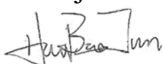
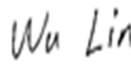

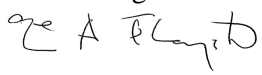




## Validation opinion for post registration changes

Title of project activity:		
Hunan Qidong Kaidi Biomass Power Project		
CDM reference number:	DNV project No.:	
3066	PRJC-351253-2011-CCS-CHN	
Date:	Validation of the changes were conducted:	
10 September 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:
Hou Baojun      Lin Wu  	Andrea Leiroz 	Ole A. Flagstad 

### 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 type="checkbox"/> No <input checked="" type="checkbox"/> Not applicable	
Changes to the start date of the crediting period (refer to section 4) <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 5)	<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 6)	<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

Not applicable

## 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 applied 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 the turbine and generator installed:

#### ***The change of biomass type:***

It was stated in the registered PDD that “The biomass residues utilized in this proposed project will be mainly rice husk, wheat straw, rice straw, cotton straw, oil seed rape straw, maize straw”. However, by checking the daily operating log during physical site visit, DNV was able to confirm that rice husk and rice straw were used from the start of proposed project implementation, and the branch, stump, wood chips and barks were utilized since December 2010 (branch, stump, wood chips and barks here are defined as forestry residues). Thus, the main biomass residues utilized for the project are rice husk, rice straw, branch, stump, wood chips and barks.

#### ***The change of the turbine and generator:***

In the registered PDD, the steam turbine and the generator were manufactured by the Nanjing Steam Turbine (Group) Co., and the steam turbine model is C12-4.90/0.981-12/435. However, during the site visit, it is found that they both were manufactured by China Chang Jiang Energy Corporation and the turbine mode were C12-4.90/0.981 by checking the nameplate. Therefore, the manufacture for the steam turbine and the generator has been changed to China Chang Jiang Energy Corporation. The model of the steam turbine has been changed to C12-4.90/0.981.

In addition, to revising the PDD with regard to the changes in the type of the biomass residue and the change of the turbine and generator, 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 18 April 2011.

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

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

The change of biomass occurred since December 2010.

The change of the turbines and generators occurred since the turbine and generator construction date of 5 January 2010\*.

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

After the project was put into operation, the project owner was compelled to seek other alternatives as the project owner realized that the seasonal production of types biomass residues, as mentioned in the registered PDD dated 31 March 2010, affected the biomass fuel supply, whereas the biomass types in Qidong County where the project is located were much more diverse than predicted and various types of biomass residues supply can guarantee the continuous operation of power plant.

The reason of the turbines and generators change is due to the delivery delay for the original equipment.

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

#### ***The change of the biomass type:***

From the validation report (version 03 ,dated 25 October 2010), the available biomass residues are rice husk, rice straw, cotton straw and oil seed rape straw during the validation stage. The available biomass residue, as envisaged, during the validation stage has been verified from Biomass Availability Report (dated November 2007) prepared by the FSR author (Wuhan Kaidi Electric Power Engineering Co., Ltd.). The changes occurred since December 2010, which was later than the final validation report completed on 25 October 2010 (version 03). But it was prior to the registration as the CDM project activity on 13 January 2011.

#### ***The change of the turbine and the generator:***

The change of the turbines and generators occurred since the turbine and generator construction date of 5 January 2010, which is later than the validation site visit dated 12 March 2009.

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

#### ***The change of the biomass type:***

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 estimate the leakage is utilized 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

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\* The turbine and generator complete report, it stated that the construction for the turbine and generator is from 5 January 2010.

the project, an investigation of the new biomass residue types was carried out by Wuhan Kaidi Power Engineering Co., Ltd\* and its effect on the leakage was re-assessed.

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

Biomass Type	Rice husk (10 <sup>4</sup> tonnes)	Rice straw (10 <sup>4</sup> tonnes)	Forestry residues (10 <sup>4</sup> tonnes)			
			Wood chips	Stumps	Branches	Barks
Total biomass generation in the region	30.38	125.53	60.00			
Biomass loss	3.04	18.83	6.00			
Available biomass in the region	27.34	106.70	54.00			
Biomass utilised out of the project	5.47	21.34	8.10			
Biomass utilised by the project**	12	8.85	12.00	2.00	2.50	11.00
Total biomass utilised, including the project	17.47	30.19	35.60			
Available biomass/Total biomass utilised	156.52%	353.43%	151.69%			

\*\* 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 over 25% larger than the quantity of available of biomass type that are utilized. The conclusion is that 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 rice husk, rice straw, wood chips, branches, barks and stumps), and the proportion of each biomass residue can be adjusted as per actual operation. In the FSR, the total energy consumed by four boilers was estimated to be 4 274.09 TJ. Considering the nature and availability of each biomass residue, the new energy balance was conducted as below:

**Table 2 Energy balance**

Biomass type	Rice husk	Rice straw	Branch	Stump	Wood chip	Bark
Wet weight (10 <sup>3</sup> t)	120	88.5	25	20	120	110
Moisture (%)	14.34	33.92	26.63	29.02	30.70	27.86
Dry weight (10 <sup>3</sup> t)	102.792	58.481	18.343	14.196	83.16	79.354
NCV (GJ/t)	13.07	10.63	11.27	11.25	11.76	12.16
Energy (TJ)	1343.49	621.65	206.72	159.71	977.96	964.94
Total energy (TJ)	4 274.47					

(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

\* Investigation report for the biomass supply/demand for year 2010 in Qidong County issued by Wuhan Kaidi Power Engineering Co., Ltd in November 2011.

