussion:

- Investors also participated in the workshop, but, as if anything most of the participants were mainly local farmers and owners of small scale rice mills, the workshop became strongly inclined to the capacity building element for project implementation
- A comment received is that it is important to select local stakeholders who can bear 5% burden because, according to the negative list of the government, the entry of foreign capital is limited to 95% as this project is a power generation business with 10 MW or less.
- A comment of considering the project positively because the project IRR is not bad was received.
- PLN personnel in charge also participated in the workshop and said that, with regard to the FIT system, internal discussion is ongoing. In order to realize this project, it was decided to continue negotiation while sharing information on the details of the project.

Others:

- Information was received from the person in charge of the Indonesian JCM secretariat who participated in the workshop such that the FIT system was changed in January 2016. As for details, it is necessary to carefully discuss the project feasibility after the situation is confirmed.

- The local press also came to the workshop for the interview and related articles were posted on the following media at a later date.

  ✧ Portal berita Metro Andalas
  https://www.metroandalas.co.id/berita-bupati-pessel-buka-lokakarya-pembangkit-listrik-tenaga-biomassa.html

  ✧ REDAKSI SUMBER
  http://redaksisumbar.com/jika-terwujud-pltu-sekam-padi-di-pessel-menjadi-yang-pertama-di-indonesia/

  ✧ Pesisir Selatan Kab
  http://www.pesisirselatankab.go.id/berita/10435/pessel-akan-memiliki-pembangkit-listrik-tenaga-biomassa-berbahan-bakar-sekam-padi.html

  ✧ Beritad Aerah
  http://beritadaerah.co.id/2017/02/28/pesisir-selatan-akan-bangun-pembangkit-listrik-tenaga-biomassa-berbahan-bakar-sekam/

  ✧ Sumber Antaranews
  http://www.antarasumbar.com/berita/198559/pesisir-selatan-siapkan-12-hektare-bangun-pltb.html

  ✧ Sumber Antaranews
  http://sumbar.antaranews.com/berita/198559/pesisir-selatan-siapkan-12-hektare-bangun-pltb.html

  ✧ KLIKPOSITIF
  http://news.klikpositif.com/baca/11478/bupati-gaet-investor-jepang-berinvestasi-di-pessel

FY 2016 Large-scale FS on legally cultivated grain waste-fired biomass power generation project in Pesisir Selatan, West Sumatra, Indonesia

Monthly progress report (July)

NTT Data Institute of Management Consulting, Inc.,

(1) Major activities in July

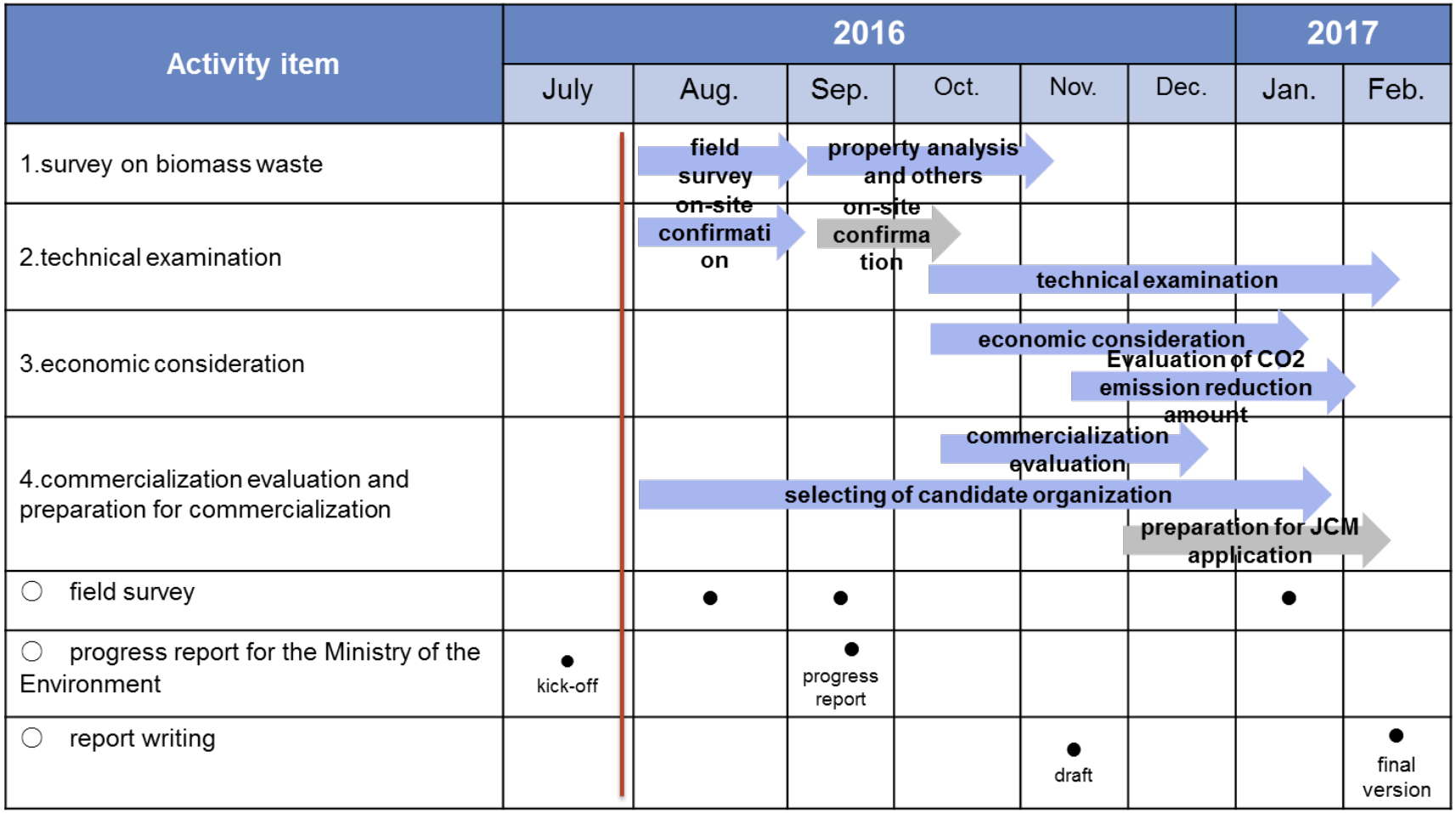
- [Specification item 4-(1) Field survey]
  - Adjustment with the site and the basic survey for the first field survey
- [Specification item 4-(2)② Kick-off meeting with the Ministry of the Environment]

(2) Major activities planned for August

- [Specification item4-(1) Field survey]
  - Implementation of the first field survey
- [Specification item3-(1) Survey on biomass waste]
  - Confirmation of recoverable biomass amount (3-(1)-1)
  - Confirmation of recoverable biomass quality (3-(1)-2)
  - Confirmation of biomass waste collecting method (3-(1)-3)
- [Specification item3-(2) Technical examination]
  - Confirmation of plant-installable lands (3-(2)-1)
  - Confirmation of regulations and procedures on plant installation (3-(2)-2)
  - Confirmation of maintenance status of power transmission network (3-(2)-3)
- [Specification item3-(3) Economic consideration]
  - Confirm legal system on electricity sales (3-(3)-1)

(3) Schedule and progress situation

・The progress as of the end of July is as follows.



Monthly progress report (August)

(1) Major activities in August

・[Specification item 4-(1) Field survey]

- Implementation of the first field survey

・[Specification item 3-(1) Survey on biomass waste]

- Confirmation of recoverable biomass amount (3-(1)-1) Sample acquisition.
- Confirmation of recoverable biomass quality (3-(1)-2)
- Confirmation of biomass waste collecting method (3-(1)-3)

・[Specification item 3-(2) Technical examination]

- Confirmation of plant-installable lands (3-(2)-1)
- Confirmation of regulations and procedures on plant installation (3-(2)-2)
- Confirmation of maintenance status of power transmission network (3-(2)-3)

・[Specification item 3-(3) Economic consideration]

- Confirm legal system on electricity sales (3-(3)-1)

(2) Major activities planned for September

・[Specification item 4-(1) Field survey]

- Implementation of the second field survey

・[Specification item 3-(1) Survey on biomass waste]

- Confirmation of recoverable biomass amount (3-(1)-1) Sample acquisition.
- Confirmation of recoverable biomass quality (3-(1)-2)
- Confirmation of biomass waste collecting method (3-(1)-3)

・[Specification item3-(2) Technical examination]

- Confirmation of regulations and procedures on plant installation (3-(2)-2)

(3) Schedule and progress situation

・The progress as of the end of August is as follows.

Activity item	2016						2017	
	July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.
1.survey on biomass waste		field survey on-site	property analysis and others					
2.technical examination		confirmation	on-site confirmation	technical examination				
3.economic consideration				economic consideration	Evaluation of CO2 emission reduction amount			
4.commercialization evaluation and preparation for commercialization				commercialization evaluation	selecting of candidate organization	preparation for JCM application		
○ field survey		●	●				●	
○ progress report for the Ministry of the Environment	● kick-off		● progress report					
○ report writing					● draft			● final version

Monthly progress report (September)

(1) Major activities in September

・[Specification item 4-(1) Field survey]

- Implementation of the second field survey

・[Specification item3-(1)Survey on biomass waste]

- Confirmation of recoverable biomass amount (3-(1)-1) Sample acquisition.
- Confirmation of recoverable biomass quality (3-(1)-2)
- Confirmation of biomass waste collecting method (3-(1)-3)

・[Specification item 3-(2) Technical examination]

- Confirmation of plant-installable lands (3-(2)-1)

(2) Major activities planned for October

・[Specification item 3-(1) Survey on biomass waste]

- Confirmation of recoverable biomass amount (3-(1)-1) Examination of the area expansion
- Confirmation of recoverable biomass quality (3-(1)-2) Confirmation of sample analysis result
- Confirmation of biomass waste collecting method (3-(1)-3)

・[Specification item 3-(2) Technical examination]

- Confirmation of regulations and procedures on plant installation (3-(2)-2)

(3) Schedule and progress situation

・The progress as of the end of September is as follows.

Activity item	2016						2017	
	July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.
1.survey on biomass waste		field survey	property analysis and others					
2.technical examination		on-site confirmation	on-site confirmation	technical examination				
3.economic consideration				economic consideration	Evaluation of CO2 emission reduction amount			
4.commercialization evaluation and preparation for commercialization				commercialization evaluation	selecting of candidate organization	preparation for JCM application		
○ field survey		●	●				●	
○ progress report for the Ministry of the Environment	● kick-off			● progress report				
○ report writing					● draft			● final version

Monthly progress report (October)

(1) Major activities in October

・[Specification item3-(1) Survey on biomass waste]

- Confirmation of recoverable biomass amount (3-(1)-1) Examination of the area expansion
- Confirmation of recoverable biomass quality (3-(1)-2) Confirmation of sample analysis result
  - It delayed because sample analysis procedure took time.
- Confirmation of biomass waste collecting method (3-(1)-3)

・[Specification item3-(2) Technical examination]

- Confirmation of regulations and procedures on plant installation (3-(2)-2)

(2) Major activities planned for November

・[Specification item 3-(1) Survey on biomass waste]

- Confirmation of recoverable biomass quality (3-(1)-2) Confirmation of sample analysis result
- Confirmation of biomass waste collecting method (3-(1)-3)

・[Specification item 3-(2) Technical examination]

- Confirmation of regulations and procedures on plant installation (3-(2)-2)

・Others

- Response to on-site counterpart's visit to Thailand and Japan
  - It aims to obtain understanding of the stakeholders such as regional administration through counterpart's inspecting the rice husk power plant constructed by MEIDENSHA in Thailand.

(3) Schedule and progress situation

・The progress as of the end of October is as follows.

Activity item	2016						2017	
	July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.
1.survey on biomass waste		field survey		property analysis and others				
2.technical examination		on-site confirmation		on-site confirmation	technical examination			
3.economic consideration					economic consideration	Evaluation of CO2 emission reduction amount		
4.commercialization evaluation and preparation for commercialization					commercialization evaluation	selecting of candidate organization	preparation for JCM application	
○ field survey		●	●				●	
○ progress report for the Ministry of the Environment	● kick-off			● progress report				
○ report writing					● draft			● final version

Monthly progress report (November)

(1) Major activities in November

・[Specification item 3-(1)Survey on biomass waste]

- Confirmation of recoverable biomass amount (3-(1)-1) Examination of the area expansion
- Confirmation of recoverable biomass quality (3-(1)-2) Confirmation of sample analysis result
  - It delayed because sample analysis procedure took time.
- Confirmation of biomass waste collecting method (3-(1)-3)

・[Specification item3-(2) Technical examination]

- Confirmation of regulations and procedures on plant installation (3-(2)-2)

(2) Major activities planned for December

・[Specification item3-(1)Survey on biomass waste]

- Confirmation of recoverable biomass quality (3-(1)-2) Confirmation of sample analysis result
- Confirmation of biomass waste collecting method (3-(1)-3)

・[Specification item3-(2) Technical examination]

- Confirmation of regulations and procedures on plant installation (3-(2)-2)
- Applicable technical examination (3-(2)-4)

・Others

- Response to on-site counterpart's visit to Thailand and Japan
  - It aims to obtain understanding of the stakeholders such as regional administration through counterpart's inspecting the rice husk power plant constructed by MEIDENSHA in Thailand.
  - It is holding ongoing response because delay of obtaining a visa for local administrative agencies, etc.

(3) Schedule and progress situation

・The progress as of the end of November is as follows.

Activity item	2016						2017	
	July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.
1.survey on biomass waste		field survey	property analysis and others					
2.technical examination		on-site confirmation	on-site confirmation	technical examination				
3.economic consideration				economic consideration	Evaluation of CO2 emission reduction amount			
4.commercialization evaluation and preparation for commercialization				commercialization evaluation	selecting of candidate organization	preparation for JCM application		
○ field survey		●	●				●	
○ progress report for the Ministry of the Environment	● kick-off			● progress report				
○ report writing								● final version

Monthly progress report (December)

(1) Major activities in November

・[Specification item 3-(1)Survey on biomass waste]

- Confirmation of recoverable biomass quality (3-(1)-2) It delayed because sample analysis procedure took time.
- Confirmation of biomass waste collecting method (3-(1)-3)

・[Specification item 3-(2) Technical examination]

- Confirmation of regulations and procedures on plant installation (3-(2)-2)
- Applicable technical examination (3-(2)-4) It starts examination based on sample analysis result

・Others

- Response to on-site counterpart's visit to Thailand and Japan
  - It aims to obtain understanding of the stakeholders such as regional administration through counterpart's inspecting the rice husk power plant constructed by MEIDENSHA in Thailand.
  - It is holding ongoing response because delay of obtaining a visa for local administrative agencies, etc.

(2) Major activities planned for January

・[Specification item 3-(2) Technical examination]

- Confirmation of regulations and procedures on plant installation (3-(2)-2)
- Applicable technical examination (3-(2)-4)

・[Specification item3-(3) Economic consideration]

- Economic consideration, projectability evaluation and calculation of CO2 emission reduction amount (3-(3)-3)

・[Specification item 3-(4) Commercialization evaluation and preparation for commercialization]

- Finding potential investors for project implementation in on-site (3-(4)-1)
  - It sets up opportunities to invite investors by invite local financial institutions on site and introducing projects.

・Others

- Response to on-site counterpart's visit to Thailand and Japan
  - It aims to obtain understanding of the stakeholders such as regional administration through counterpart's inspecting the rice husk power plant constructed by MEIDENSHA in Thailand.
  - It is holding ongoing response because delay of obtaining a visa for local administrative agencies, etc.

(3) Schedule and progress situation

・The progress as of the end of December is as follows.

Activity item	2016						2017	
	July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.
1.survey on biomass waste		field survey		property analysis and others				
2.technical examination		on-site confirmation		on-site confirmation		technical examination		
3.economic consideration					economic consideration	Evaluation of CO2 emission reduction amount		
4.commercialization evaluation and preparation for commercialization				commercialization evaluation	selecting of candidate organization		preparation for JCM application	
○ field survey		●	●				●	
○ progress report for the Ministry of the Environment	● kick-off			● progress report				
○ report writing								● final version

Monthly progress report (January)

(1) Major activities in January

・[Specification item 3-(2) Technical examination]

- Confirmation of regulations and procedures on plant installation (3-(2)-2)
- Applicable technical examination (3-(2)-4)

・[Specification item3-(3)Economic consideration]

- Economic consideration, project ability evaluation and calculation of CO2 emission reduction amount (3-(3)-3)

・[Specification item3-(4) Commercialization evaluation and preparation for commercialization]

- Finding potential investors for project implementation in on-site (3-(4)-1)
  - It sets up opportunities to invite investors by invite local financial institutions on site and introducing projects.

(2) Major activities planned for February

・[Specification item 3-(3) Economic consideration]

- Economic consideration, project ability evaluation and calculation of CO2 emission reduction amount (3-(3)-3)

・[Specification item 3-(4) Commercialization evaluation and preparation for commercialization]

- Finding potential investors for project implementation in on-site (3-(4)-1)
  - It sets up opportunities to invite investors by invite local financial institutions on site and introducing projects.
  - It bring proposals to domestic companies with potential for investment.

・Others

- Response to on-site counterpart's visit to Thailand and Japan
  - It aims to obtain understanding of the stakeholders such as regional administration through counterpart's inspecting the rice husk power plant constructed by MEIDENSHA in Thailand.
  - It is holding ongoing response because delay of obtaining a visa for local administrative agencies, etc.

(3) Schedule and progress situation

・The progress as of the end of January is as follows.

Activity item	2016						2017		
	July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
1.survey on biomass waste		field survey		property analysis and others					
2.technical examination		on-site confirmation		on-site confirmation		technical examination			
3.economic consideration						economic consideration	Evaluation of CO2 emission reduction amount		
4.commercialization evaluation and preparation for commercialization					commercialization evaluation	selecting of candidate organization		preparation for JCM application	
○ field survey		●	●				●		
○ progress report for the Ministry of the Environment	● kick-off			● progress report					
○ report writing									● final version

Monthly progress report (February)

(1) Major activities in February

・[Specification item 3-(3) Economic consideration]

- Economic consideration, project ability evaluation and calculation of CO2 emission reduction amount (3-(3)-3)

・[Specification item 3-(4) Commercialization evaluation and preparation for commercialization]

- Finding potential investors for project implementation in on-site (3-(4)-1)
  - It sets up opportunities to invite investors by invite local financial institutions on site and introducing projects.
  - It bring proposals to domestic companies with potential for investment.

・Others

- Response to on-site counterpart's visit to Thailand and Japan
  - It aims to obtain understanding of the stakeholders such as regional administration through counterpart's inspecting the rice husk power plant constructed by MEIDENSHA in Thailand.
  - It is holding ongoing response because delay of obtaining a visa for local administrative agencies, etc.

(2) Major activities planned for March

・ Hand in report to MOE

(3) Schedule and progress situation

・The progress as of the end of February is as follows.

Activity item	2016						2017		
	July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
1.survey on biomass waste		field survey on-site		property analysis and others					
2.technical examination		on-site confirmation		on-site confirmation		technical examination			
3.economic consideration						economic consideration	Evaluation of CO2 emission reduction amount		
4.commercialization evaluation and preparation for commercialization					commercialization evaluation	selecting of candidate organization		preparation for JCM application	
○ field survey		●	●				●		
○ progress report for the Ministry of the Environment	● kick-off			● progress report					
○ report writing									● final version

Lunang District(1基目)
POTENCY OF ENERGY, BIOMAS POWER PLANTS INSTALLED CAPACITY FROM CROP RESIDUE and GHG EMISSION

Assumptions

Commodity	Residue	Water Content	Caloric Value (MJ/Kg)
Paddy	Rice Husk	12%	19.3
	Paddy Straw	13%	16.0
Corn	Corn Cob	8%	16.3
	Corn Stover	15%	19.7

3.6 MJ = 860 kcal
1 = 238.89 kcal

4,618
3,827
4,697

Biomas Power Plant Eficiency= 20% | Boiler Efficiency 80% x Steam Turbin 25% | Onsite Electricity Cunsump 10%
1 kWh = 3,6 x 1.000.000 Joule 3.6 MJ | Working Day/Year = 330 | CO_2 Emission Factor : 0.867 tCO_2/MWh
Working Hour/Day = 24 | Working Hour/Year = 7,920 | 2015 Indonesia Grid

BIOMASS POWER PLANTS FUELED WITH LEGALLY CULTIVATED CROP RESIDUE

Disrtrict	Commodity	Production (Ton)	Residue Type	Residue to Production Ratio (RPR)	Total Residue (Ton)	Residue Utilization %	Residue Utilization Ton	Potency Energy (MJ/Year)	Potency Total Energy (MJ/Year)	Potency Installed Capacity (MW)	Potency Electricity Generation MWh/Yr	BIOMASS POWER PLANTS Onsite Electricity Consumption MWh/Yr	BIOMASS POWER PLANTS Estimated Reference Emission tCO2eq/Yr	Total Estimated Emission Reduction tCO2eq/Yr
Lunang	Paddy	18,394	Rice Husk	27%	4,911	100%	4,911	83,190,189	141,179,095	1.0	7,843	784	6,120	6,120
			Paddy Straw	176%	32,318	0%	0	0						
	Corn	14,110	Corn Cob	27%	3,852	100%	3,852	57,988,906						
			0	200%	28,220	0%	0	0						
Silaut	Paddy		Rice Husk	27%	0	100%	0	0	19,788,560	0.1	1,099	110	858	858
			Paddy Straw	176%	0	0%	0	0						
	Corn	4,815	Corn Cob	27%	1,314	100%	1,314	19,788,560						
			0	200%	9,630	0%	0	0						
Ranah Ampek Hulu Tapan	Paddy	12,391	Rice Husk	27%	3,308	100%	3,308	56,040,536	74,283,822	0.5	4,127	413	3,220	3,220
			Paddy Straw	176%	21,771	0%	0	0						
	Corn	4,439	Corn Cob	27%	1,212	100%	1,212	18,243,285						
			0	200%	8,878	0%	0	0						
Basa Ampek Balai Tapan	Paddy	15,103	Rice Husk	27%	4,033	100%	4,033	68,306,047	123,323,587	0.9	6,851	685	5,346	5,346
			Paddy Straw	176%	26,536	0%	0	0						
	Corn	13,387	Corn Cob	27%	3,655	100%	3,655	55,017,540						
			0	200%	26,774	0%	0	0						
Airpura	Paddy	16,091	Rice Husk	27%	4,296	100%	4,296	72,774,455	145,924,317	1.0	8,107	811	6,326	6,326
			Paddy Straw	176%	28,272	0%	0	0						
	Corn	17,799	Corn Cob	27%	4,859	100%	4,859	73,149,862						
			0	200%	35,598	0%	0	0						
Pancung Soal	Paddy	24,543	Rice Husk	27%	6,553	100%	6,553	111,000,152	247,432,309	1.7	13,746	1,375	10,726	10,726
			Paddy Straw	176%	43,122	0%	0	0						
	Corn	33,197	Corn Cob	27%	9,063	100%	9,063	136,432,156						
			0	200%	66,394	0%	0	0						
Linggo Sari Baganti	Paddy	23,951	Rice Husk	27%	6,395	100%	6,395	108,322,725	153,904,225	1.1	8,550	855	6,672	6,672
			Paddy Straw	176%	42,082	0%	0	0						
	Corn	11,091	Corn Cob	27%	3,028	100%	3,028	45,581,500						
			0	200%	22,182	0%	0	0						
Ranah Pesisir	Paddy	32,698	Rice Husk	27%	8,730	100%	8,730	147,882,613	160,635,241	1.1	8,924	892	6,964	6,964
			Paddy Straw	176%	57,450	0%	0	0						
	Corn	3,103	Corn Cob	27%	847	100%	847	12,752,628						
			0	200%	6,206	0%	0	0						
Lubuk Pinang	Paddy	12,748	Rice Husk	27%	3,404	100%	3,404	57,655,133	58,822,309	0.4	3,268	327	2,550	2,550
			Paddy Straw	176%	22,398	0%	0	0						
	Corn	284	Corn Cob	27%	78	100%	78	1,167,176						
			Corn Stover	200%	568	0%	0	0						
Air Manjunto	Paddy	4,459	Rice Husk	27%	1,191	100%	1,191	20,166,633	30,128,725	0.2	1,674	167	1,306	1,306
			Paddy Straw	176%	7,834	0%	0	0						
	Corn	2,424	Corn Cob	27%	662	100%	662	9,962,091						
			Corn Stover	200%	4,848	0%	0	0						
Limo Koto	Paddy	1,499	Rice Husk	27%	400	100%	400	6,779,498	10,219,379	0.1	568	57	443	443
			Paddy Straw	176%	2,634	0%	0	0						
	Corn	837	Corn Cob	27%	229	100%	229	3,439,881						
			Corn Stover	200%	1,674	0%	0	0						
14 Koto	Paddy	9,402	Rice Husk	27%	2,510	100%	2,510	42,522,244	50,930,841	0.4	2,829	283	2,208	2,208
			Paddy Straw	176%	16,519	0%	0	0						
	Corn	2,046	Corn Cob	27%	559	100%	559	8,408,597						
			Corn Stover	200%	4,092	0%	0	0						
Air Dikit	Paddy	0	Rice Husk	27%	0	100%	0	0	784,967	0.0	44	4	34	34
			Paddy Straw	176%	0	0%	0	0						
	Corn	191	Corn Cob	27%	52	100%	52	784,967						
			Corn Stover	200%	382	0%	0	0						
Kota Muko Muko	Paddy	369	Rice Husk	27%	99	100%	99	1,668,869	3,493,609	0.0	194	19	151	151
			Paddy Straw	176%	648	0%	0	0						
	Corn	444	Corn Cob	27%	121	100%	121	1,824,740						
			Corn Stover	200%	888	0%	0	0						
Selagan Raya	Paddy	9,441	Rice Husk	27%	2,521	100%	2,521	42,698,628	44,276,782	0.3	2,460	246	1,919	1,919
			Paddy Straw	176%	16,588	0%	0	0						
	Corn	384	Corn Cob	27%	105	100%	105	1,578,153						
			Corn Stover	200%	768	0%	0	0						
Penarik	Paddy	2,700	Rice Husk	27%	721	100%	721	12,211,238	14,479,833	0.1	804	80	628	628
			Paddy Straw	176%	4,744	0%	0	0						
	Corn	552	Corn Cob	27%	151	100%	151	2,268,595						
			Corn Stover	200%	1,104	0%	0	0						
Teras	Paddy	206	Rice Husk	27%	55	100%	55	931,672	7,864,860	0.1	437	44	341	341
			Paddy Straw	176%	362	0%	0	0						
	Corn	1,687	Corn Cob	27%	461	100%	461	6,933,188						
			Corn Stover	200%	3,374	0%	0	0						
Teramang	Paddy	2,231	Rice Husk	27%	596	100%	596	10,090,101	17,606,877	0.1	978	98	763	763
			Paddy Straw	176%	3,920	0%	0	0						
	Corn	1,829	Corn Cob	27%	499	100%	499	7,516,776						
			Corn Stover	200%	3,658	0%	0	0						
Sungai Rumbai	Paddy	537	Rice Husk	27%	143	100%	143	2,428,680	4,232,870	0.0	235	24	183	183
			Paddy Straw	176%	944	0%	0	0						
	Corn	439	Corn Cob	27%	120	100%	120	1,804,191						
			Corn Stover	200%	878	0%	0	0						
Pondok Sugu	Paddy	1,768	Rice Husk	27%	472	100%	472	7,996,099	21,702,195	0.2	1,206	121	941	941
			Paddy Straw	176%	3,106	0%	0	0						
	Corn	3,335	Corn Cob	27%	910	100%	910	13,706,095						
			Corn Stover	200%	6,670	0%	0	0						
Malin	Paddy	5,257	Rice Husk	27%	1,404	100%	1,404	23,775,732	31,037,702	0.2	1,724	172	1,345	1,345
			Paddy Straw	176%	9,237	0%	0	0						
	Corn	1,767	Corn Cob	27%	482	100%	482	7,261,970						
			Corn Stover	200%	3,534	0%	0	0						
Air Rami	Paddy	324	Rice Husk	27%	87	100%	87	1,465,349	3,080,490	0.0	171	17	134	134
			Paddy Straw	176%	569	0%	0	0						
	Corn	393	Corn Cob	27%	107	100%	107	1,615,141						
			Corn Stover	200%	786	0%	0	0						
Ipuh	Paddy	5,381	Rice Husk	27%	1,437	100%	1,437	24,336,545	26,748,982	0.2	1,486	149	1,160	1,160
			Paddy Straw	176%	9,454	0%	0	0						
	Corn	587	Corn Cob	27%	160	100%	160	2,412,437						
			Corn Stover	200%	1,174	0%	0	0						

Total		
Installed Capacity	9.8	MW
GHG Emission Reduction	60,338	tCO_2eq/Yr

Plant for Kambang District（2基目）

POTENCY OF ENERGY, BIOMAS POWER PLANTS INSTALLED CAPACITY FROM CROP RESIDUE and GHG EMISSION

Assumptions

Commodity	Residue	Water Content	Caloric Value (MJ/Kg)
Paddy	Rice Husk	12%	19.3
	Paddy Straw	13%	16.0
Corn	Corn Cob	8%	16.3
	Corn Stover	15%	19.7

3.6 MJ = 860 kcal
1 = 238.89 kcal

4,618
3,827
4,697

Biomas Power Plant Eficiency= 20% | Boiler Efficiency 80% | x | Steam Turbin 25%

Onsite Electricity Cunsump 10%

1 kWh = 3,6 x 1.000.000 Joule 3.6 MJ | Working Day/Year = 330 | CO_2 Emission Factor : 0.867 tCO_2/MWh

