CDM Project Design Document

The 30MW Project

Xinjiang Urumqi Tuoli Wind Farm

Beijing Guotou Energy Conservation Company

February, 2006

CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 02 - in effect as of: 1 July 2004)

CONTENTS

A. General description of project activity -- 2

B. Application of a baseline methodology -- 8

C. Duration of the project activity / Crediting period ------------------------------ 27

D. Application of a monitoring methodology and plan ----------------------------- 27

E. Estimation of GHG emissions by sources -- 37

F. Environmental impacts --- 38

G. Stakeholders' comments --- 40

Annexes

Annex 1: Contact information on participants in the project activity

Annex 2: Information regarding public funding

Annex 3: Baseline information

Annex 4: Monitoring plan

SECTION A. General description of project activity

A.1 Title of the project activity:

The 30 MW Tuoli Wind-Farm Project in Urumqi, Xinjiang of China
Document version: PDD V01
10 FEB. 2006

A.2. Description of the project activity:

>>
This project is aimed to develop a 30MW wind farm to be located within Tuoli Town of Urumqi County, under the jurisdiction of the Urumqi city, capital of Xinjiang Uygur Autonomous Region of the P.R.C. In this proposed project, 20 wind turbines with the per-unit capacity of 1.5MW will be installed. About 89.08 GWh of wind-produced electricity will be commercially interconnected to the Xinjiang power grid based on the power purchase agreement (PPA), which would reduce about 653,490.88t CO_2 emissions in total as a result (7 Years Crediting period). The Beijing Guotou Energy Conservation Company is responsible for the construction and operation of this project.

Contribution to sustainable development:

The project objective is to generate electricity by tapping wind resources, and to contribute towards the government's goal of increasing wind capacity according to the *Renewable Energy Law of P. R. China*, which has been approved recently. Based on the data from the World Bank, Urumqi city is one of 20 most polluted cities in the world. The Urumqi electric grid constitutes the major part of the Xinjiang main power grid, with a coal-dominated generation mix. Coal combustion in huge amount results in large GHG emissions and serious environmental pollutions. Wind farm emits neither greenhouse gases, nor other air, soil or water pollutants, while in operation. So this project helps reduce environmental pollution and promote urban sustainable development in the region of Urumqi.

The project will also help enhance the local capacity of China in developing and manufacturing domestic wind generators on its own, quicken the commercialization and marketing of grid-connected renewable energy technologies. Furthermore, the project will demonstrate the feasibility of large scale grid-connected wind farms and improve China's energy security and mix by developing sustainable energy alternatives.

The proposed wind farm is located in Northwest China, a remote and poverty-hit region. The implementation of the project is expected to promote local business investments, create new job opportunities, and increase tax income that would further push the sustainable development of renewable energy industry, improve local living standard, boost local education and tourist markets, and contribute more to the strategic targets of China's west economic development initiatives.

A.3. Project participants:

>> The project participants are:

Name of Party involved(*) ((Host) indicates a host Party)	Private and/or public entity(ies) project participants(*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
People's Republic of China (Host)	Beijing Guotou Energy Conservation Company	No

- Beijing Guotou Energy Conservation Company: Project investor, constructor, operator, and project owner.

Annex 1 lists the complete contact information on participants in the project activity.

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

Tuoli town, Urumqi County, Urumqi City of Xinjiang Uygur Nationality Autonomous Region, P.R.C

A.4.1.1. Host Party(ies):

People's Republic of China

A.4.1.2. Region/State/Province etc.:

Urumqi City, Xinjiang Uygur Nationality Autonomous Region

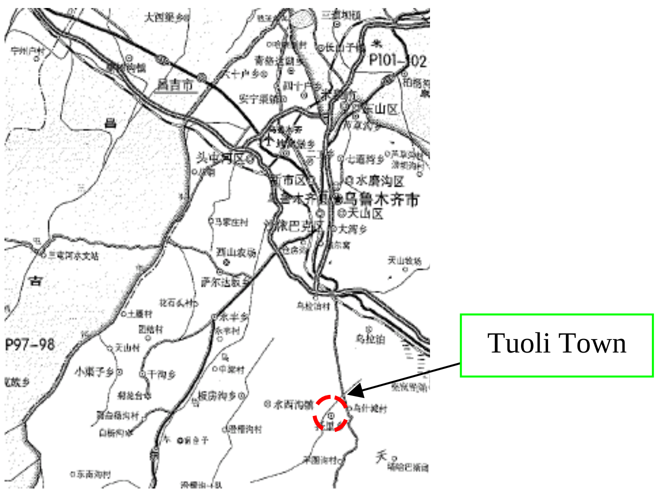
A.4.1.3. City/Town/Community etc:

Tuoli town is the nearest town from the project site

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

>>

According to Wind Power Development Plan of Xinjiang Uygur Autonomous Region up to the Year 2020, there will be 5 wind farms around Dabancheng region, about 1,000 sq.km. The No.1 and No.2 Wind Farm have been built and located in the northwest of the region. The project will be located in the region of the No.4 Wind Farm, North Latitude 43°21', East Longitude 88°19'. The altitude of the project is 1,103 meters above the sea level. The region is about 55 kilometers far away from Urumqi city, the capital of Xinjiang Uygur Nationality Autonomous Region and 4 kilometers to No.312 national highway. There are two 110KV transmission lines (Jifeng-I and Jifeng-II), and two 220KV transmission lines (Hongtuo-I and Hongtuo-II), which provides a convenient condition of connecting the proposed project to the grid.



Dabancheng region is under the jurisdiction of Urumqi city, capital of Xinjiang Uygur Autonomous Region, P.R.C. The wind farm lies at 5 kilometers to the northwest of the No.7 tap water factory of Urumqi, which is in the west of Chaiwopu Lake of Dabancheng region. And the project locates at 2 kilometers in the directly south of Xinjiang Tianshan fertilizer factory in Chaiwopu region. The precinct area of the wind farm is 5 kilometers from the fertilizer factory and 55 kilometers from Urumqi city.

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

The project activity category falls within sector scope 1: energy industries (Renewable electricity)

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

>>

20 units of wind generators will be installed in this proposed project, with the capacity of each unit being 1.5MW, forming a total capacity of 30MW. One unmanned 110/35KV voltage-boosting station at a capacity of 50MVA is going to be built during the current phase of construction, and another 220/35KV voltage-boosting station will be constructed later.

The wind generator supplier will be determined through public bidding. Each wind generator is connected to the 35KV generatrix via a transformer, then the voltage further step up to 110KV through two 50MVA main transformers, finally the electricity is transmitted, via two 110KV loop-line, to the Jifeng 110KV transmission line, passed by the proposed project site.

Other equipment will be manufactured within China, such as transformers, local transmission facilities, cables etc. Construction, equipment installation, initial operation will be jointly carried out by ways of the cooperation of Beijing Guotou Energy Conservation Company and the wind generator manufacturer. During this period a technical training for the staff of Beijing Guotou Energy Conservation Company will be taken place by the wind generator manufacturer. The wind farm is planned to run for 20 years at least. The successful performance of the proposed project will greatly strengthen the installation, operation and maintenance ability of Beijing Guotou Energy Conservation Company on advanced wind generator technologies in China.

A.4.4. Brief explanation of how the anthropogenic emissions of anthropogenic greenhouse gas (GHGs) by sources are to be reduced by the proposed CDM project activity, including why the emission reductions would not occur in the absence of the proposed project activity, taking into account national and/or sectoral policies and circumstances:

Coal accounted for 68% of primary energy consumption and 82% of fuel for power generation in China in 2003. And various forecasts indicate that coal-fired power generation as the most mature and the most economically competitive technology will continuously dominate the power market and play the role of the principal GHG emission source. As a zero-emission renewable energy, wind power is no doubt one of the options for China reducing dependence on fossil fuels and CO_2 anthropogenic emissions. Though total capacity of wind power in 2020 is forecasted to be 20,000 MW[1], the existing capacity in 2003 was just 567 MW due to the restriction of technology, cost and funds. Thus, there exists a huge development potential for wind power development.

Concretely, the construction and operation of the proposed project (Tuoli Wind Farm) will replace the corresponding electricity that would be otherwise generated by thermal power plants (mainly coal-fired plant) in Xinjiang electric grid, avoiding fossil fuel consumptions and CO_2 emissions.

But, it is rather difficult for implementing the proposed wind farm project owing to the following barriers and lack of CER support of CDM project, and then for obtaining emission reductions.

A.4.4.1. Estimated amount of emission reductions over the chosen crediting period:

>> During the 7 years of the crediting period, the total CO_2 emission reductions to be accrued from the proposed project are estimated as 653,490.88 t-CO_2, as shown in Table 1.

Table 1 Emission reduction estimation of Tuoli 30MW Wind Farm project

Year	The estimation of emission reductions (tCO_2e)
2007	93,355.84
2008	93,355.84
2009	93,355.84
2010	93,355.84
2011	93,355.84
2012	93,355.84
2013	93,355.84
The estimation of total emission reductions (Tonnes CO_2 e)	653,490.88
Total number of crediting years	7
The estimation of annual average emission reductions in crediting period (Tonnes CO_2 e)	**93,355.84**

Note: it is a simple illustration here, precise data is provided in Excel spreadsheets.

