D.2. 1. Option 1: Monitoring of the emissions in the project scenario and the baseline scenario

D.2.1.1. Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:

ID number *(Please use numbers to ease cross-referencing to D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
1. $BF_{i,y}$	Quantity of biomass type i combusted in the project plant during the year y	Project Records from Project Procurement department of plant	t biomass fuel	m	Monthly (aggregate), Continuously	100%	Electronic and paper	Minimal of two years after last issuance of CERs. The proposed biomass power plant is designed to handle various types of biomass resources not only the wheat and patty rice straws but also other biomass residues can be utilized as biomass fuel in the power plant. The quantity of biomass type i combusted in the project plant is recorded equal as the quantity of biomass purchased.

								The different types of biomass combusted will be collected separately. The accuracy of the meter is ±20kg.
2. NCV_i	Net Calorific Value of type i biomass utilized in power plant	Project Records from Project Procurement department of plant	GJ/tonne	m	Annually	100%	Electronic and paper	Minimal of two years after last issuance of CERs NCV of different type of biomass utilized in the plant will be measured based on reliable authorized data nationally or locally. Otherwise the default values from IPCC will be utilized.
3. $EF_{CH4,i.}$	Methane emission from biomass combustion in power plant	Latest version of IPCC default values	Kg CH4/TJ	m and c	Annually	100%	Electronic and paper	Minimal of two years after last issuance of CERs IPCC value from the latest version published will be utilized.
4. FF_y	Fossil fuels utilized for boiler	Project Records from Project	m^3 fossil fuel	m and c	Continuously	100%	Electronic and paper	Minimal of two years after last issuance of CERs

		Procurement department of plant						The amount of fossil fuels utilized in the power plant will be based on purchase receipts from relative plant office and storage volume in the beginning and end of verification period.
5 AVD_y	Average transport distance as a return trip from collection point to power plant site	Transport operator records	km	m	Monthly (aggregate), and Continuously	100%	Electronic and paper	Minimal of two years after last issuance of CERs Distance traveled will be continuously recorded by the sub-contracting logistics company by the project entity.
6. N_y	Number of trucks for the transportation of biomass	Transport operator records	-	m	Continuously	100%	Electronic and paper	To calculate ex-post the actual emission from the transportation process, this parameter is monitored. The formula is $PET_y = N_y * AVD_y * EF_{km,co2}$
7. TL_y	Average truck load of the trucks used for transportatio	Transport operator records	tonne	m	Regularly	100%	Electronic and paper	This parameter is only used for the ex-ante estimation of the emissions from the transportation process.

Deleted: This parameter is not taken into consideration based on the formula we choose for calculating the emission from transportation process.

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	n of biomass							
8. $EF_{km,co2}$	Average CO_2 emission factor for transportation n of biomass with trucks	Latest version of IPCC default values	tCO2/km	c	Annually	100%	Electronic and paper	Minimal of two years after last issuance of CERs Local or national data should be preferred. Default values from the IPCC may be used alternatively and should be chosen in a conservative manner.
9. $F_{Trans, I,y}$	Fuel consumption of fuel type I used for transportation n of biomass	Transport operator records	tonne	m	Continuously	100%	Electronic and paper	Not applicable due to the calculation formula selected for transportation emission.
10.$COEF_{co2,i}$	CO_2 emission factor for the fuel type I	Latest version of China Energy Statistics	tCO_2/tonne	m	Annually	100%	Electronic and paper	This parameter is not taken into consideration. Because for the onsite fuel consumption calculation the Net Calorific Value and carbon content are utilized instead, and furthermore for biomass transportation emission calculation the Emission Factor per kilometer is utilized instead. Detailed calculation in Annex

								3.
11. $FF_{project\ plant,I,y}$	Onsite fossil fuel consumption of fuel type I for co-firing in the project plant	Latest version of IPCC values	GJ/tonne	m	Annually	100%	Electronic and paper	This parameter is not applicable since it is not planned to co-firing other types of fossil fuel in the proposed project.
12.	Quantity of steam diverted from other boilers to the project plant		MWh			100%	Electronic and paper	Not applicable due to no heating utilization in the proposed project activity.
13	Average net efficiency of steam generation in the plant(s) from where steam is diverted to the project plant.		-			100%	Electronic and paper	Not applicable due to no heating utilization in the proposed project activity.

