報告書添付資料 1

\- PRELIMINARY -

THE BIOBRIQUETTE PROJECT
BY HUAINAN MINING INDUSTRY, CHINA

ＣＤＭ-PDD Version 03

03/2007

HOKUYO CO.,LTD

SECTION A. General description of project activity

A.1. Title of the project activity:

"Heat generation from biomass-coal briquette in Huainan city, China"

A.2. Description of the project activity:

The project activity is to produce biomass-coal briquette fuel (BBF) from coal and biomass residues, to transfer BBF to the heat generation equipment, and to generate heat by combustion of BBF.

The features of the project activity can reduce CO_2 emission, SO_2 emission, ash-dust and smell of flue gas caused by coal combustion.

There are generally three kinds of the project scenario options in accordance to the mode of BBF utilization, however, the project scenario of this project activity is as follows:

Option P1:

"Heat is generated by combustion of BBF at the heat generation equipment, and the whole monitoring data can be recorded and managed by the project participants".

A.3. Project participants:

1) Project participants of the host country_

a. Huainan Dongchen Group Limited
b. Huainan Coal Mining(Group) CO., LTD.

2) Project participants of Japan

a. Hokuyo Co., Ltd.
b. Furukawa-Otuka Manufacturer CO., LTD.
c. A trading company (under planning)

A.4. Technical description of the project activity:

A.4.1 Location of the project activity:

A.4.1.1. Host Party(ies):

Huainan Dongchen Group Limited

A.4.1.2. Resion/State/Province, etc.：

Anhui Province, China

A.4.1.3. City/Town/ommunity etc,：

Huainan City

A.4.1.4 Detail of physical location,including information allowing the unique identification of the project activity(maximum one page)

Lao Longyan Area, Dongshan District, Huainan City, that is owned by Huainan Dongchen Group Limited.

A.4.2. Category(ies) of the project activity:

Energy Industry

A.4.3. Technology to be employed by the project activity:

The technology to be employed by the project activity is developed newly by HOKUYO CO., LTD. in Japan.

It contains crushing of raw coal and biomass residues into small grains, drying and mixing them, and forming pellets under high pressure, consuming comparatively high quantity of energy for conversion of coal and biomass into BBF.

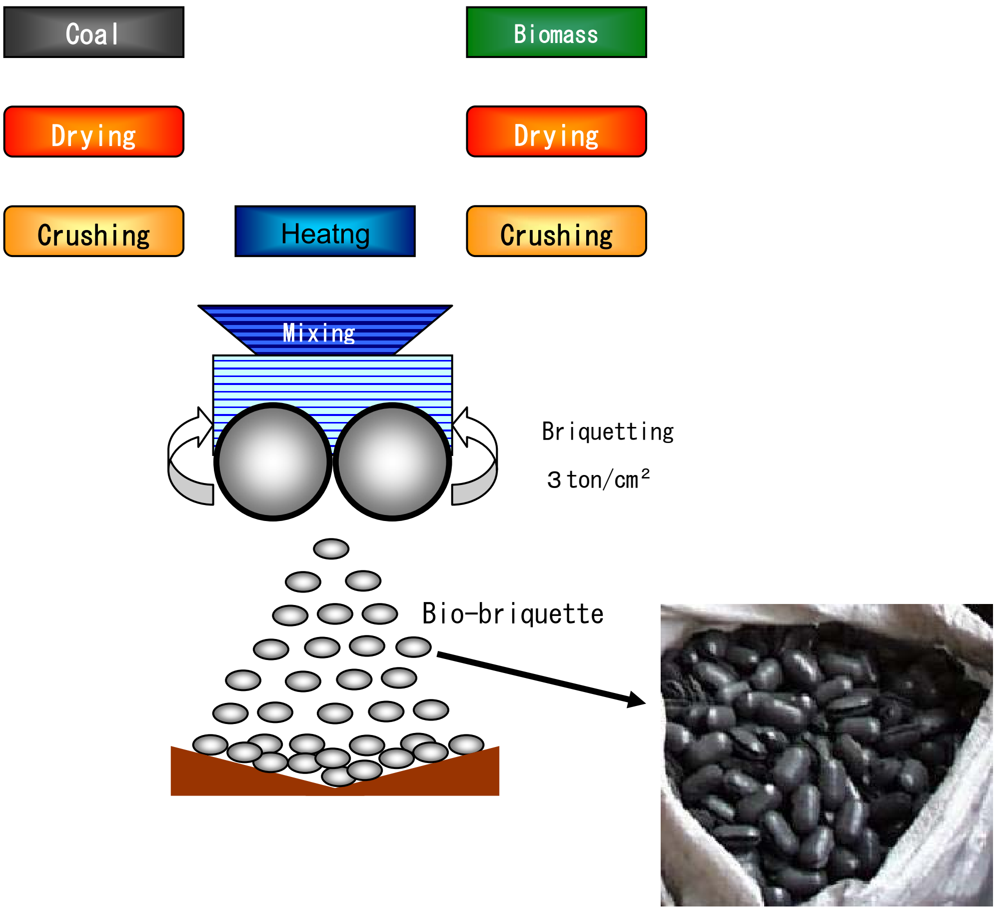
The technology can change the combustibility of coal and reduce CO_2 emissions, SO_2 emission, ash-dust and foul smell of flue gas in coal combustion through the excellent combustibility of BBF.

BBF can be utilized at usual coal combustion equipment such as industrial boiler, power generation boiler, cooking devises and stove to generate heat.

Biomass residues are surplus residues of rice-straw, sugarcane, corn-stalk etc that were burned without control or decayed in soil.

Coal contains all types of coal that are selected by economics reasons and reliability of supply.

Fig.1 Concept of the Production of Biomass-coal briquette



The technology of the project activity can reduce CO_2 emissions by following reasons:

i. Reduction of coal consumption by alternative of coal with biomass residues,

ii. Reduction of coal consumption by reduction of excess combustion air due to excellent combustibility of BBF,

iii. Reduction of coal consumption by reduction of fouling of the heat transfer surfaces due to excellent combustibility of BBF,

iv. On the other hand, CO_2 emissions are increased by the consumption of energy for operation of BBF plant.

A.4.4. Estimated amount of emission reduction over the chosen crediting period

1,072 kt-CO_2

Year	Emission reduction (kt-CO_2/y)

1	28.2 (5.64x0.5)
2	45.1(5.64x0.8)
3	56.4(5.64x1.0)
.	
7	56.4 (5.64x1.0)
.	
14	56.4 (5.64x1.0)
.	
21	56.4 (5.64x1.0)
Total	1,072.5

A.4.5. Public finding of the project activity:

Not scheduled

SECTION B. Application of a baseline and monitoring methodology

B.1. Title and reference of the approved baseline and monitoring methodology applied to the project activity:

"New baseline and monitoring methodology for heat generation from biomass-coal briquette involving the production of the biomass-coal briquette"

B.2. Justification of the choice of the methodology and why it is applicable to the project activity:

a. there is no applicable approved baseline and monitoring methodology, because the proposed project activity applies a new technology to the biomass-coal briquette plant for processing biomass residue and coal prior to combustion in the heat generation equipment, resulting in reduction of CO_2 emission.

b. "The new baseline and monitoring methodology" is proposed by the technology owner: HOKUYO CO., LTD. in consideration of the project features of "heat generation from biomass-coal briquette".

B.3. Description of the sources and gases included in the project activity

(1) Project boundary

The project activity relates to coal and biomass residues as raw materials, BBF production plant, BBF transportation system and usually a wide variety of BBF utilization devices that BBF will be combusted as substitute energy of coal from the large scale heat generators such as industrial boilers to the small scale heat generators such as cooking devises and stoves.

As for monitoring of the project activity, the large scale heat generators can be carried out easily and exactly.

In consideration of technical analysis for project emissions of the project activity and the monitoring procedures proposed, the project boundary is decided as follows:

a. Inside project boundary

The sources and gases included in the project boundary can be directly measured, recorded and managed by the project participants.

b. Outside project boundary

The sources and gases excluded from boundary can not be directly measured, recorded and managed by the project participants.

Fig. 2: Project boundary

Coal mine site (coal) | Agriculture site (biomass residues)

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Transportation of coal | Transportation of biomass

|

Outside project boundary

Project boundary

Inside project boundary

|

Briquette production plant

|

Temporary storage of briquette

|

Transportation of briquette

|

Heat generation equipment

— — — — — — — — — — — — Project boundary

Outside project boundary

|

(User site: heat or hot water pipe line etc.)