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 calculating process in the spread sheet along with updated PDD and confirmed that the annual estimated baseline emissions and project emissions are changed from 259 033 tCO<sub>2</sub> and 37 035 tCO<sub>2</sub> to 261 473 tCO<sub>2</sub> and 43 770 tCO<sub>2</sub>, respectively. So the estimated emission reductions are changed from 221 998 tCO<sub>2</sub> to 217 703 tCO<sub>2</sub>, which reflected to the actual project implementation and operation.

*The change of the turbine and the generator:*

DNV has verified the technical parameters between original turbine and generator and the installed turbines and generators as following:

Table 3 Comparison for the main technical parameters

stream turbine	Manufacturer	NanJing Steam Turbine(Group) Co., *	China Chang Jiang Energy Corporation. <sup>†</sup>
	Model	C12-4.90/0.981-12/435℃	C12-4.90/0.981
	Type	Medium temperature and sub-high pressure extraction condensing steam turbine	Medium temperature and sub-high pressure extraction condensing steam turbine
	Rated power	12MW	12MW
	Main steam pressure	4.9MPa.a	4.9MPa.a
	Main steam temperature	435℃	435℃
	Rate extraction steam volume	15t/h	15t/h
	Maximum Extraction steam volume	60t/h	60t/h
	Quantity	4	4 <sup>‡</sup>
generator	Manufacturer	NanJing Steam Turbine(Group) Co.,	China Chang Jiang Energy Corporation.
	Model	QFJ-15-2	QF15-2
	Rated power	15MW	15MW
	Rated voltage	10.5KV	10.5KV
	Power factor	0.8	0.8
	Efficiency	≥97%	≥97%
	Rated rotating speed	3000r/min	3000r/min
	Rated frequency	50Hz	50Hz
	Quantity	4	4

\* The turbine and generator purchase contract with NanJing Steam Turbine(Group) Co.,

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

<sup>‡</sup> As indicated in the registered PDD, the project will install 4 sets of 65 t/h Circulating Fluidized Bed (CFB) boilers and 4 sets of 12 MW steam turbines generator unit and the project will be built into two phases, each of them is 24 MW. During the site visit, 2 sets of 65 t/h CFB boilers and 2 sets of 12 MW steam turbines generator unit has been operated.

According to the above table, the technical parameters are the same despite the model of the turbine is difference. The rated power for the steam turbine and the generator was not changed. By verifying the purchase contracts of the turbine and generator, DNV is able to confirm that the purchase price for the turbine and generator has not been changed. Therefore, the change of the turbine and the 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*

##### ***The change of the biomass type:***

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. A notification for change of project design is therefore submitted.

On the basis of information sourced from the biomass fuel invoices<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 all the 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

Data source	Rice husk	Rice straw	Branch	Stump	Wood chip	Bark
Average prices	325	281	295	320	292	310

<sup>\*</sup> The invoices for biomass fuel in 2011

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

from invoice (RMB/t)						
Average NCV from the reputed laboratory (GJ/t)	13.07	10.63	11.27	11.25	11.76	12.16
Prices of biomass residues utilized on energy basis (RMB/GJ)	24.87	26.43	26.18	28.44	24.83	25.49
Registered PDD	22.72 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. Therefore, a notification for change of project design is submitted.

***The change of the turbines and the generators:***

According to the table 3, the rated power and the purchase price for the turbine and generator were not changed, therefore, the change of the turbine and generator does not impact the additionality of the project.

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

The rated power of the turbine and generator was not changed. The capacity of the project is not changed by the change of biomass residue. Therefore, the project is already a large scale project.

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

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 risk husk and rice straw which have been identified as biomass residues in the registered PDD, additional four types of biomass residue were used in the project activity confirmed by DNV through site visit. As state in the investigation report of local biomass resource issued by the accredited third party, the branch, stump, wood chips and barks 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 100 km are surplus as compared to the biomass consumption of the project. The biomass residues utilized are procured from agriculture and forestry 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 can be confirmed by DNV through review the investigation report of local biomass resource issued by the accredited third party. Thus B7 is not eligible. As state 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 appropriate 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.

Due to the turbine and generator technical parameters is the same, as stated in the table 3 the baseline for the heat and generator is already P4 and H6. The scenario 2 is still the baseline of the project after the change of the 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 turbine and generator change do not involve the change of the monitoring plan with the applied monitoring methodology.

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***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 turbine and generator change do not involve the change compared with the registered monitoring plan.

## **7 Validation opinion**

DNV's verification activity for the project revealed the inconsistency in the type of the used biomass residue of the registered PDD. But considering the assessment presented above, DNV was able to confirm that the biomass changes for the project and the turbine and generator change would not impact the additionality of project activity negatively, would not change the scale of CDM project activity, would not change 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 to the actual project implementation and operation.