D.2.1.2. Description of formulae used to estimate project emissions (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

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The Emission Factor of the proposed project in year y ($EF_{P,y}$) comprise three GHG sources such as the following formulae:

$$PE_y = PET_y + PEFF_{CO2,y} + GWP_{CH4} \times PE_{Biomass,CH4,y} \quad (tCO_2/year)$$

As it is illustrated above, the total project activity emissions are from three individual emission resources listed above espectively, which represents the emissions from biomass combustion in power plant, biomass transportation from collection points to plant and the fossil fuel consumption in the boiler onsite.

D.2.1.3. Relevant data necessary for determining the baseline of anthropogenic emissions by sources of GHGs within the project boundary and how such data will be collected and archived :

ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated I, estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
14. $EGproject,plant_y$	Electricity generated and supplied to the grid by project	Project Records	Mwh	m	Monthly	100%	Electronic and paper	Minimal of two years after last issuance of CERs $EGproject,plant_y$ is the net electricity generation from the project activity (Electricity produced - Electricity consumed)

15. $Q_{project\ plant,\ y}$	Net quantity of heat generated from firing biomass in the project plant	Project Records	MWh	m	Continuously	100%	Electronic and paper	Not applicable since there is no heat planned to utilize in the proposed project.
16. $BF_{i,y}$	Quantity of biomass type I combusted in the project plant during the year y	Project purchasing department record	tonne	m	Continuously, prepared annual energy balance	100%	Electronic and paper	The quantity of biomass combusted will be collected separately for all types of biomass. An annual energy balance will be undertaken in order to check the biomass to power efficiency.
17.NCV_i	Net calorific value of biomass type i	China energy statistics or IPCC latest values	Mwh/kg	c	Annually	100%	Electronic and paper	The net calorific values of the different types of biomass utilized in the power plant will be measured separately or alternatively the individual default values from China Energy Statistics or IPCC latest version will be used.

Deleted: The biomass combusted is assumed to be equal to the biomass purchased for the power plant, but also a

Deleted: And each type of the biomass will be measured separately or the individual default values from China Energy Statistics or IPCC latest version will used.

Deleted: determined by the China Energy Statistics or latest IPCC values based on the most conservative principle for emission reduction calculation.

The electricity measured above is only the displacing power generation from fossil fuel combustion which would be occurred in the absence of proposed project activity. Moreover, the CO_2 emissions associated with extraction, transportation and storage of fossil fuels, other non-GHGs emitted through the life cycle of the fossil fuel would have taken for power generation are not taken into consideration of the estimated project emission reduction. This monitoring for the emission reduction is thought to be conservative.

D.2.1.4. Description of formulae used to estimate baseline emissions (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

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The current all types of biomass would be utilized in the power plant will be left natural decay or open-air burning in the absence of the proposed project activity. The collection and controlled burning of biomass in plant avoids the emissions both from the dispatched power in same grid system generated from fossil fuel combustion and avoided biomass disposal. The following formulae illustrate this respectively quoted with1 and 2 which stands for the grid electricity displacement emissions and avoided biomass disposal emissions.

$ER_{electricity,y} = EG_y * EF_{electricity,y}$ $= EG_y * \frac{EF_{OM,y} + EF_{BM,y}}{2}$	**$ER_{Electricity,y}$:** Project emissions from avoided biomass disposal (tCO_2/year) **EG_y**: is the power generated and connected to the grid which is supplied by the proposed power plant **$EF_{electricity,y}$:** is the emission factor in the year y of the selected power grid, simplified calculation is made based on the above formulas.
$BE_{Biomass,y} = GWP_{CH4} \bullet EF_{Burning,CH4,j}$ $\bullet \sum_i BF_{i,y} \bullet NCV_{Biomass,CH4,j}$	**$BE_{Biomass,y}$**: is the baseline emission of East China Power Grid in year y **GWP_{CH4}:** Global Warming Potential of methane (21 tCO_{2eq}/tCH4) **$EF_{Burning,CH4,y}$:** Biomass controlled burning methane emission factor (tCH4/TJ) **$BF_{i,y}$:** Biomass type I utilized in power plant (tonnes/year) **$NCV_{Biomass,i}$:** Net Calorific Value of type I biomass (TJ/tonnes)

D. 2.2. Option 2: Direct monitoring of emission reductions from the project activity (values should be consistent with those in section E).