Table : Emission sources and gases included/excluded in the project boundary

Baseline: the sources and gases included in the project boundary			
Source	Gas	Included/ Excluded	Justification/Explanation
Grid electricity consumption at the heat generation equipment	CO_2	excluded	Excluded because the combustion gas treatment facility is not required in case of projected coal combustion. It is assumed that the consumption in the baseline and in the project activity is same (=0).
	CH_4	Excluded	Excluded for simplification. This is conservative.
	N_2O	Excluded	
Fossil fuel consumption for operation of the heat generation equipment	CO_2	Excluded	Excluded because the gas treatment facility is not required to the projected coal. It is assumed that the consumption in the baseline and in the project activity is same (=0).
	CH_4	Excluded	
	N_2O	Excluded	
Coal combustion at heat generation equipment	CO_2	Included	Main emission source
	CH_4	Excluded	Excluded for simplification. This is conservative.
	N_2O	Excluded	
Fossil fuel consumption of supplemental fuel at the heat generation equipment	CO_2	Excluded	Supplemental fossil fuel is not required to burn the projected coal at the heat generation equipment.
	CH_4	Excluded	Excluded for simplification. This is conservative.
	N_2O	Excluded	
Baseline: the sources and gases excluded from the project boundary			
Uncontrolled burning or decay of biomass residue	CO_2	Excluded	It is assumed that CO_2 emissions from biomass residues do not lead to changes of carbon pools in LULUCF sector.
	CH_4	Excluded	Excluded for simplification. This is conservative.
	N_2O	Excluded	
Fossil fuel consumption for coal mining reduced by the project activity	CO_2	Included	
	CH_4	Excluded	Excluded for simplification. This is conservative.
	N_2O	Excluded	
Coal mine emissions at coal mining reduced by the	CO_2	Excluded	Excluded for simplification. This is conservative.

project activity	CH_4	Included or excluded	Project participants may decide to exclude this emission source, if the volume of CH_4 is very small. This is conservative.
	N_2O	Excluded	Excluded for simplification. This is conservative.
Fossil fuel consumption for coal transportation	CO_2	Included	
	CH_4	Excluded	Excluded for simplification. This is conservative.
	N_2O	Excluded	
Fossil fuel consumption for coal ash transportation	CO_2	Included	
	CH_4	Excluded	Excluded for simplification. It is assumed that the amount of the baseline and of the project activity is same.
	N_2O	Excluded	
Project activity: the sources and gases included in the project boundary			
Grid electricity consumption at BBF plant	CO_2	Included	
	CH_4	Excluded	Excluded for simplification. These emission sources are assumed to be very small.
	N_2O	Excluded	
Fossil fuel consumption at BBF plant	CO_2	Excluded	Excluded for no use of fossil fuel at BBF plant.
	CH_4	Excluded	
	N_2O	Excluded	
BBF consumption for operation of BBF plant	CO_2	Included	
	CH_4	Excluded	Excluded for simplification. These emission sources of BBF combustion are assumed to be very small.
	N_2O	Excluded	
Fossil fuel consumption for BBF transportation	CO_2	Included	
	CH_4	Excluded	Excluded for simplification. These emission sources are assumed to be very small.
	N_2O	Excluded	
BBF combustion at heat generation equipment	CO_2	Included	Main emission source
	CH_4	Excluded	Excluded for simplification. These emission sources of BBF combustion are assumed to be very small.
	N_2O	Excluded	
Grid electricity consumption at the heat generation equipment	CO_2	Excluded	Excluded because the combustion gas treatment facility is not required in the baseline and the amount of consumption is assumed to be as same as that of the baseline.
	CH_4	Excluded	Excluded for simplification. These emission sources are assumed to be as same as that of the baseline.
	N_2O	Excluded	

Fossil fuel consumption for operation of the heat generation equipment	CO_2	Excluded	Excluded because the combustion gas treatment facility is not required in case of BBF combustion.
	CH_4	Excluded	Excluded for simplification. These emission sources are assumed to be as same as that of the baseline.
	N_2O	Excluded	
Fossil fuel consumption of supplemental fuel at the heat generation equipment	CO_2	Excluded	Supplemental fuel is not used.
	CH_4	Excluded	
	N_2O	Excluded	
Project activity: the sources and gases excluded from the project boundary			
Fossil fuel consumption for BBF ash transportation	CO_2	Included	
	CH_4	Excluded	Excluded for simplification. It is assumed that the amount of the baseline and of the project activity is same.
	N_2O	Excluded	
Fossil fuel consumption for biomass transportation	CO_2	Included	
	CH_4	Excluded	Excluded for simplification. These emission sources are assumed to be very small.
	N_2O	Excluded	
Biomass storage	CO_2	Excluded	It is assumed that CO_2 emissions from biomass residues do not lead to changes of carbon pools in LULUCF sector.
	CH_4	Excluded	Excluded for simplification. These emission sources are assumed to be very small.
	N_2O	Excluded	

B.4. Description of how the baseline scenario is identified and description of the identified baseline scenario

B.4.1. Identification of the baseline scenario

Baseline scenario is identified in accordance to the SECTION D of the new baseline methodology, which is proposed by HOKUYO CO., LTD.

Step1：Identification of biomass residues

New baseline methodology can be applied if the present situation regarding the use or disposal of biomass residues is identified with following Option 1-1

Option1-1： The biomass residue is dumped or left decay or burned in an uncontrolled manner without utilizing it for energy purposes,

Option1-2： The biomass residue is used for heat and/or electricity generation at the project site by the traditional method,

Option1-3： The biomass residue is used for heat and/or electricity generation at the outside project site by the traditional method,

Option1-4： The biomass residue is used for reduction of other GHG emissions,

Option1-5： The biomass residue is used for non-energy purposes, such as production of fertilizer,

Option1-6： The farm product of the agricultural area is switched to other farm products that biomass residues are not produced,

Option1-7： The agricultural area is used for other purposes that will increase of GHG emissions.

Biomass residues that are planned to use for the project activity are supplied from farms around Huainan City, China and composed from rice-straw and corn-stalk that were burned without control or dumped in soil in the past. There is no plan to use the present biomass residues for other purposes such as biofuels.

As for biomass residues of the project activity, it is certified that t the present situation corresponds to Option 1-1.

Step2：Identification of the fuel and the heat generation equipment

New baseline methodology can be applied if the present situation regarding the fuel and the heat generation equipment are identified with following Option 2-2-a or b, 2-3-a or b, and 2-4-a or b.

Option 2-1: The existing heat generation equipment is scrapped and heat generation is abandoned,

Option 2-2: Heat is generated by the existing heat generation equipment

here:

Option a.： Fuel is coal,

Option b.： Fuel is coal-briquette without any biomass,

Option c.： Fuel is biomass-coal-briquette or mixture of coal and biomass without any processing prior to combustion,

Option 2-3: Heat is generated by modification of the existing heat generation equipment,

here:

Option a.： Fuel is coal,

Option b.： Fuel is coal-briquette without any biomass, Option c.: Fuel is biomass-coal-briquette or mixture of coal and biomass without any processing prior to combustion,

Option d.: Fuel is mixture of biomass-coal-briquette and coal,

Option 2-4: Heat is generated by the newly constructed heat generation equipment, here:

Option a.: Fuel is coal,

Option b.: Fuel is coal-briquette without any biomass,

Option c.: Fuel is biomass-coal-briquette or mixture of coal and biomass without any processing prior to combustion,

Option d.: Fuel is mixture of biomass-coal-briquette and coal,

Option e.: Fuel is other fossil fuels except coal,

Option f.: Fuel is others except fossil fuels.

Regarding the type of the fuel and the heat generation equipment, the present situation is as follows:

a. The coal that will be used as raw material in the project activity is the coal mined at the Huainan Coal Mine near the project site,

b. The coal that will be used in the project activity is the coal used as energy to generate heat in the existing equipment and BBF is scheduled to be used in the heat generation equipment.

As for the type of fuels and the heat generation equipment, it is certified that the present situation corresponds to Option 2-2-a or b, 2-3-a or b, and 2-4-a or b.

Step3 : Removal of options which don't meet with policy, laws and regulations of the host country

New baseline methodology can not be applied if the project scenario options don't conform to the policy, law and regulation of the host country and the region.

Regarding BBF, the government of China is recommending BBF as one of clean coal technology to modify the regional environmental problems.

As for conformity to the policy, law and regulation of the host country and the region, the project scenario option P1 of the project activity meet with them completely, and accordingly, certified options above-mentioned are not eliminated.

Step4 : Removal of options which don't have any barrier in economy, investment and technology in the host county

New baseline methodology can be applied if there is any barrier for the implementation of the project activity in economy, investment and technology in the host county.

According to the economic feasibility study of the project scenario P1, IRR of the project activity is 6.66%, which is not economically feasible.

The low IRR indicates that the investment to the project activity is not attractive.

The host country, China, has no own technology and industrial experience of BBF production except two experiences of the prototype test plants applied the technology of HOKUYO CO., LTD. Japan.

As for barriers to the project activity, there are hard barriers in economy, investment and technology as mentioned above, and accordingly, certified options above-mentioned are not eliminated.

B.4.2. Description of the identified baseline scenario

In accordance to new baseline methodology and identification regarding the baseline scenario above-mentioned, identified baseline scenario in the absence of the project activity is as follows:

Baseline scenario option B1:

"Heat is generated by combustion of coal used by the project activity at the same heat generation equipment as the project activity"

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity(assessment and demonstration of the additionality):

Step 1: Investment and sensitivity analysis

According to the economic feasibility study regarding project scenario P1, without income of CER credit, IRR of the project activity is 6.66%, which is not economically feasible.

The low IRR illustrates that the investment to the project activity is not attractive.

The results of economic analysis and sensible analysis are as follows:

Without CER credit: IRR(%)

Index of change (%)	-20	-10	0	+10	+20
IRR of standard conditions			6.66		
Ratio of the operation	1.54	4.22		8.94	11.1
Investment cost	20.2	8.29		5.26	4.03
Selling price of BBF	NA	NA		17.7	26.6
Price of raw materials	20.3	13.7		NA	NA

Step 2: Common practice analysis

The host country, China, has no own technology and commercial experience of BBF production except two experiences of the prototype BBF plants applied the technology of HOKUYO CO., LTD. Japan.

Step 3: Impact of CDM registration

According to the economic feasibility study regarding project scenario P1, with income of CER credit, IRR of the project activity is 26.7%, which is economically feasible.

The reliability of the project activity will be confirmed by the CDM registration, including the technical benefit to local and global environmental conditions.