Working Hour/Day = 24 | Working Hour/Year = 7,920 | 2015 Indonesia Grid

BIOMASS POWER PLANTS FUELED WITH LEGALLY CULTIVATED CROP RESIDUE

Disrtrict	Commodity	Production (Ton)	Residue Type	Residue to Production Ratio (RPR)	Total Residue (Ton)	Residue Utilization %	Residue Utilization Ton	Potency Energy (MJ/Year)	Potency Total Energy (MJ/Year)	Installed Capacity (MW)	Electricity Generation MWh/Yr	BIOMASS POWER PLANTS Onsite Electricity Consumption MWh/Yr	BIOMASS POWER PLANTS Estimated Reference Emission tCO_2eq/Yr	Total Estimated Emission Reduction tCO_2eq/Yr
Lengayang	Paddy	33,687	Rice Husk	27%	8,994	100%	8,994	152,355,545	155,392,667	1.1	8,633	863	6,736	6,736
			Paddy Straw	176%	59,188	0%	0	0						
	Corn	739	Corn Cob	27%	202	100%	202	3,037,123						
			Corn Stover	200%	1,478	0%	0	0						
Sutera	Paddy	40,579	Rice Husk	27%	10,835	100%	10,835	183,525,860	189,961,765	1.3	10,553	1,055	8,235	8,235
			Paddy Straw	176%	71,297	0%	0	0						
	Corn	1,566	Corn Cob	27%	428	100%	428	6,435,906						
			Corn Stover	200%	3,132	0%	0	0						
Batang Kapas	Paddy	19,520	Rice Husk	27%	5,212	100%	5,212	88,282,727	91,439,033	0.6	5,080	508	3,964	3,964
			Paddy Straw	176%	34,297	0%	0	0						
	Corn	768	Corn Cob	27%	210	100%	210	3,156,306						
			Corn Stover	200%	1,536	0%	0	0						
IV Jurai	Paddy	11,782	Rice Husk	27%	3,146	100%	3,146	53,286,224	55,982,235	0.4	3,110	311	2,427	2,427
			Paddy Straw	176%	20,701	0%	0	0						
	Corn	656	Corn Cob	27%	179	100%	179	2,696,012						
			Corn Stover	200%	1,312	0%	0	0						
Bayang	Paddy	27,155	Rice Husk	27%	7,250	100%	7,250	122,813,394	129,524,655	0.9	7,196	720	5,615	5,615
			Paddy Straw	176%	47,711	0%	0	0						
	Corn	1,633	Corn Cob	27%	446	100%	446	6,711,260						
			Corn Stover	200%	3,266	0%	0	0						
Koto XI Tarusan	Paddy	27,161	Rice Husk	27%	7,252	100%	7,252	122,840,530	124,020,035	0.9	6,890	689	5,376	5,376
			Paddy Straw	176%	47,722	0%	0	0						
	Corn	287	Corn Cob	27%	78	100%	78	1,179,505						
			Corn Stover	200%	574	0%	0	0						
Bayang Utara	Paddy	10,650	Rice Husk	27%	2,844	100%	2,844	48,166,549	48,598,076	0.3	2,700	270	2,107	2,107
			Paddy Straw	176%	18,712	0%	0	0						
	Corn	105	Corn Cob	27%	29	100%	29	431,526						
			Corn Stover	200%	210	0%	0	0						
										Total	44,162			

Total		
Installed Capacity	5.6	MW
GHG Emission Reduction	34,460	tCO_2eq/Yr

MENTERI ENERGI DAN SUMBER DAYA MINERAL
REPUBLIK INDONESIA

PERATURAN MENTERI ENERGI DAN SUMBER DAYA MINERAL
REPUBLIK INDONESIA
NOMOR 21 TAHUN 2016
TENTANG
PEMBELIAN TENAGA LISTRIK DARI PEMBANGKIT LISTRIK TENAGA BIOMASSA DAN PEMBANGKIT LISTRIK TENAGA BIOGAS OLEH PT PERUSAHAAN LISTRIK NEGARA (PERSERO)

DENGAN RAHMAT TUHAN YANG MAHA ESA

MENTERI ENERGI DAN SUMBER DAYA MINERAL REPUBLIK INDONESIA,

Menimbang : a. bahwa dalam rangka pemenuhan kebutuhan energi listrik dan mendukung kebijakan strategis Pemerintah mengenai pengembangan energi baru dan energi terbarukan serta pencapaian target energi baru dan energi terbarukan sesuai dengan kebijakan energi nasional, perlu lebih mendorong pemanfaatan biomassa dan biogas sebagai bahan baku pembangkitan tenaga listrik dengan meninjau kembali pengaturan mengenai pembelian tenaga listrik oleh PT Perusahaan Listrik Negara (Persero) dari badan usaha sebagaimana dimaksud dalam Peraturan Menteri Energi dan Sumber Daya Mineral Nomor 27 Tahun 2014 tentang Pembelian Tenaga Listrik Dari Pembangkit Listrik Tenaga Biomassa dan Pembangkit Listrik Tenaga Biogas Oleh PT Perusahaan Listrik Negara (Persero);

b. bahwa berdasarkan pertimbangan sebagaimana dimaksud dalam huruf a, perlu menetapkan Peraturan Menteri Energi dan Sumber Daya Mineral tentang Pembelian Tenaga Listrik Dari Pembangkit Listrik Tenaga Biomassa dan Pembangkit Listrik Tenaga Biogas Oleh PT Perusahaan Listrik Negara (Persero);

Mengingat : 1. Undang-Undang Nomor 19 Tahun 2003 tentang Badan Usaha Milik Negara (Lembaran Negara Republik Indonesia Tahun 2003 Nomor 70, Tambahan Lembaran Negara Republik Indonesia Nomor 4297);

2. Undang-Undang Nomor 30 Tahun 2007 tentang Energi (Lembaran Negara Republik Indonesia Tahun 2007 Nomor 96, Tambahan Lembaran Negara Republik Indonesia Nomor 4746);

3. Undang-Undang Nomor 30 Tahun 2009 tentang Ketenagalistrikan (Lembaran Negara Republik Indonesia Tahun 2009 Nomor 133, Tambahan Lembaran Negara Republik Indonesia Nomor 5052);

4. Undang-Undang Nomor 23 Tahun 2014 tentang Pemerintahan Daerah (Lembaran Negara Republik Indonesia Tahun 2014 Nomor 244, Tambahan Lembaran Negara Republik Indonesia Nomor 5587) sebagaimana telah dua kali diubah terakhir dengan Undang-Undang Nomor 9 Tahun 2015 tentang Perubahan Kedua Atas Undang-Undang Nomor 23 Tahun 2014 tentang Pemerintahan Daerah (Lembaran Negara Republik Indonesia Tahun 2015 Nomor 58, Tambahan Lembaran Negara Republik Indonesia Nomor 5679);

5. Peraturan Pemerintah Nomor 23 Tahun 1994 tentang Pengalihan Bentuk Perusahaan Umum (Perum) Listrik Negara Menjadi Perusahaan Perseroan (Persero) (Lembaran Negara Republik Indonesia Tahun 1994 Nomor 34);

6. Peraturan Pemerintah Nomor 14 Tahun 2012 tentang Kegiatan Usaha Penyediaan Tenaga Listrik (Lembaran Negara Republik Indonesia Tahun 2012 Nomor 28, Tambahan Lembaran Negara Republik Indonesia Nomor 5281) sebagaimana telah diubah dengan Peraturan

Pemerintah Nomor 23 Tahun 2014 tentang Perubahan Atas Peraturan Pemerintah Nomor 14 Tahun 2012 tentang Kegiatan Usaha Penyediaan Tenaga Listrik (Lembaran Negara Republik Indonesia Tahun 2014 Nomor 75, Tambahan Lembaran Negara Republik Indonesia Nomor 5530);

7. Peraturan Pemerintah Nomor 79 Tahun 2014 tentang Kebijakan Energi Nasional (Lembaran Negara Republik Indonesia Tahun 2014 Nomor 300, Tambahan Lembaran Negara Republik Indonesia Nomor 5609);
8. Peraturan Presiden Nomor 68 Tahun 2015 tentang Kementerian Energi dan Sumber Daya Mineral (Lembaran Negara Republik Indonesia Tahun 2015 Nomor 132);
9. Peraturan Menteri Energi dan Sumber Daya Mineral Nomor 13 Tahun 2016 tentang Organisasi dan Tata Kerja Kementerian Energi dan Sumber Daya Mineral (Berita Negara Republik Indonesia Tahun 2016 Nomor 782);

MEMUTUSKAN:

Menetapkan : PERATURAN MENTERI ENERGI DAN SUMBER DAYA MINERAL TENTANG PEMBELIAN TENAGA LISTRIK DARI PEMBANGKIT LISTRIK TENAGA BIOMASSA DAN PEMBANGKIT LISTRIK TENAGA BIOGAS OLEH PT PERUSAHAAN LISTRIK NEGARA (PERSERO).

BAB I
KETENTUAN UMUM

Pasal 1

Dalam Peraturan Menteri ini yang dimaksud dengan:

1. PT Perusahaan Listrik Negara (Persero) yang selanjutnya disebut PT PLN (Persero) adalah badan usaha milik negara yang didirikan berdasarkan Peraturan Pemerintah Nomor 23 Tahun 1994 tentang Pengalihan Bentuk Perusahaan Umum (Perum) Listrik Negara Menjadi Perusahaan Perseroan (Persero).

2. Pembangkit Listrik Tenaga Biomassa yang selanjutnya disebut PLTBm adalah pembangkit listrik yang memanfaatkan energi biomassa.
3. Pembangkit Listrik Tenaga Biogas yang selanjutnya disebut PLTBg adalah pembangkit listrik yang memanfaatkan energi biogas.
4. Badan Usaha adalah badan hukum yang berupa badan usaha milik negara, badan usaha milik daerah, badan usaha swasta yang berbadan hukum Indonesia, dan koperasi yang berusaha di bidang penyediaan tenaga listrik.
5. Pengembang PLTBm atau PLTBg adalah badan usaha yang memanfaatkan energi biomassa atau biogas sebagai bahan baku pembangkit tenaga listrik dan telah mendapatkan penetapan dari Menteri melalui Dirjen EBTKE.
6. Perjanjian Jual Beli Tenaga Listrik yang selanjutnya disebut PJBL adalah perjanjian jual beli tenaga listrik antara Pengembang PLTBm atau PLTBg dengan PT PLN (Persero).
7. Izin Usaha Penyediaan Tenaga Listrik yang selanjutnya disingkat IUPTL adalah izin untuk melakukan usaha penyediaan tenaga listrik untuk kepentingan umum.
8. *Commercial Operation Date* yang selanjutnya disingkat COD adalah tanggal mulai beroperasinya pembangkit untuk menyalurkan energi listrik secara komersial ke jaringan tenaga listrik milik PT PLN (Persero).
9. Menteri adalah Menteri yang menyelenggarakan urusan pemerintahan di bidang energi dan sumber daya mineral.
10. Direktur Jenderal Energi Baru, Terbarukan, dan Konservasi Energi yang selanjutnya disebut Dirjen EBTKE adalah Direktur Jenderal yang melaksanakan tugas dan bertanggung jawab atas perumusan serta pelaksanaan kebijakan di bidang pembinaan, pengendalian, dan pengawasan kegiatan panas bumi, bioenergi, aneka energi baru dan terbarukan, dan konservasi energi.

BAB II

PENUGASAN PEMBELIAN TENAGA LISTRIK
DARI PLTBm DAN PLTBg KEPADA PT PLN (PERSERO)

Pasal 2

(1) Dengan Peraturan Menteri ini, Menteri menugaskan PT PLN (Persero) untuk membeli tenaga listrik dari PLTBm atau PLTBg yang dikelola oleh badan usaha yang telah ditetapkan sebagai Pengembang PLTBm atau PLTBg.

(2) Penugasan dari Menteri sebagaimana dimaksud pada ayat (1) berlaku sebagai:
   a. penunjukan langsung untuk pembelian tenaga listrik oleh PT PLN (Persero); dan
   b. persetujuan harga pembelian tenaga listrik oleh PT PLN (Persero).

(3) Terhadap penugasan sebagaimana dimaksud pada ayat (1), PT PLN (Persero) dapat diberikan kompensasi sesuai dengan ketentuan peraturan perundang-undangan.

BAB III

HARGA PEMBELIAN TENAGA LISTRIK
DARI PLTBm DAN PLTBg

Pasal 3

(1) Harga pembelian tenaga listrik dari PLTBm atau PLTBg sebagaimana dimaksud dalam Pasal 2 ayat (1) ditetapkan dengan memperhatikan:
   a. kapasitas PLTBm atau PLTBg;
   b. tegangan jaringan tenaga listrik PT PLN (Persero); dan
   c. lokasi/wilayah PLTBm atau PLTBg (faktor F),

   dengan besaran sebagaimana tercantum dalam Lampiran I dan Lampiran II yang merupakan bagian tidak terpisahkan dari Peraturan Menteri ini.

(2) Harga pembelian tenaga listrik dari PLTBm atau PLTBg sebagaimana dimaksud pada ayat (1) merupakan:
   a. harga yang sudah termasuk seluruh biaya pengadaan jaringan penyambungan dari PLTBm atau PLTBg ke jaringan tenaga listrik PT PLN (Persero);

b. harga yang dipergunakan dalam PJBL tanpa negosiasi harga dan tanpa eskalasi; dan

c. harga yang berlaku pada saat PLTBm atau PLTBg dinyatakan telah mencapai COD sesuai dengan jadwal yang disepakati dalam PJBL.

Pasal 4

Transaksi pembayaran pembelian tenaga listrik dari PLTBm atau PLTBg antara PT PLN (Persero) dan Pengembang PLTBm atau PLTBg dilakukan dalam mata uang rupiah menggunakan nilai tukar *Jakarta Interbank Spot Dollar Rate* (JISDOR) pada waktu yang disepakati dalam PJBL.

Pasal 5

PJBL berlaku untuk jangka waktu selama 20 (dua puluh) tahun dimulai sejak COD dan dapat diperpanjang.

BAB IV

PELAKSANAAN PEMBELIAN TENAGA LISTRIK
DARI PLTBm DAN PLTBg

Pasal 6

(1) Badan Usaha yang berminat memanfaatkan biomassa dan biogas untuk PLTBm atau PLTBg, terlebih dahulu menyampaikan permohonan penetapan sebagai Pengembang PLTBm atau PLTBg kepada Menteri melalui Dirjen EBTKE.

(2) Permohonan sebagaimana dimaksud pada ayat (1) harus dilengkapi dengan persyaratan sebagai berikut:

a. profil Badan Usaha;

b. dokumen studi kelayakan *(feasibility study)* yang telah diverifikasi PT PLN (Persero) yang berisi antara lain:

1. perkiraan total investasi yang diperlukan untuk pembangunan PLTBm atau PLTBg;
2. jadwal pelaksanaan pembangunan PLTBm atau PLTBg sampai dengan COD; dan
3. hasil kajian teknis interkoneksi ke jaringan tenaga listrik PT PLN (Persero);

c. pernyataan mengutamakan penggunaan barang dan/atau jasa dalam negeri dilengkapi data dukung sesuai dengan ketentuan peraturan perundang-undangan; dan

d. kemampuan pendanaan.

(3) PT PLN (Persero) menyampaikan hasil verifikasi atas dokumen studi kelayakan *(feasibility study)* kepada Badan Usaha dalam jangka waktu paling lama 30 (tiga puluh) hari kerja sejak penyampaian permohonan verifikasi studi kelayakan *(feasibility study)* sebagaimana dimaksud pada ayat (2) huruf b diterima oleh PT PLN (Persero).

(4) Permohonan penetapan sebagai Pengembang PLTBm atau PLTBg sebagaimana dimaksud pada ayat (1) diajukan oleh Badan Usaha secara tertulis kepada Menteri melalui Dirjen EBTKE dengan menggunakan format surat permohonan sebagaimana tercantum dalam Lampiran III yang merupakan bagian tidak terpisahkan dari Peraturan Menteri ini.

Pasal 7

(1) Menteri melalui Dirjen EBTKE melakukan penelitian dan evaluasi terhadap permohonan penetapan sebagai Pengembang PLTBm atau PLTBg sebagaimana dimaksud dalam Pasal 6.

(2) Dalam rangka pelaksanaan penelitian dan evaluasi sebagaimana dimaksud pada ayat (1), Menteri melalui Dirjen EBTKE membentuk Tim Evaluasi yang keanggotaannya dapat terdiri atas wakil dari Direktorat Jenderal Energi Baru, Terbarukan, dan Konservasi Energi, Direktorat Jenderal Ketenagalistrikan, Sekretariat Jenderal Kementerian Energi dan Sumber Daya Mineral, dan instansi terkait.

(3) Tim Evaluasi melakukan penilaian administrasi, teknis, dan keuangan atas permohonan Badan Usaha sebagaimana dimaksud dalam Pasal 6 ayat (1) dan melaporkan hasilnya kepada Menteri melalui Dirjen EBTKE dalam jangka waktu paling lambat 7 (tujuh) hari kerja sejak diterimanya permohonan secara lengkap.

(4) Dengan memperhatikan laporan hasil verifikasi Tim Evaluasi sebagaimana dimaksud pada ayat (3), Menteri melalui Dirjen EBTKE menetapkan keputusan mengenai persetujuan atau penolakan permohonan penetapan Badan Usaha sebagai Pengembang PLTBm atau PLTBg dalam jangka waktu paling lama 7 (tujuh) hari kerja sejak menerima laporan Tim Evaluasi.

(5) Dalam hal permohonan penetapan Badan Usaha sebagai Pengembang PLTBm atau PLTBg disetujui, keputusan mengenai persetujuan penetapan Badan Usaha sebagai Pengembang PLTBm atau PLTBg disampaikan oleh Menteri melalui Dirjen EBTKE kepada pemohon dengan tembusan kepada Direktur Jenderal Ketenagalistrikan dan Direksi PT PLN (Persero).

(6) Dalam hal permohonan penetapan Badan Usaha sebagai Pengembang PLTBm atau PLTBg ditolak, Menteri melalui Dirjen EBTKE memberitahukan secara tertulis kepada pemohon disertai alasan penolakannya.

Pasal 8

Penetapan Pengembang PLTBm atau PLTBg oleh Menteri melalui Dirjen EBTKE sebagaimana dimaksud dalam Pasal 7 ayat (5) menjadi dasar penandatanganan PJBL antara PT PLN (Persero) dengan Pengembang PLTBm atau PLTBg.

Pasal 9

(1) PT PLN (Persero) dan Pengembang PLTBm atau PLTBg wajib menandatangani PJBL dalam jangka waktu paling lambat 30 (tiga puluh) hari kerja setelah penetapan Pengembang PLTBm atau PLTBg sebagaimana dimaksud dalam Pasal 7 ayat (5).

(2) Pengembang PLTBm atau PLTBg wajib menyampaikan salinan PJBL sebagaimana dimaksud pada ayat (1) kepada Menteri melalui Dirjen EBTKE.

(3) Dalam hal PJBL belum ditandatangani oleh PT PLN (Persero) dan Pengembang PLTBm atau PLTBg dalam jangka waktu 30 (tiga puluh) hari kerja sebagaimana dimaksud pada ayat (1), maka:

a. PT PLN (Persero) dan Pengembang PLTBm atau PLTBg masing-masing menyampaikan laporan perihal alasan belum ditandatanganinya PJBL kepada Menteri melalui Dirjen EBTKE dalam jangka waktu paling lambat 7 (tujuh) hari kerja sejak batas waktu sebagaimana dimaksud pada ayat (1) tidak terpenuhi;
b. berdasarkan laporan sebagaimana dimaksud pada huruf a, Menteri melalui Dirjen EBTKE memfasilitasi penandatanganan PJBL.

Pasal 10

(1) PT PLN (Persero) menyediakan model PJBL dari PLTBm atau PLTBg dan menyampaikan model dimaksud kepada Menteri melalui Dirjen EBTKE dalam jangka waktu paling lambat 30 (tiga puluh) hari kerja sejak Peraturan Menteri ini diundangkan.
(2) Pengembang PLTBm atau PLTBg dapat meminta model PJBL sebagaimana dimaksud pada ayat (1) kepada PT PLN (Persero) secara tertulis dengan tembusan kepada Dirjen EBTKE.

Pasal 11

Pengembang PLTBm atau PLTBg sebagaimana dimaksud dalam Pasal 7 ayat (5) wajib menyampaikan laporan kemajuan pelaksanaan pembangunan PLTBm atau PLTBg kepada Menteri melalui Dirjen EBTKE setiap 6 (enam) bulan terhitung mulai tanggal penetapannya sebagai Pengembang PLTBm atau PLTBg sampai dengan COD dengan tembusan kepada Direktur Jenderal Ketenagalistrikan dan Direksi PT PLN (Persero).

Pasal 12

(1) Pengembang PLTBm atau PLTBg wajib mencapai pemenuhan pembiayaan (*financial close*) untuk kebutuhan pembangunan fisik PLTBm atau PLTBg dalam jangka waktu paling lambat 12 (dua belas) bulan sejak tanggal ditandatanganinya PJBL dan menyampaikan buktinya kepada Menteri melalui Dirjen EBTKE.

(2) Dalam hal setelah jangka waktu 12 (dua belas) bulan sejak ditandatanganinya PJBL, Pengembang PLTBm atau PLTBg tidak dapat mencapai pemenuhan pembiayaan (*financial close*) sebagaimana dimaksud pada ayat (1), maka penetapan sebagai Pengembang PLTBm atau PLTBg dicabut.

Pasal 13

(1) Pengembang PLTBm atau PLTBg yang telah menandatangani PJBL dan telah melakukan pemenuhan pembiayaan (*financial close*) wajib mengajukan permohonan untuk mendapatkan IUPTL sesuai dengan ketentuan peraturan perundang-undangan.

(2) Dalam jangka waktu paling lambat 3 (tiga) hari kerja setelah mendapatkan IUPTL sebagaimana dimaksud pada ayat (1), Pengembang PLTBm atau PLTBg harus menyampaikan salinan IUPTL kepada Dirjen EBTKE dan Direksi PT PLN (Persero).

Pasal 14

(1) Pelaksanaan pembangunan PLTBm atau PLTBg oleh Pengembang PLTBm atau PLTBg wajib mencapai COD dalam jangka waktu paling lambat 36 (tiga puluh enam) bulan sejak ditandatanganinya PJBL.

(2) Pelaksanaan pembangunan PLTBm atau PLTBg yang tidak mencapai COD sebagaimana dimaksud pada ayat (1), dikenakan penurunan harga pembelian tenaga listrik dari PLTBm atau PLTBg dengan ketentuan sebagai berikut:
   a. keterlambatan sampai dengan 3 (tiga) bulan dikenakan penurunan harga sebesar 3% (tiga persen);
   b. keterlambatan lebih dari 3 (tiga) bulan sampai dengan 6 (enam) bulan dikenakan penurunan harga sebesar 5% (lima persen);
   c. keterlambatan lebih dari 6 (enam) bulan sampai dengan 12 (dua belas) bulan dikenakan penurunan harga sebesar 8% (delapan persen).

(3) Dalam hal COD tidak tercapai dalam jangka waktu 48 (empat puluh delapan) bulan sejak ditandatangani PJBL, penetapan sebagai Pengembang PLTBm atau PLTBg dicabut.

Pasal 15

Dalam hal penetapan sebagai Pengembang PLTBm atau PLTBg dicabut sebagaimana dimaksud dalam Pasal 12 ayat (2) dan Pasal 14 ayat (3) maka kepada Badan Usaha tersebut dikenakan larangan untuk mengajukan permohonan sejenis untuk jangka waktu 2 (dua) tahun berturut-turut sejak pencabutan.

BAB V

PEMBELIAN TENAGA LISTRIK DARI
KELEBIHAN TENAGA LISTRIK (*EXCESS POWER*)

Pasal 16

(1) PT PLN (Persero) dapat membeli tenaga listrik dari kelebihan tenaga listrik (*excess power*) dari PLTBm atau PLTBg yang dimiliki oleh pemegang Izin Operasi dengan harga sebagaimana tercantum dalam Lampiran IV dan Lampiran V yang merupakan bagian tidak terpisahkan dari Peraturan Menteri ini.

(2) Harga sebagaimana dimaksud pada ayat (1) berlaku sebagai persetujuan harga jual tenaga listrik dari Menteri.

(3) Dalam hal PT PLN (Persero) membeli tenaga listrik dari kelebihan tenaga listrik (*excess power*) dari PLTBm atau PLTBg yang dimiliki oleh pemegang Izin Operasi di bawah harga sebagaimana dimaksud pada ayat (1) dan pemegang Izin Operasi sepakat dengan harga yang ditawarkan oleh PT PLN (Persero), maka PT PLN (Persero) menyampaikan laporan mengenai kesepakatan harga dimaksud kepada Menteri ESDM melalui Dirjen EBTKE.

(4) Harga jual tenaga listrik yang disepakati sebagaimana dimaksud pada ayat (3) tidak diperlukan persetujuan harga jual tenaga listrik dari Menteri.

(5) Harga pembelian tenaga listrik dari kelebihan tenaga listrik (*excess power*) sebagaimana dimaksud pada ayat (1) dan ayat (3) dipergunakan dalam PJBL antara PT PLN (Persero) dan pemegang Izin Operasi.

(6) Jangka waktu PJBL antara PT PLN (Persero) dan pemegang Izin Operasi terkait pembelian tenaga listrik dari kelebihan tenaga listrik (*excess power*) sebagaimana dimaksud pada ayat (5) ditetapkan berdasarkan kesepakatan antara PT PLN (Persero) dan pemegang Izin Operasi.

(7) Dalam hal PJBL sebagaimana dimaksud pada ayat (5) dan ayat (6) tidak ditandatangani oleh PT PLN (Persero) dan pemegang Izin Operasi, maka:

a. PT PLN (Persero) dan pemegang Izin Operasi menyampaikan laporan perihal alasan tidak ditandatanganinya PJBL kepada Menteri melalui Dirjen EBTKE;

b. berdasarkan laporan sebagaimana dimaksud pada huruf a, Menteri melalui Dirjen EBTKE memfasilitasi penandatanganan PJBL.

(8) PT PLN (Persero) wajib melaporkan pembelian kelebihan tenaga listrik (*excess power*) kepada Dirjen EBTKE setiap 3 (tiga) bulan dengan tembusan kepada Direktur Jenderal Ketenagalistrikan.

Pasal 17

Terhadap pemegang Izin Operasi yang menjual kelebihan tenaga listrik (*excess power*) kepada PT PLN (Persero) sebagaimana dimaksud dalam Pasal 16 tidak memerlukan penetapan sebagai Pengembang PLTBm atau PLTBg dari Menteri melalui Dirjen EBTKE.

BAB VI

KETENTUAN PERALIHAN

Pasal 18

Pada saat Peraturan Menteri ini mulai berlaku, Badan Usaha yang telah mendapatkan penetapan sebagai pengelola energi biomassa atau biogas untuk pembangkit listrik, telah mendapatkan IUPTL, belum menandatangani PJBL dan belum beroperasi sebelum Peraturan Menteri ini diundangkan, harga jual tenaga listrik mengikuti besaran harga sebagaimana tercantum dalam Lampiran I dan Lampiran II yang merupakan bagian tidak terpisahkan dari Peraturan Menteri ini.

Pasal 19

(1) Terhadap Badan Usaha yang telah mendapatkan penetapan sebagai pengelola energi biomassa atau biogas untuk pembangkit listrik, telah mendapatkan IUPTL, telah menandatangani PJBL, dan telah beroperasi sebelum Peraturan Menteri ini diundangkan, dapat menyesuaikan harga jual tenaga listriknya sebesar 85% (delapan puluh lima persen) dari besaran harga sebagaimana tercantum dalam Lampiran I dan Lampiran II yang merupakan bagian tidak terpisahkan dari Peraturan Menteri ini.

(2) Terhadap Badan Usaha yang telah mendapatkan penetapan sebagai pengelola energi biomassa atau biogas untuk pembangkit listrik, telah mendapatkan IUPTL, telah menandatangani PJBL dan belum beroperasi sebelum Peraturan Menteri ini diundangkan, dapat menyesuaikan harga jual tenaga listriknya mengikuti besaran harga sebagaimana tercantum dalam Lampiran I dan Lampiran II yang merupakan bagian tidak terpisahkan dari Peraturan Menteri ini.

(3) Untuk proses penyesuaian harga jual tenaga listrik, Badan Usaha sebagaimana dimaksud pada ayat (1) dan ayat (2) menyampaikan permohonan penyesuaian harga jual tenaga listrik kepada Menteri melalui Dirjen EBTKE dengan menggunakan format surat permohonan sebagaimana tercantum dalam Lampiran VI yang merupakan bagian tidak terpisahkan dari Peraturan Menteri ini.

(4) Dengan Peraturan Menteri ini, persetujuan penyesuaian harga jual tenaga listrik dari Menteri melalui Dirjen EBTKE berlaku sebagai dasar penyesuaian harga pembelian tenaga listrik oleh PT PLN (Persero).

Pasal 20

Harga pembelian tenaga listrik PLTBm atau PLTBg dari Badan Usaha yang mengajukan permohonan penyesuaian harga sebagaimana dimaksud dalam Pasal 19 langsung dituangkan dalam PJBL, tanpa negosiasi harga, tanpa eskalasi harga, harga tidak berlaku surut, tanpa persetujuan harga jual tenaga listrik dari Menteri, dan berlaku sampai dengan masa berakhirnya PJBL.

BAB VII

KETENTUAN PENUTUP

Pasal 21

Pada saat Peraturan Menteri ini mulai berlaku, Peraturan Menteri Energi dan Sumber Daya Mineral Nomor 27 Tahun 2014 tentang Pembelian Tenaga Listrik dari Pembangkit Listrik Tenaga Biomasa dan Pembangkit Listrik Tenaga Biogas Oleh PT Perusahaan Listrik Negara (Persero) (Berita Negara Republik Indonesia Tahun 2014 Nomor 1580), dicabut dan dinyatakan tidak berlaku.

Pasal 22

Peraturan Menteri ini mulai berlaku pada tanggal diundangkan.

Agar setiap orang mengetahuinya, memerintahkan pengundangan Peraturan Menteri ini dengan penempatannya dalam Berita Negara Republik Indonesia.

Ditetapkan di Jakarta
pada tanggal 25 Juli 2016

MENTERI ENERGI DAN SUMBER DAYA MINERAL
REPUBLIK INDONESIA,

ttd.

SUDIRMAN SAID

Diundangkan di Jakarta
pada tanggal 4 Agustus 2016

DIREKTUR JENDERAL
PERATURAN PERUNDANG-UNDANGAN,
KEMENTERIAN HUKUM DAN HAK ASASI MANUSIA
REPUBLIK INDONESIA,

ttd.

WIDODO EKATJAHJANA

BERITA NEGARA REPUBLIK INDONESIA TAHUN 2016 NOMOR 1129

Salinan sesuai dengan aslinya
KEMENTERIAN ENERGI DAN SUMBER DAYA MINERAL
Kepala Biro Hukum,

Hufron Asrofi

LAMPIRAN I

PERATURAN MENTERI ENERGI DAN SUMBER DAYA MINERAL REPUBLIK INDONESIA

NOMOR 21 TAHUN 2016

TENTANG

PEMBELIAN TENAGA LISTRIK DARI PEMBANGKIT LISTRIK TENAGA BIOMASSA DAN PEMBANGKIT LISTRIK TENAGA BIOGAS OLEH PT PERUSAHAAN LISTRIK NEGARA (PERSERO)

HARGA PEMBELIAN TENAGA LISTRIK DARI PLTBm
OLEH PT PERUSAHAAN LISTRIK NEGARA (PERSERO)

No.	Lokasi/Wilayah PLTBm	Harga Pembelian (sen USD/kWh)				Faktor F
		Kapasitas s.d. 20 MW		20 MW < Kapasitas ≤ 50 MW	Kapasitas > 50 MW	
		Tegangan Rendah	Tegangan Menengah atau Tinggi	Tegangan Tinggi	Tegangan Tinggi	
1.	Pulau Jawa	16,00 x F	13,50 x F	11,48 x F	10,80 x F	1,00
2.	Pulau Sumatera	16,00 x F	13,50 x F	11,48 x F	10,80 x F	1,15
3.	Pulau Sulawesi	16,00 x F	13,50 x F	11,48 x F	10,80 x F	1,25
4.	Pulau Kalimantan	16,00 x F	13,50 x F	11,48 x F	10,80 x F	1,30
5.	Pulau Bali, Pulau Bangka Belitung, dan Pulau Lombok	16,00 x F	13,50 x F	11,48 x F	10,80 x F	1,50
6.	Kepulauan Riau, Nusa Tenggara, dan Pulau Lainnya	16,00 x F	13,50 x F	11,48 x F	10,80 x F	1,60
7.	Pulau Maluku dan Pulau Papua	16,00 x F	13,50 x F	11,48 x F	10,80 x F	1,70

MENTERI ENERGI DAN SUMBER DAYA MINERAL
REPUBLIK INDONESIA,

ttd.