[1] Source: The National Renewable Energy Laboratory, USA (http://www.nrel.gov/docs/fy04osti/35789.pdf).

A.4.5. Public funding of the project activity:

No public funding from any of the UNFCCC Annex 1 country governments has been secured for this project.

SECTION B. Application of a baseline methodology

>>

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

ACM0002: "Consolidated baseline methodology for grid-connected electricity generation from renewable sources"

B.1.1. Justification of the choice of the methodology and why it is applicable to the project activity:

ACM0002 is applicable to the following situations in regards to Renewable electric activities, as follow:

. Applies to electricity capacity additions from:
. Run-of-river hydro power plants; hydro power projects with existing reservoirs where the volume of the reservoir is not increased.
. Wind sources;
. Geothermal sources;
. Solar sources;
. Wave and tidal sources.

.Not applicable to project activities that involve switching from fossil fuels to renewable energy at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site;
. The geographic and system boundaries for the relevant electricity grid can be clearly identified and information on the characteristics of the grid is available.

This project is just to generate electricity from renewable wind energy. It is connected with the Xinjiang grid. The geographic and system boundaries for the Xinjiang grid can be clearly identified and information on the characteristics of the grid is available. Therefore, The project meets all the applicability criteria as set out in the methodologies.

B.2. Description of how the methodology is applied in the context of the project activity:

[Determination of grid baseline]:

The electricity generation of the proposal project will be transmitted to Xinjiang grid.

According to the statistics in China , Xinjiang grid has not yet been connected with China Northwest grid (the regional grid), only feasibility has been assessed. Therefore, only parameters of Xinjiang grid are adopted in the calculation of emission reduction.

[Selection of OM emission factor]:

STEP 1. Calculate the Operating Margin emission factor(s) ($EF_{OM,y}$) based on one of the four following methods:

(a) Simple OM, or
(b) Simple adjusted OM, or
(c) Dispatch Data Analysis OM, or
(d) Average OM.

Ideally, the method (c) is truly to depict the relationship between wind farm project activities and the baseline grid operation and the corresponded emission reduction. This requires the grid to provide the detailed operation and dispatch data of plants in the grid. But currently the institutional reform of "division between plant and grid" is undergoing, the grid and plant in all levels don't open this kind information publicly. Xinjiang belong to the undeveloped western region and it would need huge transaction cost to try to get the hourly dispatch data. So the method (c) is not applicable.

The method (b), simple adjusted OM, need the annual load duration curve provided by the grid. Based on the same reason, the necessary detailed data for the method (b) is difficult to acquire, so not applicable also.

The method (d), average OM, can only be used where low-cost/must run resources[2] constitute more than 50% of total grid generation. The information provided by the Xinjiang grid show that the total capacity of Xinjiang grid is about 5494.6MW in 2003, and among it, the thermal (including coal and natural gas fired power plants) units is about 4413.5MW and 80% of the total; Viewing from electricity generation, the total grid generation is 23610MWh in 2003, and the part from thermal power plants is 19834 MWh, about 84% of the total; So Xinjiang power grid is almost a thermal power system. In future, this fact will not change considering the electric power development plan for the grid. So the method (d) is not applicable for the Xinjiang grid.

The Simple OM method (a) can only be used where low-cost/must run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term normal for hydroelectricity production. So it is reasonable to select the method (a) to calculate the OM emission factor.

According to the ACM0002, method (a), the simple OM method, calculate the emission rate adopting the formula below:

$$EF_{OM,simple,y} = \frac{\sum_{i,j} F_{i,j,y} \cdot COEF_{i,j}}{\sum_{j} GEN_{j,y}} \qquad (1)$$

Where:

Fi, j, y is the amount of fuel i (in a mass or volume unit) consumed by relevant power sources j in year(s) y,

j refers to the power sources delivering electricity to the grid, not including low-operating cost and must-run power plants, and including imports[3] to the grid,

[2] Low operating cost and must run resources typically include hydro, geothermal, wind, low-cost biomass, nuclear and solar generation. If coal is obviously used as must-run, it should also be included in this list, i.e. excluded from the set of plants.

[3] As described above, an import from a connected electricity system should be considered as one power source *j*.

$COEF_{i,j\,y}$ is the CO_2 emission coefficient of fuel i (tCO_2 / mass or volume unit of the fuel), taking into account the carbon content of the fuels used by relevant power sources j and the percent oxidation of the fuel in year(s) y, and $GEN_{j,y}$ is the electricity (MWh) delivered to the grid by source j.

The CO_2 emission coefficient COEFi is obtained as

$$COEF_{i,j,y} = NCV_i \times EF_{CO2,i} \times OXID_{i,j,y} \qquad (2)$$

Where:

NCV_i is the net calorific value (energy content) per mass or volume unit of a fuel i,

$EF_{CO2,i}$ is the CO_2 emission factor per unit of energy of the fuel i.

$OXID_{i,j,y}$ is the oxidation factor of the fuel i in power resource j and year y (see page 1.29 in the 1996 Revised IPCC Guidelines for default values).

$EF_{OM,y}$ = 1.126tCO_2e/MWh.

See Annex 3 for details.

[Determination of BM emission factor]

STEP 2. Calculate the Build Margin emission factor ($EF_{BM,y}$):

According to ACM0002, $EF_{BM,y}$ is determined by the formula as follow:

$$EF_{BM,y} = \frac{\sum_{i,m} F_{i,m,y} \cdot COEF_{i,m}}{\sum_{m} GEN_{m,y}} \qquad (3)$$

Where $F_{i,m,y}$, $COEF_{i,m}$ and $GEN_{m,y}$ are analogous to the variables described for the simple OM method above but for plants sample group m.

Project participants shall choose between one of the following two options, as appropriate:

Option 1. Calculate the Build Margin emission factor $EF_{BM,y}$ ex ante based on the most recent information available on plants already built for sample group m at the time of PDD submission. The sample group m consists of either

• the five power plants that have been built most recently, or

• the power plants capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently.

Project participants should use from these two options that sample group that comprises the larger annual generation.

Option 2. For the first crediting period, the Build Margin emission factor $EF_{BM,y}$ must be updated annually ex post for the year in which actual project generation and associated emissions reductions occur. For subsequent crediting periods, $EF_{BM,y}$ should be calculated ex-ante, as described in option 1 above. The sample group m consists of either

• the five power plants that have been built most recently, or

• the power plants capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently.

Project participants should use from these two options that sample group that comprises the larger annual generation.

In the PDD development period, it is necessary to estimate the BM emission factor, thus option 1 is chosen.

The calculation result for baseline emission factor of the first crediting period is $\boldsymbol{EF_{BM,y}}$ **= 0.971tCO_2e/MWh**;

See Annex 3 for details.

[Determination of baseline emission factor]:

STEP 3. Calculate the Combined baseline emission factor EF_y as the weighted average of the Operating Margin emission factor ($EF_{OM,y}$) and the Build Margin emission factor ($EF_{BM,y}$):

$$EF_y = w_{OM} \cdot EF_{OM,y} + w_{BM} \cdot EF_{BM,y}$$

where the weights w_{OM} and w_{BM}, by default, are 50% (i.e., $w_{OM} = w_{BM} = 0.5$), and $EF_{OM,y}$ and $EF_{BM,y}$ are calculated as described in Steps 1 and 2 above and are expressed in tCO_2/MWh. The result of combined baseline emission factor is: $\boldsymbol{EF_y}$=0.5*1.126+0.5*0.971=**1.048 tCO_2/MWh**. Also we can easily get:

The key information and data can be found in the tables of Annex 3.

[Data source]:

China Electricity Yearbook : Standard coal consumption in Xinjiang grid in 2000 to 2003, electricity generation by coal, hydro, nuclear, others and in total in Xinjiang grid in 2000 and 2003, electricity installation capacity by coal, hydro, nuclear, others and in total in Xinjiang grid in 2000 and 2003

China Energy Statistical Yearbook : Energy consumption in Xinjiang grid from 2000 to 2003, in terms of raw coal, other washed coal, crude oil, diesel oil, fuel oil, refinery gas, natural gas, average low calorie value in china.

IPCC guidance : oxidation factor, emission factor of raw coal, other washed coal, crude oil, diesel oil, fuel oil, refinery gas, natural gas.

B.3. 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:

As proposed by ACM0002, the tool for the demonstration and assessment of additionality approved at CDM EB
-16 is used for analyzing additionality of the proposed project.

***Stop 0*: Preliminary screening based on the starting date of the project activity**

The proposed project is not that type of project starting before the date of registration and prior to the start of the crediting period.

***Step 1:* Identification of alternatives to the project activity consistent with current laws and regulations**

Sub-step 1a. Define alternatives to the project activity:

Identify realistic and credible alternative(s) available to the project participants or similar project developers that provide outputs or services comparable with the proposed CDM project activity.