The results of economic analysis and sensible analysis are as follows:

With CER credit: IRR(%)

Index of change (%)	-20	-10	0	+10	+20
IRR of standard conditions			26.7		
Ratio of the operation	24.8	25.7		27.7	28.8
Investment cost	30.3	28.3		25.3	24.1
Selling price of BBF	19.3	22.6		31.8	38.2
Price of raw materials	33.8	30.0		23.8	21.4

B.6 Emission reduction

B.6.1. Explanation of methodological choices:

B.6.1.1. Project emissions

Project emissions (TPEy) include CO_2 emissions from transportation of biomass-coal briquette to the consuming site, however, exclude CO_2 emissions from transportation of coal and biomass residues. Project emissions are calculated based on the quantity of coal and biomass, energy for processing of coal and biomass, fuel for transportation, and respective net calorific values and respective CO_2 emission factor as follows:

(1) TPEy : Total project emissions

TPEy=ΣTPEp1, y (P)

where:

TPEy Total project emissions during the year *y* in t-CO_2/y,

TPEp1, y Project emissions of the project scenario option P1 during the year *y* in t-CO_2/y.

(2) TPEp1, y : Project emissions of the project scenario option P1

TPEp1, y=∑X・WBBFp1, f, y・NCVcoal・COEFco2, coal+∑PE p1, f, y (Pn)

where:

X Ratio of coal and biomass-coal briquette (BBF) by weight,

WBBFp1, f, y Quantity of BBF combusted at the heat generation equipment *f* to generate heat(Qp1, f, y) during the year *y* in kt/y,

Qp1, f, y Quantity of heat generated by combustion of BBF at the heat generation equipment *f* of the project scenario option P1 during the year *y* in TJ/y,

Here: Qp1, f, y=WBBFp1, f, y・Ɛequipp1, f, bbf・NCV bbf,

Qp1, f, y=Qb1, f, y,

NCVcoal Average net calorific value of coal consumed in BBF plant during the year *y* in TJ/kt,

COEFco2, coal CO_2 emission factor of coal consumed in BBF plant during the year y in t-CO_2/TJ,

Ɛequipp1, f, bbf Average energy efficiency of the heat generation equipment *f*, if fired with BBF, on the basis of the quantity of combusted BBF excepting carbon loss in ash,

PEp1, f, y CO_2 emission of energy consumed for operation of the heat generation equipment (f), excepting BBF combusted for heat generation, during the year *y* in t-CO_2/y.

(3) PEp1, f, y: CO_2 emission of energy consumed for operation

∑PEp1, f, y=ΣPEFFco2p1, f, i, y+∑PEPp1, f, i, y+PTbbf p1, f, y (Pn-1) where:

PEFFco2p1,f,i,y CO_2 emission of fossil fuel *i* co-fired with BBF as supplemental fuel at the heat generation equipment *f* of the project scenario option P1 during the year *y* in t-CO_2/y,

PEPp1,f,i,y CO_2 emission of energy *i* consumed for operation of BBF plant and the heat generation equipment *f* of the project scenario option P1, excepting BBF combusted for heat generation, during the year *y* in t-CO_2/y,

PTbbfp1,f,y CO_2 emission of fuel combusted for transportation of BBF to the heat generation equipment *f* of the project scenario option P1 during the year *y* in t-CO_2/y,

(4) PEFFco2p1,f,i,y: CO_2 emission of fossil fuel i co-fired with BBF

∑PEFFco2p1,f,i,y=∑FFp1,f,i,y・COEFco2,ff,i (Pn-2)

where:

FFp1,f,i,y Quantity of fossil fuel *i* co-fired with BBF as supplemental fuel at the heat generation equipment *f* of the project scenario option P1 during the year *y* in TJ/y,

COEFco2,ff,i CO_2 emission factor of fossil fuel *i* in t-CO_2/TJ,

(5) PEPp1,f,y: CO_2 emission of energy consumed for operation

∑PEPp1,f,i,y=PFbbfp1, bbf,y・NCVbbf・EFco2, bbf+
PFbbfp1,elect,y・COEFco2,elect+
∑PFequipp1,f,elect,y・COEFco2,elect (Pn-3)

where:

PFbbfp1,bbf,y Quantity of BBF combusted for operation of BBF plant of the project scenario option P1, excepting BBF combusted for heat generation, during the year *y* in kt/y,

PFbbfp1,elect,y Quantity of electricity consumed for operation of BBF plant of the project scenario option P1 during the year *y* in KWh/y,

PFbbfp1,f,elect,y Quantity of electricity consumed for operation of the heat generation equipment *f* of the project scenario option P1 during the year *y* in KWh/y,

NCVbbf Average net calorific value of BBF during the year *y* in TJ/kt,

COEFco2,bbf CO_2 emission factor of BBF in t-CO_2/TJ,

X・COEFco2,coal=X・26.2 t-C/TJ・0.98・44/12 CO2/C
= X・94.145 t-CO_2/TJ

COEFco2,elect CO_2 emission factor of electricity in t-CO_2/KWh.

（6）PTbbfp1,f,y: CO_2 emission of fuel combusted for transportation of BBF

$$\Sigma PTbbfp1,f,y=\Sigma PTbbfp1,f,t,y+\Sigma PTbbfp1,f,r,y+\Sigma PTbbfp1,f,is,y \quad (Pn\text{-}4)$$

where:

PTbbfp1,f,y　CO_2 emission of fuel combusted for transportation of BBF to the heat generation equipment *f* of the project scenario option P1 during the year *y* in t-CO_2/y,

PTbbfp1,f,t,y　CO_2 emission of fuel combusted for truck transportation of BBF to the heat generation equipment *f* during the year *y* in t-CO_2/y,

PTbbfp1,f,r,y　CO_2 emission of fuel combusted for railway transportation of BBF to the heat generation equipment *f* during the year *y* in t-CO_2/y,

PTbbfp1,f,is,y　CO_2 emission of fuel combusted for inland-sailing, transportation of BBF to the heat generation equipment *f* during the year *y* in t-CO_2/y.

a. CO_2 emission of fuel for track transportation of BBF

$$\Sigma PTbbfp1,f,t,y=\Sigma WBBFp1,f,t,y \cdot PAVDbbfp1,f,t \cdot EF,t,km,co2/PAVbbfp1,f,t \quad (Pn\text{-}4\text{-}1)$$

where:

WBBFp1,f,t,y　Quantity of BBF transported by trucks to the heat generation equipment *f* during the year *y* in t/y,

PAVCbbfp1,f,t,　Average trip-capacity of trucks for transportation of BBF to the heat generation equipment *f* in t-coal/trip,

PAVDbbfp1,f,t　Average trip-distance of truck transportation of BBF to the heat generation equipment *f* in km/trip,

EF,t,km,co2　CO_2 emission factor of truck transportation in t-CO_2/km.

b. CO_2 emission of fuel for railway transportation of BBF

$$\Sigma PTbbfp1,f,r,y=\Sigma WBBFp1,f,r,y \cdot PAVDbbfp1,f,r \cdot EF,r,km,co2/PAVCbbfp1,f,r \quad (Pn\text{-}4\text{-}2)$$

where:

WBBFp1,f,r,y　Quantity of BBF transported by railway to the heat generation equipment *f* during the year *y* in t/y,

PAVCbbfp1,f,r　Average trip-capacity of railway for transportation of BBF to the heat generation equipment *f* in t-coal/trip,

PAVDbbfp1,f,r　Average trip-distance of railway transportation of BBF to the heat generation equipment *f* in km/trip, EF,r,km,co2 CO_2 emission factor of fuel for railway transportation in $t\text{-}CO_2$/km.

c. CO_2 emission of fuel for inland-sailing transportation of BBF

ΣPTbbfp1,f,is,y= ΣWBBFp1,f,is,y・PAVDbbfp1,f,is・EF,is,km,co2/PAVCbbfp1,f,is (Pn-4-3)

where:

WBBFp1,f,is,y Quantity of BBF transported by inland-sailing to the heat generation equipment *f* during the year *y* in t/y,

PAVCbbfp1,f,is Average trip-capacity of inland-sailing transportation of BBF to the heat generation equipment *f* in t-coal/trip,

PAVDbbfp1,f,is Average trip-distance of inland-sailing transportation of BBF to the heat generation equipment *f* in km/trip,

EF,is,km,co2 CO_2 emission factor of fuel for inland-sailing transportation in $t\text{-}CO_2$/km.

B.6.1.2. Baseline emissions

(1) TBEy : Total baseline emissions

TBEy=ΣTBEb1,y (B)

where:

TBEy Total baseline emissions during the year *y* in $t\text{-}CO_2$/y,

TBEb1,y Baseline emissions of the baseline scenario B1 in the absence of the project scenario P1 in during the year *y* in $t\text{-}CO_2$/y.

(2) TBEb1,y : Baseline emissions of the baseline scenario B1

ΣTBEb1,y=ΣQb1,f,y・COEFco2,coal/Ɛequipb1,f,coal+ΣBEb1,f,y (Bn)

where:

Qb1,f,y Quantity of heat generated by combustion of coal at the heat generation equipment *f* in the absence of the project scenario P1 during the year *y* in TJ/y,

Here:

Qb1,f,y=Qp1,f,y

Qp1,f,y Quantity of heat generated by combustion of BBF at the heat generation equipment *f* of the project scenario option P1 during the year *y* in TJ/y,

here:

Qp1, f, y=WBBFp1, f, y・Ɛequipp1, f, bbf・NCVbbf

COEFco2, coal　CO_2 emission factor of coal in t-CO_2/TJ,

Ɛequipb1, f, coal　Average energy efficiency of the heat generation equipment *f*, if fired with coal, on the basis of combusted coal excepting carbon loss in ash, in the absence of the project scenario P1,

BEb1, f, y　CO_2 emission of energy consumed for operation of the heat generation equipment (f), excepting coal combusted for heat generation, in the absence of the project scenario P1 during the year *y* in t-CO_2/y.

(3) BEb1, f, y: CO_2 emission of energy consumed for operation

ΣBEb1, f, y=ΣBEFFco2b1, f, i, y+ΣBEPb1, f, y　(Bn-1)

where:

BEFFco2b1, f, i, y　CO_2 emission of fossil fuel *i* co-fired with coal as supplemental fuel at the heat generation equipment *f* in the absence of the project scenario P1 during the year *y* in t-CO_2/y,

BEPb1, f, y　CO_2 emission of energy *i* consumed for operation of the heat generation equipment *f* in the absence of the project scenario P1, excepting coal combusted for heat generation, during the year *y* in t-CO_2/y.

