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

CONTENTS

Annexes

CERUPT

SenterNovem on behalf of the State of the Netherlands

CHINA
HUITENGXILE WINDFARM PROJECT
September 2004

SECTION A. General description of project activity

A.1 Title of the project activity:

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Huitengxile Windfarm Project

A.2. Description of the project activity:

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The objective of the Huitengxile Windfarm Project is to generate renewable electricity using wind power resources and to sell the generated output to the Inner Mongolia Western Grid on the basis of a power purchase agreement (PPA). The project activity will generate greenhouse gas (GHG) emission reductions by avoiding CO_2 emissions from electricity generation by fossil fuel power plants that supply the Inner Mongolia Western Grid, which is an integral part of the North China Power Grid.

The proposed Huitengxile Windfarm Project is located within the Inner-Mongolia Autonomous Region of the People's Republic of China. The project involves the installation of 22 turbines, 12 of which have a capacity of 900 kW, and 10 of which have a capacity of 1500 kW, providing a total of 25.8 MW. The Huitengxile Windfarm Project site has an excellent wind resource which has been measured extensively. The site also benefits from a strong transmission system nearby, as it is close to one of the main power generation bases for the North China Power Grid. The proposed project is expected to generate approximately 59.19 GWh per year which will be sold into the Inner Mongolian Western Grid.

The project will assist China in stimulating and accelerating the commercialisation of grid connected renewable energy technologies and markets. It will therefore help reduce GHG emissions versus the high-growth, coal-dominated business-as-usual scenario. Furthermore the project will demonstrate the viability of larger grid connected wind farms which can support improved energy security, improved air quality, alternative sustainable energy futures, improved local livelihoods and sustainable RE industry development. The specific goals of the project are to:

- reduce greenhouse gas emissions in China compared to a business-as-usual scenario,
- help to stimulate the growth of the windpower industry in China,
- create local employment during the assembly and installation of wind turbines, and for operation of the windfarm,
- reduce other pollutants resulting from the power generation industry in China, compared to a business-as-usual approach.

A.3. Project participants:

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The following are the main Project Participants:

Project Owner: The Project Owner is the Inner Mongolia Long Yuan Wind Power Development Co. Ltd.

Host Country: The host country is the People's Republic of China and the Designated National Authority is the National Development and Reform Commission of the Government of China. The Government of the People's Republic of China announced its approval of the Kyoto Protocol in September 2002.

Purchasing Party: SenterNovem on behalf of the State of the Netherlands is purchasing the CER's arising from this Project Activity via the CERUPT Program.

Other parties involved in the Project but who are not Project Participants include:

Project Developer: The Chinese Renewable Energy Industries Association (CREIA) is developing the CDM aspects of the Project together with support from Dr Alex Westlake.

CREIA is the main contact point for the Project and detailed contact details for the project participants and other Parties are included in Annex 1.

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

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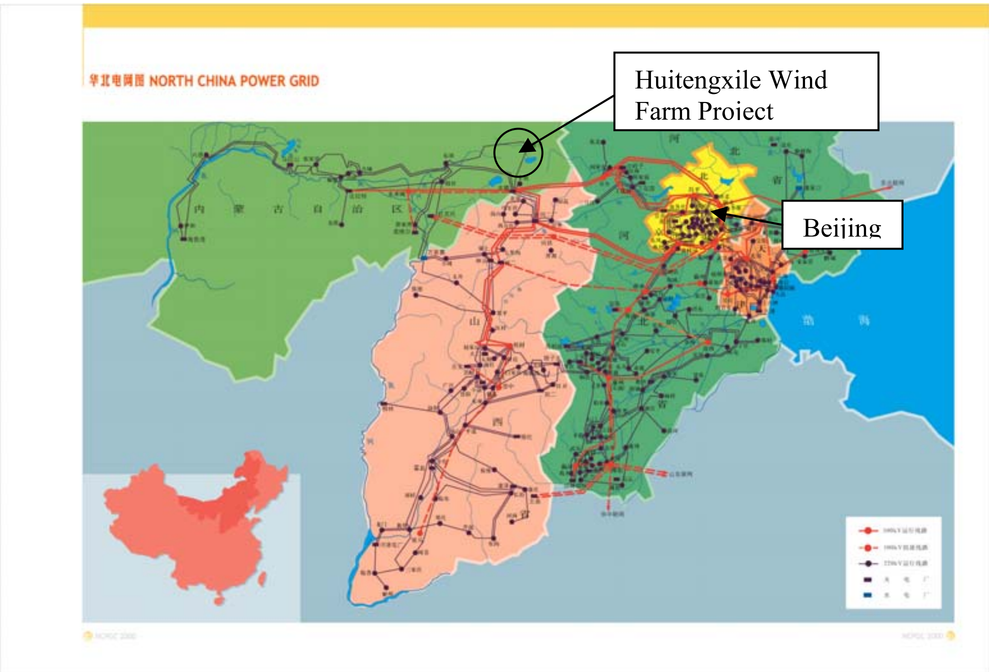
The windfarm is sited within the township area of Desheng to the west of the local villages of Hongpan and Caoduoshan. Desheng township is located in Chayouzhongqi county, within the Wulanchabu League of the Inner Mongolia Autonomous Region, People's Republic of China. Figure 1 shows the location of the Huitengxile wind farm project in relation to the North China Power Grid. The local Inner Mongolia Western Grid is shown by the lighter green shaded area.

Figure 1: Map of the North China Power Grid showing the location of the Huitengxile Windfarm Project



A.4.1.1. Host Party(ies):

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The Host Country is the People's Republic of China.

