



## Validation opinion for post registration changes

Title of project activity:		
Wanzai Kaidi Biomass Power Project		
CDM reference number:	DNV project No.:	
3071	PRJC-314620-2011-CCS-CHN	
Date:	Validation of the changes were conducted:	
18 October 2012	<input type="checkbox"/> Prior to the commencement of a verification of the project activity <input checked="" type="checkbox"/> When performing a verification of the project activity	
Work carried out by:	Work verified by:	Approved by:
Lin Wu <i>Wu Lin</i>	Sharmistha Shome <i>sharmistha shome</i>	Hendrik W. Brinks <i>H.W. Brinks</i>

### 1 Overview of post registration changes

Type of post registration change		Is prior approval by CDM EB required? (refer to Appendix 1 of CDM Project Standard)
Temporary deviations from the registered monitoring plan and/or monitoring methodology (refer to section 2)		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Not applicable
Corrections (refer to section 3)		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Not applicable
Changes to the start date of the crediting period (refer to section 0) <i>Prior approval by the CDM EB is not required in case of (a) bringing forward the start date up to one year earlier or (b) postponing the start date by up to one year (by up to two years for project activities in LDCs).</i>		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Not applicable
Permanent changes from the registered monitoring plan or applied methodology (refer to section 0)	<input type="checkbox"/> Proposed revision only includes the request by the CDM EB <input type="checkbox"/> Proposed revision includes not only the request by the CDM EB but also additional revisions proposed by the PP/DOE <input type="checkbox"/> Proposed revision includes revisions proposed by the PP/DOE	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Not applicable
Changes to the project design of a registered project activity (refer to section 0)	<input checked="" type="checkbox"/> Notification of changes from project activity as described in the registered PDD (i.e. changes do <u>not</u> raise any concerns with regard to i) additionality, ii) the scale of CDM project activity and/or iii) the applicability and	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Not applicable

	<input type="checkbox"/> application of baseline methodology <input type="checkbox"/> Request for approval of changes from project activity as described in the registered PDD	
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## 2 Temporary deviations from the registered monitoring plan and/or monitoring methodology

Not applicable

## 3 Corrections

In the registered PDD, the generator's manufacturer was "Nanjing Steam Turbine (Group) Co.,". However, by checking the nameplate and generator supply contract during the site visit, DNV found the manufacturer of 1# generator was "Nanjing Steam Turbine (Group) Co., Ltd" and "China Chang Jiang Energy Corporation" for 2# generator. The typo error on 1# generator has been corrected in the revised PDD to be "Nanjing Steam Turbine (Group) Co., Ltd", and the further assessment on the change of 2# generator's manufacturer was given in the following section 6.

## 4 Changes to the start date of the crediting period

Not applicable

## 5 Permanent changes from the registered monitoring plan or applied methodology

Not applicable

## 6 Changes to the project design of a registered project activity

### 6.1 Description of the changes as compared to the description in the registered PDD and description of the changes to the monitoring plan

The project applies the approved consolidated baseline methodology ACM0006 (version 09) "Consolidated methodology electricity generation from biomass residues". The change requested to the registered PDD is mainly regarding the biomass residue utilized and turbine-generator supplied:

#### (1) Change of biomass types

It was stated in the registered PDD that "The biomass residues utilized in this proposed project will be mainly rice husk, rice straw, oil seed rape straw". However, by checking the daily operating log during the site visit, DNV was able to confirm that rice husk was used from the start of proposed project implementation, but that also branch, bark and saw dust were utilized since December 2010 (branch, bark and saw dust here are defined as forestry residues). Thus, the biomass residues utilized for the project are rice husk, branch, bark and saw dust.

#### (2) Change of manufacturer of 2# steam turbine and generator

In the registered PDD, it stated that the 2# steam turbine and generator were manufactured both by NanJing Steam Turbine (Group) Co., Ltd and their models are C12-4.90/0.981-12/435°C and QFJ-15-2, respectively. However, during the site visit, it is found that they both were manufactured by China Chang Jiang Energy Corporation and their modes were C12-4.90/0.981/435°C and QF-15-2, respectively.