SUDIRMAN SAID

Salinan sesuai dengan aslinya
KEMENTERIAN ENERGI DAN SUMBER DAYA MINERAL
Kepala Biro Hukum,

Hufron Asrofi

LAMPIRAN II

PERATURAN MENTERI ENERGI DAN SUMBER DAYA MINERAL REPUBLIK INDONESIA

NOMOR 21 TAHUN 2016

TENTANG

PEMBELIAN TENAGA LISTRIK DARI PEMBANGKIT LISTRIK TENAGA BIOMASSA DAN PEMBANGKIT LISTRIK TENAGA BIOGAS OLEH PT PERUSAHAAN LISTRIK NEGARA (PERSERO)

HARGA PEMBELIAN TENAGA LISTRIK DARI PLTBg
OLEH PT PERUSAHAAN LISTRIK NEGARA (PERSERO)

No.	Lokasi/Wilayah PLTBg	Harga Pembelian (sen USD/kWh)				Faktor F
		Kapasitas s.d 20 MW		20 MW < Kapasitas ≤ 50 MW	Kapasitas > 50 MW	
		Tegangan Rendah	Tegangan Menengah atau Tinggi	Tegangan Tinggi	Tegangan Tinggi	
1.	Pulau Jawa	13,14 x F	10,64 x F	9,05 x F	8,51 x F	1,00
2.	Pulau Sumatera	13,14 x F	10,64 x F	9,05 x F	8,51 x F	1,15
3.	Pulau Sulawesi	13,14 x F	10,64 x F	9,05 x F	8,51 x F	1,25
4.	Pulau Kalimantan	13,14 x F	10,64 x F	9,05 x F	8,51 x F	1,30
5.	Pulau Bali, Pulau Bangka Belitung, dan Pulau Lombok	13,14 x F	10,64 x F	9,05 x F	8,51 x F	1,50
6.	Kepulauan Riau, Nusa Tenggara, dan Pulau Lainnya	13,14 x F	10,64 x F	9,05 x F	8,51 x F	1,60
7.	Pulau Maluku dan Pulau Papua	13,14 x F	10,64 x F	9,05 x F	8,51 x F	1,70

MENTERI ENERGI DAN SUMBER DAYA MINERAL
REPUBLIK INDONESIA,

ttd.

SUDIRMAN SAID

Salinan sesuai dengan aslinya
KEMENTERIAN ENERGI DAN SUMBER DAYA MINERAL
Kepala Biro Hukum,

Hufron Asrofi

LAMPIRAN III
PERATURAN MENTERI ENERGI DAN SUMBER DAYA MINERAL
REPUBLIK INDONESIA
NOMOR 21 TAHUN 2016
TENTANG
PEMBELIAN TENAGA LISTRIK DARI PEMBANGKIT LISTRIK TENAGA BIOMASSA DAN PEMBANGKIT LISTRIK TENAGA BIOGAS OLEH PT PERUSAHAAN LISTRIK NEGARA (PERSERO)

SURAT PERMOHONAN PENETAPAN
SEBAGAI PENGEMBANG PLTBm ATAU PLTBg

KOP SURAT BADAN USAHA

Nomor : ... ..., ... 20...
Lampiran : ...
Hal : Permohonan Penetapan sebagai Pengembang PLTBm/PLTBg*)

Yang terhormat
Menteri Energi dan Sumber Daya Mineral
c.q. Direktur Jenderal Energi Baru, Terbarukan, dan Konservasi Energi
Jl. Pegangsaan Timur Nomor 1, Menteng, Jakarta

Sehubungan dengan rencana pemanfaatan energi biomassa/biogas*) untuk pembangkit tenaga listrik, dengan ini kami mengajukan permohonan untuk ditetapkan sebagai Pengembang PLTBm/PLTBg dengan kelengkapan dokumen persyaratan sebagaimana terlampir.

Demikian permohonan kami, atas perhatian dan perkenan Bapak Menteri, kami ucapkan terima kasih.

Hormat kami,
Jabatan

meterai, tanda tangan, dan stempel

(Nama Lengkap)

Tembusan:
1. Direktur Jenderal Ketenagalistrikan
2. Direksi PT PLN (Persero)
3. *General Manager* Wilayah PT PLN (Persero)

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*) coret yang tidak perlu

MENTERI ENERGI DAN SUMBER DAYA MINERAL
REPUBLIK INDONESIA,

ttd.

SUDIRMAN SAID

Salinan sesuai dengan aslinya
KEMENTERIAN ENERGI DAN SUMBER DAYA MINERAL
Kepala Biro Hukum,

Hufron Asrofi

LAMPIRAN IV

PERATURAN MENTERI ENERGI DAN SUMBER DAYA MINERAL REPUBLIK INDONESIA

NOMOR 21 TAHUN 2016

TENTANG

PEMBELIAN TENAGA LISTRIK DARI PEMBANGKIT LISTRIK TENAGA BIOMASSA DAN PEMBANGKIT LISTRIK TENAGA BIOGAS OLEH PT PERUSAHAAN LISTRIK NEGARA (PERSERO)

HARGA PEMBELIAN TENAGA LISTRIK

DARI KELEBIHAN TENAGA LISTRIK (*EXCESS POWER*) DARI PLTBm

OLEH PT PERUSAHAAN LISTRIK NEGARA (PERSERO)

No.	Lokasi/Wilayah Pembangkit Tenaga Listrik	Harga Pembelian (sen USD/kWh)			
		Kapasitas s.d 20 MW		20 MW < Kapasitas ≤ 50 MW	Kapasitas > 50 MW
		Tegangan Rendah	Tegangan Menengah atau Tinggi	Tegangan Tinggi	Tegangan Tinggi
1.	Pulau Jawa	16,00	13,50	11,48	10,80
2.	Pulau Sumatera	16,00	13,50	11,48	10,80
3.	Pulau Sulawesi	16,00	13,50	11,48	10,80
4.	Pulau Kalimantan	16,00	13,50	11,48	10,80
5.	Pulau Bali, Pulau Bangka Belitung, dan Pulau Lombok	16,00	13,50	11,48	10,80
6.	Kepulauan Riau, Nusa Tenggara dan Pulau lainnya	16,00	13,50	11,48	10,80
7.	Pulau Maluku dan Pulau Papua	16,00	13,50	11,48	10,80

MENTERI ENERGI DAN SUMBER DAYA MINERAL REPUBLIK INDONESIA,

ttd.

SUDIRMAN SAID

Salinan sesuai dengan aslinya
KEMENTERIAN ENERGI DAN SUMBER DAYA MINERAL
Kepala Biro Hukum,

Hufron Asrofi

LAMPIRAN V

PERATURAN MENTERI ENERGI DAN SUMBER DAYA MINERAL REPUBLIK INDONESIA

NOMOR 21 TAHUN 2016

TENTANG

PEMBELIAN TENAGA LISTRIK DARI PEMBANGKIT LISTRIK TENAGA BIOMASSA DAN PEMBANGKIT LISTRIK TENAGA BIOGAS OLEH PT PERUSAHAAN LISTRIK NEGARA (PERSERO)

HARGA PEMBELIAN TENAGA LISTRIK

DARI KELEBIHAN TENAGA LISTRIK (*EXCESS POWER*) DARI PLTBg

OLEH PT PERUSAHAAN LISTRIK NEGARA (PERSERO)

No.	Lokasi/Wilayah Pembangkit Tenaga Listrik	Harga Pembelian (sen USD/kWh)			
		Kapasitas s.d 20 MW		20 MW < Kapasitas ≤ 50 MW	Kapasitas > 50 MW
		Tegangan Rendah	Tegangan Menengah atau Tinggi	Tegangan Tinggi	Tegangan Tinggi
1.	Pulau Jawa	13,14	10,64	9,05	8,51
2.	Pulau Sumatera	13,14	10,64	9,05	8,51
3.	Pulau Sulawesi	13,14	10,64	9,05	8,51
4.	Pulau Kalimantan	13,14	10,64	9,05	8,51
5.	Pulau Bali, Pulau Bangka Belitung , dan Pulau Lombok	13,14	10,64	9,05	8,51
6.	Kepulauan Riau, Nusa Tenggara dan Pulau lainnya	13,14	10,64	9,05	8,51
7.	Pulau Maluku dan Pulau Papua	13,14	10,64	9,05	8,51

MENTERI ENERGI DAN SUMBER DAYA MINERAL REPUBLIK INDONESIA,

ttd.

SUDIRMAN SAID

Salinan sesuai dengan aslinya
KEMENTERIAN ENERGI DAN SUMBER DAYA MINERAL
Kepala Biro Hukum,

Hufron Asrofi

LAMPIRAN VI
PERATURAN MENTERI ENERGI DAN SUMBER DAYA MINERAL
REPUBLIK INDONESIA
NOMOR 21 TAHUN 2016
TENTANG
PEMBELIAN TENAGA LISTRIK DARI PEMBANGKIT LISTRIK TENAGA BIOMASSA DAN PEMBANGKIT LISTRIK TENAGA BIOGAS OLEH PT PERUSAHAAN LISTRIK NEGARA (PERSERO)

SURAT PERMOHONAN PENYESUAIAN
HARGA JUAL TENAGA LISTRIK DARI PLTBm DAN PLTBg

KOP SURAT BADAN USAHA

Nomor : ... ..., ... 20...
Lampiran : ...
Hal : Permohonan Penyesuaian Harga Jual Tenaga Listrik Dari PLTBm/PLTBg*)

Yang terhormat
Menteri Energi dan Sumber Daya Mineral
c.q. Direktur Jenderal Energi Baru, Terbarukan, dan Konservasi Energi
Jl. Pegangsaan Timur Nomor 1, Menteng, Jakarta

Sehubungan dengan telah diterbitkannya Peraturan Menteri Energi dan Sumber Daya Mineral mengenai Pembelian Tenaga Listrik dari Pembangkit Listrik Tenaga Biomassa dan Pembangkit Listrik Tenaga Biogas oleh PT Perusahaan Listrik Negara (Persero), kami PT... menyambut baik kebijakan yang mendukung investasi dalam pengembangan PLTBm dan PLTBg dimaksud.

Perlu kami sampaikan bahwa perusahaan kami telah menandatangani PJBL dengan PT Perusahaan Listrik Negara (Persero) untuk mengoperasikan PLTBm/PLTBg*) berbasis ..(bahan baku).. dengan kapasitas ... MW (... Megawatt) dengan kondisi belum beroperasi/telah beroperasi sejak bulan .... Tahun ... di ....*)

Berkenaan dengan hal tersebut, mengacu ketentuan Pasal 19 Peraturan Menteri Menteri Energi dan Sumber Daya Mineral mengenai Pembelian Tenaga Listrik dari Pembangkit Listrik Tenaga Biomassa dan Pembangkit Listrik Tenaga Biogas oleh PT Perusahaan Listrik Negara (Persero) tersebut, bersama ini kami bermaksud mengajukan permohonan penyesuaian harga jual tenaga listrik dari PLTBm/PLTBg*) dengan mengikuti besaran harga sebagaimana tercantum dalam Lampiran I/Lampiran II*) Peraturan Menteri Menteri Energi dan Sumber Daya Mineral mengenai Pembelian Tenaga Listrik dari Pembangkit Listrik Tenaga Biomassa dan Pembangkit Listrik Tenaga Biogas oleh PT Perusahaan Listrik Negara (Persero) tersebut dengan kelengkapan dokumen persyaratan sebagaimana terlampir.

Demikian permohonan kami, atas perhatian dan perkenan Bapak Menteri, kami ucapkan terima kasih.

Hormat kami,
Jabatan

meterai, tanda tangan, dan stempel

(Nama Lengkap)

Tembusan:
1. Direktur Jenderal Ketenagalistrikan
2. Direksi PT PLN (Persero)
3. *General Manager* Wilayah PT PLN (Persero)

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*) coret yang tidak perlu

MENTERI ENERGI DAN SUMBER DAYA MINERAL
REPUBLIK INDONESIA,

ttd.

SUDIRMAN SAID

Salinan sesuai dengan aslinya
KEMENTERIAN ENERGI DAN SUMBER DAYA MINERAL
Kepala Biro Hukum,

Hufron Asrofi

MENTERI ENERGI DAN SUMBER DAYA MINERAL
REPUBLIK INDONESIA

PERATURAN MENTERI ENERGI DAN SUMBER DAYA MINERAL
REPUBLIK INDONESIA
NOMOR 12 TAHUN 2017
TENTANG
PEMANFAATAN SUMBER ENERGI TERBARUKAN
UNTUK PENYEDIAAN TENAGA LISTRIK

DENGAN RAHMAT TUHAN YANG MAHA ESA

MENTERI ENERGI DAN SUMBER DAYA MINERAL REPUBLIK INDONESIA,

Menimbang : a. bahwa dalam rangka mewujudkan ketahanan energi nasional dan menurunkan tingkat emisi karbondioksida (CO_2), pemanfaatan sumber energi terbarukan untuk kepentingan ketenagalistrikan nasional harus diutamakan;

b. bahwa pemanfaatan sumber energi terbarukan untuk kepentingan ketenagalistrikan nasional sebagaimana dimaksud dalam huruf a dikembangkan dengan memperhatikan harga tenaga listrik yang berdasarkan prinsip usaha yang sehat, sehingga diperlukan pengaturan kembali mengenai pemanfaatan sumber energi terbarukan untuk penyediaan tenaga listrik khususnya terkait pembelian tenaga listrik dari pembangkit tenaga listrik yang memanfaatkan sumber energi terbarukan oleh PT Perusahaan Listrik Negara (Persero);

c. bahwa berdasarkan pertimbangan sebagaimana dimaksud dalam huruf b, perlu menetapkan Peraturan Menteri Energi dan Sumber Daya Mineral tentang Pemanfaatan Sumber Energi Terbarukan untuk Penyediaan Tenaga Listrik;

Mengingat : 1. Undang-Undang Nomor 30 Tahun 2007 tentang Energi (Lembaran Negara Republik Indonesia Tahun 2007 Nomor 96, Tambahan Lembaran Negara Republik Indonesia Nomor 4746);

2. Undang-Undang Nomor 30 Tahun 2009 tentang Ketenagalistrikan (Lembaran Negara Republik Indonesia Tahun 2009 Nomor 133, Tambahan Lembaran Negara Republik Indonesia Nomor 5052);

3. Peraturan Pemerintah Nomor 14 Tahun 2012 tentang Kegiatan Usaha Penyediaan Tenaga Listrik (Lembaran Negara Republik Indonesia Tahun 2012 Nomor 28, Tambahan Lembaran Negara Republik Indonesia Nomor 5281) sebagaimana telah diubah dengan Peraturan Pemerintah Nomor 23 Tahun 2014 tentang Perubahan atas Peraturan Pemerintah Nomor 14 Tahun 2012 tentang Kegiatan Usaha Penyediaan Tenaga Listrik (Lembaran Negara Republik Indonesia Tahun 2014 Nomor 75, Tambahan Lembaran Negara Republik Indonesia Nomor 5530);

4. Peraturan Pemerintah Nomor 79 Tahun 2014 tentang Kebijakan Energi Nasional (Lembaran Negara Republik Indonesia Tahun 2014 Nomor 300, Tambahan Lembaran Negara Republik Indonesia Nomor 5609);

5. Peraturan Presiden Nomor 68 Tahun 2015 tentang Kementerian Energi dan Sumber Daya Mineral (Lembaran Negara Republik Indonesia Tahun 2015 Nomor 132) sebagaimana telah diubah dengan Peraturan Presiden Nomor 105 Tahun 2016 tentang Perubahan atas Peraturan Presiden Nomor 68 Tahun 2015 tentang Kementerian Energi dan Sumber Daya Mineral (Lembaran Negara Republik Indonesia Tahun 2016 Nomor 289);

6. Peraturan Presiden Nomor 4 Tahun 2016 tentang Percepatan Pembangunan Infrastruktur Ketenagalistrikan (Lembaran Negara Republik Indonesia Tahun 2016 Nomor 8);
7. Peraturan Menteri Energi dan Sumber Daya Mineral Nomor 13 Tahun 2016 tentang Organisasi dan Tata Kerja Kementerian Energi dan Sumber Daya Mineral (Berita Negara Republik Indonesia Tahun 2016 Nomor 762);

MEMUTUSKAN:

Menetapkan : PERATURAN MENTERI ENERGI DAN SUMBER DAYA MINERAL TENTANG PEMANFAATAN SUMBER ENERGI TERBARUKAN UNTUK PENYEDIAAN TENAGA LISTRIK.

BAB I
KETENTUAN UMUM

Pasal 1

Dalam Peraturan Menteri ini yang dimaksud dengan:

1. PT Perusahaan Listrik Negara (Persero) yang selanjutnya disebut PT PLN (Persero) adalah badan usaha milik negara yang didirikan berdasarkan Peraturan Pemerintah Nomor 23 Tahun 1994 tentang Pengalihan Bentuk Perusahaan Umum (Perum) Listrik Negara Menjadi Perusahaan Perseroan (Persero).
2. Sumber Energi Terbarukan adalah sumber energi yang dihasilkan dari sumber daya energi yang berkelanjutan jika dikelola dengan baik, antara lain panas bumi, angin, bioenergi, sinar matahari, aliran dan terjunan air, serta gerakan dan perbedaan suhu lapisan laut.
3. Badan Usaha adalah badan usaha milik negara, badan usaha milik daerah, badan usaha swasta, atau koperasi yang berbadan hukum Indonesia dan berusaha di bidang penyediaan tenaga listrik.

4. Pengembang Pembangkit Listrik yang selanjutnya disingkat PPL adalah Badan Usaha penyediaan tenaga listrik yang bekerja sama dengan PT PLN (Persero) melalui penandatanganan perjanjian jual beli/sewa jaringan tenaga listrik.
5. Pembangkitan Tenaga Listrik adalah kegiatan memproduksi tenaga listrik.
6. Biaya Pokok Penyediaan Pembangkitan yang selanjutnya disingkat BPP Pembangkitan adalah biaya penyediaan tenaga listrik oleh PT PLN (Persero) di Pembangkitan Tenaga Listrik, tidak termasuk biaya penyaluran tenaga listrik.
7. Pembangkit Listrik Tenaga Surya Fotovoltaik yang selanjutnya disebut PLTS Fotovoltaik adalah pembangkit listrik yang mengubah energi matahari menjadi listrik dengan menggunakan modul fotovoltaik yang langsung diinterkoneksikan ke jaringan tenaga listrik PT PLN (Persero).
8. Kuota Kapasitas adalah jumlah maksimum kapasitas pembangkit yang ditawarkan kepada badan usaha dalam suatu periode untuk harga pembelian tenaga listrik yang ditentukan.
9. Pembangkit Listrik Tenaga Bayu yang selanjutnya disingkat PLTB adalah pembangkit listrik yang memanfaatkan energi angin (bayu) menjadi listrik.
10. Pembangkit Listrik Tenaga Air yang selanjutnya disebut Tenaga Air adalah pembangkit listrik yang memanfaatkan tenaga dari aliran/terjunan air, waduk/bendungan, atau saluran irigasi yang pembangunannya bersifat multiguna.
11. Pembangkit Listrik Tenaga Biomassa yang selanjutnya disebut PLTBm adalah pembangkit listrik yang memanfaatkan energi biomassa.
12. Pembangkit Listrik Tenaga Biogas yang selanjutnya disebut PLTBg adalah pembangkit listrik yang memanfaatkan energi biogas.

13. Pembangkit Listrik Berbasis Sampah Kota yang selanjutnya disebut PLTSa adalah pembangkit listrik yang menggunakan energi terbarukan berbasis sampah kota yang diubah menjadi energi listrik.
14. Pembangkit Listrik Tenaga Panas Bumi yang selanjutnya disebut PLTP adalah pembangkit listrik yang memanfaatkan energi panas bumi.
15. Perjanjian Jual Beli Tenaga Listrik yang selanjutnya disebut PJBL adalah perjanjian jual beli tenaga listrik antara PPL dengan PT PLN (Persero).
16. Menteri adalah menteri yang menyelenggarakan urusan pemerintahan di bidang energi dan sumber daya mineral.

BAB II
PEMANFAATAN SUMBER ENERGI TERBARUKAN

Pasal 2

(1) Dalam rangka penyediaan tenaga listrik yang berkelanjutan, PT PLN (Persero) wajib membeli tenaga listrik dari pembangkit tenaga listrik yang memanfaatkan Sumber Energi Terbarukan.
(2) Pemanfaatan Sumber Energi Terbarukan untuk penyediaan tenaga listrik sebagaimana dimaksud pada ayat (1) harus mengacu pada Kebijakan Energi Nasional dan Rencana Umum Ketenagalistrikan.

BAB III
RUANG LINGKUP

Pasal 3

(1) Peraturan Menteri ini merupakan pedoman bagi PT PLN (Persero) dalam melakukan pembelian tenaga listrik dari pembangkit tenaga listrik yang memanfaatkan Sumber Energi Terbarukan.

(2) Sumber Energi Terbarukan sebagaimana dimaksud pada ayat (1) meliputi:
   a. sinar matahari;
   b. angin;
   c. tenaga air;
   d. biomassa;
   e. biogas;
   f. sampah kota; dan
   g. panas bumi.

(3) Pembelian tenaga listrik dari pembangkit tenaga listrik yang memanfaatkan Sumber Energi Terbarukan oleh PT PLN (Persero) sebagaimana dimaksud pada ayat (1) dan ayat (2) yaitu:
   a. pembelian tenaga listrik dari PLTS Fotovoltaik;
   b. pembelian tenaga listrik dari PLTB;
   c. pembelian tenaga listrik dari Tenaga Air;
   d. pembelian tenaga listrik dari PLTBm;
   e. pembelian tenaga listrik dari PLTBg;
   f. pembelian tenaga listrik dari PLTSa; dan
   g. pembelian tenaga listrik dari PLTP.

BAB IV
PELAKSANAAN PEMBELIAN TENAGA LISTRIK DARI PEMBANGKIT TENAGA LISTRIK YANG MEMANFAATKAN SUMBER ENERGI TERBARUKAN

Bagian Kesatu
Umum

Pasal 4

(1) Pembelian tenaga listrik dari pembangkit listrik yang memanfaatkan Sumber Energi Terbarukan berbasis teknologi tinggi, efisiensi sangat variatif, dan sangat tergantung pada tingkat radiasi atau cuaca setempat seperti energi sinar matahari dan angin dilakukan oleh PT PLN (Persero) dengan sistem pelelangan berdasarkan Kuota Kapasitas.

(2) Pembelian tenaga listrik dari pembangkit listrik yang memanfaatkan Sumber Energi Terbarukan selain sebagaimana dimaksud pada ayat (1), dilakukan oleh PT PLN (Persero) menggunakan harga patokan atau melalui mekanisme pemilihan langsung.

(3) PT PLN (Persero) wajib mengoperasikan pembangkit tenaga listrik yang memanfaatkan Sumber Energi Terbarukan sebagaimana dimaksud pada ayat (1) dan ayat (2) dengan kapasitas sampai dengan 10 MW (sepuluh megawatt) secara terus-menerus *(must-run)*.

Bagian Kedua

Pembelian Tenaga Listrik dari PLTS Fotovoltaik

Pasal 5

(1) Pembelian tenaga listrik dari PLTS Fotovoltaik oleh PT PLN (Persero) sebagaimana dimaksud dalam Pasal 3 ayat (3) huruf a dapat dilakukan dalam hal:
   a. sistem ketenagalistrikan setempat dapat menerima pasokan tenaga listrik yang menggunakan sumber energi sinar matahari;
   b. dimaksudkan untuk menurunkan BPP Pembangkitan di sistem ketenagalistrikan setempat; dan/atau
   c. memenuhi kebutuhan tenaga listrik di lokasi yang tidak ada sumber energi primer lain.

(2) Pembelian tenaga listrik dari PLTS Fotovoltaik sebagaimana dimaksud pada ayat (1) dilakukan melalui sistem pelelangan berdasarkan Kuota Kapasitas yang terdapat di rencana usaha penyediaan tenaga listrik PT PLN (Persero) dengan minimum total paket yang ditawarkan sebesar 15 MW (lima belas megawatt) dan lokasi pemasangan PLTS Fotovoltaik dapat tersebar di beberapa lokasi.

(3) Dalam hal BPP Pembangkitan di sistem ketenagalistrikan setempat di atas rata-rata BPP Pembangkitan nasional, harga pembelian tenaga listrik dari PLTS Fotovoltaik sebagaimana dimaksud pada ayat (2) paling tinggi sebesar 85% (delapan puluh lima persen) dari BPP Pembangkitan di sistem ketenagalistrikan setempat.

(4) Dalam hal BPP Pembangkitan di sistem ketenagalistrikan setempat sama atau di bawah rata-rata BPP Pembangkitan nasional, harga pembelian tenaga listrik dari PLTS Fotovoltaik sebagaimana dimaksud pada ayat (2) sebesar sama dengan BPP Pembangkitan di sistem ketenagalistrikan setempat.

(5) BPP Pembangkitan di sistem ketenagalistrikan setempat dan rata-rata BPP Pembangkitan nasional sebagaimana dimaksud pada ayat (3) dan ayat (4) merupakan BPP Pembangkitan di sistem ketenagalistrikan setempat dan rata-rata BPP Pembangkitan nasional pada tahun sebelumnya yang telah ditetapkan oleh Menteri berdasarkan usulan PT PLN (Persero).

Bagian Ketiga
Pembelian Tenaga Listrik dari PLTB

Pasal 6

(1) Pembelian tenaga listrik dari PLTB oleh PT PLN (Persero) sebagaimana dimaksud dalam Pasal 3 ayat (3) huruf b dapat dilakukan dalam hal:

a. sistem ketenagalistrikan setempat dapat menerima pasokan tenaga listrik yang menggunakan sumber energi tenaga angin;

b. dimaksudkan untuk menurunkan BPP Pembangkitan tenaga listrik di sistem ketenagalistrikan setempat; dan/atau

c. memenuhi kebutuhan tenaga listrik di lokasi yang tidak ada sumber energi primer lain.

(2) Pembelian tenaga listrik dari PLTB sebagaimana dimaksud pada ayat (1) dilakukan melalui sistem pelelangan berdasarkan Kuota Kapasitas yang terdapat di rencana usaha penyediaan tenaga listrik PT PLN (Persero) dengan minimum total paket yang ditawarkan sebesar 15 MW (lima belas megawatt) dan lokasi pemasangan PLTB dapat tersebar di beberapa lokasi.

(3) Dalam hal BPP Pembangkitan di sistem ketenagalistrikan setempat di atas rata-rata BPP Pembangkitan nasional, harga pembelian tenaga listrik dari PLTB sebagaimana dimaksud pada ayat (2) paling tinggi sebesar 85% (delapan puluh lima persen) dari BPP Pembangkitan di sistem ketenagalistrikan setempat.

(4) Dalam hal BPP Pembangkitan di sistem ketenagalistrikan setempat sama atau di bawah rata-rata BPP Pembangkitan nasional, harga pembelian tenaga listrik dari PLTB sebagaimana dimaksud pada ayat (2) sebesar sama dengan BPP Pembangkitan di sistem ketenagalistrikan setempat.

(5) BPP Pembangkitan di sistem ketenagalistrikan setempat dan rata-rata BPP Pembangkitan nasional sebagaimana dimaksud pada ayat (3) dan ayat (4) merupakan BPP Pembangkitan di sistem ketenagalistrikan setempat dan rata-rata BPP Pembangkitan nasional pada tahun sebelumnya yang telah ditetapkan oleh Menteri berdasarkan usulan PT PLN (Persero).

Bagian Keempat
Pembelian Tenaga Listrik dari Tenaga Air

Pasal 7

(1) Pembelian tenaga listrik dari Tenaga Air oleh PT PLN (Persero) sebagaimana dimaksud dalam Pasal 3 ayat (3) huruf c dapat berasal dari Tenaga Air yang memanfaatkan:

a. tenaga dari aliran/terjunan air sungai; atau

b. tenaga air dari waduk/bendungan atau saluran irigasi yang pembangunannya bersifat multiguna.

(2) Pembelian tenaga listrik dari Tenaga Air oleh PT PLN (Persero) sebagaimana dimaksud pada ayat (1) dilakukan menggunakan harga patokan atau melalui mekanisme pemilihan langsung.

(3) Tenaga Air dengan kapasitas paling tinggi 10 MW (sepuluh megawatt) harus mampu beroperasi dengan faktor kapasitas (*capacity factor*) paling sedikit sebesar 65% (enam puluh lima persen), sedangkan kapasitas lebih dari 10 MW (sepuluh megawatt) beroperasi dengan faktor kapasitas (*capacity factor*) tergantung kebutuhan sistem.

(4) Dalam hal BPP Pembangkitan di sistem ketenagalistrikan setempat di atas rata-rata BPP Pembangkitan nasional, harga patokan pembelian tenaga listrik dari Tenaga Air sebagaimana dimaksud pada ayat (2) paling tinggi sebesar 85% (delapan puluh lima persen) dari BPP Pembangkitan di sistem ketenagalistrikan setempat.

(5) Dalam hal BPP Pembangkitan di sistem ketenagalistrikan setempat sama atau di bawah rata-rata BPP Pembangkitan nasional, harga patokan pembelian tenaga listrik dari Tenaga Air sebagaimana dimaksud pada ayat (2) sebesar sama dengan BPP Pembangkitan di sistem ketenagalistrikan setempat.

(6) BPP Pembangkitan di sistem ketenagalistrikan setempat dan rata-rata BPP Pembangkitan nasional sebagaimana dimaksud pada ayat (4) dan ayat (5) merupakan BPP Pembangkitan di sistem ketenagalistrikan setempat dan rata-rata BPP Pembangkitan nasional pada tahun sebelumnya yang telah ditetapkan oleh Menteri berdasarkan usulan PT PLN (Persero).

(7) Pembelian tenaga listrik dari Tenaga Air sebagaimana dimaksud pada ayat (2) menggunakan pola kerja sama membangun, memiliki, mengoperasikan dan mengalihkan (*Build, Own, Operate, and Transfer*/BOOT).

(8) Pembangunan jaringan tenaga listrik untuk evakuasi daya dari Tenaga Listrik ke titik sambung PT PLN (Persero) dapat dilakukan oleh PPL berdasarkan mekanisme yang saling menguntungkan (*business to business)*.