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

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The Project Activity is located in Chayouzhongqi County of the Inner Mongolia Autonomous Region.

A.4.1.3. City/Town/Community etc:

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The nearest township to the Project Activity is Desheng Township.

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

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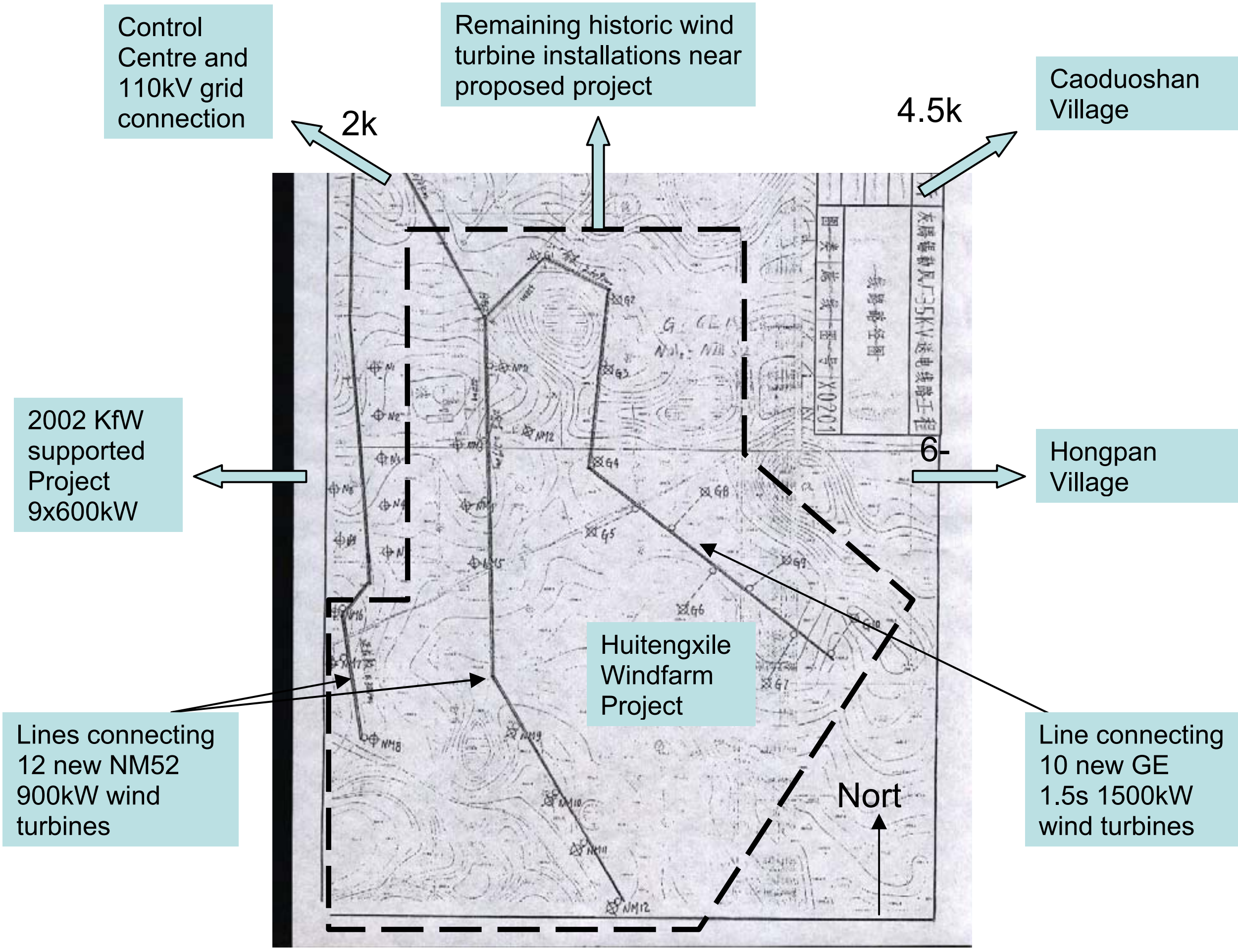
The elevation at the site of the Project Activity is approximately 2030m and its geographical co-ordinates are longitude 112º37' and north latitude 41º09'. The site is 120km from the capital of Inner Mongolia, Hohhot, 60km from Jining and 26km from the train station at Zhuozishan. The Ke-Zhuo road passes through the windfarm. A schematic of the project and where the turbines are to be located is shown in Figure 2.

Figure 2. Outline locational drawing for the Huitengxile Windfarm Project showing its relation to other projects in the vicinity.



Source: The Map is provided from the Construction Department of IMLYWPDC

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

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In accordance with AM0005 Baseline methodology (barrier analysis, baseline scenario development and baseline emission rate, using combined margin) for small grid-connected zero-emissions renewable electricity generation, which was approved by the Executive Board 12 on 27-28 November 2003, the following category is suggested “Renewable electricity generation in grid connected applications”. This category would fall within sectoral scope 1: energy industries.

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

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The Huitengxile Windfarm Project involves the installation of 22 turbines, 12 of which have a capacity of 900 kW and 10 have a capacity of 1500 kW providing a total capacity of 25.8 MW.

The capacity factor is estimated to be 26.3% based on extensive monitoring of the available local wind resource as summarised below. The proposed project is therefore expected to generate approximately 59.19 GWh per year which will be sold into the Inner Mongolian Western Grid, which is an integral part of the North China Power Grid, as shown in Figure 1.

The site is approximately 26km away from the nearest 220kV substation, which it is linked to via the Zhuo-Ke 110kV transmission line which connects to a substation which has been built at the windfarm site. A new site transformer will not be required for the windfarm, as the existing switchgear and control centre at the site has sufficient spare capacity. Each turbine will have a 690V-to-10kV transformer, from which a 10kV line will link into the on-site 110kV switchgear at the substation.