In addition, to revising the PDD with regard to the changes, the PDD was also revised in section A.3 to reflect that Camco International Limited was authorized by Switzerland to participate in this project. The request to also add Switzerland as Party involved in the project has been accepted by the UNFCCC on 5 May 2011.

## **6.2 Assessment of the changes to the project design**

### ***Assessment of when the changes occurred***

#### **(1) Change of biomass types**

The change of biomass residues occurred in December 2010, subsequent to start of the project operation on 5 July 2010.

#### **(2) Change of manufacturer of 2# steam turbine and generator**

The change of the manufacturer of 2# turbine and generator happened prior to the construction of 2# steam turbine and generator in January 2010\*.

### ***Assessment of the reasons for these changes taking place***

#### **(1) Change of biomass types**

After the project was put into operation from 5 July 2010, the project developer was compelled to seek other alternatives as the project owner realized that the seasonal production of biomass residue types. As mentioned in the registered PDD (version 04 dated 31 March 2010), affected the biomass fuel supply. The biomass types in Wanzai County where the project located were much more diverse than predicted and various types of biomass residues supply can guarantee the continuous operation of power plant.

#### **(2) Change of manufacturer of 2# steam turbine and generator**

The change of 2# steam turbine and generator was due to the delivery delay of equipment supplied by the original contracted entity NanJing Steam Turbine (Group) Co., Ltd. To guarantee the project progress, the project developer was compelled to seek the substitutes. As one of main manufacturer of the steam turbine and generator in China, China Chang Jiang Energy Corporation can provide the similar equipment with equivalent performance to meet engineering requirement.

### ***Assessment of whether the changes would have been known to the project participants prior to registration of the project activity***

#### **(1) Change of biomass types**

As stated in the validation report (version 03 dated 25 October 2010), the biomass residues utilized in this proposed project will be mainly rice husk, rice straw and oil seed rape straw. The available biomass residue, as envisaged, during the validation stage has been verified from FSR (dated March 2008) prepared by the accredited third party Wuhan Kaidi Electric Power Engineering Co., Ltd. The changes occurred in December 2010, which was later than the final validation report completed on 25 October 2010 but it was prior to the registration as the CDM project activity on 13 January 2011.

#### **(2) Change of manufacturer of 2# steam turbine and generator**

The change of manufacturer of 2# steam turbine and generator happened since the turbine and generator started construction in January 2010, which is later than the validation site visit

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\* Construction permission of 2# unit turbine and generator issued by Jiangxi Chengda Engineering Consultation and Supervision Co., Ltd in January 2010

dated 27 February 2009 but it was prior to the registration as the CDM project activity on 13 January 2011.

***Assessment of how the changes may impact the overall operation/ability of the project activity to deliver emission reductions as stated in the PDD***

**(1) Change of biomass types**

As per ACM0006 (version 09), possible leakages due to competing use of biomass have to be considered. When the types of used biomass residues are changed, the leakage has to be reconsidered. This was done as follows:

In the registered PDD, according to the applied methodology ACM0006 (version 09), the approach L<sub>2</sub> for estimating leakage is applied in the proposed project for demonstrating that the quantity of available biomass residue of each type in the region is at least 25% larger than the quantity of residues utilized. In response to the new type of biomass residues utilized in the project, an investigation of the new biomass residue types was carried out by Wuhan Kaidi Power Engineering Co., Ltd\*.

Table 1: Biomass resources in 60 km radius from the plant

Biomass Type	Rice husk (10 <sup>4</sup> tonnes)	Forestry residues (10 <sup>4</sup> tonnes)		
		Branch	Bark	Saw dust
Total biomass generation in the region	20.074	45		
Biomass loss	2.007	4.5		
Available biomass in the region	18.067	40.5		
Biomass utilised out of the project	1.807	6.075		
Biomass utilised by the project**	8.5	6.0	3.5	3.1
Total biomass utilised, including the project	10.307	18.675		
Available biomass/Total biomass utilised	175%	217%		