D.2.2.1. Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:								
ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated I, estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

D.2.2.2. Description of formulae used to calculate project emissions (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.):

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This option is not chosen in the proposed project.

D.2.3. Treatment of leakage in the monitoring plan

D.2.3.1. If applicable, please describe the data and information that will be collected in order to monitor leakage effects of the project activity

ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated I or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
18	Amount of all types of biomass fired in all grid	Official data	tonne	e	annually	100%	Electronic	Minimal of two years after last issuance of CERs

	connected power plants in the region							This will be estimated from the available official data from the host country relative statistics, otherwise the data from local agriculture bureau could offer the related information about agricultural production information.
19	Surplus all types of biomass supply in the region.	Project Records or official data	tonne	e	annually	100%	Electronic	Minimal of two years after last issuance of CERs Project participants will use official data (statistics, relevant publications, etc.) or prepare an own survey. The quantity of surplus supply is the difference between available biomass and biomass used for other purposes than gird-connected electricity generation. Surplus of each kind of biomass used in this project will be investigated to make sure whether the usage of such biomass residue will influence the biomass utilization structure and generate leakage.
20.$COEF_{co2,j}$	CO_2 emission factor of the most carbon intensive fuel in the calculation of CM with the	Latest version of China Energy Statistics	tCO_2/tonne	m	Annually	100%	Electronic and paper	Minimal of two years after last issuance of CERs whenever the leakage exist. Local or national data should be preferred. Default values from the China Energy Statistics or IPCC will be used alternatively and should be chosen in a

Deleted: This will be estimated from the available official data from the host country relative statistics, otherwise the data from local agriculture bureau could offer the related information about agricultural production information.

	ACM0002							most conservative manner. Otherwise, this parameter is not taken into the leakage calculation.

The leakage emissions in the proposed project will be taken into consideration of emission deduction from total project emission reduction only when the utilization of current amount of biomass drives the more carbon intensive fuel consumption due to insufficient amount of biomass straws resources. If there is enough evidence to show the sufficient amount of biomass, which far more than the biomass taken for proposed power plant, the leakage effect can be thought to be zero. In this case, the index of biomass surplus resource has to be measured and monitored annually to judge whether leakage effect should be taken into the calculations. Otherwise, the leakage should be calculated as: $L_y = COEF_{CO2,j} * \sum_i BF_{i,y} * NCV_i (\text{tCO}_2)$

Apart from leakage effect analysis in the applied monitoring approach, other leakage emission factors are very tiny due to the project boundary made for the proposed project. Because all the other significant emissions within the project boundary which are taken into the calculation in the project activity emissions already.

D.2.3.2. Description of formulae used to estimate leakage (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

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The critical judgment for whether should estimate the leakage emissions are depending on the driving force of more carbon intensive fuel will be consumed in the project area. Otherwise the leakage emission has to be monitored and calculated to deduct in the net project activity emission reduction.

See the detailed leakage estimation analysis in Section B 2.Therefore, it can be found that the proposed project has no leakage effect as the **alternative 1** in the table above: $\mathbf{L_y = 0}$.

Otherwise, the leakage should be calculated as: $L_y = COEF_{CO2,j} * \sum_i BF_{i,y} * NCV_i (\text{tCO}_2)$

The leakage emissions during the year y equals to the CO_2 emission coefficient per energy unit of the most carbon intensive fuel utilized in the county multiply by the amount of type I biomass used as fuel in the project plant during the year y and multiply by the Net Calorific Value of biomass type I (per volume or mass).

D.2.4. Description of formulae used to estimate emission reductions for the project activity (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

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As it is already calculated and explained in the sections D.2.1.2, D2.1.4 and D2.3.2, the total net project emission reduction is showing in the following formulae:

$$Net\,\mathrm{Pr}ojectActivityEmission\,\mathrm{Re}duction = BaselineEmissions - \mathrm{Pr}ojectActivityEmissions - Leakage$$

$$\Rightarrow ER_y = ER_{electricity,y} + BE_{Biomass,y} - PE_y - L_y \qquad (tCO_2/year)$$

$$= \left(EG_y \times EF_{electricity,y} + BE_{Biomass,y}\right) - \left(PET_y + PEFF_{co2,y} + GWP_{CH4,y} \times PE_{Biomass,CH4,y}\right)$$