(4) BEFFco2b1, f, i, y: CO_2 emission of fossil fuel i co-fired with coal

ΣBEFFco2b1, f, i, y=ΣFFb1, f, i, y・COEFco2, ff, i　(Bn-2)

FFb1, f, i, y　Quantity of fossil fuel *i* co-fired with coal as supplemental fuel at the heat generation equipment *f* in the absence of the project scenario P1 in during the year *y* in TJ/y,

COEFco2, ff, i　CO_2 emission factor of fossil fuel *i* co-fired with coal in t-CO_2/TJ.

(5) BEPb1, f, y: CO_2 emission of energy consumed for operation

ΣBEPb1, f, y=ΣBFequipb1, f, i, y・COEFco2, ff, i+
ΣBFequipb1, f, elect, y・COEFco2, elect　(Bn-3)

where:

BFequipb1, f, i, y　Quantity of fossil fuel *i* combusted for operation of the heat generation equipment *f* including the combustion gas treatment system in the absence of the project scenario P1 during the year *y* in TJ/y,

BFequipb1, f, elect, y　Quantity of electricity consumed for operation of the heat generation equipment *f* including the combustion gas treatment system in the absence of the project scenario P1 during the year *y* in KWh/y,

COEFco2,elect CO_2 emission factor of electricity in t-CO_2/kWh,

here:

BFequipb1,f,elect,y=PFequipp1,f,elect,y if the combustion gas treatment system is not required to install in view of content of SO_2 emissions.

B.6.1.3 Leakage emissions

（1）TLy: Total leakage emission

TLy=BLy-PLy

where:

TLy Total leakage emissions of the project activity during the year *y* in t-CO_2/y.

PLy Leakage emissions of the project scenario P1 during the year *y* in t-CO_2/y,

BLy Leakage emissions of the baseline scenario B1 in the absence of the project scenario P1 during the year *y* in t-CO_2/y.

（2）PLy: Leakage emission of the project scenario P1

Leakage emissions (PLy)of the project scenario P1 may result from fuel combustion for transportation of coal, biomass residues, and BBF-ash by truck, railway and inland-sailing as follows:

PL,y=PLTcoal,y+PLTbiomass,y+PLTash,y (PL)

where:

PLTcoal,y Leakage emissions due to fuel combustion for transportation of coal from the coal mine to BBF plant of the project scenario P1 during the year *y* in t-CO_2/y,

PLTbiomass,y Leakage emissions of fuel combustion for transportation of biomass from the agricultural area to BBF plant of the project scenario P1 during the year *y* in t-CO_2/y,

PLTash,y Leakage emissions due to fuel combustion for transportation of BBF's ash from the heat generation equipment to the disposal area of the project scenario P1 during the year *y* in t-CO_2/y.

a. PLTcoalp1,t,y : Leakage emissions due to coal transportation

$$PLTcoalp1,t,y=\Sigma X \cdot WBBFp1,y \cdot PAVDcoalpn,t \cdot EF,t,km,co2 / PAVCcoalpn,t \quad \text{(PL-1)}$$

where:

WBBFp1,y Quantity of BBF combusted at the heat generation equipment *f* to generate heat during the year *y* in kt/y,

PAVCcoalp1,t Average trip-capacity of trucks for transportation of coal to BBF plant in t-coal/truck-trip,

PAVDcoalp1,t Average trip-distance of trucks for transportation of coal to BBF plant in km/truck-trip,

EF,t,km,co2 CO_2 emission factor of truck transportation in t-CO2/km-truck.

b. PLTbiomass,y: Leakage emissions due to biomass transportation

$$PLTbiomass,y=PLTbiomassp1,t,y+PLTbiomassp1,r,y+PLTbiomassp1,is,y \quad \text{(PL-2)}$$

b.1. PLTbiomassp1,t,y: Leakage emissions due to biomass transportation by truck

$$PLTbiomassp1,t,y=\Sigma r \cdot WBBFp1,y \cdot PAVDbaiomassp1,t \cdot EF,t,km,co2 / PAVCbaiomassp1,t \quad \text{(PL-2-1)}$$

where:

PAVCbiomassp1,t Average trip-capacity of trucks for transportation of biomass to BBF plant in t-biomass/truck-trip,

PAVDbiomassp1,t Average trip-distance of trucks for transportation of biomass to BBF plant in km/truck-trip.

b.2. PLTbiomassp1,r,y: Leakage emissions due to biomass transportation by railway

$$PLTbiomassp1,r,y=\Sigma r \cdot WBBFp1,y \cdot PAVDbaiomassp1,r \cdot EF,r,km,co2 / PAVCbaiomassp1,r \quad \text{(PL-2-2)}$$

where:

PAVCbiomasspn,r Average trip-capacity of railway for transportation of biomass to BBF plant in t-biomass/rail-trip,

PAVDbiomasspn,r Average trip-distance of railway for transportation of biomass to BBF plant in km/rail-trip.

b.3. PLTbiomassp1,is,y: Leakage emissions due to biomass transportation

by inland-sailing

PLTbiomassp1,is,y=Σr・WBBFp1,y・PAVDbaiomassp1,is・EF,is,km,co2 /PAVCbaiomass,is (PL-2-3)

where:

PAVCbiomassp1,is Average trip-capacity of inland-sailing for transportation of biomass to BBF plant in t-biomass/sail-trip,

PAVDbiomassp1,is Average trip-distance of inland-sailing for transportation of biomass to BBF plant in km/sail-trip.

c. PLTashp1,t,y: Leakage emissions due to BBF's ash transportation

PLTashp1,y=Σr・baioash・WBBFp1,f,y・PAVDashp1,f,t・EF,t,km,co2/PAVCashp1,f,t (PL-3)

where:

PLTashp1,y Leakage emissions due to BBF's ash transportation to the disposal area in project scenario P1 during the year *y* in t-CO_2/y,

r Ratio of biomass and BBF by weight,

baioash Ratio of BBF's ash produced from combustion of BBF by weight in t-ash/t-BBF,

PAVCashp1,f,t Average trip-capacity of truck for transportation of BBF's ash to the disposal area in t-ash/truck-trip,
BAVCCashb1,f,t=PAVCashp1,f,t

PAVDashp1,f,t Average trip-distance of truck for transportation of BBF's ash to the disposal area in t-ash/truck-trip.

(3) BLy: Leakage emission of the baseline scenario B1

Leakage emissions (BLy) of the baseline scenario B1 may result from coal mine gas, fuel combustion for coal mining, transportation of coal from coal mine to the heat generation equipment by truck, railway and inland-sailing, and coal-ash transportation by truck as follows:

BLy=BLFmine,y+BLGcmm,y+BLTcoal,y+BLTash,y (BL)

where:

BLy Leakage emissions of the baseline scenario B1 in the absence of the project scenario P1 during the year *y* in t-CO_2/y,

BLFmine,y Leakage emission due to energy consumption for mining of coal corresponding to the quantity of increased coal consumption in the absence of the project activity during the year *y* in t-CO_2/y, BLGcmm,y Leakage emission due to coal mine methane produced by mining of coal corresponding to the quantity of increased coal consumption in the absence of the project activity during the year *y* in t-CO_2/y,

BLTcoal,y Leakage emissions due to fuel combustion for coal transportation from the coal mine to the heat generation equipment in the absence of the project activity during the year *y* in t-CO_2/y,

BLTash,y Leakage emissions due to coal ash transportation to the disposal area in the absence of the project activity during the year *y* in t-CO_2/y during the year *y* in t-CO_2/y.

a. BLFmine,y : Leakage emission due to energy for coal mining

BLFmine,y=Σr・WBBFp1,f,y・BFmine,ff,i・COEFco2,ff,i・NCVbiomass /NCVcoal+Σr・WBBFp1,f,y・BFmine,elect・COEFco2,elect ・NCVbriquette/NCVcoal (BL-1)

where:

r Ratio of biomass and biomass-coal briquette (BBF) by weight

WBBFp1,f,y Quantity of BBF combusted at the heat generation equipment *f* to generate heat during the year *y* in kt/y,

BFmine,ff,i Quantity of fossil fuel for mining of coal corresponding to the quantity of increased coal consumption in the absence of the project activity in TJ-i/t-coal,

BFmine,elect Quantity of electricity for mining of coal corresponding to the quantity of increased coal consumption in the absence of the project activity in kWh/t-coal,

COEFco2,ff,i CO_2 emission factor of fossil fuel *i* in t-CO_2/TJ,

COEFco2,elect CO_2 emission factor of electricity in t-CO_2/kWh,

NCVbiomass Average net calorific value of biomass consumed in BBF plant during the year *y* in TJ/kt,

NCVcoal Average net calorific value of coal consumed in BBF plant during the year *y* in TJ/kt.

b. BLG,cmm,y: Leakage emission due to coal mine methane by coal mining

BLG,cmm,y=Σr・WBBFp1,f,y・CMMmine・COEFco2,ch4・NCVbiomass/NCVcoal (BL-2)

where:

BLG,cmm,y Leakage emission due to coal mine methane produced by mining of coal corresponding to the quantity of increased coal consumption in the absence of the project activity during the year *y* in t-CO_2/y,

CMMmine Quantity of coal mine methane by coal mining in t-CH_4/t-Coal,

COEFco2,ch4 CO_2 emission factor of methane in t-CO_2/t-CH_4.

c. BLG,cmm,y: Leakage emissions due to fuel for coal transportation

$$\Sigma BLTcoalb1,f,y=\Sigma BLTcoalb1,f,t,y+\Sigma BLTcoalb1,f,r,y +\Sigma BLTcoalb1,f,is,y \quad (BL\text{-}3)$$

where:

BLTcoalb1,f,y Leakage emissions due to fuel combustion for coal transportation from the coal mine to the heat generation equipment *f* in the absence of the project activity during the year *y* in t-CO_2/y,

BLTcoalb1,f,t,y Leakage emissions due to coal transportation by truck between the coal mine and the heat generation equipment *f* in the absence of the project activity during the year *y* in t-CO_2/y,

BLTcoalb1,f,r,y Leakage emissions due to coal transportation by railway between the coal mine and the heat generation equipment *f* in the absence of the project activity during the year *y* in t-CO_2/y,

BLTcoalb1,f,is,y Leakage emissions due to coal transportation by inland-sailing between the coal mine and the heat generation equipment *f* in the absence of the project activity during the year *y* in t-CO_2/y.

c.1. BLTcoalb1,f,t,y: Leakage emissions due to coal transportation by truck

$$\Sigma BLTcoalb1,f,t,y=\Sigma WBBFpn,y \cdot BAVDcoalb1,f,t \cdot EF,t,km,co2 \cdot NCVbbf/BAVCcoalb1,f,t \cdot NCVcoal \quad (BL\text{-}3\text{-}1)$$

where:

BAVCcoalb1,f,t Average trip-capacity of truck transportation of coal to the heat generation equipment *f* in t-coal/truck-trip,

here:

It is assumed that BAVCcoalb1,f,t is equal to PAVCcoalp1,f,t.

BAVDcoalb1,f,t Average trip-distance of truck transportation of coal to the heat generation equipment *f* in km/truck-trip,

here:

It is assumed that BAVDcoalb1,f,t is equal to PAVDbbfp1,f,t.

EF,t,km,co2 CO_2 emission factor of truck transportation in t-CO_2/km-truck.

c.2. BLTcoalb1,f,r,y: Leakage emissions due to coal transportation by railway

ΣBLTcoalb1,f,r,y=ΣWBBFpn,y・BAVDcoalb1,f,r・EF,t,km,co2・NCVbbf/BAVCcoalb1,f,r・NCVcoal (BL-3-2)

where:

BAVCcoalb1,f,r Average trip-capacity of railway transportation of coal to the heat generation equipment *f* in t-coal/rail-trip,

here:

It is assumed that BAVCcoalb1,f,r is equal to PAVCcoalp1,f,r.

BAVDcoalb1,f,r Average trip-diatance of railway transportation of coal to the heat generation equipment *f* in km/rail-trip,

here:

It is assumed that BAVCcoalb1,f,r is equal to PAVCcoalp1,f,r.

EF,r,km,co2 CO_2 emission factor of railway transportation in t-CO_2/km-rail.

c.3 BLTcoalb1,f,is,y: Leakage emissions due to coal transportation by inland-sailing

ΣBLTcoalb1,f,is,y=ΣWBBFp1,y・BAVDcoalb1,f,is・EF,t,km,co2・NCVbbf/BAVCcoalb1,f,is・NCVcoal (BL-3-3)

where:

BAVCcoalb1,f,is Average trip-capacity of inland-sailing transportation of coal to the heat generation equipment *f* in t-coal/sail-trip,

here:

It is assumed that BAVCcoalb1,f,is is equal to PAVCcoalp1,f,is.

BAVDcoalb1,f,is Average trip-distance of inland-sailing transportation of coal to the heat generation equipment *f* in km/sail-trip,

here:

It is assumed that BAVCcoalb1,f,is is equal to PAVCcoalp1,f,is.

EF,iskm,co2 CO_2emission factor of inland-sailing transportation in t-CO_2/km-sail.

d. BLTashb1,f,t,y: Leakage emissions due to coal ash transportation

ΣBLTashb1,f,y=Σr・coalash・WBBFp1,f,y・BAVDashb1,f,t・EF,t,km,co2・NCVbiomass/(BAVCashb1,f,t・NCVcoal) (BL-4)

where:

coalash Ratio of coal-ash produced from combusted coal by weight in t-ash/t-coal,

BAVCashb1,f,t Average trip-capacity of truck transportation of coal-ash from the heat generation equipment *f* to the disposal area in t-ash/truck-trip,

here:

It is assumed that BAVCashb1,f,t is equal to PAVCashp1,f,t.

BAVDashbn,f,t Average trip-distance of truck transportation of coal-ash from the heat generation equipment *f* to the disposal area in km/truck-trip,

here:

It is assumed that BAVDashb1,f,t is equal to PAVDashp1,f,t.

EF,t,km,co2 CO_2 emission factor of truck transportation in t-CO_2/km-truck.

B.6.1.4 Emission reduction

ERy=ΣTBEb1,y-ΣTPEp1,y+B1y-P1y (ER)

where:

Ery	Emission reduction of the project activity during the year *y* in t-CO_2/y,
ΣTBEb1,y	Baseline emissions of the baseline scenario B1 in the absence of the project scenario P1 in during the year *y* in t-CO_2/y.
ΣTPEp1,y	Project emissions of the project scenario option P1 during the year *y* in t-CO_2/y,
BL,y	Leakage emissions of the baseline scenario B1 in the absence of the project scenario P1 during the year *y* in t-CO_2/y,
PL,y	Leakage emissions of the project scenario P1 during the year *y* in t-CO_2/y.

B.6.2. Data and parameters that are available at validation

(1) Data and parameters for calculation of project emissions:

Data and parameter	Data unit	Description	Source of data used	Value applied	Justification of the choice of data or description of measurement methods and procedures actually applied	Any comment
P10 COEFco2,coal	tCO_2/ TJ	CO_2 emission factor of the coal	China DNA	94.145	Published data by China DNA	96.2•0.96•44/12
P13 Ɛequipp1,f,bbf	-	Average heat efficiency of BBF combustion in the combustion equipments	Test data	0.70	BBF combustion test data in the combustion equipments that are tested by the organization authorized by China DNA	Not yet studied at present time. 0.7 is assumed for the study
P27 COEFco2,ff,i	tCO_2/y	CO_2 emission factor of the diesel oil	Published data	-	Published data by China DNA	Not yet studied at present time
P40 COEFco2,ff,elect	tCO_2/ MWh	CO_2 emission factor of the electricity	Published data	1.0297	Published data by China DNA	
P47 PAVDbbfp1,f,t	km /truck -trip	Average trip-distance of BBF truck to the heat generation equipment *f*	Measured	-	measured by the location map	Not yet studied at present time
P48 PAVCbbfp1,f,t	t/ truck	Average trip-capacity of BBF truck to the heat generation equipment *f*	Operation record	-	Past operation record of the coal combustion equipment f	Not yet studied at present time
P49 EF,t,km,co2	tCO_2/ km -truck	CO_2 emission factor of the truck	Published data	-	Published data by China DNA	Not yet studied at present time
P51 PAVDbbfp1,f,r	km /rail -trip	Average trip-distance of BBF railway to the heat generation equipment *f*	Measured	-	measured by the location map	Not yet studied at present time
P52 PAVCbbfp1,f,r	t/rail	Average trip-capacity of BBF railway to the heat generation equipment *f*	Operation record	-	Past operation record of the coal combustion equipment f	Not yet studied at present time

P53 EF,r,km,co2	tCO_2/km-rail	CO_2 emission factor of the railway	Published data	-	Published data by China DNA	Not yet studied at present time
P55 PAVDbbfp1,f,is	km/is-trip	Average trip-distance of BBF inland-sailing to the heat generation equipment *f*	Measured	-	measured by the location map	Not yet studied at present time
P56 PAVCbbfp1,f,is	t/is	Average trip-capacity of BBF inland-sailing to the heat generation equipment *f*	Operation record	-	Past operation record of the coal combustion equipment f	Not yet studied at present time
P57 EF,is,km,co2	tCO_2/km-sail	CO_2 emission factor of the inland sailing	Published data	-	Published data by China DNA	Not yet studied at present time

(2) Data and parameters for calculation of baseline emissions:

Data and parameter	Data unit	Description	Source of data used	Value applied	Justification of the choice of data or description of measurement methods and procedures actually applied	Any comment
B9 Ɛequipb1,f,coal	-	Average energy efficiency of coal combustion equipments in the absence of the project activity	Test data	0.6	Coal combustion test data in the combustion equipments that are tested by the organization authorized by China DNA	Not yet studied at present time. 0.6 is assumed for the study

(3) Data and parameters for calculation of leakage of the project activity:

Data and parameter	Data unit	Description	Source of data used	Value applied	Justification of the choice of data or description of measurement methods and procedures actually applied	Any comment
PL4 PAVDcoalp1,t	km/truck-trip	Average trip-distance of coal truck to BBF plant	Measured	-	measured by the location map	Not yet studied at present time
PL5	t/	Average trip-capacity of	Operation	-	Past operation record of the coal mine	Not yet studied

PAVCcoalp1,t	truck	coal truck to BBF plant	record			at present time
PL12 baioash	t-ash/ t-bbf	Ratio of ash produced by BBF combustion	Test data	0	Coal combustion test data in the combustion equipments that are tested by the organization authorized by China DNA	Not yet tested at present time
PL13 PAVDashp1,f,t	km/ truck -trip	Average trip-distance of BBF-ash truck from BBF plant to disposal area	Measured	-	Measured by the location map For simplification, BAVDashp1,f,t=PAVDashp1,f,t	Not yet studied at present time
PL14 PAVCashp1,f,t	t/ truck	Average trip-capacity of BBF-ash truck from BBF plant to disposal area	Operation record	-	Past operation record of the coal mine For simplification, BAVCashp1,f,t=PAVCashp1,f,t	Not yet studied at present time

(4) Data and parameters for calculation of leakage of the baseline scenario:

Data and parameter	Data unit	Description	Source of data used	Value applied	Justification of the choice of data or description of measurement methods and procedures actually applied	Any comment
BL8 BFmine,ff,i	TJ-i/ t-coal	Quantity of fuel *i* for mining of increased coal in the absence of the project activity	Measured by coal mine	-	Monitored by the coal mine	Not yet studied at present time
BL9 BFmine,elect	MWh/Tj -coal	Quantity of electricity for mining of increased coal in the absence of the project activity	Measured by coal mine	-	Monitored by the coal mine	Not yet studied at present time
BL12 CMMmine	tCH_4/ kt -coal	CH_4 emission factor of underground mining	Measured by coal mine	-	Monitored by the coal mine	Not yet studied at present time
BL13 COEFco2,ch4	tCO_2/ tCH_4	CO_2 emission factor of CH_4	DNA China	2.75	Published data by authority	
BL18	km/	Average trip-distance of	Measured	-	BAVDcoalb1,f,t=PAVDbbfp1,f,t	Not yet studied

BAVDcoalb1,f,t	truck -trip	coal truck from coal mine to heat generation equipment *f*				at present time
BL19 BAVCcoalb1,f,t	t/ truck	Average trip-capacity of coal truck for coal transportation	Estimated	-	BAVCcoalb1,f,t=PAVCbbfp1,f,t	Not yet studied at present time
BL21 BAVDcoalb1,f,r	km /rail -trip	Average trip-distance of coal railway from coal mine to heat generation equipment *f*	Measured	-	BAVDcoalb1,f,r=PAVDbbfp1,f,r	Not yet studied at present time
BL22 BAVCcoalb1,f,r	t/rail	Average trip-capacity of coal train for coal transportation	Estimated	-	BAVCcoalb1,f,r=PAVCbbfp1,f,r	Not yet studied at present time
BL24 BAVDcoalb1,f,is	km /sail -trip	Average trip-distance of coal inland sailing from coal mine to heat generation equipment *f*	Measured	-	BAVDcoalb1,f,is=PAVDbbfp1,f,is	Not yet studied at present time
BL25t BAVCcoalb1,f,is	t/sail	Average trip-capacity of coal inland sailing for coal transportation	Estimated	-	BAVCcoalb1,f,is=PAVCbbfp1,f,is	Not yet studied at present time
BL30 coalash	tash/ t-coal	Ratio of coal-ash/coal	Test data	-	Coal combustion test data in the combustion equipments that are tested by the organization authorized by China DNA	Not yet tested at present time
BL31 BAVDashb1,f,t	km /truck -trip	Average trip-distance of ash truck from heat generation equipment *f* to disposal area	Measured	-	BAVDash,t=PAVDash,t	Not yet studied at present time
BL32 BAVCashb1,f,t	t/ truck	Average trip-capacity of ash truck for ash transportation		-	BAVCash,t= PAVCash,t	Not yet studied at present time

B.6.3. Ex-ante calculation of emission reduction

B.6.3.1. Calculation of project emissions

ΣTPEp1,y=ΣX・WBBFp1,f,y・NCVcoal・COEFco2,coal+ΣPE p1,f,y (Pn)

It is assumed in this study that the heat generation equipment *f* is one unit to simplify the study, because any concrete condition of the heat generation equipment is not clarified at present time.

（1）Calculation of: ΣX・WBBFp1,f,y・NCVcoal・COEFco2,coal

X=0.8
WBBFp1,f,y=100 kt/y
NCVcoal=23.0 TJ/kt
COEFco2,coal=94.145 t-CO_2/TJ
X・WBBFp1,f,y・NCVcoal・COEFco2,coal=0.8・100・23.0・94.145
=173,226 t-CO_2/y

（2）Calculation of: ΣPE p1,f,y

ΣPEp1,f,y=ΣPEFFco2p1,f,i,y+ΣPEPp1,f,i,y+PTbbf p1,f,y (Pn-1)
ΣPEFFco2p1,f,i,y=ΣFFp1,f,i,y・COEFco2,ff,i (Pn-2)
ΣPEPp1,f,i,y=PFbbfp1,bbf,y・NCVbbf・EFco2,bbf+PFbbfp1,elect,y・COEFco2,elect+ΣPFequipp1,f,elect,y・COEFco2,elect (Pn-3)
PTbbfp1,f,y=ΣPTbbfp1,f,t,y+ΣPTbbfp1,f,r,y+ΣPTbbfp1,f,is,y (Pn-4)

a. Calculation of Pn-2: ΣPEFFco2p1,f,i,y

Fossil fuel is not used in the project activity due to high net calorific value of BBF.
Therefore:
ΣFFp1,f,i,y=0 and ΣPEFFco2p1,f,i,y=0

b. Calculation of Pn-3: ΣPEPp1,f,i,y

b.1. Calculation of: PFbbfp1,bbf,y・NCVbbf・EFco2,bbf

PFbbfp1,bbf,y=2.0 kt-bbf/y
NCVbbf=21.0 TJ/kt-bbf
EFco2,bbf=75.31 t-CO_2/TJ
Therefore:
PFbbfp1,bbf,y・NCVbbf・EFco2,bbf=2.0・21.0・75.31
=3,163 t-CO_2/y

b.2. Calculation of: PFbbfp1,elect,y・COEFco2,elect

PFbbfp1,elect,y=4,320 MWh/y
COEFco2,elect=1.0297 t-CO_2/MWh
PFbbfp1,elect,y・COEFco2,elect=4,448 t-CO_2/y

b.3. Calculation of: PFequipp1,f,elect,y・COEFco2,elect

The combustion gas treatment system for coal combustion in the heat generation equipment is not required to install in the absence of the project activity due to the low sulfur content in coal.

Therefore, in accordance to the assumption of methodology, it is assumed that PFequipp1,f,elect,y=0, and PFequipp1,f,elect,y・COEFco2,elect=0

b,4. Calculation of the total of Pn-3: ΣPEPp1,f,i,y

ΣPEPp1,f,i,y=7,611 t-CO_2/y

c. Calculation of Pn-4: PTbbfp1,f,y

In this study, it is assumed that the distance and quantity of raw coal and BBF transportation between the coal mine, BBF plant and the heat generation equipment in the project activity is equal to these of fuel coal in the baseline scenario, because any concrete condition of the heat generation equipment and transportation root is not clarified at present time.

Therefore, it is assumed that there is no change in CO_2 emissions between the project activity and the baseline scenario, resulting in:
PTbbfp1,f,y=0.

d. Calculation of total of Pn-１: PEp1,f,y

PEp1,f,y=3,163+4,448
=7,611 t-CO_2/y

（3）Calculation of total project emissions: ΣTPEp1,y

ΣTPEp1,y=173,226+7,611 t-CO_2/y
=180,837 t-CO_2/y

B.6.3.2 Calculation of baseline emissions

ΣTBEb1,y=ΣQb1,f,y・COEFco2,coal/Ɛequipb1,f,coal+ΣBEb1,f,y (Bn)

In this study, it is assumed that the heat generation equipment *f* is one unit in accordance to the assumption of calculation of project emissions, because any concrete condition of the heat generation equipment is not clarified at present time.

（1）Calculation of: ΣQb1,f,y・COEFco2,coal/Ɛequipb1,f,coal

Qb1,f,y=1,535 TJ/年
COEFco2,coal=26.2tC/TJ・0.98・44/12=94.145 t-CO_2/TJ
Ɛequipb1,f,coal=60.9 %
Qb1,f,y・COEFco2,coal/Ɛequipb1,f,coal=1,535・94.145/0.609
=237,294 t-CO_2/y

（2）Calculation of: ΣBEb1,f,y

ΣBEb1, f, y=ΣBEFFco2b1, f, i, y+ΣBEPb1, f, y (Bn-1)

ΣBEFFco2b1, f, i, y=ΣFFb1, f, i, y・COEFco2, ff, i (Bn-2)

ΣBEPb1, f, y=ΣBFequipb1, f, i, y・COEFco2, ff, i+BFequipb1, f, elect, y・COEFco2, elect (Bn-3)

a. Calculation of Bn-2: ΣBEFFco2b1, f, i, y

Fossil fuel is not used in the baseline scenario due to high net calorific value of coal.

Therefore:

ΣFFb1, f, I, y=0, and therefore, ΣBEFFco2b1, f, I, y=0

b. Calculation of Bn-3: ΣBEPb1, f, y

The combustion gas treatment system for coal combustion in the heat generation equipment is not required to install in the absence of the project activity due to the low sulfur content in coal.

Therefore, in accordance to the assumption of methodology, it is assumed that ΣBFequipb1, f, i, y=0, BFequipb1, f, elect, y=0,

Therefore:

BEPb1, f, y=0

c. Calculation of the total of Bn-1: ΣBEb1, f, y

ΣBEb1, f, y=0

（3）Calculation of total baseline emissions: ΣTBEb1, y

ΣTBEb1, y=237,294 t-CO_2/年

B.6.3.3. Calculation of leakage

（1）Calculation of leakage of the project scenario: PL, y

PL, y=PLTcoal, y+PLTbiomass, y+PLTash, y (PL)

In this study, it is assumed that the distance and quantity of raw coal and BBF transportation between the coal mine, BBF plant and the heat generation equipment in the project activity is equal to these of fuel coal in the baseline scenario, because any concrete condition of the location the heat generation equipment and transportation roots is not clarified at present time. Conditions of the ash disposal area are not clarified also.