(1) Forestry residues include branch, bark and saw dust; (2) Biomass utilised by the project is sourced from the assessment on all type of biomass residues used by the project issued by the FSR designer

The investigation of the biomass residues utilized shows that the quantity of available residues of the above mentioned biomass types in 60 km away from the project plant are all more than 25% larger than the quantity of available biomass. In the registered PDD, it stated “the geographical boundary in the biomass availability report is covering a radius of 70 km around the project site”. As the boundary with the radius of 60 km around the project site has proved that the surplus quantity of biomass is available for the project, the boundary with radius of 70 km around the project site has the same conclusion, i.e. the project will not influence the present biomass utilisation and it will not create any leakage. This is in compliance with ACM0006 (version 09).

However, due to the change of biomass residues type, the biomass quantity consumed by the project has been re-assessed. The project participant commissioned the FSR’s designer to assess the quantity of biomass residues consumed by the project, which is based on the same operation output. In the assessment, it was stated that the applicability of the boilers selected is good enough for various types of biomass residues (also including branch, bark and saw dust), and the proportion of each biomass residue can be adjusted as per actual operation. In the FSR, the total energy consumed by two boilers was estimated to be 2 142.10 TJ.

\* Investigation report for the biomass supply/demand in Wanzai County issued by Wuhan Kaidi Power Engineering Co., Ltd in January 2012

Considering the nature and availability of each biomass residue, the new energy balance was conducted as below:

Table 2: Energy balance calculation

Biomass type	Rice husk	Branches	Barks	Saw dust
Wet weight (10 <sup>3</sup> t)	85	60	35	31
Moisture (%)	12.67%	22.29%	30.34%	37.02%
Dry weight (10 <sup>3</sup> t)	74.231	46.626	243.81	19.524
NCV (GJ/t)	13.23	13.80	12.74	10.55
Energy (TJ)	982.06952	643.4388	310.61394	205.97609
Total energy (TJ)	2142.10			

(1) Moistures are sourced from the daily actual measurement

(2) NCV results were issued by reputed laboratory

By checking relevant documents/evidences, DNV was able to confirm that the quantity of all types of biomass residues used by the project activity was reasonable and can meet the requirement of project implementation and operation. Hence, the updated quantity and nature of each biomass residue are applied in the calculation of baseline emissions and project emissions. Furthermore, due to the change of total quantity of biomass residues, the number of truck trips for the transportation of biomass residues and on-site electricity consumption attributable to the project activity has also been updated in the calculation. DNV has verified the calculations in the spread sheet along with the updated PDD and confirmed that the annual estimated baseline emissions and project emissions are changed from 129 802 tCO<sub>2</sub> and 14 042 tCO<sub>2</sub> to 130 181 tCO<sub>2</sub> and 15 353 tCO<sub>2</sub>, respectively. As a result, the estimated emission reductions are changed from 115 760 tCO<sub>2</sub> to 114 828 tCO<sub>2</sub>, which reflects the actual project implementation and operation.

## (2) Change of manufacturer of 2# steam turbine and generator

DNV has verified the technical parameters between original turbine and generator and the installed turbine and generator of 2# unit as follows.

Table 3: Comparison for the main technical parameters

Steam turbine	Manufacturer	NanJing Steam Turbine (Group) Co., Ltd <sup>*</sup>	China Chang Jiang Energy Corporation <sup>†</sup>
	Model	C12-4.90/0.981-12/435 °C	C12-4.90/0.981 °C
	Type	Medium temperature and sub-high pressure extraction condensing steam turbine	Medium temperature and sub-high pressure extraction condensing steam turbine
	Rated power	12 MW	12 MW
	Main steam pressure	4.9 MPa.a	4.9 MPa.a
	Main steam temperature	435 °C	435 °C
	Rate extraction steam volume	15 t/h	15 t/h
	Maximum Extraction steam volume	60 t/h	60 t/h
	Quantity	1	1
generator	Manufacturer	NanJing Steam Turbine (Group) Co., Ltd	China Chang Jiang Energy Corporation.