D.3. Quality control (QC) and quality assurance (QA) procedures are being undertaken for data monitored		
Data *(Indicate table and ID number e.g. 3.-1.; 3.2.)*	Uncertainty level of data (High/Medium/Low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.
1	*Low*	*Trucks carrying biomass will be weighed twice, upon entry and exit. Meters at the weighing station will undergo maintenance subject to national standard JJG907-2003. Any direct measurement with mass or volume meters at the plant site should be cross checked with an annual energy balance that is based on purchased quantities and stock changes.*
2	*Low*	*Official local or national data or IPCC default values will be used. If the values differ significant, additional information is necessary to collect and provide in a more feasible method.*
3	*Low*	*Official local or national data or IPCC default values will be used. If the values differ significant, additional information is necessary to collect and provide in a more feasible method.*
4	*Low*	*The receipts from the fuel suppliers for the on site fossil fuel consumption will be checked with the data form the accounting department. The Volume indicator will be manually checked.*
5	*Low*	*The records submitted by the trucks will be compared to the average distance between the plant and the biomass collection point.*
6	*Low*	*The records monitored by the drivers will be compared to the biomass delivery records of biomass at the storehouse.*
8	*Low*	*This involves the use of official data such as IPCC latest version values for the host country.*

14	*Low*	*Meters will undergo maintenance/calibration subject to national power industry standard DL/T 448-2000. The accuracy of the meter readings will be verified by receipts issued by the purchasing power company, a national or regional authority in most cases. And the local technical and supervision bureau will calibrate and issue the authorized reports annually. Quality control of this data is beyond the control of the project operators. This involves the use of official data released by the power generating company.*
16	*Low*	*An annual energy balance will be undertaken with the biomass purchasing records onsite by the project operator.*
17	*Low*	*This involves the use of official data nationally such as China Energy Statistics and international official such as IPCC latest version values for the host country.*
18	*Low*	*This involves the use of official data nationally and regionally released by the power generating companies all over the country. And quality control of this data is beyond the control of the project operators.*
19	*Low*	*An independence third party will perform this activity. Quality control of this data is beyond the control of the project operators. However, this data, if considered unreasonable, maybe supplanted by more accurate data according to methods verified by the DOE. The survey will include quantifications of biomass resources, biomass collected, biomass consumption for electricity generation, and an analysis of project impacts on carbon stocks.*
20	*Low*	*This involves the use of official data such as IPCC latest version values for the host country.*

D.4 Please describe the operational and management structure that the project operator will implement in order to monitor emission reductions and any leakage effects, generated by the project activity

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ZHONGJIENENG Suqian Biomass Energy Investment Co.,Ltd is the daughter company of ZHONGJIENENG Biomass Energy Investment Co.,Ltd. And the staff from this onsite subsidy company will conduct the monitoring procedures work based on the monitoring methodology chosen for the proposed project activity. The chosen monitoring methodology is thought to be most accurate and conservative that guaranteed the recording of the emission reductions and leakages is valid and verifiable.

The monitoring data such as all kinds of tables for different monitoring parameters, reports will be processed and stored first in the plant office, and will be sent periodically to the ZHONGJIENENG Biomass Energy Investment Co.,Ltd headquarter in Beijing for Quality Assurance and final processing.

The following table shows the responsibilities for carrying out the monitoring plan after the operation of proposed power plant.

Main technical supervision	Contact person: Xin Fuhua Address: Yuyuan Villa C266, Suyu District, Suqian City, Jiangsu Province Phone: 0527-4456683/13852806455 Email:xbh@beips.com.cn
Data acquisition (Continuously, monthly and annually)	Contact Person: Lv Gang Address: Yuyuan Villa C266, Suyu District, Suqian City, Jiangsu Province Phone:0527-4456682/13773999770 Email:sczb@beips.com.cn
Emission Reduction calculation (monthly and annually)	Contact Person: Zhao Yanan Address: 804 A, Zhongjieneng Tower, No 42 Xizhimen Beidajie St, Haidian District, Beijing, P.R.China 100036 Phone:010-6226 9659/13810008347 Email:zhaoyanan7445@163.com
Main monitoring supervision (Continuously)	Contact Person: Wu Xiaohua Address: 804 A, Zhongjieneng Tower, No 42 Xizhimen Beidajie St, Haidian District, Beijing, P.R.China 100036 Phone:010-6226 9659/13501368536 Email:wuxiaohua@cecic.cn