In theory these possible alternatives are to include:
a). the proposed project itself, that is, 30MW Touli wind-farm project, but not undertaken as a CDM project activity
b). construction of a thermal power plant or small hydro power station with the same installed capacity or annual electricity generation.
c). equivalent capacity or electricity service provided by the Xinjiang power grid

Sub-step 1b). Enforcement of applicable laws and regulation

a), A series of favorable policies and regulations including tax break, operation franchise and sweetened offer for grid-connecting price, have been stipulated in the recently enacted "Renewable Energy Law", along with the targeted share of wind electricity in the national power grid for the foreseeable future. Actually the grid-connecting prices within the Urumqi power grid have been formally approved in the circular: "Straightening out Conflicts over Electric Tariff in Urumqi Power Grid" issued by the NDRC (Ref. No.: NDRC-Price [2004] 2570) on November 19, 2004, as shown in the following table:

Units	Grid-Connecting Tariff	Note
Newly installed coal-fired units	0.220 ¥/kWh	Without de-sulfur equipment
Newly installed coal-fired units	0.235 ¥/kWh	With de-sulfur equipment
Newly installed wind power	0.470 ¥/kWh	

The following financial analysis shows that the expensively imported 1.5MW advanced wind-driven units for Touli wind farm would prove less commercially competitive or attractive to investors in terms of the internal return rate (IRR) even considering possible preferential policies if without the revenue from the sale of CERs to be accrued from the expected CDM project activity. So this Touli wind-farm project is apparently ineligible for a realistic and credible non-CDM alternative. It should be pointed that the above-stated wind-based target in the national power mix is little more than a planned objective without shaping up to be a legally mandatory renewable portfolio standard (RPS), thus not losing the additionality needed for a proposed CDM project activity.

For the choice b), Xinjiang is abundant in coal and natural gas, as well as small amount of exploitable hydro power. By the end of 2003, the installed capacity of thermal power units had accounted for 80.3%, 18.0% for hydro power and 1.7% for wind power in Xinjiang main power grid. So alternative b) could be considered as a possible alternative from the viewpoint of energy resource availability. The current atmospheric environment protection regulation permits the connection of newly installed coal-fired units without de-sulfur equipment to the power grid, but at a lower tariff, while encouraging the grid-connection of newly installed coal-fired units equipped with de-sulfur one at a higher rate. However, from the perspective of China's energy-conservation regulations for electric power industry, the coal-fired thermal power plants below 50-100MW are not allowed for construction. Furthermore the coal-based power plant and wind-farm differ considerably with respect to annual operation hours and would be incomparable with each other in terms of the annual electricity generation and associated supply reliability even for the same installed capacity. In addition, hydropower and windpower are also quite different in supply quality, technical characteristics, service scope and reliability. So the choice b) is not necessarily a realistic and credible alternative.

For the choice c), the same capacity or electricity service to be provided by the Xinjiang power grid, could be the only possible alterative for the baseline. The proposed wind farm project, well beyond this baseline, apparently has the required additionality. In addition, coal is dominated in the Xinjiang power grid, and wind power is renewable energy with zero emission, so the emissions from the baseline scenario will no doubt exceed those from this project.

Step 2. Investment analysis

Determine whether the proposed project activity is the economically or financially less attractive than other alternatives without the revenue from the sale of certified emission reductions (CERs). To conduct the investment analysis, use the following sub-steps:

Sub-step 2a. Determine appropriate analysis method

The project will have proceeds from power selling as well as from CER. So either investment comparative analysis or benchmark analysis has to be employed for financial analysis of baseline scenario. Here, the benchmark analysis is selected to be conducted as follows:

Sub-step 2b – Option III. Apply benchmark analysis

The financial principles for the Beijing Guotou Energy-Conservation Corporation, the owner of Xinjiang Touli wind-farm project, require that the IRR be no less than 8% and the Net Present Value be more than 0. These financial parameters have been benchmarks in this corporation for developing and assessing project activities under similar conditions.

Sub-step 2c. Calculation and comparison of financial indicators (only applicable to options II and III):

Calculate the suitable financial indicator for the proposed CDM project activity including IRR, which refers to the value when the accumulation of all the annual net present cash-flows reaches zero over the project life time, or the discount rate when the financial net present value of the proposed project equals to zero. The mathematical relations can be expressed in the following equation.

$$\sum_{t=1}^{n}\frac{CI_t - CO_t}{(1+IRR)^t} = 0$$

Where IRR is the benchmark internal return rate, and is presumed to take 8%, the standard commercial IRR. CI_t denotes the cash-inflow at the time of the t^{th} year, including the revenue from the sale of electricity and certain government subsidies/financial incentives as the case may be, but not including the revenue from the sale of CERs, while CO_t refers to the cash-outflow at the time of the t^{th} year, including all the costs, related to, for example, capital investment, maintenance and operation. The symbol of n represents the life-time of this project, assumed to be 21 years in the calculation (including one-year construction).

Some key techno-economic information related to the 30MW Touli wind-farm project is presented in the following table, based on the wind resource potentials in the planned project site, as well as the recommended power curve and operation mode in the local electric power grid.

Key items	Parameters
Electricity connected to power grid	89.08GWh
Construction time	1 year

Life time	20 year
Total investment	288.71 million Yuan
Self-financed input	57.74 million Yuan
Self-financed percentage	20%
Domestic commercial bank loan	230.97 million Yuan
Bank loan rate	6.12%
Payback period	12 year
Grace period	1 year

In addition, 0.5 million Yuan of working capital will be needed at the 1st year of the project commencement, and also credited into the capital investment.

The costs related to electricity generation primarily include depreciation, maintenance, employee's salary and welfares, materials, bank interests and others. The electric tariff for connecting to the power grid is calculated to be 0.4332¥/kWh (excluding tax), at the benchmark rate of 8%, and has been officially approved by the NDRC for the business operation.

The taxes to be paid for electrical projects generally include value-added tax (VAT), sales revenue surtax. VAT is not included in the price, and will be halved at the rate of 8.5% according to the circular-[2001]198 issued by the Ministry of Finance and the State Administration of Taxation. While sales revenue surtax include urban construction tax and education fee and is levied at the rates of 7% and 3% respectively. In accordance with the circular-[2001]202 concerning the Preferential Taxation Policy for Boosting China's West Economic Initiatives, the revenue tax can be exempted in the first five-year period, and afterward levied at the rate of 15%. In addition 10% for housing fund and 5% for public interests will be drawn respectively from the post-tax profits.

IRR for the proposed CDM project activity
If Option III (benchmark analysis) is used, and if the CDM project activity has a less favorable indicator (e.g. lower IRR) than the benchmark, then the CDM project activity cannot be considered as financially attractive.

The outcomes of IRR calculation for the Touli wind-farm are respectively given in Table-3 and Table-4, with or without the revenue from the sale of CERs through CDM.

Table-3. Financial analysis on Touli wind-farm project without CDM

Project	Grid-connecting tariff	IRR (Total investment)
Touli wind-farm	0.4332 Yuan/kWh	7.02%

Obviously, the internal return rate of total investments for this project, if without the revenue from the sale of CERs through CDM, is less than 8%. the industrial benchmark IRR. So this wind-farm project is rendered less financially attractive. In addition, the NPV is sub-zero at the discount rate of 8%, if considering price volatility, exchange rate and other uncertainties, this project appears less financially attractive and practically feasible to potential investors.

Actually the revenue from the sale of CERs have remarkable impact on the IRR, either for the self-financed capital or total investments, making it reach the business benchmarks in this case. Additionally, the NPV is also over zero at the discount rate of 8%. Although some uncertainties still exist, investors could gain reasonable financial returns at such risk. The internal return rates, being % for total investments, would appear more financial attractive for prospective investor.

Sub-step 2d. Sensitivity analysis (only applicable to options III):

Sensitivity analysis is a more frequently used method for assessing the perceived uncertainties by identifying the potential changing ranges of some key elements such as capital investments, costs, prices, construction time, etc., and possible impacts as a result on the economic performance of the proposed project. Then the most critical parameters could be found out for final assessment. In this case, such a sensitivity analysis is employed to show whether the conclusion regarding the financial attractiveness is robust to reasonable variations in the critical assumptions. The investment analysis provides a valid argument in favor of additionality only if it consistently supports (for a realistic range of assumptions) the conclusion that the project activity is unlikely to be financially attractive (as per step 2c para 6).

The following key parameters have been selected as sensitive elements to test the financial attractiveness for this Touli wind-farm project.

(1) Static total investments
(2) Annual operational costs
(3) Electricity price

Firstly, the effect of changes in the static total investments, annual operational costs and electricity price will be examined on the internal return rate (IRR). Assuming these three parameters to change within the range between (-20%~20%), then the outcomes of IRR sensitivities will be presented in the following table.