<sup>\*</sup> The turbine and generator purchase contract with NanJing Steam Turbine (Group) Co., Ltd

<sup>†</sup> The turbine and generator purchase contract with China Chang Jiang Energy Corporation

	Model	QFJ-15-2	QF15-2
	Rated power	15 MW	15 MW
	Rated voltage	10.5 kV	10.5 kV
	Power factor	0.8	0.8
	Efficiency	≥97%	≥97%
	Rated rotating speed	3000 r/min	3000 r/min
	Rated frequency	50 Hz	50 Hz
	Quantity	1	1

From the table above, it seems that the technical parameters of the steam turbine and generator from two manufacturers are same despite their models are different. The rated power for the steam turbine and the generator was not changed. Furthermore, by verifying the purchase contracts of the turbine and generator, DNV is able to confirm that the purchase price for the turbine and generator from two manufacturers were same also. Therefore, the change of manufacturer of 2# steam turbine and generator does not impact the overall operation/ability of the project activity to deliver emission reductions as stated in the PDD.

### 6.3 Assessment of the impact of the changes to the project design

*Do the changes adversely affect the conclusions of the validation report of the registered PDD with regard to any of the following?*

- ☐ Additionality
- ☐ Scale of CDM project activity
- ☐ Applicability and application of approved baseline methodology under which the project activity has been registered or the later version of the applied methodology
- ☐ The compliance of the monitoring plan with applied monitoring methodology (*refer as applicable to section 3 for the assessment of revisions to the monitoring resulting from the change of the project design*)
- ☐ The level of accuracy of the monitoring compared with the requirements contained in the registered monitoring plan (*refer as applicable to section 3 for the assessment of revisions to the monitoring resulting from the change of the project design*)
- ☒ The changes do not adversely impact i) the applicability and application of the applied methodology, ii) the additionality of the project activity and iii) the scale of the project activity

#### *Assessment of impacts of the changes on additionality*

##### **(1) Change of biomass types**

The change of biomass impacts the project's additionality as an investment analysis was used to demonstrate the additionality of the project and with a change of biomass residue types, the prices are different. However, no concerns are raised with respect to additionality. Hence, in accordance with the Appendix 1 of CDM Project Standard, no prior approval by the CDM EB on such change of the project design is required.

On the basis of information sourced from the biomass fuel purchase contract<sup>\*</sup>, and the data of the net calorific values for biomass residues used in the project activity from a reputed laboratory<sup>†</sup>, DNV could verify that the average prices for the biomass residues utilized by the project are higher on an energy basis than those used in the registered PDD. The project IRR considering actual biomass residue prices is therefore lower than the one anticipated in the registered PDD.

Table 4: Prices of biomass residues utilized on energy basis

Data source	Rice husk	Branch	Bark	Saw dust
Average prices from invoice (RMB/t)	340	305	290	270
NCV from the reputed laboratory (GJ/t)	13.23	13.80	12.74	10.55
Prices of biomass residues utilized on energy basis (RMB/GJ)	25.70	22.10	22.76	25.59
Registered PDD	21.88 RMB/GJ (lowest NCV of the rice straw is conservatively used)			

Therefore, using other biomass residue types does not impact the conclusion in the registered PDD of the proposed project that the project is additional.

## **(2) Change of manufacturer of 2# steam turbine and generator**

According to the section 6.2 above, the rated power and the purchase price of the turbine and generator from two manufacturers were same. Therefore, the change of manufacturer of 2# steam turbine and generator does not impact financial assessment conclusion and also the additionality of the project.

### ***Assessment of impacts of the changes on the scale of the CDM project activity***

The capacity of the project is not changed by the change of biomass residue and the change of manufacturer of 2# steam turbine and generator. The project is already a large scale project.