Therefore, it is assumed that there is no change in CO_2 emissions between the project activity and the baseline scenario, resulting in:

PL, y=0

（2）Calculation of leakage of the baseline scenario: BL, y

BLy=BLFmine, y+BLGcmm, y+BLTcoal, y+BLTash, y (BL)

Due to the same reason to PLy, it is assumed that CO_2 emissions of the baseline scenario are equal to these of the project activity, resulting in:
BLy=0

B.6.4. Summary of the ex-ante estimation of emission reduction

（1）Baseline emissions

ΣTBEb1,y=237,294 t-CO_2/y

（2）Project emissions

ΣTPEp1,y=180,837 t-CO_2/y

（3）Leakage of the project scenario

Pl,y=0

（4）Leakage of the baseline scenario

BL,y=0

（5）CO_2 emissions of the project activity

ERy=237,294 t-CO_2/y－180,837 t-CO_2/y
=56,457 t-CO_2/y

B.7 Application of the monitoring methodology and description of the monitoring plan:

B.7.1. Data and parameters monitored

B.7.1.1 Data and parameters monitored for calculation of project emissions

(1) TPEy : Total project emission

ID number and data/parameters	Data unit	description	Source of data to be used	Value of data applied	Description of measurement methods and procedure to be applied	QA/QC procedure to be applied	Any comment
P1 TPEy	tCO_2/y	Total project emissions	Calculated		Calculated by Formula (P)		
P2 TPEp1, y	tCO_2/y	CO_2 emissions of project scenario P1	Calculated		Calculated by Formula (Pn)		

TPEy=TPEp1, y (P)

TPEp1, y=ΣX・WBBFp1, f, y・NCVcoal・COEFco2, coal+ΣPE p1, f, y (Pn)

(2) TPEp1, f, y : Project emission of project scenario P1

ID number and data/parameters	Data unit	description	Source of data to be used	Value of data applied	Description of measurement methods and procedure to be applied	QA/QC procedure to be applied	Any comment
P5 X	-	Ratio of coal/BBF	Calculated	0.8	To be calculated by the consumption of coal and biomass		In this study, the design value is applied
P6 WBBFp1, f, y	kt/y	Quantity of BBF by weight burned at the heat generation equipment *f*	Operation record	100	Supply record by BBF plant and record of BBF consumption by		In this study, the heat generation equipment is assumed to be one unit,

					the heat generation equipment		and the design value of BBF production is applied
P9 NCVcoal	TJ/kt	Net calorific value of coal with 7% total moisture	Published data by the coal mine	23.0	measured by Huainan Coal Mine Group Co., LTD		In this study, the design value is applied
P11 PFcoal, y	tcoal/y	Quantity of coal consumed for the project activity by weight at 7% of the total moisture	Operation record	81,633	To measure by instrument equipped to BBF plant		To be used to confirm X (p5) and WBBFp1, y (P6). Data shall be adjusted by the actual total moisture m as follows: PFcoal, 7= PFcoal, m・(1.07-m)
P12 PFbiomass, i, y	tcoal/y	Quantity of biomass consumed for the project activity by weight at 7% of the total moisture	Operation record	20,408	To measure by instrument equipped to BBF plant		To be used to confirm X (p5) and WBBFp1, y (P6). Data shall be adjusted by the actual total moisture m as follows: PFbiomass, 10= PFbiomass, m・(1.10-m)
P17 PEp1, f, y	tCO_2/y	CO_2 emission of energy consumed for operation in the project activity	Calculated	0	Calculated by Formula (Pn-1)		Supplemental fuel for BBF combustion is disused, and the flue gas treatment system is disused. Therefore, PEp1, f, y=BEb1, f, y=0

ΣPEp1, f, y=ΣPEFFco2p1, f, i, y+ΣPEPp1, f, i, y+PTbbf p1, f, y (Pn-1)

(3) PEp1,f,y: CO_2 emission of energy consumed for operation in the project scenario P1

ID number and data/parameters	Data unit	description	Source of data to be used	Value of data applied	Description of measurement methods and procedure to be applied	QA/QC procedure to be applied	Any comment
P20 PEFFco2p1,f,i,y	tCO_2/y	CO_2 emission of fossil fuel consumed as supplemental fuel	Calculated	0	Calculated by Formula (Pn-2)		Supplemental fuel for coal combustion is disused, and the flue gas treatment system is unnecessary
P23 PEPp1,f,i,y	tCO_2/y	CO_2 emission of energy *i* consumed for operation	Calculated	0	Calculated by Formula (Pn-3)		Flue gas treatment system is unnecessary due to low sulfur content in coal. Therefore: PEPp1,f,y=BEPb1,f,y=0
P41 PTbbfp1,f,y	tCO_2/ tbbf	CO_2 emission of fuel consumed for BBF transportation	Calculated	-	Calculated by Formula (Pn-4)		=P42+P43+P44

PEFFco2p1,f,i,y=ΣFFp1,f,i,y・COEFco2,ff,i (Pn-2)

ΣPEPp1,f,i,y=PFbbfp1,bbf,y・NCVbbf・EFco2, bbf+PFbbfp1,elect,y・COEFco2,elect
+ΣPFequipp1,f,elect,y・COEFco2,elect (Pn-3)

ΣPTbbfp1,f,y=ΣPTbbfp1,f,t,y+ΣPTbbfp1,f,r,y+ΣPTbbfp1,f,is,y (Pn-4)

(4) PEFFco2p1,f,i,y: CO_2 emission of fossil fuel consumed as supplemental fuel

ID number and data/parameters	Data unit	description	Source of data to be used	Value of data applied	Description of measurement methods and procedure to be applied	QA/QC procedure to be applied	Any comment
P26	tCO_2/y	Quantity of fossil fuel	Operation	0	Instrument in BBF		Supplemental fuel for BBF

FFp1, f, i, y		as supplemental fuel for BBF combustion	record		plant		combustion is disused

PEFFco2p1, f, i, y=ΣFFp1, f, i, y・COEFco2, ff, i (Pn-2)

(5) PEPp1, f, i, y: CO_2 emission of energy consumed for operation in the project scenario P1

ID number and data/parameters	Data unit	description	Source of data to be used	Value of data applied	Description of measurement methods and procedure to be applied	QA/QC procedure to be applied	Any comment
P28 PFbbfp1, bbf, y	t/y	Quantity of BBF consumed for operation of BBF plant	Operation record	2,041	Instrument in BBF plant		In this study, the design value, 2% of processing loss, is applied
P31 PFbbfp1, elect, y	MWh/y	Quantity of electricity consumed for operation of BBF plant	Operation record	4,320	Instrument in BBF plant		In this study, the design value is applied. 600KWh・24h・300d/1000
P34 PFequipp1, f, elect, y	MWh/y	Quantity of electricity consumed for operation of the heat generation equipment *f*.	Operation record	0	Instrument in the heat generation equipment		Flue gas treatment system is unnecessary. Therefore, P34=B26=0
P37 NCVbbfp1	TJ/kt	Average net calorific value of BBF at 7.6% of the total moisture content	Operation record	21.0	Instrument in BBF plant		In this study, the design value is applied
P38 NCVbiomass	TJ/kt	Average net calorific value of biomass at 10% of the total moisture content	Operation record	13.0	Instrument in BBF plant		In this study, the design value is applied
P39 COEFco2, bbf	tCO2/TJ	CO_2 emission factor of BBF	Calculated	75.31	COEFco2, coal(p10)・0.8		In this study, the design value is applied

PEPpn, y=PFbbfp1, bbf, y・NCV bbf・COEFco2, bbf+PFbbfp1, elect, y・COEFco2, elect+
PFequippn, elect, y・COEFco2, elect (Pn-3)

（6）PT bbfp1,f,y： CO_2 emission of the fuel for BBF transportation

ID number and data/parameters	Data unit	description	Source of data to be used	Value of data applied	Description of measurement methods and procedure to be applied	QA/QC procedure to be applied	Any comment
P41 PTbbfp1,f,y	tCO_2/tbbf	CO_2 emission of BBF transportation	Calculated	0	Calculated by Formula (Pn-4)		=P42+P43+P44 Not yet studied at present time
P42 PTbbfp1,f,t,y	tCO_2/tbbf	CO_2 emission of BBF transportation by truck	Calculated	0	Calculated by Formula (Pn-4-1)		Not yet studied at present time
P43 PTbbfp1,f,r,y	tCO_2/tbbf	CO_2 emission of BBF transportation by train	Calculated	0	Calculated by Formula (Pn-4-2)		Not yet studied at present time
P44 PTbbfp1,f,is,y	tCO_2/tbbf	CO_2 emission of BBF transportation by inland-sailing	Calculated	0	Calculated by Formula (Pn-4-3)		Not yet studied at present time
P46 WBBFp1,f,t,y	t/y	Quantity of BBF transportation by truck	Operation record	-	Monitored by the BBF plant		Not yet studied at present time
P50 WBBFp1,f,r,y	t/y	Quantity of BBF transportation by train	Operation record	-	Monitored by the BBF plant		Not yet studied at present time
P54 WBBFp1,f,is,y	t/y	Quantity of BBF transportation by inland-sailing	Operation record	-	Monitored by the BBF plant		Not yet studied at present time

ΣPTbbfp1,f,y=ΣPTbbfp1,f,t,y+ΣPTbbfp1,f,r,y+ΣPTbbfp1,f,is,y (Pn-4)

ΣPTbbfp1,f,t,y=ΣWBBFp1,f,t,y・BAVDbbfp1,f,t・EF,t,km,co2/BAVbbfp1,f,t (Pn-4-1)

ΣPTbbfp1,f,r,y=ΣWBBFp1,f,r,y・BAVDbbfp1,f,r・EF,r,km,co2/BAVCbbfp1,f,r (Pn-4-2)

ΣPTbbfp1,f,is,y= ΣWBBFp1,f,is,y・BAVDbbfp1,f,is・EF,is,km,co2/BAVCbbfp1,f,is (Pn-4-3)