Table 6. IRR sensitivity test for Touli wind-farm project(total investment)

Changing ranges / Uncertain elements	-20%	-10%	0%	10%	20%
Static total investments	9.98%	8.36%	7.02%	5.89%	4.88%
Annual operational costs	7.31%	7.16%	7.02%	6.88%	6.73%
Electric tariff (w/t VAT)	4.3%	5.71%	7.02%	8.28%	9.5%

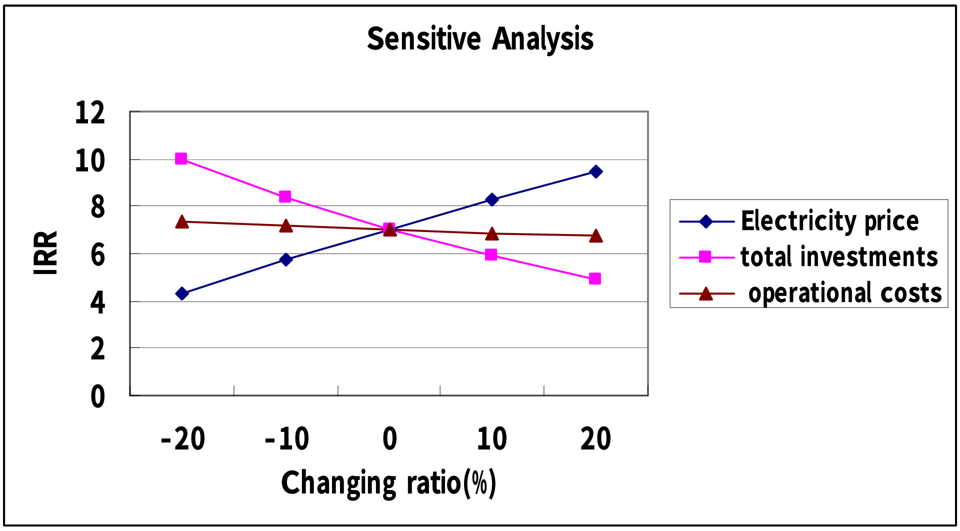


Fig-3 Impacts of three major uncertain elements on IRR (total investments)

From the calculation outcomes as shown in table 6, the IRR (total investments) for this wind-farm project will vary to different degrees with these three uncertain parameters changing between -20% and +20%. The electricity price and total investment are both important factor affecting the IRR. If the electricity price continues to decline, then the financial feasibility for the project's total investment would be undermined. So the electricity price can be regarded as the sensitive parameter for affecting the economic performance of this wind-farm project. In addition, for the other two changeable elements, the static total investment will strongest impact on the IRR, when it increases by 20% around, the financial feasibility would be reduced, and it is tested to be a variable of medium sensibility. While annual operational costs create less effect on the IRR.

Based on the above analysis, electricity price will create a significant impact on the economic performance of the project. With other conditions remaining constant, the higher the electric tariff, the more financially attractive the project will look like. But on the other hand, it is also one of the most important determinants and factors for successfully marketing the electric power. If the electric rate is excessively higher, then the wind power will lose attractiveness to customers, and even lose ground in the marketplace. Currently, the grid-connecting tariff for coal fired electricity (including tax) ranges between 0.25~ 0.35¥/kWh, more competitive compared with that for wind-power.

The revenue from the sale of CERs would largely improve the economic status of wind power projects, and can be considered as an important complimentarily for the electric tariff. Wind power is a welcome and clean renewable energy source with zero emissions and promising GHG mitigation benefits, has increasingly become a promising technology for CDM cooperation. Although some preferential policies are in place in terms of franchises, taxes and interconnection tariff, aimed to encourage the large-scale and wider deployment of wind power where appropriate, the financially feasible grid-connecting price is actually well above that for coal-fired power plant, hardly acceptable to local power grid and price administration. Fortunately, the expected revenue from the sale of CERs though CDM could help make up such gap between electric tariffs to meet the requirements of financial feasibility for this wind-farm project.

Step 3. Barrier analysis
This step is used to determine whether the proposed project activity faces barriers that:
(a) Prevent the implementation of this type of proposed project activity; and
(b) Do not prevent the implementation of at least one of the alternatives.
Use the following sub-steps:

Sub-step 3a. Identify barriers that would prevent the implementation of type of the proposed project activity:
1. Establish that there are barriers that would prevent the implementation of the type of proposed project activity from being carried out if the project activity was not registered as a CDM activity. Such barriers may include, among others:

Financing barriers: The Tuoli wind power farm will install advanced 1.5MW turbines of enhanced type. The specific investment cost of the imported wind turbine is far higher than that of the conventional fossil fuel power plants. As a project with capacity of 30MW only and inferior continuous power supply dependability, it faces the barriers of higher project development cost (construction material, purchase of imported equipment), and higher financing transaction cost (short period and high price). The financial return rate of the project investment and the ability of loan repayment are on the low side though there are preferential price policy and other incentive mechanism for the wind power projects provided from China's government. The international steel prices have increased recently, which will bring negative influence to the project, increasing the financial risk.

The wind power development at Urumqi Tuoli wind farm has historically been supported by government's higher grid-in price policies and international soft credits loan (mainly official development & donor ODA fund). These projects are put in practice as demonstration under preferential conditions. Once operated as commercial project, difficulties in financing would come out without ODA fund support. The status will not change until the support of CDM comes.

Technology barriers: The Urumqi Tuoli wind farm project adopted the enhanced type of wind turbines that are especially designed for the wind farm. Higher technology risk has to be beard while obtaining high level wind turbine efficiency and technology content, because lack of skilled and/or properly trained labors to operate and maintain the technology and there is few suitable education/training institution to provide qualified technicians needed and few spare parts supply base in China, and thus this easily cause equipment malfunctioning and disrepair. Such technology risks associated with wind power were identified in several international assistance programs on wind farms in China. For instance, for the Dabancheng No.2 wind power plant with installed capacity 82 MW, the actually operational capacity connecting to the gird is 64.8MW only, due to many blades of the 51 units of 500kW wind turbine, supported by part of the mixed loan of US$ 25 million from Denmark government had serious quality problems and were not be able in operation yet. This is an evidence of the technology risk of wind turbines. All this leads to an increased perception of risk from investors and makes it more difficult to attract financing. If wind turbines with mature technology but lower efficiency are adopted, the risk would reduce, but the electricity generated and emission reductions would be less too. So the additionality associated with technology barriers of the wind power project is demonstrated. While the CDM revenue can be used as guarantee fund for the operation and maintenance with stand-alone capacity of more than 1.5MW wind turbines, helping overcome the barriers on technology aspect.

Electricity Price Barriers: The grid connecting electricity price of wind power farm is always a barrier hindering wind power development in China, so does Tuoli wind power farm. The tariff that was officially approved by the NDRC for the coal fired power capacity units newly installed in Urumqi Grid of Xinjiang Uygur Nationality Autonomous Region is only 0.22 Yuan/kWh (without desulphurization) and 0.235 Yuan/kWh (with desulphurization). While the tariff officially approved for the new wind power project is 0.47Yuan/kWh (with VAT) and 0.4332Yuan/kWh (without VAT at rate 8.5%) which is far higher than the tariff of coal power plants. Even with such high price, the Tuoli wind power project is still unable to be commercially competitive. While on the other hand such high price is difficult to be acceptable by local pricing bureau and local grids. So the electricity price barriers will foreclose the implementation of the proposed wind power project without the CERs revenue from CDM as complementarities.

Sub-step 3 b. Show that the identified barriers would not prevent the implementation of at least one of the alternatives (except the proposed project activity):

3. As described as above, the possible alternative scenarios include a) the proposed project itself, the Tuoli 30MW wind farm project, but not acting as a CDM project activity; b) install a fossil fuel power plants or small scale hydropower station with the same capacity or same annual electricity generation; c) the Xinjiang grid providing the same capacity and electricity supply service. Obviously, the identified barriers would prevent the implementation of the alternative scenario a) in the sense that the alternative scenario a) is implemented under the commercial terms without the financial grant and soft loan as in the case of the previous Dabancheng No.1 35MW and No.2 82MW wind farm project. From a long-term view point, with the more deepened reform in the electric power sector towards market economy, the long term power purchase agreement with concessional condition for wind power would not be accepted by

the local pricing bureau and local power grids whose offer are usually lower than the financial balance point between profit and loss for newly launched wind power farm. So the wind power project would end in failure of entering the power market without CDM support. On the contrary, both alternative scenarios b) and c) are based on coal-fired power plant, not subject to the influence of the barriers specific to the wind power project. Further considering the restriction by the China's power industry policy on the alternative scenario b), in other word, the identified barriers will not block at least one alternative scenario implementation, i.e. scenario c) local Xinjiang grid.

Step 4. Common practice analysis

Sub-step 4a. Analyze other activities similar to the proposed project activity:

1. There have been other similar wind power farms developed at similar scale around the Tuoli wind power farm and nearby region, including Dabancheng No.1 wind farm and No.2 wind farm:

Name	Total Installed Capacity (MW)	Commencement	Additional information
Dabancheng No.1 wind farm	35	1998	Imported turbines
Dabancheng No.2 wind farm	82	1992-1998	Imported turbines

Sub-step 4b. Discuss any similar options that are occurring:

2. It is noticed that the existences of the previous wind power project activities as mentioned above does not come into contradiction with claimed financially unattractive and/or existing barriers that Tuoli wind power project is subject to. That is to say, the proposed Tuoli wind power CDM project does not lose its additionality, because there are essential distinctions between the previous wind power project and proposed Tuoli wind power project activity regarding financial sources of investment and operation environment. In particular, the former is demonstration project, enjoying certain benefits from the international grant, soft loan and government's preferential tariff policies etc., that rendered it financially attractive or no longer facing these barriers to which the proposed project is subject. While the latter is a commercial project facing a series of barriers without the government's preferential tariff policies and international financial assistance.

More concrete, the Dabancheng No.1 wind power farm received 3.4 million US$ of grant from Denmark government in 1988. The subsequent projects made use of the Golden Plan of Germany and preferential national debt loan. The Dabancheng No.2 wind power farm received a Danish interest-free loan for four sets of 300 kW wind turbines in 1992 and then a mixed loan for four sets of 500 kW wind turbines in 1994, followed up receiving again Danish interest-free loan for twenty sets of 600 kW wind turbines in 1996. In addition, it received Dutch mixed loan of 25 million US$ for total 34.5MW wind power capacity in 1998.