Bagian Kelima

Pembelian Tenaga Listrik dari PLTBm

Pasal 8

(1) Pembelian tenaga listrik dari PLTBm oleh PT PLN (Persero) sebagaimana dimaksud dalam Pasal 3 ayat (3) huruf d hanya dapat dilakukan kepada PPL yang memiliki sumber pasokan bahan bakar (*feedstock*) yang cukup untuk kelangsungan operasi PLTBm selama masa PJBL.

(2) Pembelian tenaga listrik dari PLTBm oleh PT PLN (Persero) sebagaimana dimaksud pada ayat (1) dengan kapasitas sampai dengan 10 MW (sepuluh megawatt) dilakukan dengan menggunakan harga patokan, sedangkan kapasitas lebih dari 10 MW (sepuluh megawatt) dilakukan melalui mekanisme pemilihan langsung.

(3) Dalam hal BPP Pembangkitan di sistem ketenagalistrikan setempat di atas rata-rata BPP Pembangkitan nasional, harga patokan pembelian tenaga listrik dari PLTBm sebagaimana dimaksud pada ayat (2) paling tinggi sebesar 85% (delapan puluh lima persen) dari BPP Pembangkitan di sistem ketenagalistrikan setempat.

(4) Dalam hal BPP Pembangkitan di sistem ketenagalistrikan setempat sama atau di bawah rata-rata BPP Pembangkitan nasional, harga patokan pembelian tenaga listrik dari PLTBm sebagaimana dimaksud pada ayat (2) sebesar sama dengan BPP Pembangkitan di sistem ketenagalistrikan setempat.

(5) BPP Pembangkitan di sistem ketenagalistrikan setempat dan rata-rata BPP Pembangkitan nasional sebagaimana dimaksud pada ayat (3) dan ayat (4) merupakan BPP Pembangkitan di sistem ketenagalistrikan setempat dan rata-rata BPP Pembangkitan nasional pada tahun sebelumnya yang telah ditetapkan oleh Menteri berdasarkan usulan PT PLN (Persero).

(6) Pembangunan jaringan tenaga listrik untuk evakuasi daya dari PLTBm ke titik sambung PT PLN (Persero) dapat dilakukan oleh PPL berdasarkan mekanisme yang saling menguntungkan (*business to business)*.

Bagian Keenam

Pembelian Tenaga Listrik dari PLTBg

Pasal 9

(1) Pembelian tenaga listrik dari PLTBg oleh PT PLN (Persero) sebagaimana dimaksud dalam Pasal 3 ayat (3) huruf e hanya dapat dilakukan kepada PPL yang memiliki sumber pasokan bahan bakar (*feedstock*) yang cukup untuk kelangsungan operasi PLTBg selama masa PJBL.

(2) Pembelian tenaga listrik dari PLTBg oleh PT PLN (Persero) sebagaimana dimaksud pada ayat (1) dengan kapasitas sampai dengan 10 MW (sepuluh megawatt) dilakukan dengan menggunakan harga patokan, sedangkan kapasitas lebih dari 10 MW (sepuluh megawatt) dilakukan melalui mekanisme pemilihan langsung.

(3) Dalam hal BPP Pembangkitan di sistem ketenagalistrikan setempat di atas rata-rata BPP Pembangkitan nasional, harga patokan pembelian listrik dari PLTBg sebagaimana dimaksud pada ayat (2) paling tinggi sebesar 85% (delapan puluh lima persen) dari BPP Pembangkitan di sistem ketenagalistrikan setempat.

(4) Dalam hal BPP Pembangkitan di sistem ketenagalistrikan setempat sama atau di bawah rata-rata BPP Pembangkitan nasional, harga patokan pembelian tenaga listrik dari PLTBg sebagaimana dimaksud pada ayat (2) sebesar sama dengan BPP Pembangkitan di sistem ketenagalistrikan setempat.

(5) BPP Pembangkitan di sistem ketenagalistrikan setempat dan rata-rata BPP Pembangkitan nasional sebagaimana dimaksud pada ayat (3) dan ayat (4) merupakan BPP Pembangkitan di sistem ketenagalistrikan setempat dan rata-rata BPP Pembangkitan nasional pada tahun sebelumnya yang telah ditetapkan oleh Menteri berdasarkan usulan PT PLN (Persero).

(6) Pembangunan jaringan tenaga listrik untuk evakuasi daya dari PLTBg ke titik sambung PT PLN (Persero) dapat dilakukan oleh PPL berdasarkan mekanisme yang saling menguntungkan (*business to business)*.

Bagian Ketujuh

Pembelian Tenaga Listrik dari PLTSa

Pasal 10

(1) Pembelian tenaga listrik dari PLTSa wajib dilakukan oleh PT PLN (Persero) sebagaimana dimaksud dalam Pasal 3 ayat (3) huruf f dalam rangka membantu Pemerintah dan/atau pemerintah daerah dalam mengatasi atau menangani persoalan sampah kota.

(2) PLTSa sebagaimana dimaksud pada ayat (1) dapat menggunakan cara pengumpulan dan pemanfaatan gas metana dengan teknologi *sanitary landfill*, *anaerob digestion*, atau yang sejenis dari hasil penimbunan sampah atau melalui pemanfaatan panas/termal dengan menggunakan teknologi *thermochemical*.

(3) Pembelian tenaga listrik dari PLTSa oleh PT PLN (Persero) sebagaimana dimaksud pada ayat (1) dilakukan menggunakan harga patokan.

(4) Dalam hal BPP Pembangkitan di sistem ketenagalistrikan setempat di atas rata-rata BPP Pembangkitan nasional, harga patokan pembelian tenaga listrik dari PLTSa sebagaimana dimaksud pada ayat (3) paling tinggi sebesar BPP Pembangkitan di sistem ketenagalistrikan setempat.

(5) Dalam hal BPP Pembangkitan di sistem ketenagalistrikan di wilayah Sumatera, Jawa, dan Bali atau sistem ketenagalistrikan setempat lainnya sama atau di bawah rata-rata BPP Pembangkitan nasional, harga pembelian tenaga listrik dari PLTSa ditetapkan berdasarkan kesepakatan para pihak.

(6) BPP Pembangkitan di sistem ketenagalistrikan setempat dan rata-rata BPP Pembangkitan nasional sebagaimana dimaksud pada ayat (4) dan ayat (5) merupakan BPP Pembangkitan di sistem ketenagalistrikan setempat dan rata-rata BPP Pembangkitan nasional pada tahun sebelumnya yang telah ditetapkan oleh Menteri berdasarkan usulan PT PLN (Persero).

(7) Pengembang PLTSa dapat diberikan fasilitas berupa insentif sesuai dengan ketentuan peraturan perundang-undangan.

Bagian Kedelapan

Pembelian Tenaga Listrik dari PLTP

Pasal 11

(1) Pembelian tenaga listrik dari PLTP oleh PT PLN (Persero) sebagaimana dimaksud dalam Pasal 3 ayat (3) huruf g hanya dapat dilakukan kepada PPL yang memiliki wilayah kerja panas bumi sesuai dengan cadangan terbukti setelah eksplorasi.

(2) Pembelian tenaga listrik dari PLTP oleh PT PLN (Persero) sebagaimana dimaksud pada ayat (1) dilakukan menggunakan harga patokan.

(3) Dalam hal BPP Pembangkitan di sistem ketenagalistrikan setempat di atas rata-rata BPP Pembangkitan nasional, harga patokan pembelian tenaga listrik dari PLTP sebagaimana dimaksud pada ayat (2) paling tinggi sebesar BPP Pembangkitan di sistem ketenagalistrikan setempat.

(4) Dalam hal BPP Pembangkitan di sistem ketenagalistrikan di wilayah Sumatera, Jawa, dan Bali atau sistem ketenagalistrikan setempat lainnya sama atau di bawah rata-rata BPP Pembangkitan nasional, harga pembelian tenaga listrik dari PLTP ditetapkan berdasarkan kesepakatan para pihak.

(5) BPP Pembangkitan di sistem ketenagalistrikan setempat dan rata-rata BPP Pembangkitan nasional sebagaimana dimaksud pada ayat (3) dan ayat (4) merupakan BPP Pembangkitan di sistem ketenagalistrikan setempat dan rata-rata BPP Pembangkitan nasional pada tahun sebelumnya yang telah ditetapkan oleh Menteri berdasarkan usulan PT PLN (Persero).

(6) Pembangunan jaringan tenaga listrik untuk evakuasi daya dari PLTP ke titik sambung PT PLN (Persero) dapat dilakukan oleh PPL berdasarkan mekanisme yang saling menguntungkan (*business to business)*.

(7) Pembelian tenaga listrik dari PLTP sebagaimana dimaksud pada ayat (2) menggunakan pola kerja sama membangun, memiliki, mengoperasikan dan mengalihkan (*Build, Own, Operate, and Transfer*/BOOT).

Bagian Kesembilan

Pelaksanaan Uji Tuntas *(Due Diligence)*

Pasal 12

(1) Dalam rangka pembelian tenaga listrik sebagaimana dimaksud dalam Pasal 5 sampai dengan Pasal 11, PT PLN (Persero) wajib melakukan uji tuntas *(due diligence)* atas kemampuan teknis dan finansial dari PPL.

(2) Uji tuntas *(due diligence)* sebagaimana dimaksud pada ayat (1) dapat dilakukan oleh pihak *procurement agent* yang ditunjuk oleh PT PLN (Persero).

BAB V

PENGGUNAAN TINGKAT KOMPONEN DALAM NEGERI DAN PEMENUHAN STANDAR

Pasal 13

(1) Dalam melakukan pelelangan, pemilihan, atau penunjukan PPL, PT PLN (Persero) mengutamakan PPL yang menggunakan tingkat komponen dalam negeri sesuai dengan ketentuan peraturan perundang-undangan.

(2) Komponen dalam negeri yang digunakan dalam sistem pembangkit tenaga listrik yang memanfaatkan Sumber Energi Terbarukan harus memenuhi:
   a. standar nasional Indonesia di bidang ketenagalistrikan;
   b. standar internasional; atau
   c. standar negara lain yang tidak bertentangan dengan standar *International Organization for Standardization* (ISO) atau *International Electrotechnical Commission* (IEC).

(3) Konstruksi pembangkit tenaga listrik yang memanfaatkan Sumber Energi Terbarukan harus memenuhi:
   a. standar nasional Indonesia di bidang ketenagalistrikan;
   b. standar internasional;
   c. standar negara lain yang tidak bertentangan dengan standar *International Organization for Standardization* (ISO) atau *International Electrotechnical Commission* (IEC); atau
   d. standar yang berlaku di PT PLN (Persero).

BAB VI

PENERIMAAN DAN PENGOPERASIAN PEMBANGKIT TENAGA LISTRIK YANG MEMANFAATKAN SUMBER ENERGI TERBARUKAN PADA SISTEM KETENAGALISTRIKAN

Pasal 14

(1) Untuk menciptakan transparansi dalam pembelian tenaga listrik dari pembangkit tenaga listrik yang memanfaatkan Sumber Energi Terbarukan, PT PLN (Persero) wajib:
   a. menginformasikan secara terbuka kondisi sistem ketenagalistrikan setempat yang siap menerima pembangkit tenaga listrik yang memanfaatkan Sumber Energi Terbarukan; dan
   b. menginformasikan secara terbatas rata-rata BPP Pembangkitan pada sistem ketenagalistrikan setempat kepada PPL yang berminat mengembangkan pembangkit tenaga listrik yang memanfaatkan Sumber Energi Terbarukan.
(2) PT PLN (Persero) wajib melaporkan informasi sebagaimana dimaksud pada ayat (1) kepada Menteri secara berkala setiap 3 (tiga) bulan sekali atau sewaktu-waktu apabila diperlukan.
(3) Usulan pengembangan pembangkit tenaga listrik yang memanfaatkan Sumber Energi Terbarukan dari PPL kepada PT PLN (Persero) harus dilengkapi dengan kajian kelayakan penyambungan sistem ketenagalistrikan.

BAB VII

STANDAR PJBL DARI PEMBANGKIT TENAGA LISTRIK YANG MEMANFAATKAN SUMBER ENERGI TERBARUKAN

Pasal 15

(1) Guna mempercepat pembelian tenaga listrik dari pembangkit tenaga listrik yang memanfaatkan Sumber Energi Terbarukan, PT PLN (Persero) wajib menyusun dan mempublikasikan:

a. standar dokumen pengadaan pembangkit tenaga listrik yang memanfaatkan Sumber Energi Terbarukan; dan
b. standar PJBL untuk masing-masing jenis pembangkit tenaga listrik yang memanfaatkan Sumber Energi Terbarukan.

(2) Pokok-pokok PJBL sebagaimana dimaksud pada ayat (1) huruf b mengacu pada ketentuan peraturan perundang-undangan.

BAB VIII
SANKSI KETERLAMBATAN PEMBANGUNAN PEMBANGKIT TENAGA LISTRIK YANG MEMANFAATKAN SUMBER ENERGI TERBARUKAN

Pasal 16

(1) PPL yang telah ditunjuk sebagai pengembang pemanfaatan Sumber Energi Terbarukan untuk penyediaan tenaga listrik wajib menyelesaikan pembangunan pembangkit tenaga listrik yang menjadi tanggung jawabnya sesuai dengan *Commercial Operation Date* (COD) yang telah disepakati dalam PJBL.
(2) Dalam hal PPL terlambat dalam menyelesaikan pembangunan pembangkit tenaga listrik sebagaimana dimaksud pada ayat (1), PPL dikenakan sanksi dan/atau penalti.
(3) Sanksi dan/atau penalti sebagaimana dimaksud pada ayat (2) dituangkan dalam PJBL.

BAB IX
KETENTUAN PERALIHAN

Pasal 17

Pada saat Peraturan Menteri ini mulai berlaku, terhadap Badan Usaha yang:

a. telah mendapatkan penetapan sebagai pemenang Kuota Kapasitas PLTS Fotovoltaik, penetapan sebagai pengelola tenaga air untuk pembangkit listrik, penetapan sebagai pengembang PLTBm, PLTBg, atau PLTSa, atau pemenang pelelangan wilayah kerja panas bumi; dan
b. telah menandatangani PJBL dengan PT PLN (Persero),

proses pelaksanaan pembelian dan harga tenaga listriknya sesuai dengan ketentuan yang diatur dalam PJBL yang telah ditandatangani.

Pasal 18

Pada saat Peraturan Menteri ini mulai berlaku, terhadap Badan Usaha yang:

a. telah mendapatkan penetapan sebagai pengelola tenaga air untuk pembangkit listrik atau penetapan sebagai pengembang PLTBm, atau PLTBg, PLTSa; dan
b. belum menandatangani PJBL dengan PT PLN (Persero),

proses pelaksanaan pembelian tenaga listriknya sesuai dengan ketentuan yang diatur dalam peraturan perundang-undangan sebelum Peraturan Menteri ini diundangkan sepanjang tidak bertentangan dengan Peraturan Menteri ini dan ketentuan mengenai harga pembelian tenaga listrik mengacu pada ketentuan Peraturan Menteri ini.

Pasal 19

Pada saat Peraturan Menteri ini mulai berlaku terhadap:

a. Badan Usaha yang telah mendapatkan penetapan sebagai pemenang pelelangan Wilayah Kerja Panas Bumi dan belum menandatangani PJBL dengan PT PLN (Persero); dan
b. BUMN yang mendapat penugasan pengusahaan panas bumi,

proses pelaksanaan pembelian dan harga tenaga listriknya sesuai dengan ketentuan yang diatur dalam peraturan perundang-undangan sebelum Peraturan Menteri ini diundangkan.

Pasal 20

Pada saat Peraturan Menteri ini mulai berlaku, terhadap Pemegang Kuasa Pengusahaan Panas Bumi dan telah menandatangani perjanjian jual beli uap dan/atau PJBL yang telah dan/atau dalam proses verifikasi badan pengawasan keuangan dan pembangunan, proses pelaksanaan pembelian dan harga uap atau tenaga listriknya sesuai dengan ketentuan yang diatur dalam peraturan perundang-undangan sebelum Peraturan Menteri ini diundangkan.

Pasal 21

Ketentuan sebagaimana dimaksud dalam Pasal 17 sampai dengan Pasal 20 dapat dikecualikan terhadap Badan Usaha dan PT PLN (Persero) yang bersepakat untuk mengikuti ketentuan proses pelaksanaan pembelian dan harga tenaga listrik berdasarkan Peraturan Menteri ini.

Pasal 22

Pada saat Peraturan Menteri ini mulai berlaku, terhadap pembelian tenaga listrik dari PLTSa untuk program percepatan pembangunan PLTSa, ketentuan mengenai pelaksanaan pembelian dan harga tenaga listrik sesuai dengan ketentuan yang diatur dalam peraturan perundang-undangan sebelum Peraturan Menteri ini diundangkan.

BAB X

KETENTUAN PENUTUP

Pasal 23

(1) Pada saat Peraturan Menteri ini mulai berlaku maka ketentuan mengenai pelaksanaan pembelian tenaga listrik yang diatur dalam:
    a. Peraturan Menteri Energi dan Sumber Daya Mineral Nomor 17 Tahun 2014 tentang Pembelian Tenaga Listrik Dari PLTP dan Uap Panas Bumi untuk PLTP oleh PT PLN (Persero) (Berita Negara Republik Indonesia Tahun 2014 Nomor 713);

b. Peraturan Menteri Energi dan Sumber Daya Mineral Nomor 19 Tahun 2015 tentang Pembelian Tenaga Listrik Dari Pembangkit Listrik Tenaga Air Dengan Kapasitas Sampai Dengan 10 MW (sepuluh megawatt) oleh PT Perusahaan Listrik Negara (Persero) (Berita Negara Republik Indonesia Tahun 2015 Nomor 963);

c. Peraturan Menteri Energi dan Sumber Daya Mineral Nomor 44 Tahun 2015 tentang Pembelian Tenaga Listrik oleh PT Perusahaan Listrik Negara (Persero) Dari Pembangkit Listrik Berbasis Sampah Kota (Berita Negara Republik Indonesia Tahun 2015 Nomor 2051);

d. Peraturan Menteri Energi dan Sumber Daya Mineral Nomor 19 Tahun 2016 tentang Pembelian Tenaga Listrik Dari Pembangkit Listrik Tenaga Surya Fotovoltaik oleh PT Perusahaan Listrik Negara (Persero) (Berita Negara Republik Indonesia Tahun 2016 Nomor 1013); dan

e. Peraturan Menteri Energi dan Sumber Daya Mineral Nomor 21 Tahun 2016 tentang Pembelian Tenaga Listrik Dari Pembangkit Listrik Tenaga Biomassa dan Pembangkit Listrik Tenaga Biogas oleh PT Perusahaan Listrik Negara (Persero) (Berita Negara Republik Indonesia Tahun 2016 Nomor 1129),

dinyatakan tetap berlaku sepanjang tidak bertentangan dengan Peraturan Menteri ini.

(2) Pada saat Peraturan Menteri ini mulai berlaku, harga patokan tertinggi pembelian tenaga listrik untuk PLTA sebagaimana tercantum dalam Lampiran Peraturan Menteri Energi dan Sumber Daya Mineral Republik Indonesia Nomor 03 Tahun 2015 tentang Prosedur Pembelian Tenaga Listrik dan Harga Patokan Pembelian Tenaga Listrik dari PLTU Mulut Tambang, PLTU Batubara, PLTG/PLTMG, dan PLTA oleh PT Perusahaan Listrik Negara (Persero) Melalui Pemilihan Langsung dan Penunjukan Langsung (Berita Negara Republik Indonesia Tahun 2015 Nomor 49), dinyatakan tidak berlaku.

Pasal 24

Peraturan Menteri ini mulai berlaku pada tanggal diundangkan.

Agar setiap orang mengetahuinya, memerintahkan pengundangan Peraturan Menteri ini dengan penempatannya dalam Berita Negara Republik Indonesia.

Ditetapkan di Jakarta
pada tanggal 27 Januari 2017

MENTERI ENERGI DAN SUMBER DAYA MINERAL
REPUBLIK INDONESIA,

ttd.

IGNASIUS JONAN

Diundangkan di Jakarta
pada tanggal 30 Januari 2017

DIREKTUR JENDERAL
PERATURAN PERUNDANG-UNDANGAN
KEMENTERIAN HUKUM DAN HAK ASASI MANUSIA
REPUBLIK INDONESIA,

ttd.

WIDODO EKATJAHJANA

BERITA NEGARA REPUBLIK INDONESIA TAHUN 2017 NOMOR 189

Salinan sesuai dengan aslinya
KEMENTERIAN ENERGI DAN SUMBER DAYA MINERAL
Kepala Biro Hukum,

Hufron Asrofi

Masyarakat Energi Terbarukan Indonesia
(The Indonesian Renewable Energy Society)
Gedung Badan Diklat ESDM Lt. 5 Jl. Jend. Gatot Subroto Kav. 49
Telp +62-21 25529106, 25529212 E-mail: meti.ires@gmail.com
http: //www.meti.or.id

Jakarta, 8 Februari 2017

No Surat : 011/METI-KU/II/2017
Perihal : **Peninjauan Kembali Peraturan Pemerintah ESDM No. 12/2017**

Kepada Yth.:
Drs. Ignasius Jonan, M.A.
Menteri Energi dan Sumber Daya Mineral Republik Indonesia
Jl. Medan Merdeka Selatan No. 18
Jakarta 10110

Dengan hormat,

Sehubungan dengan terbitnya Peraturan Menteri ESDM No. 12/2017 tentang Pemanfaatan Sumber Energi Terbarukan untuk Penyediaan Tenaga Listrik dan hasil pertemuan antara METI dengan semua Pengurus Asosiasi Energi Terbarukan pada hari Selasa tanggal 7 Februari 2017 bertempat di Bimasena, dengan ini kami sampaikan hal-hal sebagai berikut:

1. Bahwa kami memandang Peraturan Menteri ESDM No. 12/2017 tidak sejalan dengan semangat UU 30/2007 tentang Energi dan Peraturan Pemerintah No. 79/2014 tentang Kebijakan Energi Nasional untuk mendorong peningkatan energi terbarukan yang merupakan kewajiban pemerintah dalam pelaksanaan UU dan Peraturan Perundang-undangan yang berlaku;

2. Pemerintah sudah menetapkan bahwa pemanfaatan energi terbarukan untuk meningkatkan ketahanan energi dan menurunkan emisi gas rumah kaca akan diprioritaskan. Namun, penerbitan Permen No. 12/2017 kelihatannya bertentangan dengan upaya pemerintah tersebut, mengingat tujuan penerbitan Permen ini hanyalah untuk menurunkan BPP PLN;

3. Pasal 7 UU 30/2007 tentang Energi menyatakan bahwa *"Harga energi ditetapkan berdasarkan nilai keekonomian berkeadilan"*. Yang dimaksud dengan nilai keekonomian berkeadilan adalah suatu nilai/biaya yang merefleksikan biaya produksi energi, termasuk biaya lingkungan dan biaya konservasi serta keuntungan yang dikaji berdasarkan kemampuan masyarakat dan ditetapkan oleh Pemerintah. Lebih lanjut dalam PP 79/2014 tentang Kebijakan Energi Nasional Pasal 20 Ayat 4c disebutkan bahwa Pemerintah mewujudkan pasar tenaga listrik paling sedikit melalui penerapan mekanisme feed in tariff dalam penetapan harga jual Energi Terbarukan. Penetapan tarif berdasarkan BPP PLN sebagaimana diatur dalam Permen 12/2017 tidak sejalan dengan UU dan PP dimaksud;

Masyarakat Energi Terbarukan Indonesia
(The Indonesian Renewable Energy Society)
Gedung Badan Diklat ESDM Lt. 5 Jl. Jend. Gatot Subroto Kav. 49
Telp +62-21 25529106, 25529212 E-mail: meti.ires@gmail.com
http: //www.meti.or.id

4. Sehubungan dengan poin-poin tersebut di atas, dalam rangka mendorong peningkatan pemanfaatan ET, maka METI bersama Asosiasi Energi Terbarukan memandang perlu meminta Bapak Menteri ESDM untuk meninjau kembali Permen No. 12/2017;

5. METI dan Asosiasi Energi Terbarukan berpendapat bahwa pemerintah perlu untuk menerbitkan pedoman perhitungan harga keekonomian berkeadilan sebagaimana diamanatkan dalam Pasal 7 UU 30/2007;

Demikian surat ini kami sampaikan. Atas perhatian dan kerjasamanya kami sampaikan terimakasih.

Hormat kami,
Pengurus METI

Dr. Surya Darma
Ketua Umum METI

Tembusan :
1. *Direktorat Jenderal Energi Baru Terbarukan Konservasi Energi (EBTKE)*
2. *Direktorat Jenderal Ketenagalistrikan (DJK)*

Discussion Material about
Large-scale FS on legally cultivated grain waste-fired biomass power generation project in Pesisir Selatan, West Sumatra, Indonesia

August, 2016

NTT Data Institute of Management Consulting, Inc.,
Socio & Eco Strategic Consulting Unit

NTT DATA

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NTT DATA

0.Introduction about our company

NTT DATA

Corporate outline

Name	NTT DATA INSTITUTE OF MANAGEMENT CONSULTING, Inc.
Date of Establishment	April 12, 1991
Shareholder	NTT DATA Corporation 100%
Capital	¥450 million
Head Office	10th floor, JA Kyosai Building, 7-9, Hirakawa-cho 2-chome, Chiyoda-ku, Tokyo 102-0093, Japan Tel +81-3-3221-7011 (main number) Fax +81-3-3221-7022
Office Toyosu	25th floor, Toyosu Center Building, 3-3, Toyosu 3-chome, Koto-ku, Tokyo 135-6025, Japan Tel +81-3-3221-7011 (main number) Fax +81-3-3534-3880
Office Singapore Branch	20 Pasir Panjang Road, #11-28 Mapletree Business City, Singapore 117439
URL	http://www.keieiken.co.jp/english/

Society, Environment and Energy

The environmental and energy sectors continue to be the scene of dynamic developments exemplified by the revision of energy policy, approaches to global warming, and recycling of dwindling resources. They also hold much promise for industrial activity. We promote client approaches through activities including support for smart community development, assistance with export of infrastructural elements, and creation of new business by private-sector consortiums.

- Development of environmental business and environmental management
- Social and environmental communication
- Building of recycling-oriented social systems
- Measures to mitigate global warming
- New energy and energy conservation
- Systems for assurance of safety/security and management of chemical substances
- Smart communities
- Infrastructural export

1. Background and Purpose of the Study

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Background that we are understanding

- ✓ South Pesisir Regency have KSNP which is
- ✓ Rice and corn are cultivated in South Pesisir Regency and they produce sufficient biomass waste like rice husk, paddy straw, corn cob, and corn stover.
- ✓ Electricity supply from PLN for South Pesisir Regency is not enough and the quality of the electricity is low.

Purpose

- The project will conduct the feasibility study on biomass power generation utilizing generated matters from biomass waste of rice and corn farming based on the above situation.
- It estimates CO2 GHGs reduced efficiency through Implementation of biomass power generation.

2. Overview of the Project

Object region	Pesisir Selatan, West Sumatra, Indonesia
Type of treatment target waste	Biomass waste focusing on rice husk (and paddy straw)
Utilization technology	Stoker furnace waste power generation plant
Size of introduction	Size of incinerator and waste power generation facility are verified through the study retrievable amount （It is supposed approximate 16MW generating capacity at the beginning of a study）
Expected business	● Biomass power generation utilizing generated matters from biomass waste of rice and corn farming. ● Verification on the generated electricity is following. （basic case）Option of selling whole generated electricity to PLN. （reference case）Consume a part of generated electricity at neighborhood rice mill. Option of selling the surplus generated electricity to PLN.
Japanese participants for the study	● NTT DATA Institute of Management Consulting, Inc. (whole project management) ● ATGREEN Co., Ltd (mainly study for biomass) ● MEIDENSHA CORPORATION(study for installation of plant)

3. Expected Introduction of Technology

○Overview of Technology

Biomass thermal generating system (Stoker furnace)

○features

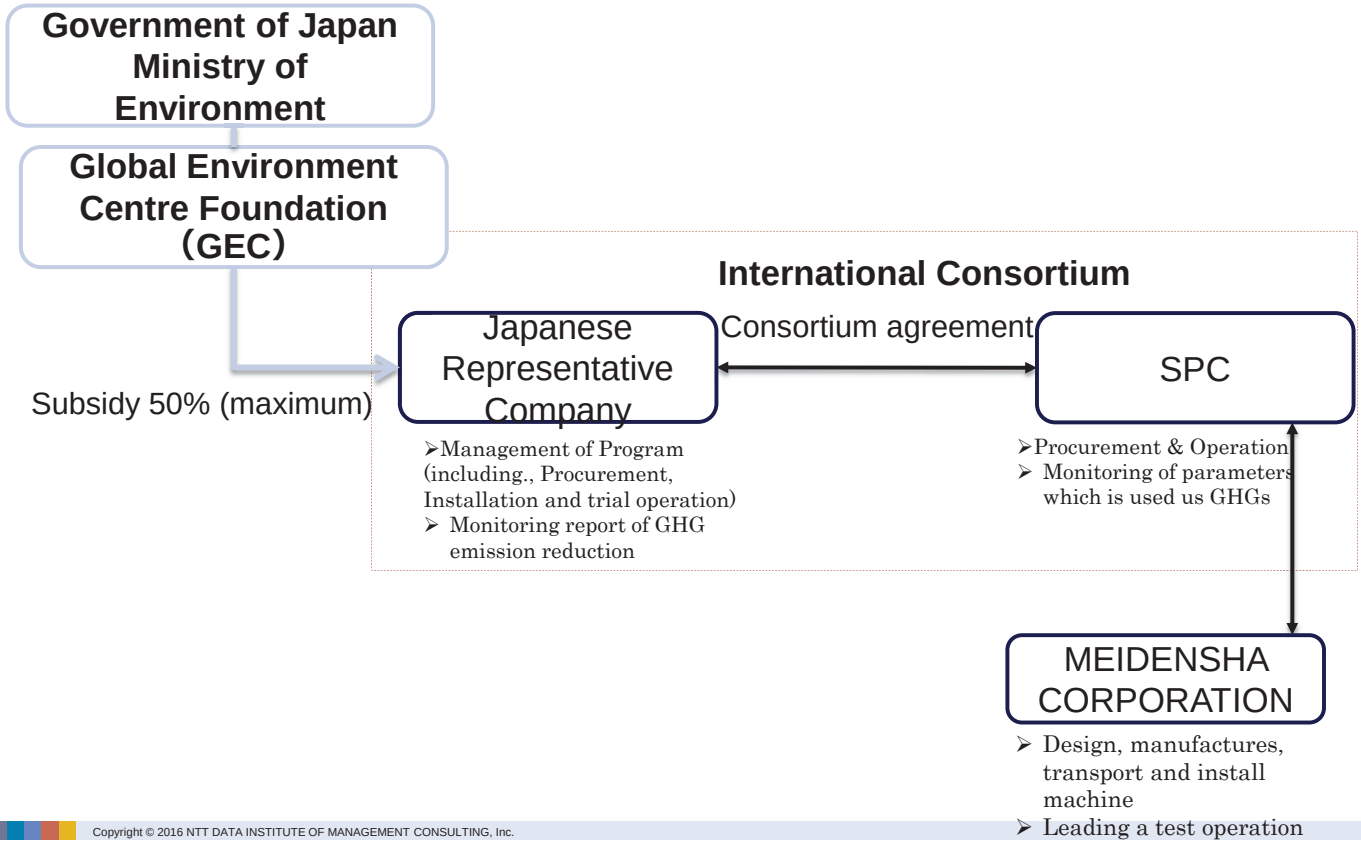
- The technology can be relatively suppress the initial investment and low running cost.
- Even if low calorie wastes the Technology can treat them without any problems .
- It is possible to operate constantly, long-term with bringing out the maximum energy use efficiency

○List of results

Date of supply	Delivery place	概要説明
May 2003	Roi Et Province, Thailand	9.95MW biomass thermal generating system run on rice husk
Sep. 2007	Surat Thani Province, Thailand	10.4MW biomass power generation system for palm in Thailand

4. Expected Draft Scheme of JCM project implementation

consideration of candidates on JCM Project Implementation Scheme



5. Total GHGs reduced and Cost-Effectiveness

Provisional estimate on CO2 GHGs reduced and cost efficiency when executing the project is following.