The 900 kW and 1500 kW turbine suppliers were contracted through competitive bidding, and purchase contracts were signed in 22nd August 2003, after the award of CDM funding to the Project from CERUPT. Since then site preparation has been underway. The 900kW and 1500kW turbines are significantly larger than the average turbine rating in China which by the end of 2002 was 515 kW per wind turbine (Source: Shi Pengfei).

The main characteristics of the turbines at the Huitengxile Windfarm Project are:

Table 1. Key technology to be employed at Huitengxile Windfarm Project

Number of Turbines	Rating of Turbine	Manufacturer	Designation
12	900 kW	NEG Micon of Denmark	NM52
10	1500 kW	GE Wind Energy	GE 1.5S
Total Capacity	25.8 MW		

The GE Wind supplied “GE 1.5s” range of wind turbines is proven worldwide with over 1300 turbines installed and represents many advances in technology. The turbines have a rotor diameter of 70.5 m and are active yaw and pitch regulated with power/torque control capability and are coupled to an asynchronous generator. The turbines utilize a bedplate drive train design where nacelle components are joined on a common structure, providing exceptional durability. Furthermore the generator and gearbox are supported by elastomeric elements to minimize noise emissions. The variable speed control and independent blade pitch control assure aerodynamic efficiency and reduce loads on the drive train, yielding reduced maintenance costs overall and longer turbine life – important considerations in remote areas. The independent blade pitch system also mitigates the need for large emergency braking systems and enables the use of larger rotors for increased energy yield. The bespoke GE power electronic system (“WindVAR”) will enable transmission efficiency to be optimized and enable the turbine to function harmoniously with the local grid. A detailed technical specification is available for download from:

http://www.gepower.com/prod_serv/products/wind_turbines/en/downloads/ge_15brochure.pdf

The NEG Micon supplied “NM52/900” is an extension of the NM 750 which has over 1000 models installed worldwide. The main design improvements are focused on the yaw system and the rotor and by introducing a more rigid and stronger cast machine frame. The stall controlled rotor is 52.2 m in diameter and is coupled to an asynchronous generator allowing for good energy capture and simple maintenance. Special emphasis has been placed on the gearbox technology and there is a new three stage gearbox which NEG Micon believes can handle all loads it will experience. Furthermore the braking system has been improved to lessen the loads on the drive train. A detailed technical specification is available for download from:

http://www.neg-micon.com/cm17.asp?d=1

The balance of plant, e.g. transformers, local transmission equipment and cables, will be procured locally.

Construction will be managed by the Inner Mongolia Long Yuan Wind Power Development Co. Ltd. (IMLYWPDC) in conjunction with the wind turbine manufacturers. Operation of the windfarm during the first two years will be undertaken by IMLYWPDC with close technical support from the manufacturers, during which time there will be on the job training for staff of the Inner Mongolia Long Yuan Wind Power Development Co. Ltd provided by the manufacturers.. After two years, the company will then take over full responsibility for operation and management of the wind farm. It is planned that the windfarm will be operational for a minimum of 20 years.

Completion of the Project will significantly improve the capacity of Inner Mongolia Long Yuan Wind Power Development Co. Ltd. to install, operate and maintain state-of-the-art wind turbine technology in China.

Estimation of Capacity Factor

There are seven years of anemometer readings available for the site. Over the three years between 1999-2001 data was obtained using wind anemometers and wind vane sensors made by the Shanghai Meteorological Instrument Manufacturing Company. Analysis of data from one of the anemometers at 40m showed average wind speeds for 1999 of 8.80m/s, 8.87m/s for 2000 and 8.37m/s for 2001 [Windpower Research Institute of the Inner Mongolia Windpower Company, 2002]. The average for the 3 years was 8.68m/s. This correlates well with other readings from other anemometers at the site over the period and for other readings obtained over the last seven years. Over the three year period the average annual wind speed varied by approximately 6%. This history of wind data gathering gives confidence that the proposed turbines to be installed will operate as planned.

The net capacity factor for 2002 calculated from the operating hours of the existing 600kW wind turbines operating at the site, excluding the Zond Turbines which have experienced difficulties, is 2312 hours which is equivalent to 26.39% (Source: Report from Production Department of IMLYWPDC). This gives confidence that the assumed gross capacity factor (i.e. before consumption of electricity by the turbines) of 26.3% can be achieved. Furthermore the new wind turbines are larger and therefore have higher hub heights (55m for the NM52 and 65m for the GE1.5s) than the existing 600kW turbines at the site (hub heights around 40m)[1] and so the wind speed is likely to be higher and so will the capacity factor.

This estimate of capacity factor is to provide a basis for the ex-ante baseline estimation but the actual emissions will be based on ex-post monitoring of electricity delivered to the grid so inaccuracies and annual variations in capacity factor will be factored into the emissions reductions claimed.

[1] The developer has confirmed this information in a fax.

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:

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Applying the methodology described in Section B which is in accordance with the approved AM0005 Baseline methodology (barrier analysis, baseline scenario development and baseline emission rate, using combined margin) for small grid-connected zero-emissions renewable electricity generation, the implementation of the Huitengxile Windfarm Project in the North China Power Grid system will generate an estimated reduction of 514,296 tCO_2e over the ten year crediting period of the project from 2005 to 2014 (see Table 2). This reduction is the result of displacement of fossil fuel fired plants that would otherwise have delivered electricity to the North China Power Grid.