In 1997 these wind farms also made use of the domestic technology renovation loan, as much as 400 million Yuan for the installation of total capacity with 39.3MW wind turbines. These projects also enjoyed half of both import tariff and value-added tax (VAT) and financial subsidies on interest of 20 million Yuan.

However, there are no international grant funds or soft loan sources available for Tuoli wind power farm under the commercial operation environment, while the government and local pricing bureau were adjusting the restrictive price of wind power. First of all, according to a document available in 1996 from the Electric Power Ministry, requiring acceptance by local power grid, of local renewable electricity generation. Up to January 2000, the incremental costs of wind power generation were shared among the local power grid. However from 1998 to 2002, the more burden of the renewable electricity generation cost was transferred to the end-users. In order to coordinate the economical benefits among relevant sectors, the local pricing bureaus including those located in Xinjiang Uygur Autonomous Region, insisted on acceptance of relatively less amount of renewable electricity because of the large amount of cheap coal fired electric power available. In order to secure numerous job opportunities and lower energy cost for local enterprises and residents, the NDRC put the wind power price cap at 0.5Yuan/kWh (excluding VAT at 8.5% rate), which is lower than the finance balance point between profit and loss for newly launched wind power farm. This price cap is about 0.05 Euro/kWh, which is lower than the imperative purchase price while the wind turbine technology is more mature and widespread in Europe.

Though the newly approved China Renewable Energy Law proposes a series of incentive initiatives and preferential policies for wind power, the wind power technology are currently far from commercially prevailing in China. Therefore the Tuoli wind power project activity is not a common practice and has CDM additionality, which especially needs CDM support to overcome the financing, technology and tariff barriers as described above.

The large-scale wind power project in Huitenxile, Inner Mongolia has been approved domestically as CDM project and it is expected that all concession projects in short-term will require CDM credits to proceed to final realization.

Step 5. Impact of CDM registration

This project is currently in its initial phase of technical preparation and supplier selection, and if without the expected additional revenue from CDM CERs credits, the Beijing Guotou Energy Conservation Company will not be able to pursue the project further and look elsewhere for their energy project investments. And CDM credits revenue is regarded as an important incentive factor, effecting bank's decision on the loans to be offered to the project developer. Clearly, the impact of CDM credits is considerable in this particular wind farm project.

Provided that the proposed Tuoli wind power project is registered by the CDM Executive Board, the additional revenue of CDM CERs plus the government's preferential policies for the wind power project could bridge the gap in terms of the financial return rate between the proposed project and its alternative coal fired thermal power project. Also CDM credits could bring about foreign exchange needed for the project developers. This provides a means to reduce effectively the foreign exchange risks in the purchasing foreign equipment or repaying foreign loans secured for the project. The CDM revenue for the project could also compensate the tariff gap between what is offered by the local power price sector and the tariff needed to secure the financial feasibility for the project. The CDM revenue could effectively increase the grid connecting tariff by 10% .

The project developer proposes to use the CDM revenue as a reserve for the operation and maintenance of the new enhanced wind turbines with stand-alone capacity up to 1.5MW, which is first type to be installed in the Xinjiang power grid service area. This will help to ensure reduction of technology risk, reliable operation, and CERs revenue.

If the project is not officially approved and registered as a CDM activity, the project developer foresees the following impacts.

1. The CER revenue (net of initial and annual transactions costs) represents a significant complementary source of revenue for the project, and if without this revenue the debt service coverage ratio of the project will be impaired, potentially leading to a cash flow crisis and failure of the project.
2. Facing higher technology risk and lacking the financial sources of guarantee fund, the project

development plan may turn its steps to adopt smaller scale wind turbine units with lower technology risk and efficiency, resulting in a waste of wind resource, less electricity generation and less CO_2 emission reduction.

3. All these demonstrate the proposed wind power project is not the baseline scenario. Without the support of CDM, it will not appear, and the CO_2 emission will be the power grid baseline instead. According to the practice of Xinjiang power grid, section B.2 calculated these alternative electricity emissions. These emissions are far higher than that of wind power (even consider the whole project life cycle, the emission of wind power is much lower). The project has additionality and can reduce greenhouse gas emissions. If the project is not officially approved and registered as a CDM activity, the CO_2 emission reduction will get lost.

In summary, the above analyses clearly demonstrated that Tuoli wind farm project measures up the criteria for assessment of additionality in the aspects of environment benefit, investment and technology, thus the proposed project has CDM additionality. The above demonstration and assessment of the additionality have provided sufficient and necessary evidence to show that the approval and registration of the proposed CDM project activity could help the Tuoli wind farm project to overcome barriers that are currently hindering the development of large scale wind farms in China.

B.4. Description of how the definition of the project boundary related to the baseline methodology selected is applied to the project activity:

The electricity generation of the proposal project will be transmitted to Xinjiang grid.

According to the statistics, Xinjiang grid has not yet been connected with China Northwest grid(the regional grid), only feasibility has been assessed. Therefore there are currently no electricity import and export between Xinjiang grid and Northwest grid.

The Northwest grid, the Xinjiang grid, the system boundary of Tuoli wind farm and the connection relationship are illustrated below:

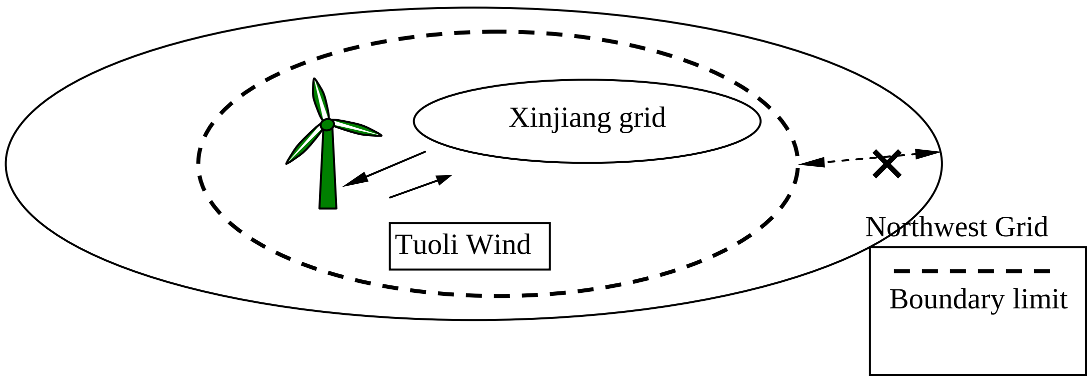


Fig. 5 sketch map of project, grid and connection relationship

B.5. Details of baseline information, including the date of completion of the baseline study and the name of person (s)/entity (ies) determining the baseline:

The data of completion of PDD: 10/02/2006
Name of persons/entities determining the baseline:
Mizuho Information & Research Institute

Shigeo Sasaki, Associate General Manager,
e-mail: shigeo.sasaki@mizuho-ir.co.jp ,
Tel: 81-3-5281-5457

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:

25/09/2006, or earlier, if project is out into operation earlier.

C.1.2. Expected operational lifetime of the project activity:

The project is contracted for a period of 21 years, which includes 1 years of the project construction.

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

C.2.1. Renewable crediting period

C.2.1.1. Starting date of the first crediting period:

25/09/2006, or earlier, if project is out into operation earlier.

C.2.1.2. Length of the first crediting period:

7 years

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

Not applicable

C.2.2.2. Length:

Not applicable

SECTION D. Application of a monitoring methodology and plan

D.1. Name and reference of approved monitoring methodology applied to the project activity:

Approved consolidated monitoring methodology **ACM0002**: "Consolidated monitoring methodology for zero emissions grid-connected electricity generation from renewable sources"

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

In Section B we have shown the Tuoli wind farm project can adopt the approved baseline methodology ACM0002 (Consolidated baseline methodology for grid-connected electricity generation from renewable sources), so in Section D, the monitoring method and plan will adopt ACM0002 monitoring methodology to keep consistent.

As the same as the ACM0002 baseline methodology, the ACM0002 monitoring methodology can be applicable to the grid-connected electricity generation from renewable sources under the conditions as follow:

1. The Tuoli 30MW wind farm project is a type of power generation by renewable energy and connected to the Xinjiang grid.
2. The Xinjiang grid can be seen as a project electricity system whose geographic and system boundaries can be clearly identified and are connected with the project, and information on the characteristics of the grid is available. The project doesn't belong to activities that involve switching from fossil fuels to renewable energy.
3. The monitoring plan adopts the ACM0002 monitoring methodology in conjunction with ACM0002 baseline methodology.

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 type	Data variable	Data unit	Measured (m), calculated (c), estimated (e)	For which base-line method(s) must this element be included	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

(Note: the archived data will be kept during the crediting period and two years afterward, same as below)

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

Under the assumption that indirect emissions from project construction, transportation of materials & equipment and other upstream activities could be omitted, the emission from the project itself is zero. The table above only measure the electricity supplied to the grid.