### ***Assessment of impacts of the changes on the applicability and application of baseline methodology***

#### **(1) Change of biomass types**

The project applied the approved consolidated baseline methodology ACM0006 (version 09) “Consolidated methodology electricity generation from biomass residues”, which is applicable to the project activity as:

- Other than rice husk which has been identified as biomass residues in the registered PDD, additional three types of biomass residue were used in the project activity as confirmed by DNV through the site visit. As stated in the investigation report of local biomass resource issued by the accredited third party, branch, bark and saw dust are forestry residues, which are considered as renewable biomass residues. Hence, no other biomass types than biomass residues, as defined in ACM0006 (version 09), are the predominant fuel used in the project activity and there are no fossil fuels was co-fired, which can be verified by the purchase and operating records of biomass residues as well as the on-site visit.
- The biomass residues abundantly available within the boundary of the project covering radius of 60 km (and also 70 km) are surplus as compared to the biomass consumption of the project. The biomass residues utilized are procured from agriculture and forestry

<sup>\*</sup> The biomass fuel purchase contract in 2011

<sup>†</sup> NCV of biomass residues test result issued by Luoyang City Coal Quality Test Centre in January 2011

residues, not the product of any production process. Therefore, the implementation of the project activity will not increase the biomass production in the identified region, which can be verified by the investigation report of local biomass resource by the accredited third party.

- Due to the volatility and deterioration of biomass residues, the performance of the power plant equipment will be affected by the calorific value decreasing. Therefore, the biomass residues used in the proposed project will not be stored for more than 1 year. The biomass fuels will be consumed on a first-come first-burn basis.
- There is no significant energy quantities except from transportation and mechanical treatment of the biomass residues required. The project activity will consume a few liters of diesel for start-ups and transportation and mechanical treatment of the biomass residues.

The methodology is hence still applicable for the project after the change of project design.

#### **Baseline determination of biomass residues used and determination of scenario:**

The alternative B2 is not realistic as the practice of land filling and other planned dumping of biomass residues in anaerobic conditions in rural area is not a common practice and highly impractical in China. B5 is eliminated as there is no generation or cogeneration project using biomass residues as fuel close to proposed project. B6 also is excluded since there are no biomass boilers using biomass residues as fuel close to proposed project. There is no project using the surplus biomass residues for other energy purposes at the project site, which could be confirmed by DNV through reviewing the investigation report of local biomass resource issued by the accredited third party. Thus B7 is not eligible. As stated in the investigation report of local biomass resource, there is a little amount of biomass residues that has been used as fertilizer or firewood around the project site. But the biomass residues consumption by the proposed project activity is derived from local surplus biomass residues within the identified boundary, which will not inappropriate the biomass residues as fertilizer. Thus, B8 is eliminated.

In conclusion, the baseline for all the biomass residues is B1/B3 and the baseline for cogeneration is unchanged. Hence, the baseline of the project after the change of project design is still Scenario 2 of the methodology.

#### **(2) Change of manufacturer of 2# steam turbine and generator**

Since the technical parameters of 2# steam turbine and generator from two manufacturers are same, as stated in Table 3 above, the baselines for the power generation and heat generation are already P4 and H6. Therefore, the Scenario 2 is still the baseline of the project after the change of manufacturer of 2# steam turbine and generator.

#### ***Assessment of impacts of the changes on the compliance of the monitoring plan with the applied monitoring methodology***

The biomass type change and the manufacturer of 2# turbine and generator change do not involve the change of the monitoring plan with the applied monitoring methodology.

#### ***Assessment of impacts of the changes on level of accuracy of the monitoring compared with the requirements contained in the registered monitoring plan***

The biomass type change and the manufacturer of 2# steam turbine and generator change do not involve the change compared with the registered monitoring plan.



## **7 Validation opinion**

DNV's verification of emission reductions reported for the project revealed an inconsistency with regard to the type of biomass residues actually used compared to the types mentioned in the registered PDD. Considering the assessment presented above, DNV was able to confirm that the change of biomass types and the change of manufacturer of 2# steam turbine and generator for the project does not impact the additionality of the project activity, does not impact the scale of CDM project activity, and does not impact the applicability of ACM0006 (version 09). Since the quantity and nature of each biomass residue used in the calculation of emission reductions in the registered PDD are changed due to the change of biomass residue types, the annual estimated emission reductions have been updated to reflect the actual project implementation and operation.

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