In each year the amount of CERs generated by the project will vary depending on the metered net generation output from the Huitengxile Windfarm Project and the appropriate CO_2 emission factor. This emission factor is computed from the latest official information on the North China Power Grid as outlined in Annex 3.

The principle arguments for why the project is additional and therefore not the baseline scenario are:

1) The project faces financial and technical barriers to its implementation
2) The project faces barriers as the costs per kW installed for the windfarm are higher than the typical coal and gas fired power station which are being considered for new plant on the North China Power Grid and the transaction costs are disproportionately higher for such a small-sized renewables project versus conventional fossil fuel projects.
3) A series of baseline scenarios have been developed which support the above barrier analysis and which include the potential impacts of sectoral policies and national circumstance for renewables.
4) Wind power only provides 0.17% of the generation capacity of the North China Power Grid and 0.7% of the generation capacity of the Inner Mongolia Western Grid (2002 figures, Source: China Electric Power Yearbook 2003). This highlights the barriers that a windfarm project faces versus conventional fossil fuel power stations in China.

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

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The Project Activity will generate an estimated reduction of 514,296 tCO_2e over the ten year crediting period of the project from 2005 to 2014 as shown in Table 2 below.

Table 2: Huitengxile Windfarm Project Estimated CERs

	Unit	2005[2]	2006	2007	2008	2009	2010	2011	2012	2013	2014
Estimated Huitengxile net generation (including auxiliary power)	GWh	29.60	59.19	59.19	59.19	59.19	59.19	59.19	59.19	59.19	59.19
North China Power Grid (estimated Emission Factor)[3]	Kg CO_2e/ kWh	0.915	0.915	0.915	0.915	0.915	0.915	0.915	0.915	0.915	0.915
Emission reductions	tCO_2e	27,068	54,136	54,136	54,136	54,136	54,136	54,136	54,136	54,136	54,136

Note: Data is calculated accurately in an excel spreadsheet and rounded here appropriately.

A.4.5. Public funding of the project activity:

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There is no public funding 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:

>>It is proposed that the AM0005 Baseline methodology (barrier analysis, baseline scenario development and baseline emission rate, using combined margin) for small grid-connected zero-emissions renewable electricity generation, which was approved by EB-12 (27-28 November 2003), is applied to the Huitengxile Windfarm Project as this Project also falls into the category of "Renewable electricity generation in grid connected applications" and its circumstances are similar. The methodology is referred to as "Barrier Analysis, baseline scenario development, and baseline emission factor, using combined margin for small grid connected zero emissions renewable electricity generation".

It consists of two parts:
1) Establishing the additionality of the Huitengxile Project
2) Defining a conservative baseline scenario and an algorithm for calculating the corresponding baseline emission factor.

In this methodology the actual emission factor is not provided by the baseline methodology, but is calculated from monitored data as per the monitoring methodology.

In applying this methodology, the Executive Board's clarification in Annex 1 to the EB 10 Report is followed in showing the additionality of the Project.

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2 The CERs estimated for 2005 are subject to a part-year correction as the Turbines will be operational from June.

3 The ex-post emission factor will vary in accordance with the El Gallo Methodology.

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

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Applying the AM0005 Baseline methodology (barrier analysis, baseline scenario development and baseline emission rate, using combined margin) for small grid-connected zero-emissions renewable electricity generation to the Huitengxile windfarm is justified because:

- The Huitengxile Windfarm Project matches the applicability criteria defined in the AM0005 Baseline methodology (barrier analysis, baseline scenario development and baseline emission rate, using combined margin) for small grid-connected zero-emissions renewable electricity generation , and the additional criteria suggested by the EB.
- There is sufficient proof that renewable energy projects in China are similarly disadvantaged to the El Gallo project because of the barriers and lack of effective support policies when compared with traditional energy sources.
- The Huitengxile project has also faced financial and investment barriers for which the project developer has sought a variety of means to overcome.
- The Huitengxile project faces additional technological, operational and institutional barriers which need to be overcome.

Using the applicability criteria of the AM0005 Baseline methodology (barrier analysis, baseline scenario development and baseline emission rate, using combined margin) for small grid-connected zero-emissions renewable electricity generation and the additional conditions defined by the EB, the methodology is applicable to the Huitengxile Project because:

A. Sufficient information exists to demonstrate in a transparent and conservative manner that the Huitengxile Windfarm Project faces barriers and its registration as a CDM project is helping it to overcome these barriers. (It should be noted that the agreement between the project developers and SenterNovem, the tendering authority for the Dutch Government's CERUPT program, is such that any risk that the Kyoto Protocol will not come into force and that the CDM will not become operational has been assumed by SenterNovem/CERUPT. The benefits derived from registration as a CDM activity will accrue regardless of the status of the Kyoto Protocol and the CDM, in so far as SenterNovem will honour the terms of their mutually contracted agreement).

B. Sufficient information exists to demonstrate in a transparent and conservative manner that the type of activity undertaken in the Huitengxile Windfarm Project is not common practice in China at the present time.

C. Huitengxile Windfarm Project will displace grid electricity that would otherwise be provided by the operation and expansion of the generating plant connected to the grid. Data on the North China Power Grid is available and regularly updated.

D. The North China Power Grid is not dominated by generating sources with zero or low operating costs such hydro, geothermal, wind, solar, nuclear, and low cost biomass. These resources only account 6.1% of the 53.80 GW capacity of the North China Power Grid (calculated from data in Table A3 in Annex 3). Clearly these sources do not dominate the generation mix.