The methodology requires for monitoring the following data for calculation of baseline emissions:

• Electricity generation from the proposed project activity;

• Data needed to recalculate ex-post the operating margin emission factor, based on the simple Operating Margin (OM) method, in consistent with consolidated baseline methodology for grid-connected electricity generation from renewable sources (ACM0002);

• Data needed to recalculate ex-post the build margin emission factor, based on the Build Margin (BM) method, in consistent with consolidated baseline methodology for grid-connected electricity generation from renewable sources (ACM0002);

If in practice the net electricity imported from the Xinjiang main grid to the Urumqi grid exists, then the net import can be seen as one of the power source of Urumqi grid. Accordingly, in monitoring plan the net electricity import and coal consumption of power supply from the Xinjiang main grid should be collected to calculate its contribution to OM emission factor (see the row 11a and 11b in the Table of D.2.1.3).

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*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated	For which base-line method(s) must this	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

D.3)					(e)	element be included				
1. EGy	Electricity quantity	Electricity supp-lied to the grid by the Tuoli wind farm project	MWh	m	*Simple OM, BM*	Hourly measu-ring, monthly recording	100%	electronic	Electricity supplied by the project to the grid. Double check by receipt of sales.
2. EF_y	CO_2 emission factor of the grid	Statistical data of Xinjiang Grid	tCO_2 / MWh	c	*Simple OM, BM*	yearly	100%	electronic/ paper	Calculated as a weighted sum of the OM and BM emission factors
3. $EF_{OM,y}$	CO_2 Operating Margin emission factor of the grid	Statistical data of Xinjiang Grid	tCO_2 / MWh	c	*Simple OM,*	yearly	100%	electronic/ paper	Calculated as indica-ted in the simple OM baseline method above
4. $EF_{BM,y}$	CO_2 Build Margin emission factor of the grid	Statistical data of Xinjiang Grid	tCO_2 / MWh	c	*BM*	yearly	100%	electronic/ paper	Calculated as indica-ted in BM baseline method over selected recently built power plants sample group m
5. $F_{i,y}$	Amount of fossil fuel consumed in the grid	Annual coal consumption in the grid	Mass or volume	m	*Simple OM, BM*	Monthly measu -ring and yearly recording	100%	Electronic/ paper	Obtained from the China Energy Statistical Yearbook
6. $COEF_i$	Emission coefficien t	IPCC defalt	tCO_2 / mass or volume unit	c	*Simple OM, BM*	yearly	100%	Electronic/ paper	IPPC defaults will be used.

7. $GEN_{j/k/n,,y}$	Electricity quantity	Annual electricity generated in the grid	MWh/a	m	*Simple OM, BM*	yearly	100%	Electronic/ paper	Obtained from the China Electric Power Yearbook
8.	Plant name	Identification of power source/ plant for the OM	Text	m	*Simple OM,*	yearly	100% of selected plants	electronic	Plant by plant information is not publicly available for a grid the size of Xinjiang and therefore aggregated data obtained from the China Electric Power Yearbook is used
9.	Plant name	Identification of power source/ plant for the OM	Text	m	*BM*	yearly	100% of selected plants	electronic	Plant by plant information is not publicly available for a grid the size of Xinjiang and therefore aggregated data obtained from the China Electric Power Yearbook is used

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

In consistent with ACM0002 consolidated baseline methodology, using ACM0002 consolidated monitoring methodology to monitor a series of data of the baseline of Urumqi grid, calculate ex post the Simple OM baseline emission factor. The formula is as below:

(1) Simple OM emission factor:

$$EF_{OM,simple,y} = \frac{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}}{\sum_{j} GEN_{j,y}} = COEF \times \frac{\sum_{i,j} F_{i,j,y}}{\sum_{j} GEN_{j,y}} \quad (1)$$

where

$F_{i,j,y}$ is the amount of fuel i (in a mass or volume unit) consumed by relevant power sources j in year(s) y in Urumqi grid,

j refers to the power sources delivering electricity to the grid, not including low-operating cost and must-run power plants, and including imports to the grid[4],

GENj,y is the electricity supply (MWh) from coal fired power plant j in the Urumqi grid to the grid in year *y*. *y* is the year in the crediting period.

$COEF_{i,j,y}$ is the CO_2 emission coefficient of fuel i (tCO_2/mass or volume unit of the fuel), taking into account theoretically the carbon content of the fuels used by relevant power sources j and the percent oxidation of the fuel in year(s) y, and

The CO_2 emission coefficient $COEF_{i,j,y}$ is obtained as

$$COEF_{i,j,y} = NCV_i \times EF_{CO2,i} \times OXID_{i,j,y} \quad (2)$$

where:

NCV_i is the net calorific value (energy content) per mass or volume unit of a fuel i,

$EF_{CO2,i}$ is the CO_2 emission factor per unit of energy of the fuel i.

$OXID_i$ is the oxidation factor of the fuel i (see page 1.29 in the 1996 Revised IPCC Guidelines for default values).

Because of data availability limitation, the grid is difficult to provide the carbon content of fuel and its oxidation rate of every plant j in year y. So let $COEF_{i,j\,y}$ be the identical figure omitting the difference in coal types and combustion conditions. The constant figure of $COEF_{i,j\,y}$=0.726 kgC/Kgce.

(2) BM emission factor:

$$EF_{BM,y} = \frac{\sum_{i,m} F_{i,m,y} \times COEF_{i,m}}{\sum_{m} GEN_{m,y}} = COEF \times \frac{\sum_{i,m} F_{i,m,y}}{\sum_{m} GEN_{m,y}} \quad (3)$$

Where:

m is the sample group selected from recently built power plants in Xinjiang grid for calculation of build margin baseline emissions rate ex post, according to approved consolidated baseline methodology ACM0002. Although the formula is the same as equation (1), here only those newly built power plants that are selected in the sample group m in Xinjiang grid, can be considered (in term of year y, y is the years in the crediting period.)

(3) Combined marginal emission factor

$EF_y = w_{OM} \cdot EF_{OM,y} + w_{BM} \cdot EF_{BM,y}$, where the weights w_{OM} and w_{BM}, by default, are 50% (i.e., w_{OM} = w_{BM} = 0.5).

(4) Baseline emission

[4] As described above, the imported electricity from connected electricity system could be seen as a electric power source *j*

$$BE_y = EG_y \times EF_y$$

where:

BE_y is the baseline emissions (unit: tCO_2) of Urumqi grid in year *j*, *EFy* is the combined margin baseline emissions factor (unit: tCO_2/MWh) of the Urumqi power grid, *EGy* is the electricity supplied by the proposed Tuoli wind farm project activity to the Urumqi grid (unit: MWh) in the year *y*.

Note about the self service rate of the wind farm: the electricity supplied or delivered to the grid as mentioned above refers to electricity generation deducted from the self service consumption. Accordingly, the calculation of baseline emission is based on the electricity supply and coal intensity per unit of electricity supply.

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

Option 2 is not applicable for this project. This option 2 may, for instance, applicable to the CDM project activity with type of landfill gas (CH_4) recovery and utilization, where the GHG emission reductions could be direct monitored from the project activity by measuring how much LFG is recovered. While the wind farm is not in the case, since merely monitoring electricity generation of the wind farm is not enough to measure the emission reduction directly, instead the ex post monitoring the baseline emission rate of the Urumqi grid is needed as well.

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	Data type	Data variable	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
Not applicable								

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

Not applicable

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	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

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

The emission sources potentially giving rise to leakage in the context of electric power projects are those GHG emission sources outside of the project boundary that are attributable to the project activities, such as power plant construction, fuel handling (extraction, processing, and transport), and land inundation (for hydropower projects, see applicable conditions above). Project participants do not need to consider these emission sources as leakage when applying this ACM0002 methodology. Project activities using this baseline methodology shall not claim any emission reduction credit from reducing such type emissions to below the level in the baseline scenario. So the proposed project activities consider no these leakage source, i.e. Ly=0.

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.)

The project activity reduces the carbon dioxide emissions mainly through displace of grid electricity generation with fossil fuel fired power plants by renewable wind power electricity. The emission reduction ER_y by the project activity during a given year *y* is the difference between baseline emissions (BE_y) and, project emissions (PE_y) and emissions due to leakage (L_y), as follows:

$$ER_y = BE_y - PE_y - L_y$$

For PE_y and L_y is zero, so we have

$$ER_y = BE_y = EG_y \times EF_y$$

where:

BE_y is the baseline emissions (unit: tCO_2) of Urumqi grid in year y, *EFy* is the combined margin baseline emissions factor (unit: tCO_2/MWh) of the Urumqi power grid, *EGy* is the electricity supplied by the proposed Tuoli wind farm project activity to the Urumqi grid (unit: MWh) in the year *y*.

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.
D.2.1.3-*6)*	*Medium*	Verification through comparison among China electric statistics year book, authoritative national statistics, national communication, the study report of Chinese specialist, and IPCC default value.
D.2.1.1-*1)*, D.2.1.3 *5), 7)*	*Low*	The Urumqi grid, the power plants in the grid, the Tuoli wind farm company, have the regular monitoring measure and statistics procedure for the electricity supply to the grid and coal consumption as well as the self service rate. These data are the key indicators for the economic performance and energy efficiency of the company's operation. However as a CDM project, the specific QA/QC procedures within the enterprise management to secure the accuracy of the data are needed in the monitoring plan.