B.7.1.2 Data and parameters monitored for calculation of baseline emissions

(1) TBEy： Total baseline emissions

ID number and data/parameters	Data unit	description	Source of data to be used	Value of data applied	Description of measurement methods and procedure to be applied	QA/QC procedure to be applied	Any comment
B1 TBEy	tCO_2/y	Total baseline emission	Calculated	0	Calculated by Formula (B)		
B2 TBEb1, y	tCO_2/y	Baseline emissions of the baseline scenario B1	Calculated		Calculated by Formula (Bn)		The project activity is baseline scenario B1 only

TBEy=TBEb1, y (B)

(2) TBEb1, y：Baseline emissions of the baseline scenario B1

ID number and data/parameters	Data unit	description	Source of data to be used	Value of data applied	Description of measurement methods and procedure to be applied	QA/QC procedure to be applied	Any comment
B5 Qb1, f, y	TJ/y	Quantity of heat generated at the heat generation equipment	=Qp1, y	=Qp1, y	Qp1, y=Qb1, y		
B12 BEb1, f, y	tCO_2/y	CO_2 emission of energy for operation of the heat generation equipment in the absence of the project activity	= PEp1, f, y	0	Calculated by Formula (Bn-1)		Supplemental fuel for coal combustion is disused, and the flue gas treatment system is disused. Therefore, PEp1, f, y=BEb1, f, y=0

TBEb1, y=Qb1, f, y・COEFco2, coal/Ɛequipb1, f, coal+BEb1, f, y (Bn)

(3) BEb1, f, y : CO_2 emissions of energy consumed for operation the baseline scenario B1

ID number and data/parameters	Data unit	description	Source of data to be used	Value of data applied	Description of measurement methods and procedure to be applied	QA/QC procedure to be applied	Any comment
B15 BEFFco2b1, f, i, y	tCO_2/y	CO_2 emission of fossil fuel co-fired with coal		0	Calculated by Formula (Bn-2)		Supplemental fuel for coal combustion is disused
B18 BEPb1, f, y	tCO_2/y	CO_2 emission of energy consumed for operation of the heat generation equipment including the gas treatment system		0	Calculated by Formula (Bn-3)		Flue gas treatment system is disused. Therefore, PEPp1, f, y=BEPb1, f, y=0

BEb1, f, y=BEFFco2b1, f, i, y+BEPb1, f, y (Bn-1)

BEFFco2b1, f, i, y=ΣFFb1, f, i, y・COEFco2, ff, i (Bn-2)

BEPb1, f, y=ΣBFequipb1, f, i, y・COEFco2, ff, i+BFequipb1, f, elect, y・COEFco2, elect (Bn-3)

B.7.1.3 Data and parameters monitored for calculation of leakage

(1) Project leakage

ID number and data/parameters	Data unit	description	Source of data to be used	Value of data applied	Description of measurement methods and procedure to be applied	QA/QC procedure to be applied	Any comment
PL1 PLTcoalp1, y	tCO_2/t coal	CO_2 emission of fuel for transportation of raw coal	Calculated	-	Calculated by Formula (PL-1)		Not yet studied at present time
PL2 PLTbiomass, y	tCO_2/t coal	CO_2 emission of fuel for transportation of biomass	Calculated	-	Calculated by Formula (PL-2)		Not yet studied at present time
PL3 PLTash, y	tCO_2/t ash	CO_2 emission of fuel for transportation of BBF-ash	Calculated	-	Calculated by Formula (PL-3)		Not yet studied at present time
PL6 PAVDbiomassp1, t	km/truck -trip	Average trip-distance of biomass truck to BBF plant	Measured	-	measured by the location map		Not yet studied at present time
PL7 PAVCbiomassp1, t	t/truck	Average trip-capacity of biomass truck to BBF plant	Measured	-	PAVCbiomassp1, t= PAVCbbfp1, t(P48)		Not yet studied at present time
PL8 PAVDbiomasp1s, r	km/rail -trip	Average trip-distance of biomass railway to BBF plant	Measured	-	measured by the location map		Not yet studied at present time
PL9 PAVCbiomassp1, r	t/rail	Average trip-capacity of biomass train to BBF plant	Measured	-	PAVCbiomassp1, r= PAVCbbfp1, r(P52)		Not yet studied at present time
PL10 PAVDbiomassp1, is	km/sail -trip	Average trip-distance of biomass inland sailing to BBF plant	Measured	-	measured by the location map		Not yet studied at present time

PL11 PAVCbiomassp1, is	t/sail	Average trip-capacity of biomass inland sailing to BBF plant	Measured	-	PAVCbiomassp1, is= PAVCbbfp1, is(P56)		Not yet studied at present time

$$PL,y=PLTcoal,y+PLTbiomass,y+PLTash,y \qquad (PL)$$

$$PLTcoalp1,t,y=\Sigma X \cdot WBBFp1,y \cdot PAVDcoalp1,t \cdot EF,t,km,co2/PAVCcoalp1,t \qquad (PL\text{-}1)$$

$$PLTbiomassp1,t,y=\Sigma r \cdot WBBFp1,y \cdot PAVDbaiomassp1,t \cdot EF,t,km,co2/PAVCbaiomassp1,t \qquad (PL\text{-}2\text{-}1)$$

$$PLTbiomassp1,r,y=\Sigma r \cdot WBBFp1,y \cdot PAVDbaiomassp1,r \cdot EF,t,km,co2/PAVCbaiomassp1,r \qquad (PL\text{-}2\text{-}2)$$

$$PLTbiomassp1is,y=\Sigma r \cdot WBBFpn,y \cdot PAVDbaiomassp1,is \cdot EF,t,km,co2/PAVCbaiomassp1,is \qquad (PL\text{-}2\text{-}3)$$

$$PLTash,y=\Sigma r \cdot baioash \cdot WBBFp1,f,y \cdot PAVDash,f,t \cdot EF,t,km,co2/PAVCash,f,t \qquad (PL\text{-}3)$$

(2) Baseline leakage

ID number and data/parameters	Data unit	description	Source of data to be used	Value of data applied	Description of measurement methods and procedure to be applied	QA/QC procedure to be applied	Any comment
BL7 r	t-baio /t-bbf	Ration of biomass/BBF by weight	Calculated	0.2	Calculated by Formula P12/(P11+P12)		In this study, the design value is applied

B.7.2. Description of the monitoring plan

(1) Monitoring person(s)/entity(s) for the inside/outside of the project boundary

a. Monitoring procedure inside the project boundary

Sources and gases included in the project boundary should be monitored under the responsibility of the operation manager of the BBF plant appointed by the project participants.

Those monitoring data will be measured, calculated, recorded by the operating manager or his nominated fellows in accordance with B.7.1: Data and parameters monitored of this CDM-PDD (Form-Version 03) and reserved by the responsible person/entity nominated by the participants.

b. Monitoring procedure outside the project boundary

Sources and gases excluded from the project boundary are usually difficult to monitor directly by the operation manager or his nominated fellows of the BBF plant due to less technical knowledge and less chance to access to the monitoring devices.

Therefore, these sources and gases of the outside should be monitored under the responsibility of the operation manager of the corresponding facilities under the monitoring contracts between the project participant and the entities of the corresponding facilities.

Those monitoring data will be measured, calculated, recorded by the operating manager or his nominated fellows of the corresponding facilities in accordance with B.7.1: Data and parameters monitored of this CDM-PDD (Form-Version 03), and collected and reserved by the responsible person/entity nominated by the participants.

(2) Monitoring methods for the inside of the project boundary

Monitoring data to be collected at the inside of the project boundary are measured by the instrument installed on the related facilities and recorded manually in accordance with the required time schedule.

a. BBF plant:
   Quantity of coal, biomass, BBF, BBF and electricity used in BBF plant, etc.
b. Transportation
   Quantity of BBF transported to the heat generation equipment, biomass to BBF plant, BBF-ash to the disposal area, etc.
c. Heat generation plant:
   Quantity of BBF(received, burned, stocked), heat generated, electricity used, etc.

(3) Monitoring methods the outside of the project boundary

Monitoring data to be collected at the outside of the project boundary are measured and provided by the operation entity(s) of the related facility(s) in accordance with the measuring methods approved by DNA of the host country.

a. Data related to coal mining:

The coal supplier, Huainan Coal Mine Group Co., LTD

b. Data related to transportation:

DNA of the host country

B.8 Date of completion of the application of the baseline study and monitoring methodology and the name of the responsible person/entity

(1) Date of completion of the application of the baseline study and monitoring methodology

No application at present time

(2) Name of the responsible person/entity

Entity : HOKUYO CO., LTD.
Person : Mr.Tetsuo Akibayashi, Vice president
Tel/FAX : 0081-11-711-7105/0081-11-711-2220
E-mail : akibayashi@hokuyo-gr.co,jp

SECTION C. Duration of the project activity/crediting period

C.1. Duration of the project activity

C.1.1 Starting date of the project activity

01/04/2009

C.1.2. Expected operational lifetime of the project activity

21 years (from the year 2009 to the year 2029)

C.2. Choice of the crediting period and related information

C.2.1. Renewable crediting period

21 years (from the year 2009 to the year 2029)

C.2.1.1. Starting date of the first crediting period

01/04/2009(planned)

C.2.1.2. Length of the first crediting period

7 years

SECTION D ENVIRONMENTAL IMPACT

D.1. Documentation on the analysis of the environmental impacts, including transboundary impacts:

The analysis of the environmental impacts is not implemented yet.

D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by host Party:

There is no information at present time, due to no analysis of the environmental impacts.

SECTION E. Stakeholders' comments

E.1. Brief description how comments by local stakeholders have been invited and compiled:

There is no information at present time, due to no invitation and compilation of the local stakeholders' comments.

E.2 Summary of comments received :

There is no information at present time, due to no invitation and compilation of the local stakeholders' comments.

E.3 Report on how due account was taken of any comments received:

There is no information at present time, due to no invitation and compilation of the local stakeholders' comments.