E. Electricity imports/exports are included in electricity generation data used for calculating and monitoring the baseline emission factor to avoid potential leakage. Currently the imports to the

North China Power Grid are very small (0.4 TWh were imported in 2002 out of a total of 283.3 TWh generated source: China Electric Power Yearbook 2003 p122 i.e. only 0.14%). As per the AM0005 Baseline methodology (barrier analysis, baseline scenario development and baseline emission rate, using combined margin) for small grid-connected zero-emissions renewable electricity generation the emission factor of the grid, EF_y, is checked to see if this level of imports has a significant impact. Furthermore the imports are from within China, principally from the North-East Power Grid which has a very similar grid emissions factor so leakage effects are minimal. Over the last two years, for which data is available, the highest import amount was 1.619 TWh out of 250.7 TWh of generation representing 0.646% of the total generation in that year, thus showing that typically such imports/exports are low.
F. The Huitengxile Windfarm Project will only lead to a small capacity addition, 25.8MW, below the EB limit of 60MW. The project will have a very small impact on the build and operating margins.

B.2. Description of how the methodology is applied in the context of the project activity:
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Both parts of the baseline methodology, as detailed in the AM0005 Baseline methodology (barrier analysis, baseline scenario development and baseline emission rate, using combined margin) for small grid-connected zero-emissions renewable electricity generation, are applied to the Huitengxile Windfarm Project:

1) First, the additionality of the Huitengxile Windfarm Project is established based on a barrier analysis. Relevant arguments are presented both in the specific context of the Huitengxile Windfarm Project (Step M1) and in the general context of the North China Power Grid in which the Huitengxile Windfarm Project will be operating (Step M2).
2) Next, a justification for the baseline scenario and a transparent and conservative estimation of the baseline emission factor is carried out (Step M3), using the algorithm applied in the El Gallo Methodology and the data provided in Annex 3.

Part 1. Additionality argument for the Huitengxile Windfarm Project based on barrier analysis.

Methodology Step M1. Analyse barriers to the proposed projects

This methodology seeks to establish that barriers would have prevented the project from being undertaken or completed (Substep M1(a)), and to demonstrate that by registering the project as a CDM activity these barriers are alleviated and the project enabled (Substep M1(b)). Being a registered CDM project activity, by successfully negotiating a formal agreement with SenterNovem as part of the CERUPT programme, has both financial and institutional benefits that have affected the viability of the project.

Substep M1(a). Identify the relevant barriers to the proposed project activity.

The primary relevant barriers to the project are:

Investment barriers: The wind power development at Huitengxile windfarm has historically been supported by government preferential tariff policies and mixed credits on favourable terms from donor countries, e.g. the last 5.4 MW at the site was supported via the German KfW bank (this is considered by KfW to be Official Development Assistance and the loan document for this is available from IMLYWPDC). Indeed the original plans for the financing of the Huitengxile Windfarm Project also featured a Dutch mixed credit loan on favourable terms which required the use of Dutch sourced equipment. However even with this support the developer realised CDM funds would be needed to make the project an attractive investment due to the changes in the sectoral policy and investment environment for renewables in China as outlined in Step M2. Therefore the developer approached the Chinese Renewable Energy Industries Association in 2001 to assist them with the CDM registration process and signed a formal contract on June 30th 2002 to carry out a baseline study and apply for CDM funding from SenterNovem / CERUPT.

Subsequent to the application to SenterNovem / CERUPT for the CDM credits, the Dutch Soft Loan was cancelled because the supplier in Holland was closed – this was confirmed in email correspondence from the Dutch Embassy in Beijing to CREIA on March 21st 2003 (this documentation can be made available to the DOE) Therefore the developer again faced significant financing difficulties. However after SenterNovem confirmed its intention to purchase CERs from Huitengxile Windfarm Project in March 2003, this gave the Inner Mongolia Long Yuan Wind Power Development Company sufficient supporting revenue from the project to proceed with a company loan for the project from the Agricultural Bank of China (signed in September 2003) - a memo from the Inner Mongolia Long Yuan Windpower Development Company to the Agricultural Bank of China dated November 2nd 2003 summarises this.

Furthermore in January 2004, subsequent to the offer from SenterNovem for the purchase of CERs, the company also managed to secure an equity injection from one of its parent companies, Long Yuan which increased its registered capital from RMB20m to RMB60m. This increase in registered capital has enabled the company to proceed with the 20% equity contribution to the Huitengxile Windfarm Project on the basis of the enhanced project financials including the CDM credits. Inter-company documentation exists which highlights the role of CDM in securing this equity injection.

The financing difficulties are also evidenced from the considerable lead time for the project, which at three years now, is significantly longer than the company's historic norm of one year under the previous more favourable conditions and this demonstrates the barriers the project has faced. The preceding paragraphs highlight the important role that CDM has played in the decision making process for the project.

The CDM will also allow the company to mitigate foreign exchange risks associated with the euro denominated purchase of equipment from NEG-Micon which represents 34.6% of the installed capacity of the project (the euro:dollar rate has risen from €1.132:$1, when the equipment purchase agreement was signed in August 2003, to €1:$1.256, when the first payment was due in February 2004 – exchange rates taken from xe.com for the relevant dates). Note: the RMB:US dollar rate is effectively hedged by the RMB's peg to the dollar. Furthermore the CDM revenues would help the company finance the local elements of site works as commodity prices in China have increased dramatically since the first business plan was created – steel prices in the third quarter of 2003 were already 48% higher than planned for in the feasibility study. Cumulatively these effects in relation to the originally estimated total investment volume are about 3-4% which is significant.