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

With the institutional reform in the electric power industry sector, the grid and plants are divided, not belong to one monopolized company, and thus the local grid company need to complete operational electric data statistics mechanism and normative procedures. In term of monitoring the grid-connected baseline emissions, Tuoli wind farm owner is advised to include the provision of monitoring data and quality assurance measures in the electric power purchased agreement to be signed with Urumqi grid. Also further provisions to be included are consignment agreement on procurement of monitoring data and onsite validation and verification by DOE. Tuoli wind farm operation entity and Urumqi power grid will establish joint CDM project management office and assign dedicated people responsible for the monitoring and report the emission reduction due to the project activity.

D.5 Name of person/entity determining the monitoring methodology:

Huang Gengxin, Beijing Guotou Energy Conservation Company, Manager of Department of Project Investment, also the project participant listed on Annex 1,
e-mail: Hgx@bjgtec.com
Tel: 86-10-65134431

SECTION E. Estimation of GHG emissions by sources

E.1. Estimate of GHG emissions by sources:

As stated in Section D.2.1.2, under the assumption of omitting leakage emissions in the project construction period, the GHGs emission within the project boundary is zero, i.e. PE_y=0.

E.2. Estimated leakage:

As stated above, the project don't consider the leakage sources, i.e. Ly=0.

E.3. The sum of E.1 and E.2 representing the project activity emissions:

E.1+ E.2 = $PE_y + L_y = 0$

E.4. Estimated anthropogenic emissions by sources of greenhouse gases of the baseline:

According to the formulae in Section D.2.4, the combined margin baseline emission factor of the first crediting period:

EF_y **= 1.048 tCO_2/MWh**,

According to the feasibility study report on Tuoli 30MW wind farm project, the estimated annual electricity supply to grid is

EG_y **= 89080MWh**,

Then the estimated anthropogenic emissions of the first crediting period by the baseline Urumqi grid is

$BE_y = EG_y \times EF_y$ =**93355.84** tCO_2.

E.5. Difference between E.4 and E.3 representing the emission reductions of the project activity:

The annual emission reduction of the first crediting period of the project activity:

$ER_y = BE_y = EG_y \times EF_y$ = **93355.84 tCO_2**.

E.6. Table providing values obtained when applying formulae above:

Year	Project Activity Emission (tCO2)	Baseline Emission (tCO2)	Leakage (tCO2)	Emission Reductions (tCO2)
1	0	93355.84	0	93355.84
2	0	93355.84	0	93355.84
3	0	93355.84	0	93355.84

4	0	93355.84	0	93355.84
5	0	93355.84	0	93355.84
6	0	93355.84	0	93355.84
7	0	93355.84	0	93355.84
Total	0	653490.88	0	653490.88

SECTION F. Environmental impacts

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

The Article 13 of the Environmental Protection Law of the People's Republic of China states that "Units constructing projects that cause pollution to the environment must observe the state provisions concerning environmental protection for such construction projects. The environmental impact statement on a construction project must assess the pollution the projects is likely to produce and its impact on the environment and stipulate the preventive and curative measures; the statement shall, after initial examination by the authorities in charge of the construction project, be submitted by specified procedure to the competent department of environmental protection administration for approval. The department of planning shall not ratify the design plan descriptions of the construction project until after the environmental impact statement on the construction project is approved."

Though the overall area of the wind farm is quite large, the actual construction area of the project is comparatively small. Since engineering approach of abutment construction is adopted for building the wind generator towers and an enhanced construction management is organized as well, the disturbance and damage of the land surface will be limited at a minimal scope. Hence the impacts of the wind farm construction on overall environmental qualities and ecological environment in the proposed project area are very limited. Concretely the potential environmental impacts of the Tuoli Wind Farm Project are analyzed as below:

1. Noise. Noise is mainly caused by the machines and vehicles used during construction period and the interaction between wind and turbine generator blades. All the machines are operated in day time during construction period, and the noise level is kept in consistence with the relevant environment standard. Certain noise happens when wind generators are running, but its impact is primarily effective within the scope of 200 meters, no essential impacts are caused in the range of 500 meters outside as noise has been greatly weakened. There is no any enterprises and residential districts near the wind farm, it can be concluded that environmental impacts of noise satisfy the national standard of China (GB3096-93, GB12348-90, GB12523-90).

2. Impact on birds. There exists possibilities of birds hitting the wind power generators, but the observations for the existing wind farms (Dabancheng No. 1 and No.2 Plants) show that operation of wind power generators has no obvious influences on live of the migratory birds and resident birds inhabiting at the Chaiwopu Lake. The proposed wind farm project is more far away from the Chaiwopu Lake than the wind farms of Dabancheng No. 1 and No.2 Plant, so its impacts on birds' live will be minor.

3. Visual impact. In several countries (e.g. in UK), wind farm development is opposed by local public, who think the local natural scene could be damaged by wind generators. In China, wind farm is perceived as a scene site to demonstrate the high tech progresses and successful application of clean and renewable energy technology, Tuoli town becomes a new tourist spot now in Xinjiang that are attributable to the wind farm there.

4. Disturbance to communication by blades. Blades of wind power generators might cause electromagnetic wave and microwave departure from original direction, and might disturb television and broadcast signals, cellular wireless communication, and various control systems for sail and flight. Metallic blades have the strongest disturbance on communication, while fiberglass and wood blades have the weakest disturbance so they are the most popular materials for manufacturing blades. No influences on communication system by existing wind generators in Tuoli are found so far. The influences can be corrected by adopting low cost beamed receiver and transmitter if the influences happen.

5. Disturbance to communication by power transmission and distribution (T&D). Impacts of the Corona noise produced by T&D are mainly on the low frequency signals used for AM wireless broadcast. The Corona noise becomes bigger while storm coming. At the stage of designing and laying T&D lines, the distances from the broadcast stations, receiver stations, residential houses etc. have been kept beyond the minimal length. In addition, investigations of the electric field force of T&D lines and transformer stations, and comparison between the electric field force and the applicable standard in China have been carried out, the disturbance would not happen if the electric field force value meets the standard.

6. Impacts on water and land use. Because the Tuoli wind farm site is located in the water source area, waste water of daily life can not be drained out directly, it is disposed into a waste water ponds, near to the main control chamber of the wind farm and the voltage-up station, which have been treated to protect from penetration. The waste water is periodically removed to the urban sewer or farm land in order to avoid any impacts on the underground water quality in the Chaiwopu water source area. Through the construction of the wind farm, ecological environment of the site will be improved and result in protecting the water and land from losses. Land used for the wind farm is divided into two categories, one is permanent land used as toft of the wind generators, which is less than about 4 hectares, the other is temporary land used during the construction period only, which is about 7 hectares. Both permanent and temporary lands are used for agricultural production before the proposed project.

7. Air quality. Flying dust caused by using and moving machines during construction period has a negative impact on the air quality. But this impact will be eliminated after completing the construction. Wind power is a clean energy, does not generate air and water pollution during operation period, is greatly benefit for environmental protection.

F.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 the host Party:

It is known from the environmental impact assessment that the proposed project does not induce serious environmental impacts as described above (see F.1.).

SECTION G. Stakeholders' comments

>>

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

G.2. Summary of the comments received:

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

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Beijing Guotou Energy Conservation Company
Street/P.O.Box:	Qihelou Street 33#, Dongcheng District (East City District)
Building:	
City:	Beijing
State/Region:	
Postfix/ZIP:	100006
Country:	The People's Republic of China
Telephone:	86-10-65134431
FAX:	86-10-65275524
E-Mail:	Hgx@bjgtec.com
URL:	
Represented by:	Huang Gengxin
Title:	Engineer
Salutation:	Mr.
Last Name:	Huang
First Name:	Gengxin
Department:	Investment project Department
Mobile:	13501370866
Direct FAX:	86-10-65275524
Direct tel:	86-10-65134431
Personal E-Mail:	Hgx@bjgtec.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding from any of the UNFCCC Annex 1 country governments was obtained in this project

Annex 3

BASELINE INFORMATION

Table.1 The information and result of operating margin

Operating Margin Emission Factor 2001

Fuel types	unit	Xinjiang grid	Emission Factor	Oxidation rate	average low Caloric value	CO2 emission
			tc/TJ	%	MJ/t,m³,tce	tco2e
		A	*B*	*C*	*D*	*E=A*B*C*D*44/12/100*
Raw Coal	Mton	917.67	26.80	98%	20908.00	18476994.34
Other Washed Coal	Mton	0.00	26.80	98%	8363.00	0.00
Crude Oil	Mton	0.00	20.00	99%	41816.00	0.00
Diesel Oil	Mton	0.69	20.20	99%	42652.00	21579.75
Fuel Oil	Mton	1.76	21.10	99%	41816.00	56369.51
Refinery Gas	$10^{10}m^3$	1.49	18.20	100%	46055.00	45564.75
Natural Gas	$10^{10}m^3$	2.66	15.30	100%	38931.00	57804.70
					TOTAL	18658313.05

a. total CO2 emission in Xinjiang grid(tCO2e)	18658313.05
b. total generation in Xinjiang grid(MWh)	16.33
c. OM emission factor(tCO2e/MWh) (a/b/10^6)	1.1426