○CO2 GHGs reduced from energy sources

Total GHGs reduced (t-CO2)＝
annual CO2 GHGs reduced from energy sources (tCO2 per year) × durable years (year)

100,130t-CO2 per year × 15 years = 1,501,950t - CO2

○ Cost efficiency of subsidy on CO2 emission reduction from energy sources

CO2 reduction cost (JPY ¥/t-CO2)＝
Subsidy (¥) ÷ (annual CO2 emission reduction from energy sources (tCO2/ year) × durable years (year))

○ Cost efficiency of subsidy on GHG emission reduction（Omit avoidance effect for methane gas generation）

GHG reduction cost (JPY ¥/t-CO2 equivalent) ＝
subsidy (¥) ÷ (annual GHGs reduced (tCO2 equivalent /year) × durable years (year))

Equivalent to cost efficiency on CO2 emission reduction from energy sources

6. Issues of the Study ①

No.	Issues to be solved by study	Commitment	Actor	Contents
1	Confirmation of retrievable biomass waste amount	Confirm irretrievability of A sufficient amount of biomass waste for project implementation	NTT , ATGREEN	・Confirm status of rice milling in operation ・Confirm the terms of a contract on collecting chaff of local cooperative and farmer
2	Confirmation of retrievable biomass waste quality	Confirm composition and calorie of biomass waste	NTT, ATGREEN	・Confirm retrievable biomass waste quality by sampling and composition analysis
3	Confirmation of collecting method biomass waste	Get information of collecting method and cost for biomass waste in each district	NTT, ATGREEN	・Investigation of biomass waste emission source ・Study of collecting method of biomass waste
4	Confirmation of land installable land for plant	Confirm place, area and Utility where it would be possible to establish without national park area	NTT, MEIDENSHA	・Confirm place, area and Status of development where it would be possible to establish without national park area ・Confirm procurable utility (e.g. water) at the site
5	Confirmation of control and procedure on installation plant	Confirm necessary procedure in construction at the study target area	NTT, MEIDENSHA	・Confirm legal system on environmental assessment, construction approval plant operating approval and so on.
6	Confirmation of status of development of transmission network	Confirm status of transmission network rail in the study target area	NTT, MEIDENSHA	・プラント設置候補地のサイト調査

6. Issues of the Study ②

No.	Issues to be solved by study	Commitment (timeframe)	Actor	Contents
7	Study of applicable technologies	consider applicable technologies based on the results of No. 1, 2, 3.	MEIDENSHA	・Estimate electricity generated ・Fundamental design of plant ・Calculate initial cost and running cost
8	Confirmation of the legal system on electricity sales	Confirm information of Feed-in tariff and the detail conditions	NTT	・Confirm information of Feed-in tariff and the detail conditions
9	Economic efficiency study, Commercialization evaluation, Calculate CO2 GHGs reduced	Implement commercialization evaluation and calculate CO2 GHGs reduced calculate based on the results of No. 6, 7	NTT	・Implement comprehensive assessment through payback period and IRR ・Study MRV
10	Discover financial supporter for the on-site project implementation	Discover financial supporter by the end of the project	NTT	・Extract financial supporter at the on-site project implementation
11	Confirmation of fund-raising method and financial condition of main organization for JCM project	After No.8, confirm financial condition of main organization for JCM project and fund-raising method for of JCM industrialization	NTT	・Confirm financial condition of main organization for JCM project and fund-raising method for of JCM industrialization
12	Confirmation of order and contract method	Confirm whether bidding is necessary or not, and possibility of private contract	NTT	Confirm whether bidding is necessary or not, and possibility of private contract
13	Extraction of representative company at the JCM industrialization	Extract representative company at the JCM industrialization	NTT	・Descript operation program so that conduct a invitation candidate organization

7. Schedule of the study Implementation

Activity Item	2016							2017		
	June	July	Aug.	Sep	Oct.	Nov.	Dec.	Jun.	Feb.	Mar.
A .Study on Biomass waste			Field study →	Property analysis →						
B .Technical examination			On-site confirmation →	On-site confirmation →						
			Technical examination →							
C .Feasibility Study						Feasibility Study →				
						Evaluation of CO2 GHGs reduced →				
D .Evaluation and preparation for commercialization						Commercialization evaluation →				
			Selecting of candidate organization →							
								Preparation for application of auxiliary plant →		
○ Field Study			●	●				●		
○ Report writing					● Draft					● Finalizing

Appendix: information about JCM

1. What is JCM(Joint Crediting Mechanism) ?

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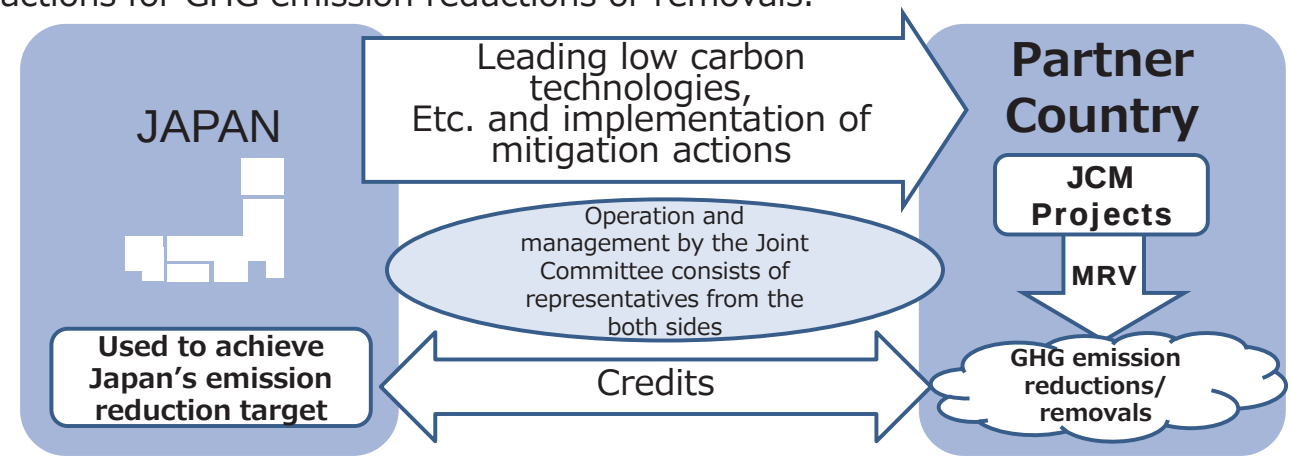
Purpose

- Facilitating diffusion of leading low carbon technologies, products, systems, services, and infrastructure as well as implementation of mitigation actions, and contributing to sustainable development of developing countries.
- Appropriately evaluating contributions from Japan to GHG emission reductions or removals in a quantitative manner and use them to achieve Japan's emission reduction target.
- Contributing to the ultimate objective of the UNFCCC by facilitating global actions for GHG emission reductions or removals.



2. JCM Financial support Program

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The draft budget for projects starting from FY 2016 is 6.7 billion JPY (approx. USD 56 million) in total by FY2018

※Budget will be fixed after approval by the Parliament

Government of Japan

※Includes collaboration with projects supported by JICA and other governmental-affiliated financial institute.

Finance part of an investment cost (**less than half**)

Conduct MRV and expected to deliver at least half of JCM credits issued

International consortiums (which include Japanese entities)

- ◆ Scope of the financing: facilities, equipment, vehicles, etc. which reduce CO2 from fossil fuel combustion as well as construction cost for installing those facilities, etc.
- ◆ Eligible Projects : starting installation after the adoption of the financing and finishing installation within three years.

3. JCM Partner Countries

NTT DATA

- Japan has held consultations for the JCM with developing countries since 2011 and has established the JCM with Mongolia, Bangladesh, Ethiopia, Kenya, Maldives, Viet Nam, Lao PDR, Indonesia, Costa Rica, Palau, Cambodia, Mexico, Saudi Arabia, Chile, Myanmar and Thailand.

Mongolia
Jan. 8, 2013
（Ulaanbaatar）

Bangladesh
Mar. 19, 2013
(Dhaka)

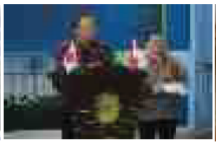
Ethiopia
May 27, 2013
(Addis Ababa)

Kenya
Jun. 12,2013
(Nairobi)

Maldives
Jun. 29, 2013
(Okinawa)

Viet Nam
Jul. 2, 2013
(Hanoi)

Lao PDR
Aug. 7, 2013
(Vientiane)



Indonesia
Aug. 26, 2013
(Jakarta)

Costa Rica
Dec. 9, 2013
(Tokyo)

Palau
Jan. 13, 2014
(Ngerulmud)

Cambodia
Apr. 11, 2014
(Phnom Penh)

Mexico
Jul. 25, 2014
(Mexico City)

Saudi Arabia
May 13, 2015

Chile
May 26, 2015
(Santiago)

Myanmar
Sep. 16, 2015
(Nay Pyi Taw)

Thailand
Nov. 19, 2015
(Tokyo)

- In addition, the Philippines and Japan signed an aide memoire with intent to establish the JCM.

4. Things must be considered to JCM application

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◆ To apply JCM scheme to get subsidy, 4 things below must be determined.

（1） Implementation system of business

- The determination of the members of the international consortium.
- Especially, the selection of the liability only large representative operators.
- Consideration of the benefit exclusion.

（2） Establishment of MRV technique

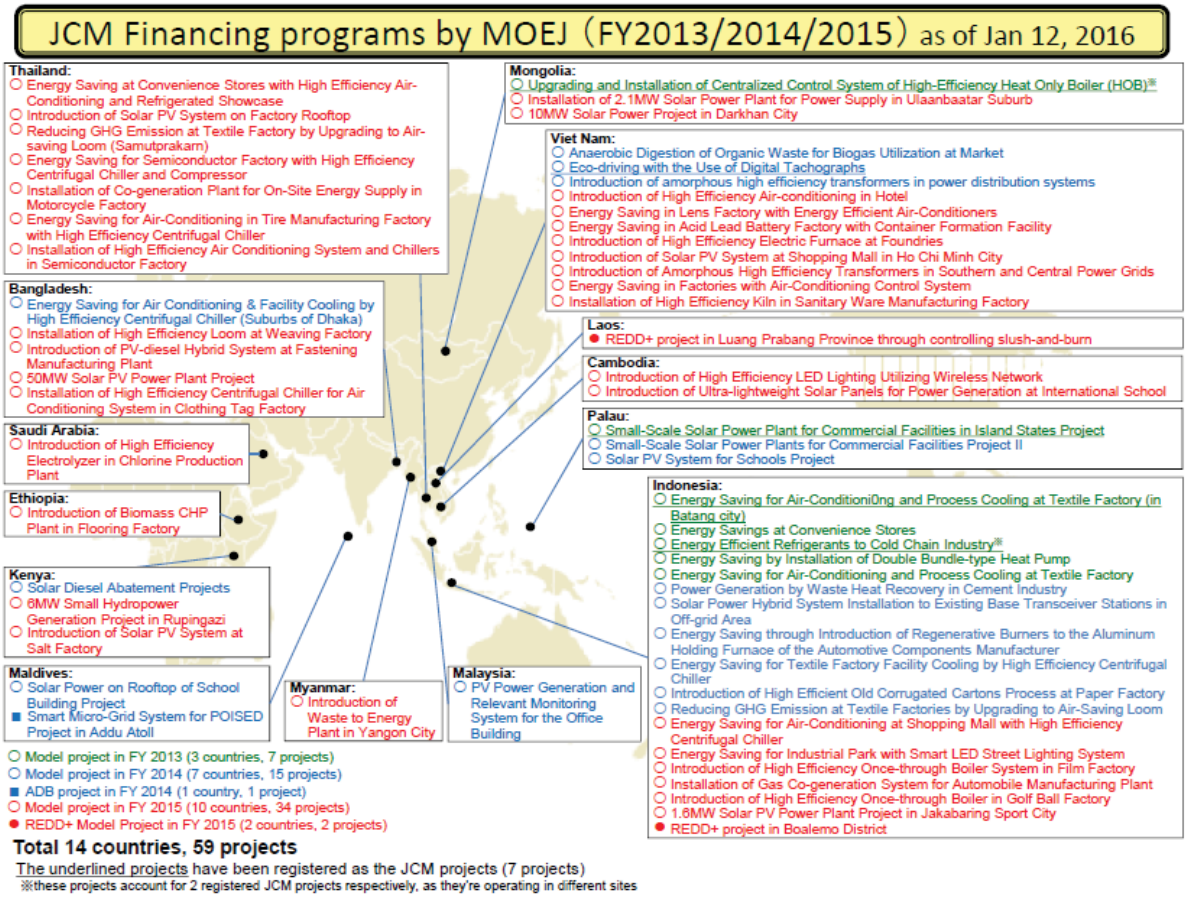
- Study of quantification method of CO2 emission reductions
- the cost-effectiveness of CO2 emissions are becoming increasingly important

（3） Details of equipment to be introduced in subsidy

- Determination of the specifications and price of at the expected target equipment
- Evaluation of the validity of the specifications and price of the target equipment that is assumed
- Competitiveness of assumed to have the target equipment

（4） Evaluation of business potential

- Evaluation of IRR
- Validity of subsidy necessary



NTT DATA
Global IT Innovator

Discussion Material about
Large-scale FS on legally cultivated grain waste-fired biomass power generation project in Pesisir Selatan, West Sumatra, Indonesia

September 2016
NTT Data Institute of Management Consulting, Inc.,
Socio & Eco Strategic Consulting Unit

NTT DATA

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Purpose

- The project will conduct the feasibility study on biomass power generation utilizing generated matters from biomass waste of legal rice and corn farming based on the above background and field conditions for supporting
  - Indonesia Presidential Regulation No. 4/2016
  - Indonesia Presidential Regulation No. 61/2011
  - International community movement/action to remove the tropical rainforest heritage of Sumatra from the List of World Heritage in danger.

  …by considering technical, economical, social and environmental aspect.

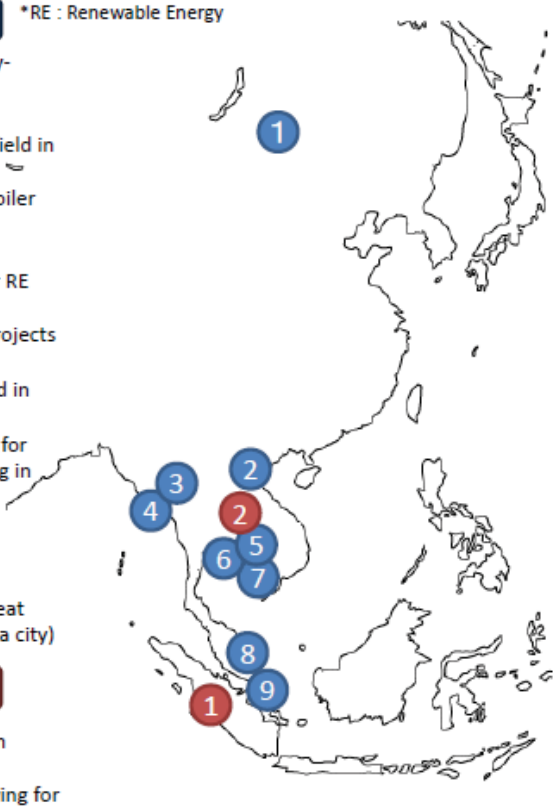
- It estimates CO2 GHGs reduced efficiency through implementation of biomass power generation.

FY2016 Feasibility studies on JCM projects by MOEJ

Feasibility Study on JCM Project by City to City Collaboration

*RE : Renewable Energy

1. The study of high-efficiency heat pump installation projects for Energy-saving field and PV generation projects for RE* field in Mongolia(Ulaanbaatar city-Sapporo city/Hokkaido)
2. The study of cogeneration and exhaust heat recovery projects for RE field in Vietnam(Hai phong city-Kitakyushu city)
3. The study of PV generation projects for RE field and high-efficiency boiler installation projects for Energy-saving field in Myanmar(Yangon city-Kawasaki city)
4. The study of water treatment system installation and WtE projects for RE field in Myanmar(Pathein city-Fukushima city)
5. The study of biomass power generation projects and PV generation projects for RE field in Cambodia(Siem reap state-Kanagawa pref.)
6. The study of WtE, cogeneration and exhaust heat recovery for RE field in Thailand(Rayong prov.-Kitakyushu city)
7. The study of project formulation by assisting planning the action plan for the climate change strategy and projects for RE field and Energy-saving in Cambodia(Phnom Penh city-Kitakyushu city)
8. The study of cogeneration projects for RE field and high-efficiency air conditioning system installation projects for Energy-saving field in Malaysia(Iskandar development region-Kitakyushu city)
9. The study of high-efficiency air conditioning system installation and heat desorption unit installation projects in Indonesia(Batam city-Yokohama city)



Feasibility Study on JCM large-scale CO2 reduction project

1. The study of a biomass power generation project by rice hull and grain waste for RE field in Indonesia(West Sumatra prov.)
2. The study of refining waste water and residue into bio gas and supplying for vehicles for RE field in Thailand(Ubon Ratchathani prefecture etc.)

ABANDONED PADDY RESIDUE AND GHG EMISSION SOURCES AROUND MINANGKABAU INTERNATIONAL AIRPORT

Corn Residue Open Burning in Nagari Katapiang, Batang Anai District. Padang Pariaman Regency, ± 6 Km from Minangkabau International Airport. May 01, 2015 at 10.00 am

ABANDONED PADDY RESIDUE AND GHG EMISSION SOURCES IN PESISIR SELATAN REGECY

Paddy Straw Open Air Burning in Siguntur Mudo Village, Koto XI Tarusan District. Pesisir Selatan Regency. May 01, 2015 at 04.00 pm

Ready Burnt or Left Decay-Rice Husk in a Small-Scale Rice Milling unit in Duku Village, Koto XI Tarusan District. Pesisir Selatan Regency May 01, 2015 at 03.00 pm

(Reference)on-site survey on illegal cropping in KNSP

We have a on-site survey on illegal cropping in KNSP on 6th August,2016.

Corn was cropped inside KNSP.

(Reference)on-site survey in KNSP in this survey

Some residue was burnt inside the protected forest. Smoke aroused anywhere .
This smoke will flow to other country such as Malaysia, Singapore and it makes haze at that countries.

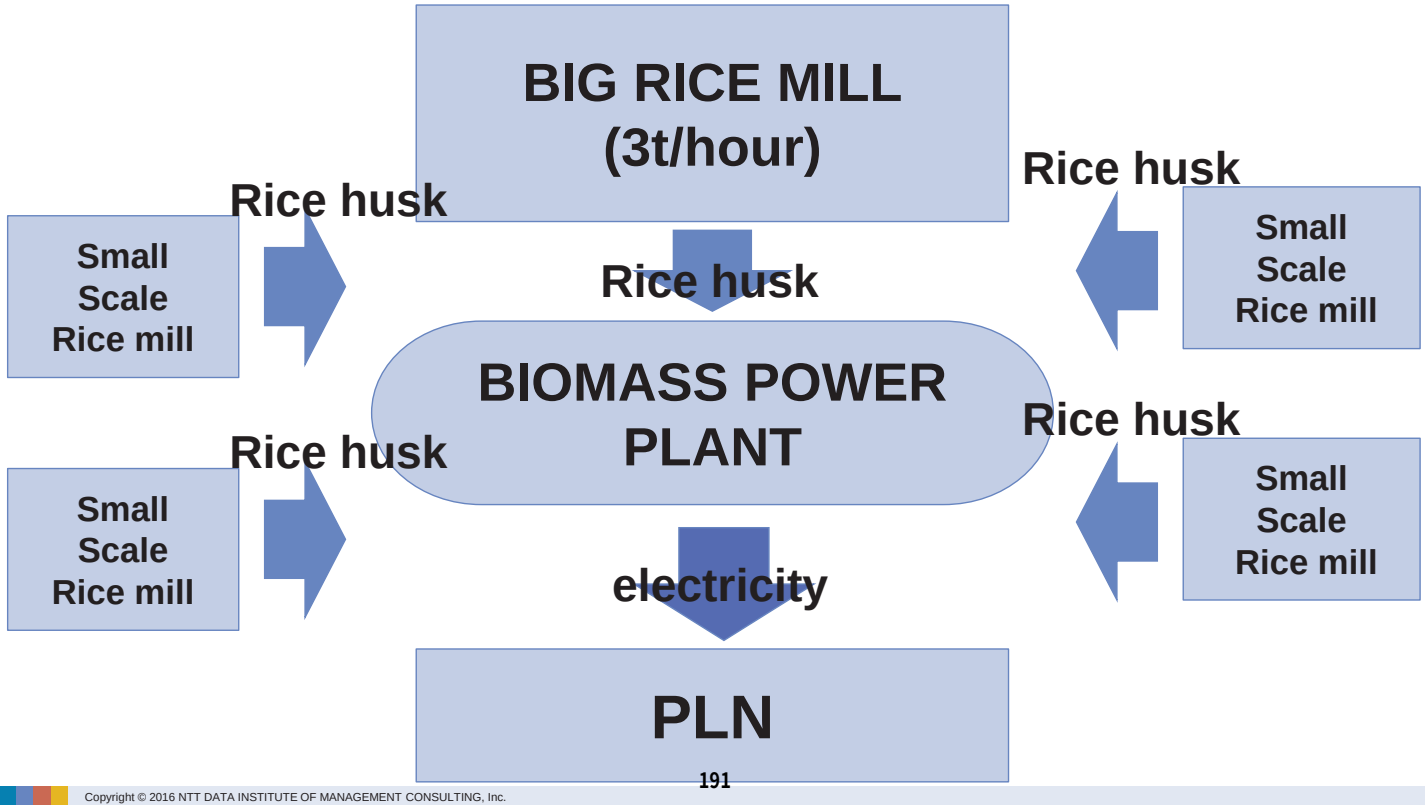
Many trees in the protected forest were cut down and soil appears.
It will be a cause of landslide.

2. Overview of the Project

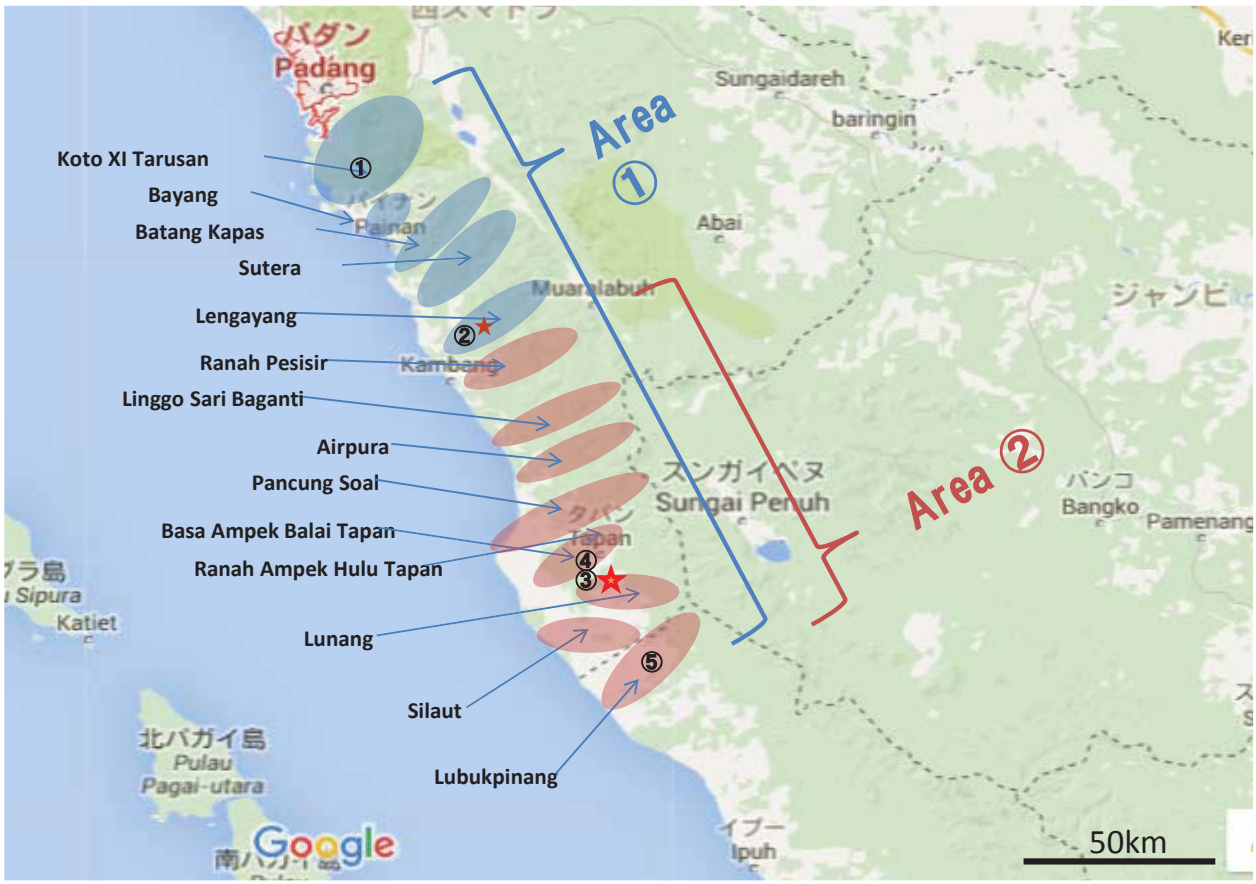
Object region	Pesisir Selatan, West Sumatra, Indonesia
Target waste	Biomass waste, mainly focus on rice husk and corn cob
Technology to be implemented	biomass power generation plant(stoker furnace)
Size of the plant	Size of the plant is verified through the study retrievable amount （But, it is supposed approximate 16MW generating capacity at the beginning of a study）
Expected business contents	● Biomass power generation utilizing generated matters from biomass waste of rice ● Verification on the generated electricity is following. （basic case）Option of selling whole generated electricity to PLN. （reference case）Consume a part of generated electricity at neighborhood rice mill. Option of selling the surplus generated electricity to PLN.
Japanese participants for the study	● NTT DATA Institute of Management Consulting, Inc. (whole project management) ● ATGREEN Co., Ltd (mainly study for biomass) ● MEIDENSHA CORPORATION(study for installation of plant)

FOR THE REDEUCTION OF TRANSPORTATION COST

Mills and Power plant would be central-located.



4.Our Planning Area to construct a plant



3. Expected Introduction of Technology

○Overview of Technology

Biomass power plant (Stoker furnace)

○features

- The technology can be relatively suppress the initial investment and low running cost.
- Even if low calorie wastes the Technology can treat them without any problems .
- It is possible to operate constantly, long-term with bringing out the maximum energy use efficiency

○List of results

Date of supply	Delivery place	Summery
May 2003	Roi Et Province, Thailand	9.95MW biomass thermal generating system run on rice husk
Sep. 2007	Surat Thani Province, Thailand	10.4MW biomass power generation system for palm in Thailand

5. Total GHGs reduced and Cost-Effectiveness

Provisional estimate on CO2 GHGs reduced and cost efficiency when executing the project is following.