Tariff Barriers: Furthermore it is clear that the project is not the least cost option as it faces the considerable barrier from the abundance of large supplies of cheap coal and considerable new coal fired generation being constructed in China with correspondingly low generation tariffs (the average inter-grid sales tariff in China in 2002 was only RMB0.231per kWh[4] and in Inner Mongolia circulars from NDRC in 2002 show that the tariff for local power stations are only RMB0.228 per kWh[5]) which is far less than the tariff of RMB0.498/kWh (excluding 8.5% VAT) included in the Huitengxile Windfarm Project Feasibility Study Document. This gap in tariffs makes it difficult for local pricing bureaux and local grids to approve wind powered generation projects and creates considerable financing risk in the absence of defined support policies. Thus the CDM will assist the Project to overcome these tariff barriers and further spur the development of wind power in China.

Technology Barriers: The technology risks associated with wind power in China are quite high due to the transfer of advanced foreign made technology. Indeed at Huitengxile Windfarm Project there have been a considerable number of failures – at one stage this was 60% for the 10 installed Zond turbines and all the gearboxes of the Micon Turbines needed to be replaced as part of a global problem. Furthermore this is evidenced by the several significant donor programmes to improve capacity factors at windfarms in China, e.g. KfW's. All this leads to an increased perception of risk from financiers and makes it more difficult to attract financing. Also windfarm operators need to maintain larger operation and maintenance reserves for such eventualities. The developer is also facing the barrier that this is one of the first projects in China to use the state of the art 1.5MW class wind turbines and the first one of its class in Inner Mongolia[6]. This increases the risks of the project inherent in it being such a "first".

Transaction Costs: Being a small facility with a maximum output of 25.8MW and intermittent dispatch, Huitengxile faces the barrier of project development costs and transaction costs for financing (short tenor, high rate) that are disproportionately high, as is often the case for low-capacity renewable projects.

Substep M1(b). Explain how only the approval and registration of the project as a CDM activity would enable the project to overcome the identified barriers and thus be undertaken.

Carrying out the Huitengxile Windfarm Project as a CDM project has already clearly helped the project developer overcome the barriers listed in Substep M1(a). Firstly, provided the project is registered and approved by the Executive Board, the contract with SenterNovem has improved the cash flow and debt service ratio of the project which has assisted IMLYWPDC to secure the necessary financing and equity injection to carry out the Project – as outlined in Step M1 (a). Secondly the CDM revenues for the Project have bridged the tariff gap between what is offered by the local power off-taker and the tariff needed to secure investments in the Project. The CDM revenues effectively increased the tariff by 10% or about 0.05RMB/kWh. Thirdly the CDM revenue has enabled more advanced >1MW technology to be transferred.

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4 Source: China Electric Power Yearbook 2003 page 122 – calculated as revenue from wheeled power divided by total wheeled power.

5 Source: NDRC circular 2002 – 940 – revision of coal price for Guo Hua Zhun Ge Er 2x330MW coal fired power station from 0.212 RMB/ kWh to 0.228 RMB/kWh.

6 The wind turbine installation history in China is detailed in annual reports created by Shi Pengfei of the China Hydropower Consulting Company – this includes data on total installation in China and by windfarm and the turbine sizes, manufacturers and month when installed for each windfarm. Reports are available for 2002 and 2003.

Finally the CDM revenues will allow IMLYWPDC to overcome the foreign exchange risks for the purchase of the international equipment selected for the site which have significantly added to the transaction costs for the Project and it will help to overcome the high development costs of the windfarm, which have been further increased by the rise in commodity prices in China recently (e.g. for steel and concrete for the site preparation). As introduced in Step M1(a), these account for 3-4% of the total investment volume. In China these risks are known and the CDM contract will provide a natural hedge.

If the project is not formally approved and registered as a CDM activity, then the project developer foresees the following impacts:

1. The CER revenue (net of initial and annual transactions costs) represents a significant source of revenue for the project (10% of gross annual revenue calculated using the CERUPT price for the project, an exchange rate of Euros 1.2: 1USD and compared against the annual electricity sales revenue at the tariff included in the feasibility report excluding VAT for the projected sales of 59.19 GWh per year) and without this revenue the debt service coverage ratio of the project will be impaired, potentially leading to a cashflow crisis in the company and the closing of the Project, with the resulting loss in emission reductions. Indeed when the developer secured the loan from the Agricultural Bank of China, their explanation that this was the first potential CDM project in China to secure carbon funding assisted them in their loan application. However, apart from the company memo, this evidence is not formal in nature due to the nature of local project development in China where much of the development is not required to be documented formally.
2. The Project Developer proposes to use the CDM revenues as a reserve for the operation and maintenance of the new >1MW turbines, the first to be installed in the North China Power Grid service area and the second and largest such installation in China. This will help to ensure their operation and contribution of CERs.
3. The CDM revenues are the only income the Project Developers receive in euros and is the only revenue that can be used to offset the foreign exchange risks that are being incurred for the purchase of the NEG-Micon equipment (34.6% of the installed capacity of the Project). Failure to secure the CDM money will place a strain on the company's finances which may adversely affect the subsequent operation of the turbines.

Methodology Step M2. Discussion of other existing activities similar to the proposed project.

In order to test whether a credible claim can be made that there are real, prohibitive barriers to development of a project such as the Huitengxile Windfarm Project, it is necessary to investigate the current state of wind farm development in China, within the service area of the North China Power Grid and in the area of Huitengxile itself.

International development aid, e.g. from the World Bank, Asian Development Bank, and KfW and government tariff support has been used in China since 1993 to initiate the wind power industry in the country and demonstrate the feasibility of windfarms. However the industry is still in the nascent stage as only 0.22% of the 250GW technical wind potential (567MW) had been successfully developed by the end of 2003 and during 2002-3 no windfarms or windfarm extensions comparable in size to the Huitengxile windfarm have been completed – see Table 3 and 4.