Operating Margin Emission Factor 2002

Fuel types	unit	Xinjiang grid	Emission Factor	Oxidation rate	average low Caloric value	CO2 emission
			tc/TJ	%	MJ/t,m³,tce	tco2e
		A	*B*	*C*	*D*	*E=A*B*C*D*44/12/100*
Raw Coal	Mton	981.75	26.80	98%	20908.00	19767224.81
Other Washed Coal	Mton	0.00	26.80	98%	8363.00	0.00
Crude Oil	Mton	0.00	20.00	99%	41816.00	0.00
Diesel Oil	Mton	1.12	20.20	99%	42652.00	35028.01
Fuel Oil	Mton	1.27	21.10	99%	41816.00	40675.72
Refinery Gas	$10^{10}m^3$	0.00	18.20	100%	46055.00	0.00
Natural Gas	$10^{10}m^3$	2.33	15.30	100%	38931.00	50633.44
					TOTAL	19893561.98

a. total CO2 emission in Xinjiang grid(tCO2e)	19893561.98
b. total generation in Xinjiang grid(MWh)	17.50
c. OM emission factor(tCO2e/MWh) (a/b/10^6)	1.137

Operating Margin Emission Factor 2003

Fuel types	unit	Xinjiang grid	Emission Factor	Oxidation rate	average low Caloric value	CO2 emission
Coal Total		53.60				
			tc/TJ	%	MJ/t,m3,tce	tco2e
		A	*B*	*C*	*D*	*E=A*B*C*D*44/12/100*
Raw Coal	Mton	1065.75	26.80	98%	20908.00	21458538.17
Other Washed Coal	Mton	3.64	26.80	98%	8363.00	29315.40
Crude Oil	Mton	0.00	20.00	99%	41816.00	0.00
Diesel Oil	Mton	0.40	20.20	99%	42652.00	12510.00
Fuel Oil	Mton	1.02	21.10	99%	41816.00	32668.69
Refinery Gas	$10^{10}m^3$	3.48	18.20	100%	46055.00	106419.68
Natural Gas	$10^{10}m^3$	5.95	15.30	100%	38931.00	129299.98
					TOTAL	21768751.91

a. total CO2 emission in Xinjiang grid(tCO2e)	21768751.91
b. total generation in Xinjiang grid(MWh)	19.83
c. OM emission factor(tCO2e/MWh) (a/b/10^6)	1.098

Average Operating Margin from 2001to 2003

	2001	2002	2003
OM	1.143	1.137	1.098
Average OM	1.126		

Table. 3 The information and result of building margin

Table A3	A	B	C	D	E	F
	Installed Capacity 2000	Installed Capacity 2003	New capacity Additions	Split of New Capacity	Emissions factor	Weighted Average Build Margin Emiddions Factor, EF_Bmy
	MW	MW	MW	%	tCO2/MWh	tCO2/MWh
	China Electric Power Yearbook 2000	China Electric Power Yearbook 2003	=B-A	=C / (Total of column C)	From Table A1	=D*E
Hydro	86.81	98.98	12.17	11.7%	0	0.000
Thermal	351.99	441.35	89.36	86.3%	1.126	0.971
Nuclear	0	0	0	0.0%	0	0.000
Other(wind)	7.06	9.13	2.07	2.0%	0	0.000
Total / % change	445.86	549.46	103.6			0.971

Table.4 The baseline emission factor

Table A4		Units	equation or source	
A	Estimated operating margin emission factor	tCO2/MWh	Table A1	1.126
B	Estimated Build margin emission factor	tCO2/MWh	Table A3	0.971
C	Estimated Baseline Emission factor	tCO2/MWh	(=(A+B)/2)	1.048

Annex 4

MONITORING PLAN

The project adopts the approved ACM0002: "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" to determine the baseline of g Xinjiang rid. Consistent with ACM0002 baseline methodology, use ACM0002 monitoring methodology to establish the monitoring plan.

1. The total objective of the monitoring plan

This Monitoring plan will set out a number of monitoring tasks in order to ensure that all aspects of projected greenhouse gas (GHG) emission reductions for the project are controlled and reported. This requires an on going monitoring of the project to ensure performance according to its design and that claimed Certified Emission Reductions (CERs) are actually achieved.

Managers of the Project must maintain credible, transparent, and adequate data estimation, measurement, collection, and tracking systems to maintain the information required for an audit of an emission reduction project. These records and monitoring systems are needed to allow the selected Designated Operational Entity (DOE) to verify project performance as part of the verification and certification process. This process also reinforces that CO_2 reductions are real and credible to the buyers of the Certified Emissions Reductions (CERs). The only significant emission source identified relates to the generation of electricity. emission reductions will be achieved through avoided power generation of fossil-fuel based electricity in the Xinjiang power grid due to the power generated by the project. The amount of electrical output from the project is therefore defined as the key activity to monitor.

Beijing Guotou Energy Reservation Company, who is developing the Wind Farm, will use this document as guide in monitoring of the project emission reduction performance and will adhere to the guidelines set out in this monitoring plan. This plan should be revised according to the real environment and the requirement of DOE to make the emission reduction process credible, transparent and conservative.

2. Key Definitions

The monitoring plan will use the following definitions of monitoring and verification.

- Monitoring: the systematic surveillance of the Urumqi Tuoli 30 MW wind farm project's performance by measuring and recording performance-related indicators relevant in the context of GHG emission reductions.
- Verification: the periodic ex-post auditing of monitoring results, the assessment of achieved emission reductions and of the project's continued conformance with all relevant project criteria by a selected Operational Entity (DOE).

3. Calibration of Meters & Metering Dispute Resolution Procedures

The Power Interchange Agreement between Xinjiang Urumqi Tuoli Wind Farm and Beijing Guotou Energy Conservation Company defines the metering arrangements and the required quality control procedures to ensure accuracy. These are copied below:

- The metering equipment will be properly calibrated and checked annually for accuracy. The metering equipment shall have sufficient accuracy so that any error resulting from such equipment shall not exceed +0.5% of full-scale rating.
- Both meters shall be jointly inspected and sealed on behalf of the parties concerned and shall not be

interfered with by either party except in the presence of the other party or its accredited representatives.

- All the meters installed shall be tested by Xinjiang Power Grid within 10 days after (a) the detection of a difference larger than the allowable error in the readings of both meters, (b) the repair of all or part of meter caused by the failure of one or more parts to operated in accordance with the specifications, and/or each anniversary of the Commercial operations date. If any errors are detected the party owning the meter shall repair, recalibrate or replace the meter giving the other party sufficient notice to allow a representative to attend during any corrective activity.
- Should any previous months reading of the Main Meter be inaccurate by more than the allowable error, or otherwise functioned improperly, the Net Energy output shall be determined by (a) first, by reading Backup Meter, unless a test by either party reveals it is inaccurate; (b) if the backup system is not with acceptable limits of accuracy or is otherwise performing improperly the Xinjiang Urumqi 30 MW Wind Farm and Xinjiang Power Grid shall jointly prepare an estimate of the correct reading; and (c) if Xinjiang Power Grid and Xinjiang Urumqi 30 MW Wind Farm fail to agree then the matter will be referred for arbitration according to agreed procedures.
- The Net Energy Output registered by the Main Meters alone will suffice for the purpose of billing and emission reduction verification as long as the error in the Main meter is within the permissible limits.

Calibration is carried out by Xinjiang Power Grid with the records being supplied to Xinjiang Urumqi 30 MW Wind Farm, and these records will be maintained by Xinjiang Urumqi 30 MW Wind Farm and the appointed third party.

4. Monitoring

The project is mainly monitoring on the data as follows:

In order to make sure of the accurateness of the electricity generation quantity, the monitoring process should be carried out by the project owner. Project electricity generation will be monitored through the use of on site metering equipment at the substation (interconnection facility connecting the facility to the grid). The main Metering System equipment will be operated and maintained by Xinjiang Urumqi 30 MW Wind Farm. The monitoring tasks are to measure Xinjiang Urumqi 30 MW Wind Farm's electric output, and steps to derive the emissions reductions are:

- Xinjiang Urumqi 30 MW Wind Farm supply reading and file for Verifier
- Xinjiang Urumqi 30 MW Wind Farm accumulates readings for payment period and calculates CERs for sales, and invoices Buyer

The monthly meter reading records will be kept as middle process documents and readily accessible for auditors, Calibration tests records will be maintained for the auditors.

5. Data Management Systems

This provides information on record keeping of the data collected during monitoring. Record keeping is the most important exercise in relation on the monitoring process. Without accurate and efficient record keeping, project emission reductions cannot be verified. Below follows an outline of how project related records will be managed.

Overall responsibility for monitoring of greenhouse gas emissions reduction will rest with Xinjiang Urumqi 30 MW Wind Farm, and which will be located at Xinjiang Power Grid. The following section sets out the procedures for tracking information from the primary source to the end-data calculations, in paper document format. Xinjiang Urumqi 30 MW Wind Farm will provide the CERs and necessary data to allow it to transfer to the Buyer.

Physical document such as paper-based maps, diagrams and environmental assessments will be collated in a central place, together with this monitoring plan. In order to facilitate auditors' reference of relevant literature relating to Xinjiang Urumqi 30 MW Wind Farm project, the project material and monitoring results will be indexed. All paper-based information will be stored by the technology department of Xinjiang Urumqi 30 MW Wind Farm and all the material should have a copy for backup.