○CO2 GHGs reduced from energy sources

Total GHGs reduced (t-CO2)＝
annual CO2 GHGs reduced from energy sources (tCO2 per year) × durable years (year)

100,130t-CO2 per year × 15 years = 1,501,950t - CO2

○ Cost efficiency of subsidy on CO2 emission reduction from energy sources

CO2 reduction cost (JPY/t-CO2)＝
Subsidy ÷ (annual CO2 emission reduction from energy sources (tCO2/ year) × durable years (year))

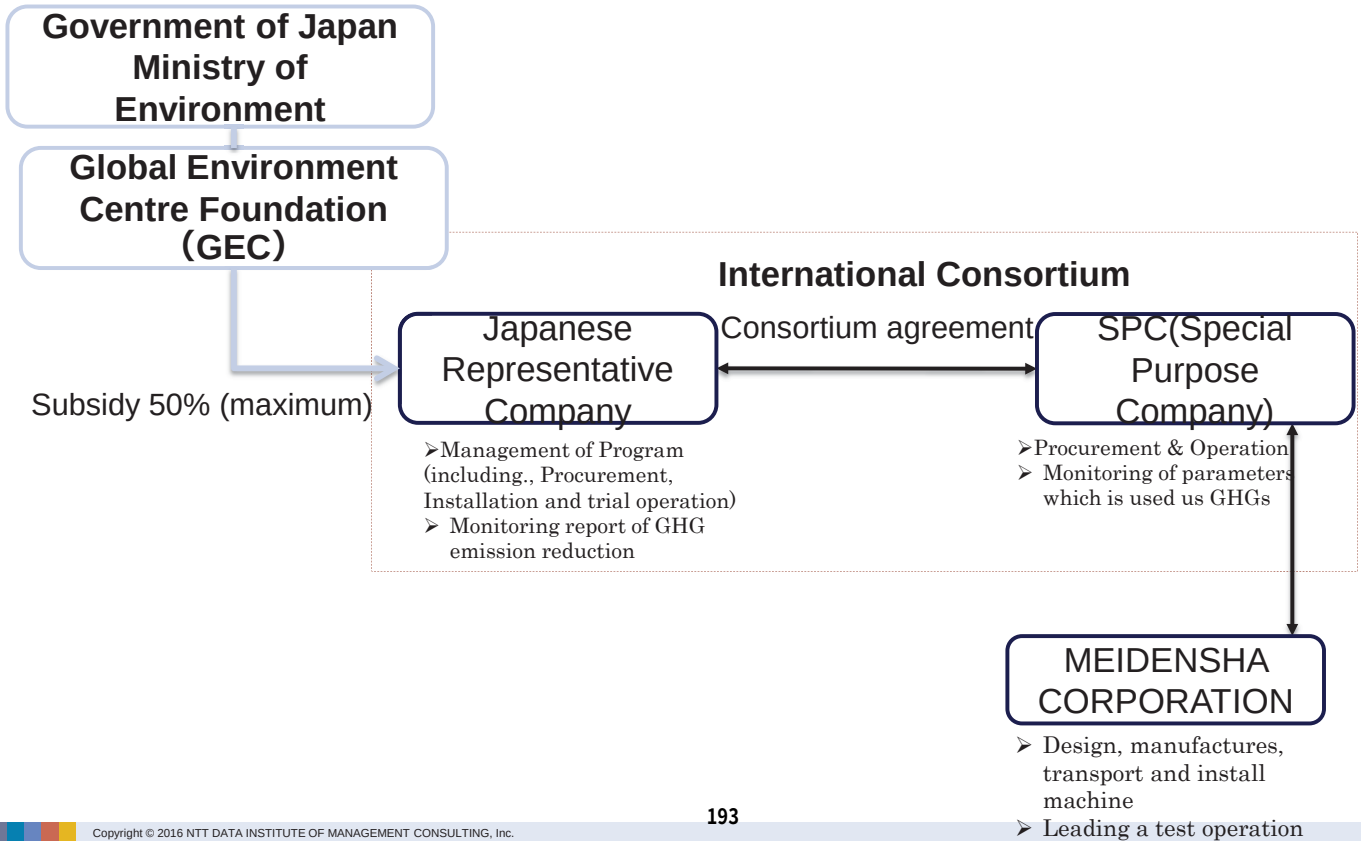
JPY365,000,000÷ 100,130t-CO2/year× 15years=JPY2,430

○ Cost efficiency of subsidy on GHG emission reduction（Omit avoidance effect for methane gas generation）

Equivalent to cost efficiency on CO2 emission reduction from energy sources

4. Expected Draft Scheme of JCM project implementation

consideration of candidates on JCM Project Implementation Scheme



6. Issues of the Study ①

No.	Issues to be solved by study	Commitment	Actor	Contents
1	Confirmation of retrievable biomass waste amount	Confirm irretrievability of A sufficient amount of biomass waste for project implementation	NTT , ATGREEN	・Confirm status of rice milling in operation ・Confirm the terms of a contract on collecting chaff of local cooperative and farmer
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3	Confirmation of collecting method biomass waste	Get information of collecting method and cost for biomass waste in each district	NTT, ATGREEN	・Investigation of biomass waste emission source ・Study of collecting method of biomass waste
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6	Confirmation of status of development of transmission network	Confirm status of transmission network rail in the study target area	NTT, MEIDENSHA	・プラント設置候補地のサイト調査

6. Issues of the Study ②

No.	Issues to be solved by study	Commitment (timeframe)	Actor	Contents
7	Study of applicable technologies	consider applicable technologies based on the results of No. 1, 2, 3.	MEIDENSHA	・Estimate electricity generated ・Fundamental design of plant ・Calculate initial cost and running cost
8	Confirmation of the legal system on electricity sales	Confirm information of Feed-in tariff and the detail conditions	NTT	・Confirm information of Feed-in tariff and the detail conditions
9	Economic efficiency study, Commercialization evaluation, Calculate CO2 GHGs reduced	Implement commercialization evaluation and calculate CO2 GHGs reduced calculate based on the results of No. 6, 7	NTT	・Implement comprehensive assessment through payback period and IRR ・Study MRV
10	Discover financial supporter for the on-site project implementation	Discover financial supporter by the end of the project	NTT	・Extract financial supporter at the on-site project implementation
11	Confirmation of fund-raising method and financial condition of main organization for JCM project	After No.8, confirm financial condition of main organization for JCM project and fund-raising method for of JCM industrialization	NTT	・Confirm financial condition of main organization for JCM project and fund-raising method for of JCM industrialization
12	Confirmation of order and contract method	Confirm whether bidding is necessary or not, and possibility of private contract	NTT	Confirm whether bidding is necessary or not, and possibility of private contract
13	Extraction of representative company at the JCM industrialization	Extract representative company at the JCM industrialization	NTT	・Descript operation program so that conduct a invitation candidate organization

7. Schedule of the study Implementation

Activity Item	2016							2017		
	June	July	Aug.	Sep	Oct.	Nov.	Dec.	Jun.	Feb.	Mar.
A .Study on Biomass waste			Field study			Property analysis				
B .Technical examination			On-site confirmation		On-site confirmation					
			Technical examination							
C .Feasibility Study						Feasibility Study				
						Evaluation of CO2 GHGs reduced				
						Commercialization evaluation				
D .Evaluation and preparation for commercialization										
			Selecting of candidate organization							
								Preparation for application of auxiliary plant		
○ Field Study			●	●				●		
○ Report writing					● Draft					● Finalizing

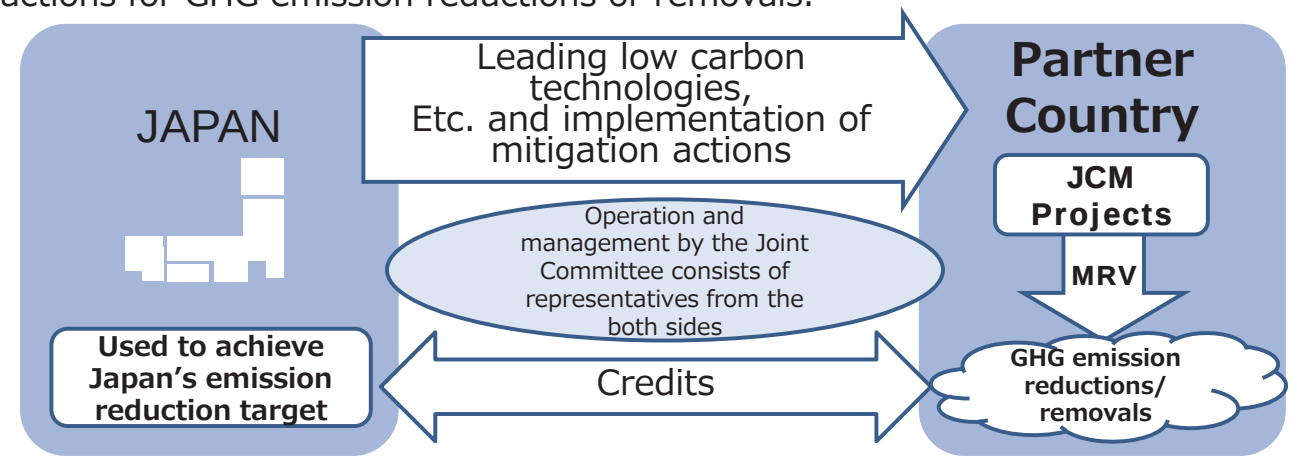
Appendix: information about JCM

1. What is JCM(Joint Crediting Mechanism) ?

NTT DATA

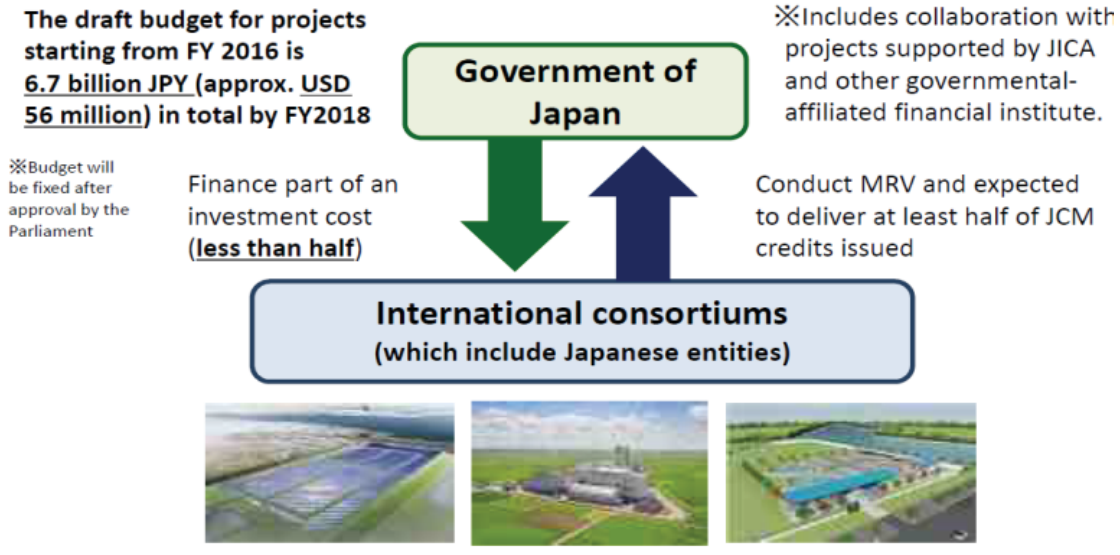
Purpose

- Facilitating diffusion of leading low carbon technologies, products, systems, services, and infrastructure as well as implementation of mitigation actions, and contributing to sustainable development of developing countries.
- Appropriately evaluating contributions from Japan to GHG emission reductions or removals in a quantitative manner and use them to achieve Japan's emission reduction target.
- Contributing to the ultimate objective of the UNFCCC by facilitating global actions for GHG emission reductions or removals.



2. JCM Financial support Program

NTT DATA



- ◆ Scope of the financing: facilities, equipment, vehicles, etc. which reduce CO2 from fossil fuel combustion as well as construction cost for installing those facilities, etc.
- ◆ Eligible Projects : starting installation after the adoption of the financing and finishing installation within three years.

3. JCM Partner Countries

NTT DATA

- Japan has held consultations for the JCM with developing countries since 2011 and has established the JCM with Mongolia, Bangladesh, Ethiopia, Kenya, Maldives, Viet Nam, Lao PDR, Indonesia, Costa Rica, Palau, Cambodia, Mexico, Saudi Arabia, Chile, Myanmar and Thailand.

Mongolia
Jan. 8, 2013
(Ulaanbaatar)

Bangladesh
Mar. 19, 2013
(Dhaka)

Ethiopia
May 27, 2013
(Addis Ababa)

Kenya
Jun. 12,2013
(Nairobi)

Maldives
Jun. 29, 2013
(Okinawa)

Viet Nam
Jul. 2, 2013
(Hanoi)

Lao PDR
Aug. 7, 2013
(Vientiane)

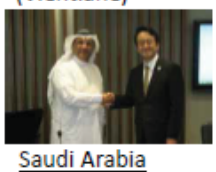
Indonesia
Aug. 26, 2013
(Jakarta)

Costa Rica
Dec. 9, 2013
(Tokyo)

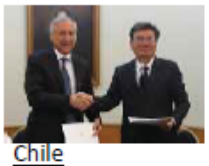
Palau
Jan. 13, 2014
(Ngerulmud)

Cambodia
Apr. 11, 2014
(Phnom Penh)

Mexico
Jul. 25, 2014
(Mexico City)



Saudi Arabia
May 13, 2015



Chile
May 26, 2015
(Santiago)

Myanmar
Sep. 16, 2015
(Nay Pyi Taw)

Thailand
Nov. 19, 2015
(Tokyo)

- In addition, the Philippines and Japan signed an aide memoire with intent to establish the JCM.

4. Things must be considered to JCM application

NTT DATA

◆ To apply JCM scheme to get subsidy, 4 things below must be determined.

(1) Implementation system of business

- The determination of the members of the international consortium.
- Especially, the selection of the liability only large representative operators.
- Consideration of the benefit exclusion.

(2) Establishment of MRV technique

- Study of quantification method of CO2 emission reductions
- the cost-effectiveness of CO2 emissions are becoming increasingly important

(3) Details of equipment to be introduced in subsidy

- Determination of the specifications and price of at the expected target equipment
- Evaluation of the validity of the specifications and price of the target equipment that is assumed
- Competitiveness of assumed to have the target equipment

(4) Evaluation of business potential

- Evaluation of IRR
- Validity of subsidy necessary

5. Achievements of JCM Financing programs

JCM Financing programme by MOEJ (FY2013～2016) as of July 15, 2016

Thailand:
- ○Energy Saving at Convenience Store
- ○Upgrading Air-saving Loom
- ○Co-Generation in Motorcycle Factory
- ○Air Conditioning System & Chiller
- ○Ion Exchange Membrane Electrolyzer
- ○LED Lighting to Sales Stores
- ○Co-generation System
- ○Solar PV and EMS in Paint Factory
- ○Solar PV on Factory Rooftop
- ○Centrifugal Chiller & Compressor
- ○Centrifugal Chiller in Tire Factory
- ○Refrigeration System
- ○Chilled Water Supply System
- ○Waste Heat Recovery in Cement Plant
- ○Refrigerator and Evaporator
- ○3.4MW Solar PV

Mongolia:
- ○Heat Only Boiler (HOB)※
- ○10MW Solar PV
- ○2.1MW Solar PV in Farm
- ○8.3MW Solar PV in Farm

Viet Nam:
- ○Digital Tachographs
- ○Air-conditioning in Hotel
- ○Container Formation Facility
- ○Solar PV in Shopping Mall
- ○Air-conditioning Control System
- ○Waste Heat Recovery in Cement Plant
- ○Energy saving Equipment in Lens Factory
- ○Energy Saving Equipment in Wire Production Factory
- ○Amorphous transformers
- ○Air-conditioning in Lens Factory
- ○Electric Furnace
- ○Amorphous transformers 2
- ○Electricity Kiln
- ○Water Pumps
- ○Amorphous transformers 3

Bangladesh:
- ○Centrifugal Chiller
- ○PV-diesel Hybrid System
- ○Centrifugal Chiller
- ○Loom at Weaving Factory
- ○50MW Solar PV Power Plant
- ○Air-conditioning system

Myanmar:
- ○Waste to Energy Plant
- ○Brewing Systems to Beer Factory
- ○Once-through Boiler in Instant Noodle Factory

Laos:
- ●REDD+ through controlling slush-and-burn

Mexico:
- ○4.8MW Power Generation with Methane Gas Recovery System

Costa Rica:
- ○5MW Solar PV
- ○Chiller and Exhaust Heat Recovery System

Palau:
- ○Solar PV for Commercial Facilities
- ○Solar PV for School
- ○Solar PV for Commercial Facilities Ⅱ

Saudi Arabia:
- ○Electorolyzer in Chlorine Production Plant

Ethiopia:
- ○Biomass CHP Plant

Cambodia:
- ○LED Street Lighting
- ○Solar PV & Centrifugal Chiller
- ○0.2MW Solar PV at International School
- ○0.8MW Solar PV at International School

Kenya:
- ○Solar Diesel Abatement Projects
- ○6MW Hydropower Generation
- ○Solar PV at Salt Factory

Maldives:
- ○Solar Power on School Rooftop
- ■Smart Micro-Grid System

Malaysia:
- ○Solar PV

Indonesia:
- ○Centrifugal Chiller at Textile Factory
- ○Refrigerants to Cold Chain Industry※
- ○Centrifugal Chiller at Textile Factory 2
- ○Solar Power Hybrid System
- ○Centrifugal Chiller at Textile Factory 3
- ○Upgrading to Air-saving Loom
- ○Smart LED Street Lighting System
- ○Gas Co-generation System
- ○Solar PV in Jakabaring Sport City
- ○10MW Hydro Power Plant
- ○LED Lighting to Sales Stores
- ○Air-conditioning Utility System in Airport
- ○Energy Saving at Convenience Store
- ○Double Bundle-type Heat Pump
- ○Waste Heat Recovery in Cement Industry
- ○Regenerative Burners
- ○Old Corrugated Cartons Process
- ○Centrifugal Chiller in Shopping Mall
- ○Once-through Boiler System in Film Factory
- ○Once-through Boiler in Golf Ball Factory
- ●REDD+ through controlling slush-and burn
- ○Looms in Weaving Mill
- ○Industrial Wastewater Treatment System

○ Model project in FY 2013 (3 countries, 7 projects)
○ Model project in FY 2014 (7 countries, 14 projects)
■ ADB project in FY 2014 (1 country, 1 project)
○ Model project in FY 2015 (10 countries, 34 projects)
○ Model project in FY 2016 (9 countries, 28 projects)
● REDD+ Model Project (2 countries, 2 projects)

Total 15 partner countries, 85 projects

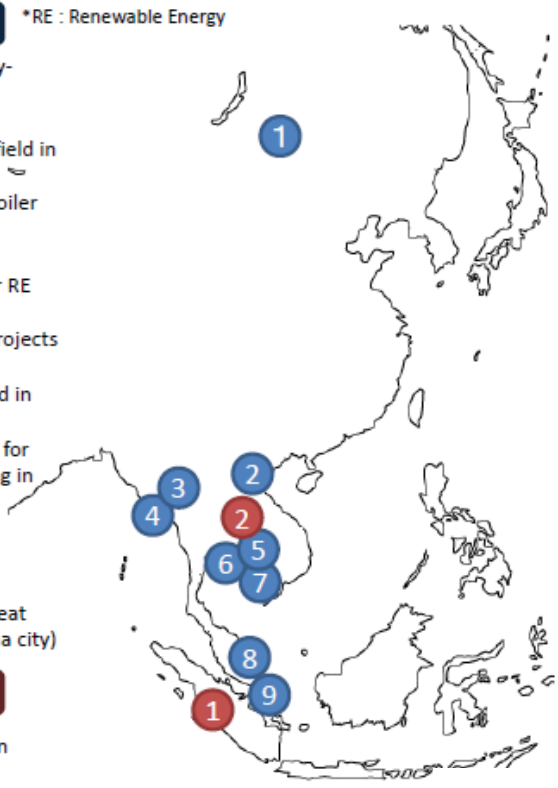
The underlined projects have been registered as the JCM projects (13 projects)
※these projects account for 2 registered JCM projects respectively, as they're operating in different sites

FY2016 Feasibility studies on JCM projects by MOEJ

Feasibility Study on JCM Project by City to City Collaboration

*RE : Renewable Energy

1. The study of high-efficiency heat pump installation projects for Energy-saving field and PV generation projects for RE* field in Mongolia(Ulaanbaatar city-Sapporo city/Hokkaido)
2. The study of cogeneration and exhaust heat recovery projects for RE field in Vietnam(Hai phong city-Kitakyushu city)
3. The study of PV generation projects for RE field and high-efficiency boiler installation projects for Energy-saving field in Myanmar(Yangon city-Kawasaki city)
4. The study of water treatment system installation and WtE projects for RE field in Myanmar(Pathein city-Fukushima city)
5. The study of biomass power generation projects and PV generation projects for RE field in Cambodia(Siem reap state-Kanagawa pref.)
6. The study of WtE, cogeneration and exhaust heat recovery for RE field in Thailand(Rayong prov.-Kitakyushu city)
7. The study of project formulation by assisting planning the action plan for the climate change strategy and projects for RE field and Energy-saving in Cambodia(Phnom Penh city-Kitakyushu city)
8. The study of cogeneration projects for RE field and high-efficiency air conditioning system installation projects for Energy-saving field in Malaysia(Iskandar development region-Kitakyushu city)
9. The study of high-efficiency air conditioning system installation and heat desorption unit installation projects in Indonesia(Batam city-Yokohama city)



Feasibility Study on JCM large-scale CO2 reduction project

1. The study of a biomass power generation project by rice hull and grain waste for RE field in Indonesia(West Sumatra prov.)
2. The study of refining waste water and residue into bio gas and supplying for vehicles for RE field in Thailand(Ubon Ratchathani prefecture etc.)

0.Introduction about our company

NTT DATA

Corporate outline

Name	NTT DATA INSTITUTE OF MANAGEMENT CONSULTING, Inc.
Date of Establishment	April 12, 1991
Shareholder	NTT DATA Corporation 100%
Capital	¥450 million
Head Office	10th floor, JA Kyosai Building, 7-9, Hirakawa-cho 2-chome, Chiyoda-ku, Tokyo 102-0093, Japan Tel +81-3-3221-7011 (main number) Fax +81-3-3221-7022
Office Toyosu	25th floor, Toyosu Center Building, 3-3, Toyosu 3-chome, Koto-ku, Tokyo 135-6025, Japan Tel +81-3-3221-7011 (main number) Fax +81-3-3534-3880
Office Singapore Branch	20 Pasir Panjang Road, #11-28 Mapletree Business City, Singapore 117439
URL	http://www.keieiken.co.jp/english/

Society, Environment and Energy

The environmental and energy sectors continue to be the scene of dynamic developments exemplified by the revision of energy policy, approaches to global warming, and recycling of dwindling resources. They also hold much promise for industrial activity. We promote client approaches through activities including support for smart community development, assistance with export of infrastructural elements, and creation of new business by private-sector consortiums.

- Development of environmental business and environmental management
- Social and environmental communication
- Building of recycling-oriented social systems
- Measures to mitigate global warming
- New energy and energy conservation
- Systems for assurance of safety/security and management of chemical substances
- Smart communities
- Infrastructural export

1. Background and Purpose of the Study

NTT DATA

Background issue that we are understanding

- ✓ Indonesia Presidential Regulation No. 4/2016 on the Acceleration of Electricity Infrastructure Developments, including the government's program of the 35,000 Megawatt (MW) power plant project and the 46,000 kilometer transmission network development with the end goal of bolstering the national economy. PR 4/2016 supports new and renewable energy projects and provides various forms of fiscal support for new and renewable energy projects, in order to facilitate the government achieving its energy policy target of 25% of its power generation from new and renewable energy sources by 2025.

- ✓ The electricity power of the southern part of Pesisir Selatan Regency is supplied by 150 KV transmission line from Teluk Sirih Coal-Fired Power Generation from Bungus Main Substation in Padang with about 250 km of the transmission line long is sensitive with line loss or transmission loss risk.

- ✓ Sumbagselteng Interconnection System covering the province of Bengkulu, Sumatera Selatan and Lampung Province is sensitive with deficit in electrical power

1. Background and Purpose of the Study

NTT DATA

Background issue that we are understanding

- ✓ The electricity power of Mukomuko Regency, Bengkulu Province, bordered directly with Pesisir Selatan Regency as a part of Sumbagselteng Interconnection System now is supplied from three (3) derated Diesel Fuel power generations with peak load of 9.6 MW. There is no new connection services since 2013 and there are 6.000 applications for new connection now is in waiting list.
- ✓ In 2014, peak load of Benkulu Province electrical system reaches 154MW consist of 101 MW of interconnection and 22MW isolated system.Benkulu Province still minus 31MW.
- ✓ When we were in Mukomuko regency last week, we met electricity down at least 3 times in night. In afternoon, all electricity had down and we could not use cellular phone while the electricity had down.
- ✓ Rice and corn are cultivated in the southern part of South Pesisir Regency and Lubuk Pinang District of Mukomuko Regency and they produce sufficient biomass waste like rice husk, paddy straw, corn cob and corn stover.

1. Background and Purpose of the Study

NTT DATA

Background issue that we are understanding

- ✓ Presidential Regulation No. 61/2011 on the National Action Plan for Reducing GHG Emissions Indonesia commitment to reduce its GHG emissions by 26% using domestic resources and up to 41% with international support by 2020 which was approved by Indonesia through sustainable peat land management; a reduction in the rate of deforestation and land degradation; carbon sequestration in forestry and agriculture; the promotion of energy efficiency; the renewable energy sources development; the reduction of waste; and shifting to low-emission modes of transportation.
- ✓ West Sumatera Governor Regulation No. 80/2012 on West Sumatera Province Local Action Plan for GHGs Emissions Reduction as a part of Presidential Regulation No. 61 of 2011 has not been implemented well

.

- ✓ Kerinci Seblat National Park (KNSP) as a World Heritage Property is a part of Tropical Rain-forest Heritage of Sumatra (TRHS; N 1167. The World Heritage Committee of UNESCO at its 39th session in 2015 decides to "retain" the Tropical Rainforest Heritage of Sumatra on the List of World Heritage in Danger. Threats for which the property was inscribed on the List of World Heritage in Danger as follows: road construction, mining, illegal logging and encroachment (illegal crop farming).

(reference) Bengkulu Province Electric Power Needs Projection

Year	Economic Growth (%)	Sales (Gwh)	Production (Gwh)	Peak Load (MW)	Costumer
2015	6.6	791	881	175	473.135
2016	6.9	878	976	193	493.023
2017	7.3	978	1.086	213	507.794
2018	7.5	1.093	1.212	236	518.095
2019	7.6	1.222	1.354	262	533.962
2020	7.4	1.368	1.514	291	542.962
2021	7.4	1,532	1.695	324	551.956
2022	7.4	1.718	1.899	360	560.876
2023	7.4	1,929	2,132	401	569.832
2014	7.4	2.168	2.395	448	578.705
Growth	7.3%	11.9%	11.8%	11.0%	2.3%

Source : 2016 - 2025 PT. PLN Electric Power Suply Business Plan

NTT DATA
Global IT Innovator

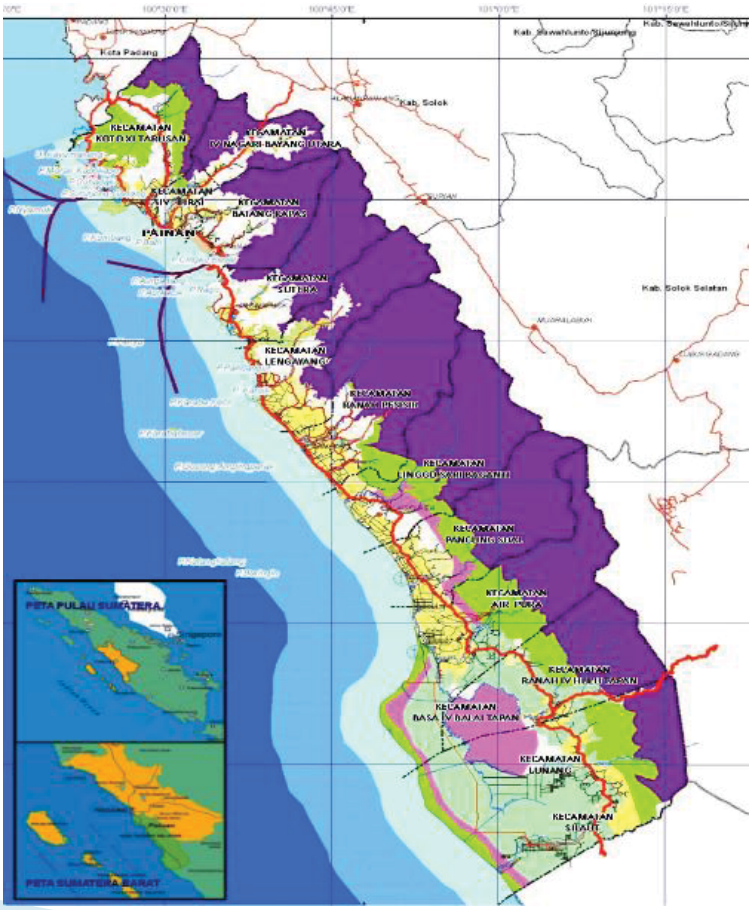
PESISIR SELATAN REGENCY, FOOD CROPS AND FISHERIES POTENCY

H. HENDRAJONI, SH, MH
PESISIR SELATAN REGENT
WEST SUMATERA
INDONESIA

PRESENTED AT MEETING WITH
KITAKYUSHU OFFICER
JAPAN, 8 FEBRUARI 2017

PESISIR SELATAN REGENCY

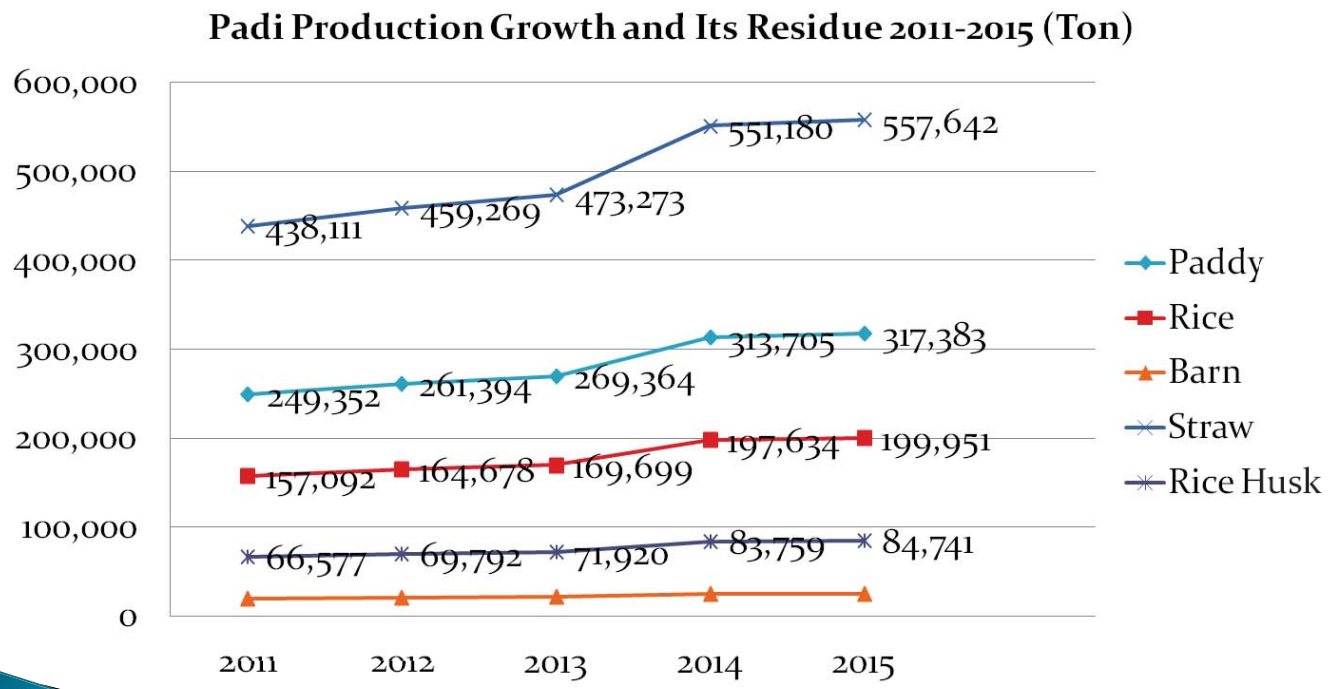
- Astronomically located between 0° 59´ – 2° 28.6´ South Latitude and 100° 19´ - 101° 18´ East Longitutde
- Geographycally located in west coast Sumatera island.
- Total area : 5749.89 km²
- Height above sea level 0 – 1000 meter
- Has 47 small island spreads along coast side.
- Topologically flowed by 22 rivers.
- Length of beach : 234.20 km
- Area boundary
  - North : Padang City
  - South : Mukomuko Regency
  - West : Hindia Ocean
  - East : Solok and Solok Selatan Regency (West Sumatera Prov.)
    Kabupaten Kerinci (Jambi Province)
- 2015 Population : 450.186 peoples increased peoples from previous year
- www.pesisirselatankab.go.id



LAND AREA BY ITS STATUS 2015

Status		Area (Km2)	Persentage
Protection Area			
1	Nature Recreation Park dan Biosfer Reserve Kerinci Seblat National park	295,63	51,01
2	Protection Forest	23,10	3,99
Cultivation Area			
3	Production Forest	5,30	0,91
4	Convertible Production Forest	25,38	4,38
5	Limited Production Forest	31,74	5,48
Other Areas			
6	Open water (inland)	1,85	0,32
7	Housing	14,57	2,51
8	Plantation	59,15	10,21
9	Agriculture	107,84	18,61
10	Mining	4,951	2,58
	Total	579,51	100