Table 3 Installed capacity of wind farms in China from 1993 to 2003

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Installed MW	10.5	14.8	6.8	21.4	109.2	56.9	44.7	77.7	57.2	66.9	98.3
Cumulative MW	14.5	29.3	36.1	57.5	166.7	223.6	268.3	346.0	403.2	468.4	567

Note: Slight differences in installed and cumulative capacity arise due to turbine retirements

Table 4. Windfarm Development in China during 2002 and 2003, Shi Pengfei (China Hydropower Consulting Company)

Windfarm Name	Province	Capacity installed in 2002	Number of Turbines Installed in 2002	Total Size of Windfarm at end 2002	Project Type	Case specific circumstances that relieved barriers
Huitengxile	Inner Mongolia	5.4 MW	9	42.7MW	Small extension Project	- 5.4MW facilitated by CDM and KfW mixed credit loan
Donggang	Liaoning	10.5MW	14	22.45MW	Small extension Project	Wind resource in coastal area of Liaoning is very good. Liaoning is a province that can better afford RE energy versus western provinces In 2002 GDP per capita was 12985 RMB versus Inner Mongolia of 7288RMB per capita[7]
Hengshan	Liaoning	2.4MW	4	7.4MW	Small extension Project	- Trial of using domestic equipment
Xianrendao	Liaoning	11.46MW	19	31.66MW	Small extension Project	- Trial of using domestic manufactured equipment
Zhangzidao	Liaoning	3MW	12	3MW	New small Project	- First projects carried out by Windey in China
XiaoChangshan	Liaoning	3.6MW	6	3.6MW	New small Project	- using local equipment
Faku	Liaoning	9.6MW	12	9.6MW	New small project	- Liaoning is a province that can better afford RE energy versus western provinces
Hedingshan	Zhejiang	3.25MW	6	13.25MW	Small extension project	- Trial of domestic equipment - new manufacturer in China

[7] China Statistical Year Book 2003

Yumen	Gansu	7.8MW	13	16.2MW	Small extension project	- Domestic equipment
Shanwei	Hainan	9.9	15	9.9MW	New small Project	Penetration of wind farms in Hainan is very small with these 15 turbines representing 79% of total capacity installed on the island
Total		66.91MW				
Windfarm Name	**Province**	**Capacity installed in 2003**	**Number of Turbines Installed in 2003**	**Total Size of Windfarm at end 2003**	**Project Type**	**Case specific circumstances that relieved barriers**
Xilin	Inner Mongolia	1.8MW	3	4.78MW	Small extension project	- Domestic Equipment
Chifeng	Inner Mongolia	10.2MW	17	30.36	Small Extension Project	- Domestic Equipment
Kangpeng	Liaoning	10.2MW	12	10.2	New Small project	Liaoning is a province that can better afford RE energy versus western provinces In 2002 GDP per capita was 12985 RMB versus Inner Mongolia of 7288RMB per capita[3]
Zhangwu	Liaoning	10.2MW	12	10.2	New Small project	See above
Da-ChangShan	Liaoning	3.6MW	6	3.6MW	New Small project	See above and domestic equipment
Mulan	Heilongjiang	3.6MW	6	3.6MW	New Small Project	Domestic Equipment, first project in province
Fengxian	Shanghai	3.4MW	4	3.4MW	New Small Project	First Project in municipality
Jimo	Shandong	16.1MW	14	16.4MW	New large scale project building on previously installed test turbine	Shandong is a rich province in eastern China with GDP per capita in 2002 of RMB11,619 and a lower wind penetration than Inner Mongolia (ranks 7th in China)
Qixia	Shandong	0.5MW	2	0.5MW	New small project	Domestic Equipment

Changdao	Shandong	2.7MW	4	8.1MW	Small extension project	Domestic Equipment
Shanwei	Guangdong	6.6MW	10	16.5MW	Small extension project	Guangdong is a rich province with energy shortages and higher grid tariffs than elsewhere in China
Yumen	Gansu	5.4MW	9	21.6MW	Small extension project	Domestic Equipment
Helan	Ningxia	10.2MW	12	10.2MW	New small project	First project in province
Dabancheng No 1	Xinjiang	6.3MW	10	18.4MW	Small extension project	Domestic equipment
Dabancheng No 2	Xinjiang	7.5MW	10	82.8MW	Small extension project	Largest windfarm in China.
Total		98.3MW				

As Table 4 shows, only four new small size projects were completed in 2002 in all of China and also only a further 6 out of the 28 existing windfarms in China were able to extend their capacity and then only slightly, with the nearest being 2.2 times less in scale than the proposed Huitengxile Windfarm Project. In 2003 the situation improved slightly for new projects, with 7 new small projects (<15MW) completed and one larger one of 16.1MW completed. However the ratio stayed about the same for projects extending their capacity, with only 7 out of 32 extending their capacity. In 2003, the next nearest project to Huitengxile in terms of scale in the whole of China was the Jimo Project which was still only 60% of the size of Huitengxile. The Jimo project could overcome the prohibitive barriers that Huitengxile faces because:

- it occurred in Shandong which is a relatively rich province where generation tariffs are higher (Shandong ranks 3rd highest in State Power's table of tariffs)[8] and so the tariff gap is lower.
- Shandong has relatively lower wind penetration (it ranks 5th in China in 2002) than Inner Mongolia (ranked 2nd)[9] and so the grid off-taker can better afford the higher tariff for wind.
- The Jimo project is about 900km away from the Huitengxile project and is located near the wealthy city of Qingdao. Combined with its location and the two factors above, the tariff for the windfarm was significantly higher than for the Huitengxile project. However, despite approaches to the financiers of the project, it is difficult to obtain the tariff details for the project as these are commercial in confidence.