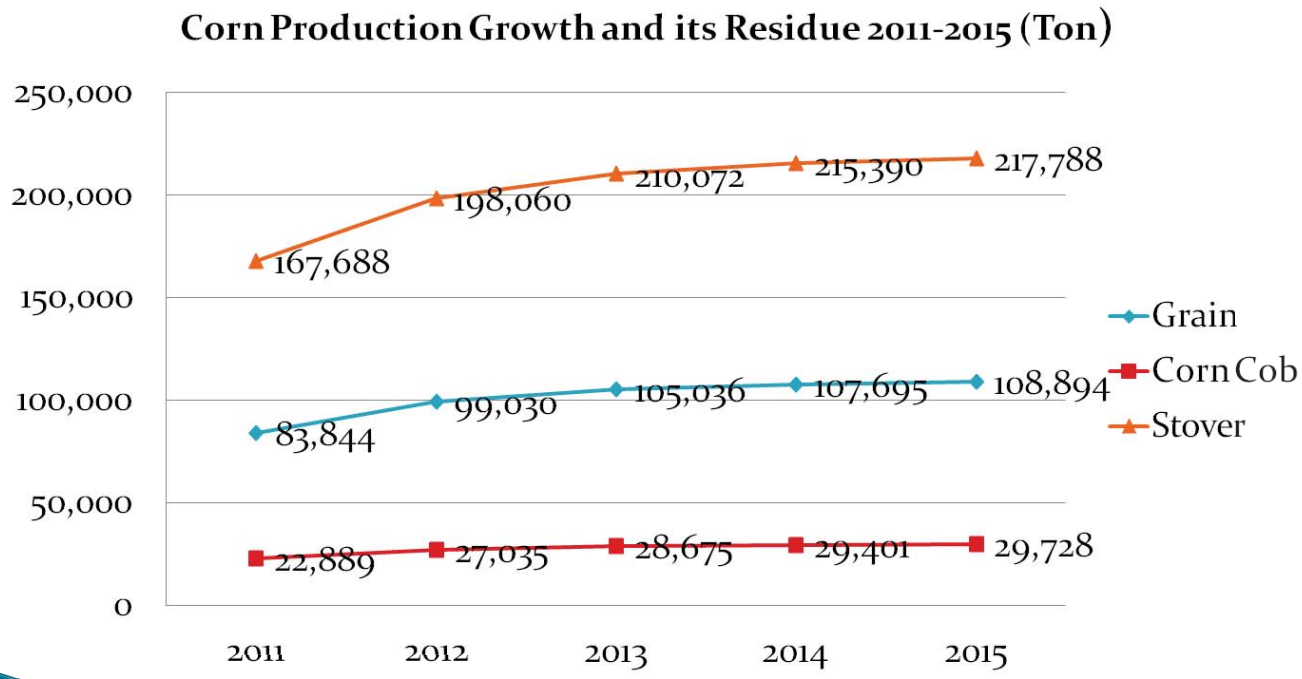
FOOD CROPS PRODUTION



ABANDONED PADDY RESIDUE AND GHG EMISSION SOURCES IN PESISIR SELATAN REGECY

Paddy Straw Open Air Burning in Siguntur Mudo Village, Koto XI Tarusan District. Pesisir Selatan Regency . May 01, 2015 at 04.00 pm

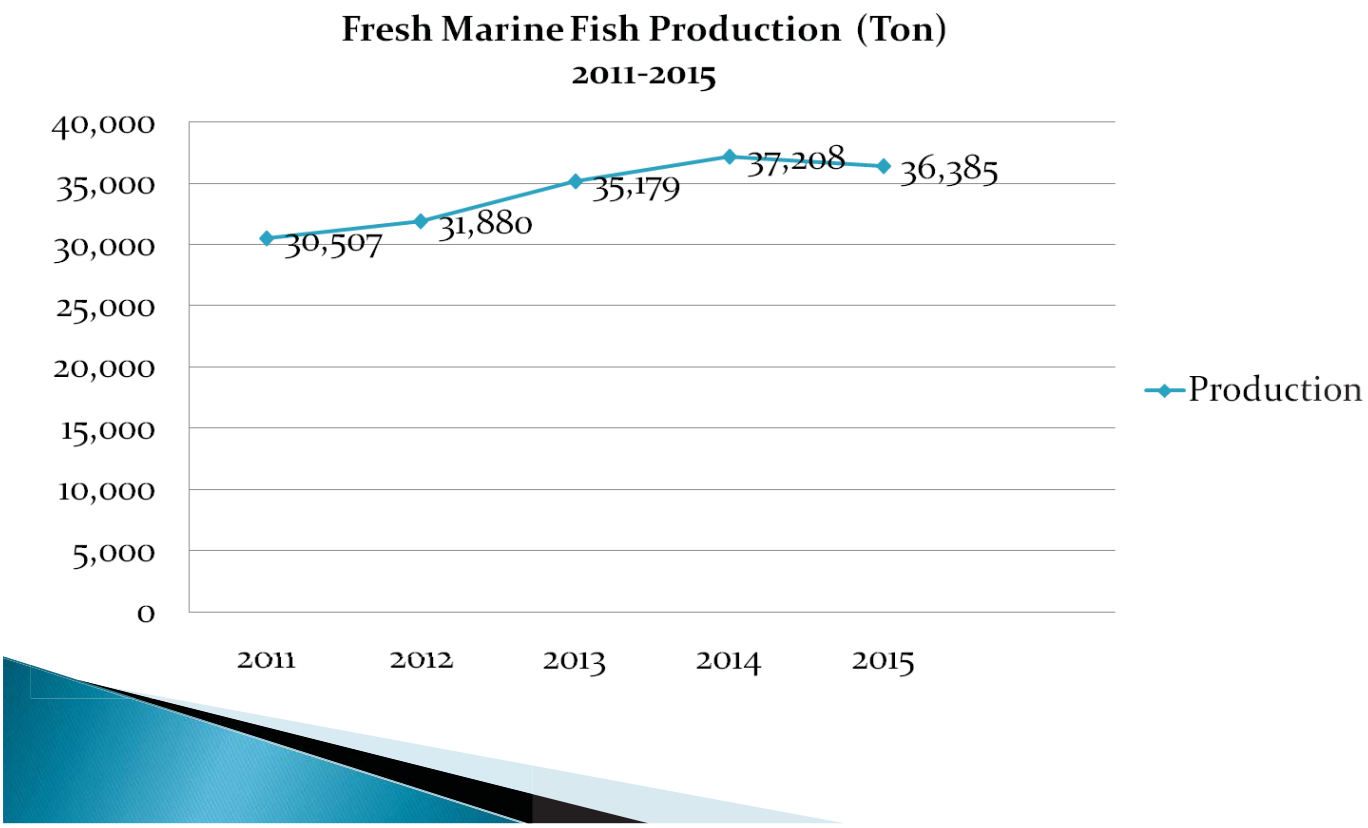
Ready Burnt or Left Decay-Rice Husk in a Small-Scale Rice Milling unit in Duku Village, Koto XI Tarusan District. Pesisir Selatan Regency May 01, 2015 at 03.00 pm

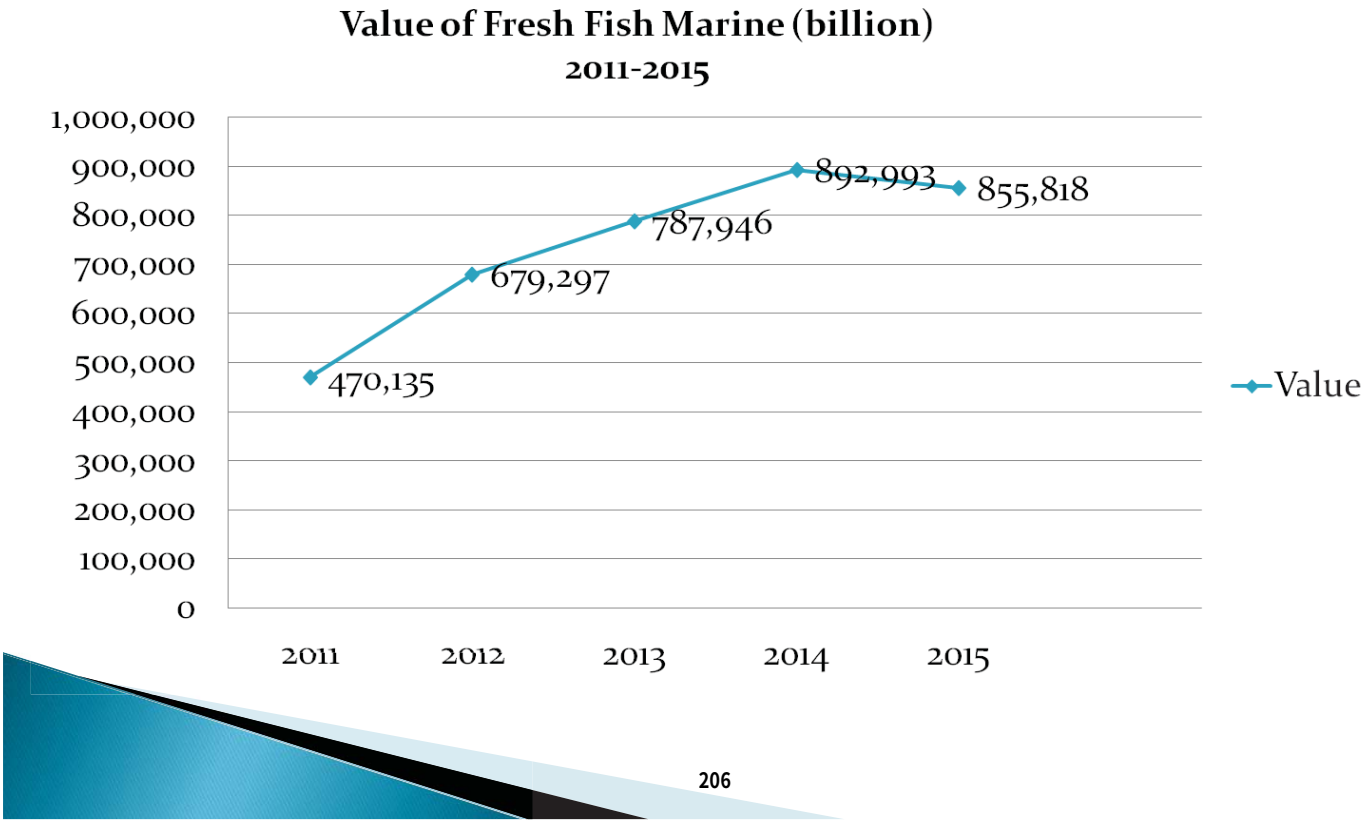


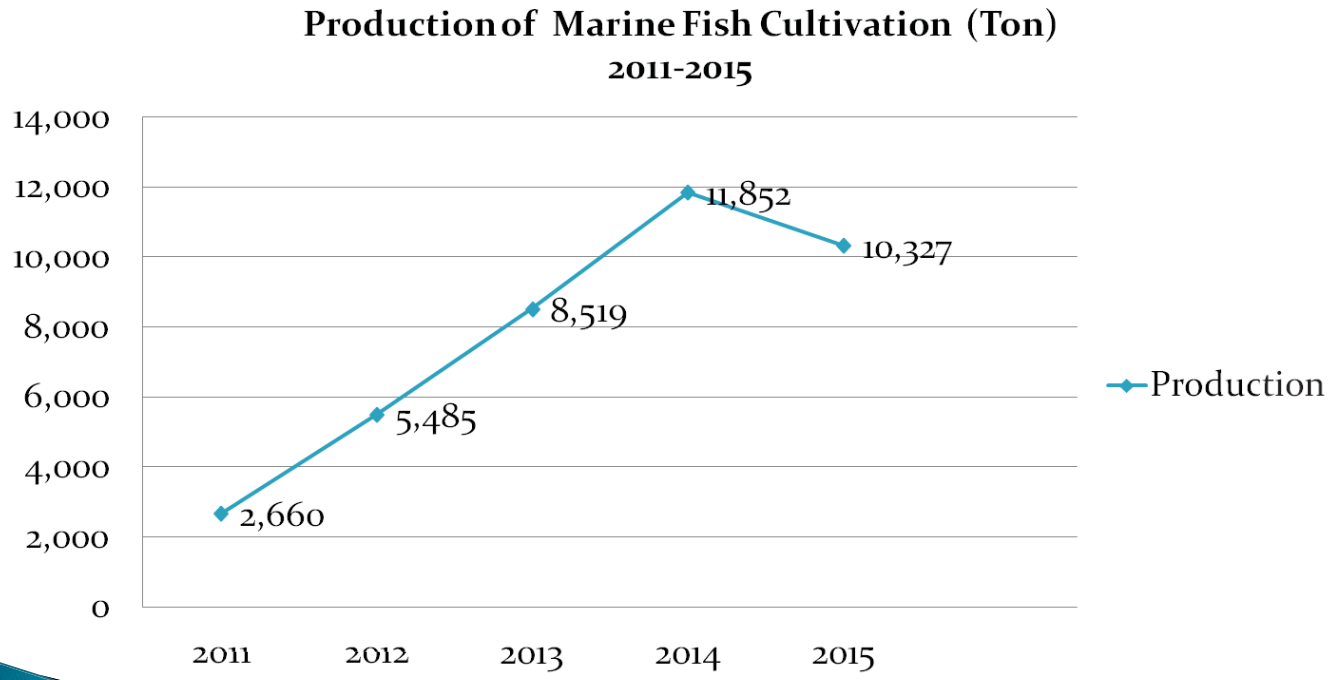
ABANDONED CORN RESIDUE AND GHG EMISSION SOURCES AROUND MINANGKABAU INTERNATIONAL AIRPORT

Pembakaran limbah jagung diruang terbuka di Nagari Katapiang, Kecamatan Batang Anai Kabupaten Padang Pariaman, ± 6 Km dari Bandara Internasional Minangkabau.
May 01, 2015 at 10.00 am

FISHERY PRODUCTION







Tabel 1. Tuna Fishing Season in General in Indonesia Water

No	Month	Tuna Fishing Season
1	January	**West Sumatera**, South NTT/NTB, Flores sea, East Banda sea
2	February	**West Sumatera**, South of Java/Bali/NTT/NTB and Banda sea (small)
3	March	**West Sumatera**, South of Java/Bali/NTT/NTB and Banda sea (small)
4	April	**West Sumatera**, South of Java/Bali/NTT/NTB, Flores sea and Banda sea (crowded)
5	May	Mostly south of Java/Bali, NTT/NTB/and Banda sea
6	June	South Java/Bali/NTB and Banda sea
7	July	South Java/Bali, offshore of NTT/NTB and Banda sea (small)
8	August	A little of **West Sumatera**, and South of Java and Banda sea
9	September	**West Sumatera**, South of Java, offshore of NTB and Banda sea
10	October	South of Java/Bali/NTB and Banda sea
11	November	**West Sumatera**, a little at South of Java/NTB, Flores sea and Banda sea
12	December	South NTB/NTT and Banda sea and Flores sea

Tabel 2. Tuna Fish Catch Production of West Sumatera Waters by Species 2013 (MT)

Bulan	Jenis Tuna															Total
	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	
Jan	45.0	82.8														127,1
Feb	32.3	41.7														74.2
Mar	27.6	23.6														51.2
Apr	56.5	30.3														86.8
May	45.3	23.0														68.3
Jun	78.0	28.9														106.9
Jul	91.3	7.0														98.3
Aug	58.2	1.0														59.2
Sep	34.6	5.9														40.5
Oct	52.8	21.9														74.4
Nov	89.0	3.7														92.7
Dec	54.2	0.3														54.5
	664.0	270.1														934.1

a. Yellowfin Tuna, b. Bigeye Tuna, c. Albacore, d. Southern Bluefin Tuna, d. Longtail Tuna, e. Skipjack, f. Frigate Tuna, g. Bullet Tuna, h. Dogtoothed Tuna, i. Bonito, j. Sender, k. Sailfish, l. Swordfish, m. Black Marlin, n. Blue Marlin, o. Stripped Marlin

Tabel 3. Tuna Fish Production of West Sumatera Waters by Species 2014 (MT)

Bulan	Jenis Tuna															Total
	A	b	c	d	e	f	g	h	i	j	k	l	m	n	o	
Jan	58.9	0.5														59.3
Feb	78.9	0.3														79.2
Mar	57.6	7.6											0.5			65.7
Apr	112.7	18.9											10.1			141.7
May	187.6	4.2														191.8
Jun	184.5	-														184.5
Jul	106.1	4.4											5.1			115.6
Aug	105.2	-														105.2
	891.5	35.9														927,4

a. Yellowfin Tuna, b. Bigeye Tuna, c. Albacore, d. Southern Bluefin Tuna, d. Longtail Tuna, e. Skipjack, f. Frigate Tuna, g. Bullet Tuna, h. Dogtoothed Tuna, i. Bonito, j. Sender, k. Sailfish, l. Swordfish, m. Black Marlin, n. Blue Marlin, o. Stripped Marlin

Table 4. Tuna End Product of West Sumatera Waters by Year and Destination (MT)

2013					2014				
Month	Destination			Total	Month	Destination			Total
	Local	Export				Local	Export		
	Fresh	Fresh	Proceed			Fresh	Fresh	Proceed	
Jan	20.7	56.4	50.0	127.1	Jan	4.2	16.5	38.6	59.3
Feb	18.4	29.5	26.3	74.2	Feb	8.3	36.6	34.3	79.2
Mar	3.7	25.7	21.8	51.2	Mar	17.3	14.8	33.6	65.7
Apr	22.4	34.0	30.4	86.8	Apr	59.9	22.6	59.2	141.7
May	12.6	21.3	34.9	68.4	May	107.0	11.5	73.8	191.8
Jun	26.7	27.8	52.4	106.9	Jun	80.0	17.6	87.4	184.5
Jul	22.0	12.1	64.2	98.3	Jul	10.0	34.4	71.2	115.6
Aug	15.6	6.7	36,9	59.2	Aug	27.7	18.3	59.2	105.2
Sep	1.2	12.0	27.3	45.5	Sep	-	-	-	
Oct	7.75	24.4	42.2	74.4	Total	313,4	172.3	457.3	943.0
Nov	4.6	18.7	69.4	92.7					
Dec	9.2	10.2	35.1	54.6					
Total	164.4	278.6	489.9	933.0					

Other Marine Capture Fisheries Species
Fishes , Indian Halibut, Flat Fishes, Bombay Duck, Pony Fishes, Sea Cat Fishes, Lizard Fishes, Grunters/Sweet-Lips, Goat Fishes, Red Snapper, Groupers, Emperors/Scavengers, Barramundi/Giant Seaperch, Treadfin Beams, Yellow Tail/Fussiliers/, Croakers/Drums, Sharks, Rays, Black Pomfret, Silver Pomfret, Barracudas, Scads, Trevallies, Hardtail Scad, Queen Fishes, Rainbow Runner, Flying Fishes, Mullets, Threadfins, Needle Fishes, Anchovies, Rainbow Sardine, Frinegscale Sardinella, Indian Sardinella, Wolf Herrings, Chinese Herrings, Indian Mackerel, Indo-Pacific King Mackerels, Narrow King Mackerels, Hair Tail/Cutlass Fishes, etc
Crustacea, Swim Crabs, Mud Crabs, Panalurid Spiny Lobster, Giant Tiger Prawn Jerebung Banana Prawn, Metapenasus Shrimps, Other Shrimps
Mollusca, Common Squids, Cuttle Fishes, Octopuses, Sea Cucumbers, Other Mollusc Animals
Other Aquatic Animals, Marine Turtle, Jelly Fishes
Aquatic Plant, Sea Weeds (Rumput laut)

TERIMA KASIH
ARIGATO GOZAIMASU

UNDANGAN INVITATION

LOKAKARYA PEMBANGUN KAPASITAS NEGARA TUAN RUMAH
PROYEK JCM SKALA BESAR LARGE SCALE JCM PROJECT
HOST COUNTRY CAPACITY BUILDING WORKSHOP

" PEMBANGKIT LISTRIK TENAGA BIOMASSA
BERBAHAN BAKAR SEKAM PADI DAN LIMBAH TANAMAN BIJIAN
UNTUK PEMBANGUNAN KAWASAN EKO-INDUSTRI LUNANG DAN LENGAYANG
BIOMASS POWER GENERATION BY RICE HULL AND GRAINS WASTE FOR
LUNANG AND LENGAYANG ECO-INDUSTRIAL PARK DEVELOPMENT"

Kamis Thursday, 16/02/2017, Saga Murni Hotel
Jl. Sudirman Painan, Pesisir Selatan Regency
West Sumatera Province, INDONESIA

Financed by
Ministry of Environment Japan
Co-organized by
NTT Data Institute of Management Consulting, Inc.
Koperasi Serba Usaha Bangkit Mandiri
Partners
Meidensha Corporation
AT Green Co. Ltd

With the kind support of
West Sumatera Province Government
Pesisir Selatan Regency Government
Mukomuko Regency Government

KSU Bangkit Mandiri htt://www.keleiken.co.jp htt://www.atgreen.jp MEIDEN 明電舎

Para Kolega yang terhormat
Dear Colleagues

Sebagaimana Kita ketahui Pemerintah Indonesia diwakili Menteri Kordinator Bidang Perekonomian, Bapak Hatta Rajasa dan Menteri Luar Negeri Jepang Mr. Fumio Kishida, Agustus 2013 menanda tangani perjanjian Joint Crediting Mechanism (JCM), suatu skema kerjasama bilateral G-to-G yang mendukung sektor swasta Jepang untuk berinvestasi dalam kegiatan Pembangunan Rendah Karbon di Indonesia melalui insentif (subsidi) dari Pemerintah Jepang. Sebagai salah satu negara tuan rumah Indonesia harus bersaing dengan 16 negara lain untuk mendapatkan fasilitas JCM As we know Indonesia Government represented by Coordinating Minister for Economic Affairs, Mr. Hatta Rajasa and Minister for Foreign Affair of Japan, Mr. Fumio Kishida, in August 2013 signed Joint Crediting Mechanism (JCM) agreement, a G-to-G bilateral cooperation scheme which encourages Japan private sectors to invest in Low Carbon Development Activities in Indonesia through incentives (subsidy) from the Government of Japan. As a project host country Indonesia has to compete with other 16 countries to get JCM facilities www.jcm.ekon.go.id

Dengan senang hati diinformasikan kepada Anda bahwa Kementerian Lingkungan Hidup Jepang pada 17 Juni 2016 menyetujui proposal studi kelayakan NTT Data Institute of Management Consulting, Inc. dan Koperasi Serba Usaha Bangkit Mandiri untuk didanai melalui skema pembiayaan JCM, berjudul Studi Proyek Pembangkit Listrik Tenaga Biomassa Berbahan Bakar Sekam Padi dan Limbah Tanaman Bijian Untuk Bidang Energi Terbarukan di Indonesia (Prov. Sumatera Barat). Salah satu dari dua proyek yang disetujui untuk Tahun Fiskal 2016 It is a pleasure to inform you that Ministry of Environment Japan on 17 June 2016 approved feasibility study proposal of NTT Data Institute of Management Consulting, Inc. and Koperasi Serba Usaha Bangkit Mandiri to be financed through JCM Financing Scheme, entitled The Study of Biomass Power Generation Project by Rice Hull and Grain Waste for RE field in Indonesia (West Sumatra prov.). One of two projects approved for Fiscal Year 2016 www.gec.jp/jcm/kobo/h28/mp/20160822_goj_eng.pdf halaman page 32

Menurut The Global Competitiveness Report 2015-2016 yang dirilis the World Economic Forum (WEF), daya saing Indonesia jatuh ke posisi 37 dari ke 34 di tahun 2014-15. "Revolusi Industri keempat sedang memfasilitasi terjadinya peningkatan model perekonomian dan industri yang sama sekali baru dan dengan cepat menghancurkan lainnya. Untuk mempertahankan daya saing ditatanan ekonomi baru ini diperlukan penekanan yang lebih besar terhadap pendorong kunci-kunci produktivitas, seperti bakat dan inovasi, "Kata Klaus Schwab, pendiri dan kepala pelaksana WEF. According to the Global Competitiveness Report 2015-16 released by the World Economic Forum (WEF) Indonesia competitiveness position dropped to 37 from 34 in 2014-15. "The fourth industrial revolution is facilitating the rise of completely new industries and economic model and the rapid decline of other. To remain competitive in this new economic landscape will require greater emphasis on key driver of productivity, such as talent and innovation," said Klaus Schwab, founder and executive chairman of the WEF www.jakartaglobe.id/business/wef-indonesia-drops-37-competitiveness-index/

Kawasan Eko-Industri (KEI) adalah suatu komunitas pelayanan bisnis dan pabrikasi berlokasi bersama di suatu kawasan umum. Para anggota pengusaha berusaha meningkatkan kinerja di bidang sosial, ekonomi dan lingkungan melalui kerjasama dalam mengelola sumber daya dan lingkungan. Dengan bekerjasama, masyarakat bisnis memperoleh keuntungan kolektif yang lebih besar dibanding jumlah keuntungan individual perusahaan yang terealisasi hanya dengan mengoptimalkan kinerja individualnya. Tujuan KEI adalah untuk meningkatkan kinerja ekonomis perusahaan yang berpartisipasi sambil meminimal dampak buruk terhadap lingkungan mereka. Komponen pendekatan meliputi "green desain" infrastruktur kawasan dan pabrik (baru atau peremajaan), produksi bersih, pencegahan polusi, energi efisiensi dan kemitraan antar perusahaan. Sebuah KEI juga memberikan keuntungan pada masyarakat sekitar dengan menjamin bahwa dampak pembangunan yang dilakukan adalah positif An Eco-Industrial Park (EIP) is a community of manufacturing and service businesses located together on a common property. Member business seek enhanced environmental, economic and social performance through collaboration in managing environmental and resource issues. By working together, the community of businesses seeks a collective benefit that is greater that the sum individual benefits each company would realize by only optimizing its individual performance. The goal of an EIP is to improve the economic performance of the participating companies while minimizing their environmental impacts. Component of this approach include "green design" of park infrastructure and plants (new of retrofitted); cleaner production, pollution, prevention, energy efficiency; and inter-company partnering. An EIP also seeks benefit for neighboring communities to assure that the net impact of its development is positive. www.indigodev.com

Lokakarya ini didasarkan pada temuan selama studi lapangan dan pertemuan dengan Pemerintah Kabupaten Pesisir Selatan dan Mukomuko, pemilik rice mill, petani padi dan jagung, 2-6 Agustus dan 22-23 September 2016 serta studi tour ke Jepang (pertemuan dengan pejabat Kota Kitakyushu dan mengunjungi KEI Kota Kitakyushu) dan Thailand (mengunjungi Pembangkit Listrik Tenaga Sekam Padi milik Perusahaan Meidensha di Provinsi Ayuthaya), 7-11 Februari 2017 The workshop based on findings during the filed study and meeting with Pesisir Selatan and Mukomuko Regency Government, rice mill owner, paddy and corn farmer, 2-6 August dan 22-23 September 2016 as well as study tour to Japan (meeting with Kitakyushu City Officer and visiting Kitakyushu City EIP) and Thailand (visiting Meidensha Corporation's rice hull-based power generation in Ayuthaya Province), 7-11 February 2017.

Berdasarkan pencapaian di atas, permasalahan, pertimbangan, hasil study tour dan lokakarya sebagai salah satu kegiatan pembangun kapasitas partisipan negara tuan rumah JCM, maka dengan senang hati Kami mengundang Anda untuk menghadiri lokakarya mengenai "Pembangkit Listrik Tenaga Biomassa Berbahan Bakar Sekam Padi dan limbah Tanaman Bijian Untuk Pembangunan Kawasan Eko-Industri Lunang dan Lengayang" Following on from the above achievement, problems, considerations, study tour outcome and workshop JCM as host country participant capacity building activities we have the pleasure to invite you to attend workshop on "Biomass Power Generation by Rice Hull and Grain Waste for Lunang and Lengayang Eco-Industrial Park Development

Lokakarya strategi teknis ini menekankan konsep tiga P, meliputi Proses, Partisipasi, dan Produk. Menjelang kesimpulan lokakarya, semua pelaku pembangunan akan: This technical strategy workshop stress three Ps: Process, Participation and Product. By the conclusion of the workshop, all development stakeholders will:

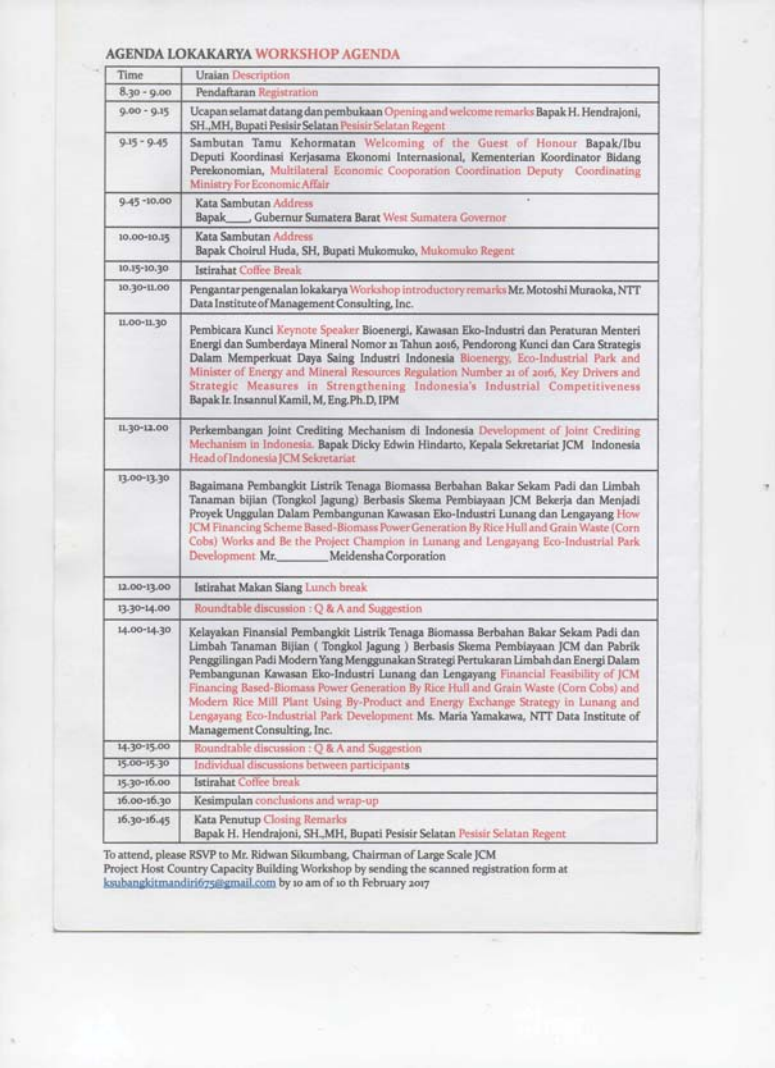
a. Lebih mengapresiasi peran penting proyek Appreciate more fully the important role of the project
b. Memperoleh masukan untuk mendukung proyek Have input for supporting the project
c. Memfasilitasi pembangunan proyek Facilitating the project development
d. Berfungsi sebagai pembangun kapasitas yang memberdayakan semua pelaku pembanguan untuk mendukung proyek Function of capacity-building which enabling all development stakeholders to support the project
e. Mengembangkan pembangunan jaringan, team atau vocal point yang mampu mengembangkan dan menyusun prioritas, ulasan, dan proses penyaringan proyek. Spark the creation of network, team and focal point capable of developing priority setting, review and screening process of the project
f. Membangun dan memperkuat kemitraan pada level lokal, nasional, regional, dan internasional agar mendukung pembangunan proyek secara efektif Develop and strengthen partnership at the local, national and international level to support for the project development effectively

Lokakarya ini akan mengundang pejabat Kementerian Koordinator Bidang Perekonomian dan Kementerian lain, Komite Akreditasi Nasional, PT. PLN, Sekretariat JCM Indonesia, Lembaga Pengelola Dana Bergulir, Pemerintah dan Dewan Perwakilan Rakyat Daerah Provinsi/Kabupaten/Kota, lembaga perbankan, universitas, asosiasi bisnis, lembaga penelitian, pemilik rice milli, gabungan kelompok tani dll. Sementara dari pihak Jepang akan hadir Meidensha Corporation, AT Green Co. Ltd, Asosiasi Pabrik Makakan Ternak Jepang, etc. The Workshop will invite Officers of Coordinating Ministry for Economic Affairs and other ministries, National Accreditation Committee, PT. PLN, Indonesia JCM Secretariat, Revolving Fund Management Agency, Provincial/District/City Government and House of Representative, banking institutions, universities, business associations, research agency, rice mill owner, united farmers group, etc. Meanwhile from Japan side will be attended by Meidensha Corporation, AT Green Co. Ltd, Japan Feed Manufacturers Association, etc.

Kami menunggu untuk menyambut anda pada 16 Februari 2017!!
We are looking forward to welcome you on the 16 February 2017!!
Yours sincerely, 25 January 2017

Motoshi Muraoka
Senior Executive Manager,
Socio and Eco Strategic Consulting Unit
NTT Data Institute of Management Consulting, Inc

Fitra Jaya Piliang
Agriculture and Bioenergy Manager
Koperasi Serba Usaha Bangkit Mandiri



AGENDA LOKAKARYA WORKSHOP AGENDA

Time	Uraian Description
8.30 - 9.00	Pendaftaran Registration
9.00 - 9.15	Ucapan selamat datang dan pembukaan Opening and welcome remarks Bapak H. Hendrajoni, SH.,MH, Bupati Pesisir Selatan Pesisir Selatan Regent
9.15 - 9.45	Sambutan Tamu Kehormatan Welcoming of the Guest of Honour Bapak/Ibu Deputi Koordinasi Kerjasama Ekonomi Internasional, Kementerian Koordinator Bidang Perekonomian, Multilateral Economic Cooperation Coordination Deputy Coordinating Ministry For Economic Affair
9.45 -10.00	Kata Sambutan Address Bapak____, Gubernur Sumatera Barat West Sumatera Governor
10.00-10.15	Kata Sambutan Address Bapak Choirul Huda, SH, Bupati Mukomuko, Mukomuko Regent
10.15-10.30	Istirahat Coffee Break
10.30-11.00	Pengantar pengenalan lokakarya Workshop introductory remarks Mr. Motoshi Muraoka, NTT Data Institute of Management Consulting, Inc.
11.00-11.30	Pembicara Kunci Keynote Speaker Bioenergi, Kawasan Eko-Industri dan Peraturan Menteri Energi dan Sumberdaya Mineral Nomor 21 Tahun 2016, Pendorong Kunci dan Cara Strategis Dalam Memperkuat Daya Saing Industri Indonesia Bioenergy, Eco-Industrial Park and Minister of Energy and Mineral Resources Regulation Number 21 of 2016, Key Drivers and Strategic Measures in Strengthening Indonesia's Industrial Competitiveness Bapak Ir. Insannul Kamil, M, Eng.Ph.D, IPM
11.30-12.00	Perkembangan Joint Crediting Mechanism di Indonesia Development of Joint Crediting Mechanism in Indonesia. Bapak Dicky Edwin Hindarto, Kepala Sekretariat JCM Indonesia Head of Indonesia JCM Sekretariat
13.00-13.30	Bagaimana Pembangkit Listrik Tenaga Biomassa Berbahan Bakar Sekam Padi dan Limbah Tanaman bijian (Tongkol Jagung) Berbasis Skema Pembiayaan JCM Bekerja dan Menjadi Proyek Unggulan Dalam Pembangunan Kawasan Eko-Industri Lunang dan Lengayang How JCM Financing Scheme Based-Biomass Power Generation By Rice Hull and Grain Waste (Corn Cobs) Works and Be the Project Champion in Lunang and Lengayang Eco-Industrial Park Development Mr._____Meidensha Corporation
12.00-13.00	Istirahat Makan Siang Lunch break
13.30-14.00	Roundtable discussion : Q & A and Suggestion
14.00-14.30	Kelayakan Finansial Pembangkit Listrik Tenaga Biomassa Berbahan Bakar Sekam Padi dan Limbah Tanaman Bijian (Tongkol Jagung) Berbasis Skema Pembiayaan JCM dan Pabrik Penggilingan Padi Modern Yang Menggunakan Strategi Pertukaran Limbah dan Energi Dalam Pembangunan Kawasan Eko-Industri Lunang dan Lengayang Financial Feasibility of JCM Financing Based-Biomass Power Generation By Rice Hull and Grain Waste (Corn Cobs) and Modern Rice Mill Plant Using By-Product and Energy Exchange Strategy in Lunang and Lengayang Eco-Industrial Park Development Ms. Maria Yamakawa, NTT Data Institute of Management Consulting, Inc.
14.30-15.00	Roundtable discussion : Q & A and Suggestion
15.00-15.30	Individual discussions between participants
15.30-16.00	Istirahat Coffee break
16.00-16.30	Kesimpulan conclusions and wrap-up
16.30-16.45	Kata Penutup Closing Remarks Bapak H. Hendrajoni, SH.,MH, Bupati Pesisir Selatan Pesisir Selatan Regent

To attend, please RSVP to Mr. Ridwan Sikumbang, Chairman of Large Scale JCM Project Host Country Capacity Building Workshop by sending the scanned registration form at ksubangkitmandiri675@gmail.com by 10 am of 10 th February 2017

Introduction of the research project

February 22th, 2017
NTT Data Institute of Management Consulting, Inc.,
Socio & Eco Strategic Consulting Unit
Partner, Motoshi Muraoka

NTT DATA

1. Introduction of our company

1. Introduction of our company

NTT DATA

Corporate outline

Name	NTT DATA INSTITUTE OF MANAGEMENT CONSULTING, Inc.
Date of Establishment	April 12, 1991
Shareholder	NTT DATA Corporation 100%
Capital	¥450 million
Head Office	10th floor, JA Kyosai Building, 7-9, Hirakawa-cho 2-chome, Chiyoda-ku, Tokyo 102-0093, Japan Tel +81-3-3221-7011 (main number) Fax +81-3-3221-7022
Office Toyosu	25th floor, Toyosu Center Building, 3-3, Toyosu 3-chome, Koto-ku, Tokyo 135-6025, Japan Tel +81-3-3221-7011 (main number) Fax +81-3-3534-3880
Office Singapore Branch	20 Pasir Panjang Road, #11-28 Mapletree Business City, Singapore 117439
URL	http://www.keieiken.co.jp/english/

Society, Environment and Energy

The environmental and energy sectors continue to be the scene of dynamic developments exemplified by the revision of energy policy, approaches to global warming, and recycling of dwindling resources. They also hold much promise for industrial activity. We promote client approaches through activities including support for smart community development, assistance with export of infrastructural elements, and creation of new business by private-sector consortiums.

- Development of environmental business and environmental management
- Social and environmental communication
- Building of recycling-oriented social systems
- Measures to mitigate global warming
- New energy and energy conservation
- Systems for assurance of safety/security and management of chemical substances
- Smart communities
- Infrastructural export

2. Experience of JCM related Projects(1/2)

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◆Industrial Sector

Outline of Activity	Purpose	Phase
Installation of Co-generation System into the Factory and Industrial Estate (Indonesia, Vietnam)	Reduce CO2 Emission & Energy Cost	Study
Installation of Economizer for the Existing Boiler in Factory (Malaysia)	Reduce CO2 Emission & Energy Cost	Study
Installation of Exhaust Heat Recovery & Electricity Generation System into the Existing Cement Factory (Vietnam and Thailand)	Reduce CO2 Emission & Energy Cost	Study, Implementation
Replacement or Installation of Saving Energy Type of Electrical Furnace into Casting Companies (Vietnam)	Reduce CO2 Emission & Energy Cost	Implementation
Installation of Electricity Generation System using Rice Husk (Indonesia)	Reduce CO2 Emission & Energy Cost	Study
Installation of Solar Electricity Generation System on the Roof of the Existing Cold Storage Warehouse (Malaysia)	Reduce CO2 Emission & Energy Cost	Study
Replacement of Existing Lighting System into LED Lighting System (Indonesia)	Reduce CO2 Emission & Energy Cost	Implementation
Changing Fuel Type from Oil to Natural Gas in a Factory (Malaysia)	Reduce CO2 Emission & Energy Cost	Study
Installation of Mini-hydro Electricity Generation System in Isolated Area (Kenya and Ethiopia)	Reduce CO2 Emission & Energy Cost	Implementation
Installation of Mega Solar Electricity Generation System (Costa Rica)	Reduce CO2 Emission & Energy Security Increase	Implementation
Installation of Landfill Gas Recovery & Electricity Generation System (Mexico)	Reduce CO2 Emission & Energy Cost	Implementation

3. Experience of JCM related Projects(2/2)

NTT DATA

◆Commercial Sector

Outline of Activity	Purpose	Phase
Replacement or Installation of Saving Energy Type of Chiller or Air-conditioning System into Hotel, Commercial Building and Shopping Mall (Indonesia, Vietnam, Cambodia, Costa Rica)	Reduce CO2 Emission & Energy Cost	Implementation
Installation of Mini Co-generation System into Hotel (Indonesia)	Reduce CO2 Emission & Energy Cost	Study
Replacement of Refrigerated Show Case into Saving Energy Type (Vietnam)	Reduce CO2 Emission & Energy Cost	Study
Replacement of Air-conditioning System, Lighting System and Refrigerated Show Case of Convenience Store into Saving Energy Type (Vietnam, Thailand)	Reduce CO2 Emission & Energy Cost	Implementation
Installation of Solar Electricity Generation System on the Roof of the New Building (Malaysia, Thailand), Hospital (Cambodia) and Shopping Mall (Vietnam)	Reduce CO2 Emission & Energy Cost	Implementation, Study
Introduction of EV Bus & Solar Electricity Generation System with Funding Mechanism in an Isolated Island (Vietnam)	Keep Environment and Reduce CO2 Emission	Study
Installation of Solar System & Saving Energy Equipments into the Existing School, Building and Hotel, using Environmental Fund & ESCO + Leasing System (Costa Rica)	Reduce CO2 Emission & Energy Cost	Study

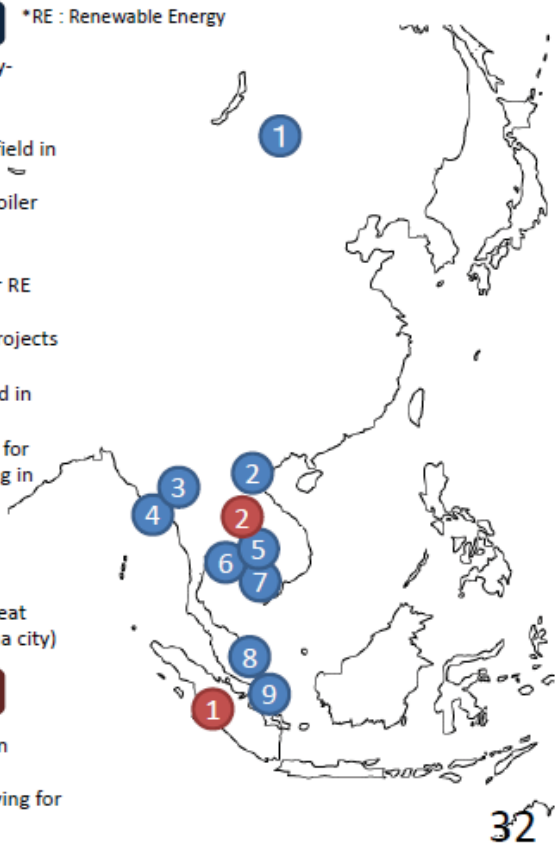
2. Project Introduction

FY2016 Feasibility studies on JCM projects by MOEJ

Feasibility Study on JCM Project by City to City Collaboration

*RE : Renewable Energy

1. The study of high-efficiency heat pump installation projects for Energy-saving field and PV generation projects for RE* field in Mongolia(Ulaanbaatar city-Sapporo city/Hokkaido)
2. The study of cogeneration and exhaust heat recovery projects for RE field in Vietnam(Hai phong city-Kitakyushu city)
3. The study of PV generation projects for RE field and high-efficiency boiler installation projects for Energy-saving field in Myanmar(Yangon city-Kawasaki city)
4. The study of water treatment system installation and WtE projects for RE field in Myanmar(Pathein city-Fukushima city)
5. The study of biomass power generation projects and PV generation projects for RE field in Cambodia(Siem reap state-Kanagawa pref.)
6. The study of WtE, cogeneration and exhaust heat recovery for RE field in Thailand(Rayong prov.-Kitakyushu city)
7. The study of project formulation by assisting planning the action plan for the climate change strategy and projects for RE field and Energy-saving in Cambodia(Phnom Penh city-Kitakyushu city)
8. The study of cogeneration projects for RE field and high-efficiency air conditioning system installation projects for Energy-saving field in Malaysia(Iskandar development region-Kitakyushu city)
9. The study of high-efficiency air conditioning system installation and heat desorption unit installation projects in Indonesia(Batam city-Yokohama city)



Feasibility Study on JCM large-scale CO2 reduction project

1. The study of a biomass power generation project by rice hull and grain waste for RE field in Indonesia(West Sumatra prov.)
2. The study of refining waste water and residue into bio gas and supplying for vehicles for RE field in Thailand(Ubon Ratchathani prefecture etc.)

1.Project members for this Feasibility study

NTT Data Institute of Management Consulting, Inc.

Outsourcing

- Project Management
- Holding a meeting and Workshop and so on
- Economics Analysis
- Development of MRV Methodology
- Development of PDD etc.

Meidensha Corporation

- Technical Study
- Cost Analysis on Plant etc

Koperasi Serba Usaha Bangkit Mandiri

- Coordination with local stakeholders
- Collection of basic data
- Support for workshop etc

ATGREEN

- Investigation of Biomass Residue
- Study on Related regulation etc

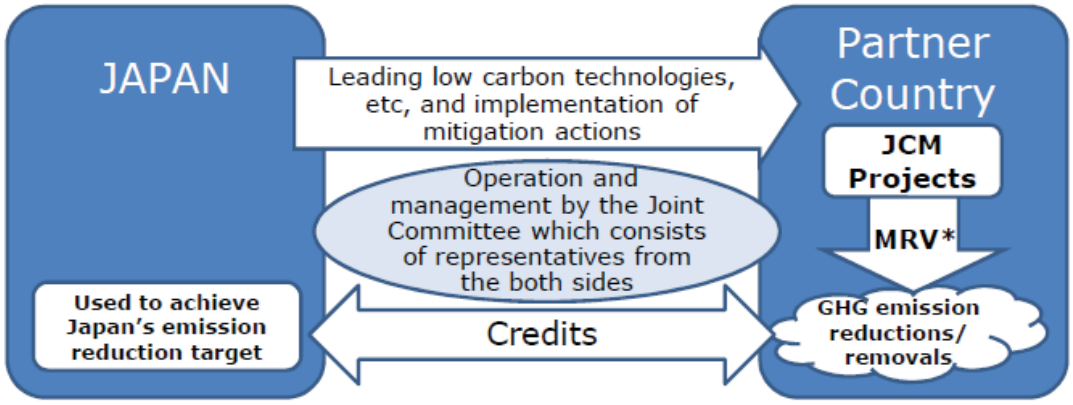
Applied Technology (assumed) : Stoker Fired Furnace

Rice Husk
Corn Cob

Electricity

（Reference） Basic Concept of JCM

- Facilitating diffusion of leading low carbon technologies, products, systems, services, and infrastructure as well as implementation of mitigation actions, and contributing to sustainable development of developing countries.
- Appropriately evaluating contributions from Japan to GHG emission reductions or removals in a quantitative manner and use them to achieve Japan's emission reduction target.
- Contributing to the ultimate objective of the UNFCCC by facilitating global actions for GHG emission reductions or removals.



*measurement, reporting and verification

（Reference） JCM Project Development & Outreach Program

JCM Project development

- To **identify barriers and needs** for JCM project development in partner countries in terms of technology, financing and partnership, and **provide solutions for overcoming barriers** through consultations and matching between companies.
- To **enhance overall capacity for JCM project implementation** through facilitating understanding on the JCM rules & guidelines, and MRV methodologies by workshops, seminars, training courses and site visits.
- To **conduct feasibility studies** on specific projects for elaborating investment plan with considering expected emission reductions. To see reports, access: <http://gec.jp >

Types of Feasibility Studies (FS)

FS on JCM Project by City to City Collaboration
FS on JCM large-scale CO2 reduction project

Outreach

- **New Mechanisms Information Platform website** provides information on the latest updates on the JCM and on the relevant programme such as JCM promotion schemes by the Government of Japan. <http://www.mmechanisms.org/e/index.html>
- **Mail magazine** and up-to-date information are distributed regularly. To register, access:

(for JP) <http://www.mmechanisms.org/newsletter/index.html>
(for EN) <http://www.mmechanisms.org/e/newsletter/index.html>

（Reference） JCM Subsidy Program

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JCM Model Projects by MOE

The draft budget for projects starting from FY 2017 is 6.0 billion JPY (approx. USD 60million) in total by FY2019

(1 USD = 100 JPY)

※Budget will be fixed after approval by the Parliament

Government of Japan

※Includes collaboration with projects supported by JICA and other governmental-affiliated financial institute.

Finance part of an investment cost (less than half)

Conduct MRV and expected to deliver at least half of JCM credits issued

International consortiums (which include Japanese entities)



- Scope of the financing: facilities, equipment, vehicles, etc. which reduce CO_2 from fossil fuel combustion as well as construction cost for installing those facilities, etc.
- Eligible Projects : starting installation after the adoption of the financing and finishing installation within three years.

2. Main activity in the study

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We have conducted site survey and picked up several samples to be treated.
Chemical analysis of the samples were conducted.
Based on the analysis data and site survey result, we conducted very basic design concept.

So far, we assume 2 plants will be constructed in 2 sites (please see the above).

The purpose of today's workshop

We would like to introduce the result of our research and would like to invite partner to join the project.

If you have any questions, please don't to hesitate to contact us.

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変える力を、ともに生み出す。

Financial Feasibility of JCM Financing based Biomass Power Generation by rice husk and Corn cobs

22nd February 2017
NTT Data Institute of Management Consulting, Inc.,
Socio & Eco Strategic Consulting Unit

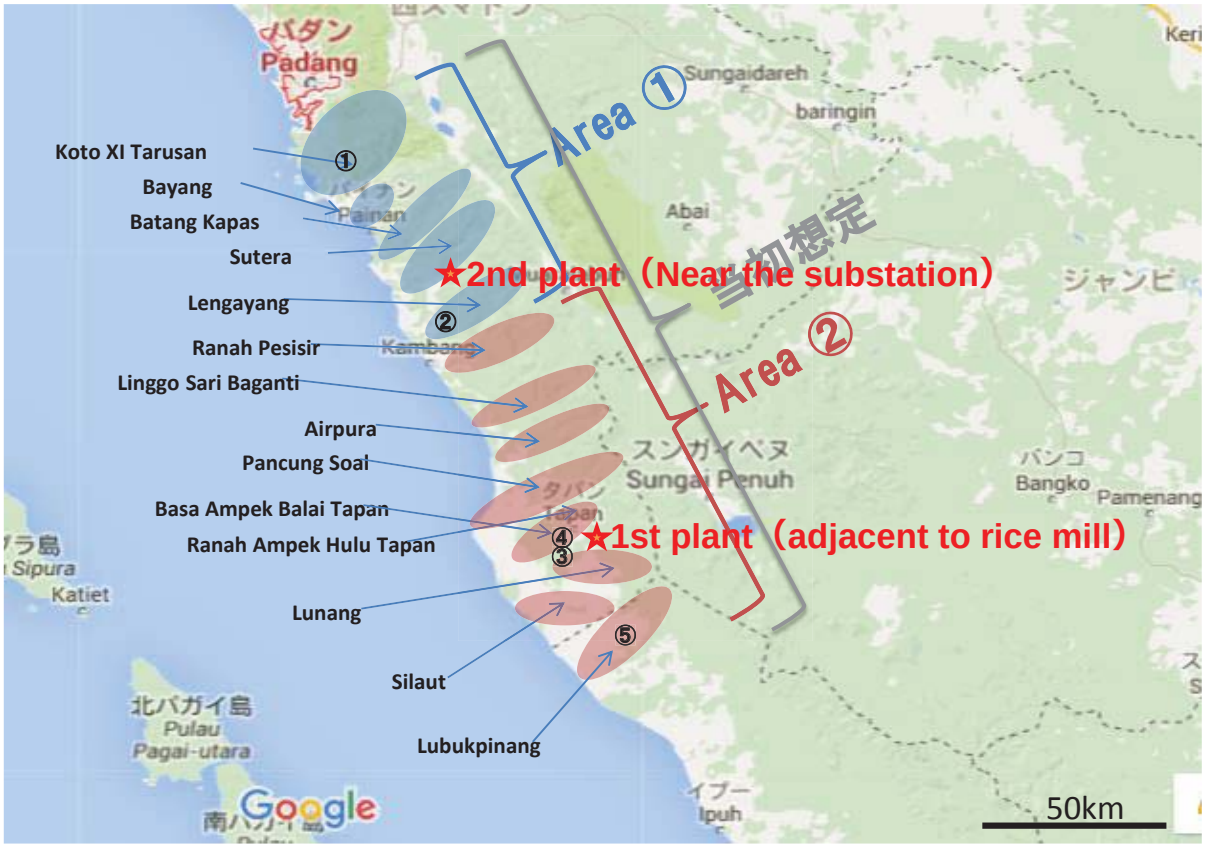
NTT DATA

INDEX

1. Overview of planning Project

Target region	Lunang District, Kambang District, Pesisir Selatan Regency, West Sumatra, Indonesia
Target waste	Biomass waste, (rice husk and corn cob)
Technology	Power generation plant with Stoker furnace
Size of Power plant	Maximum 16MW power plant.
Expected business	● Making electricity from the Biomass power plant which use rice husk and corn cob as fuel. ● Whole electricity generated from this Biomass power plant are planned to sold to PLN.

2.Planning area to collecting biomass waste and 2 area for construct a Biomass power plant



3.Site survey in Lunang district about land for the plant

- We are considering to build biomass power plant next to 3t per hour large rice mill then rice husk after milling will directly put into the plant. This can reduce the cost for transport the biomass fuel
- In the future, we are also considering to movie existing small rice mills next to the Biomass power plant to make cluster.
- By using this 3TPH rice mill, the quality of the rice in Pesisir Selatan will better.

4.Simple image for this project

3TPH RICE MILL

Small Scale Rice mill

Corn cob **Rice husk**

BIOMASS POWER PLANT

Sell electricity

PLN

5. Options for Biomass Power plant

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- As Meidensha explained before, we have 3 plans to construct biomass power plant.
- 1 is constructing 2 plant in Kambang and Lunang, both of them are different size.
- 2 is constructing 2 plant in Kambang and Lunang, both of them are same size
- 3 is constructing 1 plant in Lunang

Item	Unit	Case-1		Case-2		Case-3	Remarks
		South	North	South	North	South	
Fuel Plan							
Rice Husk Availability	t/y	39,764	109,067	69,638	79,193	138,263	
Corn Cob Availability	t/y	24,114	12,170	30,245	6,039	35,624	
Fuel Loss	%	5.0	5.0	5.0	5.0	5.0	Assumption
Rice Husk Consumption	t/h	4.770	13.083	8.353	9.499	16.585	
Corn Cob Consumption	t/h	2.892	1.460	3.628	0.724	4.273	
Heat Input	kW	28,235	54,320	44,312	38,243	77,514	
Boiler Capacity							
Steam Availability	t/h	32.20	61.95	50.54	43.61	88.40	
Boiler MCR	t/h	35	65	55	55	90	
Ratio Steam Availability against MCR	%	92.0	95.3	91.9	79.3	98.2	
Ash Discharge							
Ash Discharge	t/h	0.971	2.550	1.676	1.846	3.276	
Electricity Output							
Plant Gross Output	kW	7,200	13,800	11,600	11,600	19,400	Based on MCR
Plant Aux. Power Consumption	kW	1,100	2,100	1,700	1,700	2,900	Based on MCR
Plant Net Output	kW	6,100	11,700	9,900	9,900	16,500	Based on MCR
Estimated Plant Net Output	kW	5,612	11,151	9,097	7,851	16,207	Based on Actual Fuel Availability

6.Economic consideration

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We calculated financial model below;

CAPEX will reduce by getting JCM subsidy

case	case 1 (Construction of two different sizes)	case 2 (Construction of two same sizes)	case 3 (1 unit construction)
CAPEX	IDR759,023,137,650	IDR812,730,006,391	IDR587,248,003,476
OPEX	IDR22,734,694,130	IDR12,172,950,096	IDR17,581,440,104
Revenue from Power selling	IDR257,643,119,250	IDR260,486,523,000	IDR249,097,538,250
power generation (24h*330day)	16.763MW	16.948MW	16.207MW
Project IRR (in15 years) Without Subsidy	25%	24%	34%

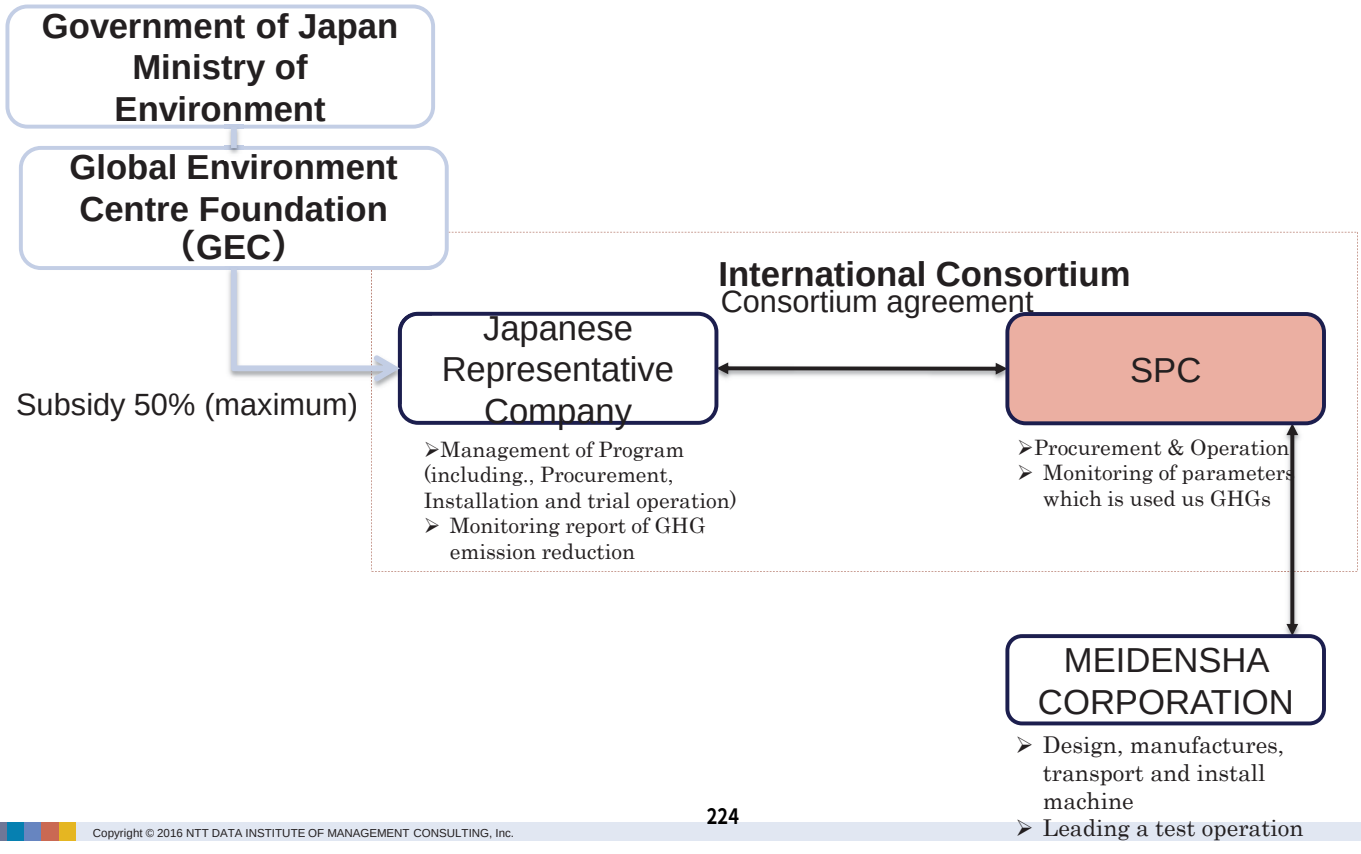
(reference) FIT table for Biomass power

Biomass power generation buying price table 2016 edition

No	Location /Area of Biomass Power Generation	Purchasing Price (sen USD/kWh)				F Factor
		Capacity ≤ 20 MW		20 MW <Capacity ≤ 50 MW	Capacity > 50 MW	
		Low Voltage	Medium or High Voltage	High Voltage	High Voltage	
1	Java Island	16,00 x F	13,50 x F	11,48 x F	10,80 x F	1.00
2	Sumatera Island	16,00 x F	**13,50 x F**	11,48 x F	10,80 x F	**1.15**
3	Sulawesi Island	16,00 x F	13,50 x F	11,48 x F	10,80 x F	1.25
4	Kalimantan Island	16,00 x F	13,50 x F	11,48 x F	10,80 x F	1.30
5	Island of Bali, Bangka Belitung and Lombok	16,00 x F	13,50 x F	11,48 x F	10,80x F	1.50
6	Archipelago of Riau, Nusa Tenggara and other island	16,00 x F	13,50 x F	11,48 x F	10,80x F	1.60
7	Molucca and Papua Island	16,00 x F	13,50 x F	11,48 x F	10,80x F	1.70

7. Draft Scheme for project implementation

consideration of candidates on JCM Project Implementation Scheme



NOT Burning Rice Husk and Corn cob anymore, make electricity.

Terima Kasih!

NTT DATA
Global IT Innovator