The reasons for this stalling of development are twofold:

- Firstly, up to 2000-1, the tariff burden of the increased cost of windpower generation had been placed on the local grid which had to foot the bill for the acceptance of local RE generation under a 1996 Ministry of Electric Power guideline (a copy of this can be provided to the DOE). However with the corporatisation of the Ministry of

[8] State Power Tariffs – please see http://www.sp-china.com/financial

[9] Shi Pengfei, 2002 wind report

Electric Power and the provincial power bureaux from 1998 to 2000 there was increasing pressure to pass the cost of renewables on to the end user. However the local pricing bureaux, including in Inner Mongolia, resisted this and preferred only a relatively small amount of renewables as there are plentiful supplies of cheap coal and associated coal fired generation plant which also supports significant local employment and keeps energy costs to industry and residential users low. Therefore an SDPC (now NDRC) tariff cap of about RMB0.5 / kWh (excluding 8.5% VAT) was introduced which is lower than the breakeven point for new windfarm development. This tariff cap, at around 5 eurocent, is below the feed-in tariffs in European markets, where wind turbine utilisation is far more mature. This highlights the need for CDM support to overcome this significant prohibitive barrier in the market.

- Secondly the power sector was under restructuring towards a market oriented economy which meant that long term Power Purchase Agreements with price and volume agreed are difficult to secure. Without such agreements and with the technology risk it is difficult for financial institutions to extend project finance loans for projects and renewables pioneers therefore need to resort to balance sheet financing which limits their ability to develop projects without securing acceptable tariffs or additional funding from CDM.

In contrast to the stalled development of the wind power projects in China, significant expansion of the conventional fossil fuel generation has taken place in China in the last five years. This can be seen in the Table 5 below. From this it can be seen that wind power faces considerably higher barriers and challenges to development than other fossil fuel generation sources.

Table 5. Conventional power development in China compared with wind power in recent years

	1999	2000	2001	2002
Capacity Additions – fossil fuel in MW	14434	14989	16630	13144
Wind Capacity Additions in MW	44.7	77.7	57.2	66.9
Wind additions relative to fossil fuel additions	0.3%	0.5%	0.34%	0.5%

Source: China Electric Power Yearbook for conventional data and Shi Pengfei for wind data

Taking the case of only the North China Power Grid area, then the Huitengxile 5.4MW project, the Xilin 1.8MW project and the Chifeng 10.2MW project are the only expansions of wind power capacity in the North China Power Grid during 2002-3. These projects were either supported by soft loans or used cheaper domestically produced turbines and all three are considerably smaller than the proposed Huitengxile windfarm project both in terms of scale, at least 2.5 times smaller, and in terms of turbine size, 600kW versus the 900kW and 1500kW turbines proposed at Huitengxile. So it is clear that in the North China Power Grid there has also been a stalling of the development of large scale wind farms (>15MW) since 2001-2. The windfarm at Huitengxile is also being developed in an area of lower capacity to pay and higher wind penetration than other provinces which are crucial factors considering the current policy environment where local grids must be able to afford the delivered electricity.

At the local level, there has been some historical windfarm development at or near to the Huitengxile wind farm site. This historical development can be seen in Table 6 together with a brief summary of the facilitating conditions for these developments.

Table 6: Installation status of wind turbines at or near to Huitengxile to April 2004

Model	Unit capacity (kW)	No. of turbines	Total capacity (kW)	Date of grid connection	Facilitating Circumstances
M1500-43	600	9	5,400	Oct. 1996	Higher Tariff to "demonstrate" wind power, Ministry of Electric Power control of power sector, Danish Government favourable loan
M1500-43	600	33	19,800	Oct. 1997	Higher Tariff to "demonstrate" wind power, Ministry of Electric Power control of power sector
NM48	600	1	600	Apr. 1999	Higher Tariff to "demonstrate" wind power, Ministry of Electric Power control of power sector
Z-40	550	10	5,500	Dec. 1998	Higher Tariff to "demonstrate" wind power, Ministry of Electric Power control of power sector, US Government favourable loan
V-42	600	9	5,400	Dec. 1998	Higher Tariff to "demonstrate" wind power, Ministry of Electric Power control of power sector, Dutch Government favourable loan
WD646	600	1	600	Nov. 2000	Test of locally made equipment
N-43	600	9	5,400	Jan. 2002	KfW soft loan
Total		72	42,700		

The main reason that the original wind projects could develop was the higher tariffs initially afforded to wind farms to ensure their initial development in China. These tariffs have been progressively reduced over time. Another facilitating factor is that much of the development at Huitengxile was facilitated by favourable international loans from governments which lowered the financing costs of the projects. Thus without a higher supporting tariff nor favourable soft loans, the development of further large scale windfarms at Huitengxile faced considerable barriers. Furthermore the development of windfarms at Huitengxile has historically been with lower incremental increases in installed capacity and with smaller turbines than the proposed 25.8 MW windfarm with turbine ratings of 900kW and 1500kW.

The above additionality analysis provides clear evidence that the registration and approval as a CDM Activity allows the Huitengxile Windfarm Project to overcome barriers that are currently proving prohibitive to the development of large scale windfarms (i.e. those that exceed15MW) in China.

Part 2. Calculation of a baseline emission factor for the Huitengxile Project.

Methodology Step M3(a). Define the baseline scenario and calculate the baseline emission factor.

In this step, the baseline scenario is defined and the emission factor is calculated for the Huitengxile Project. In defining the baseline scenario it is clear that the Huitengxile Windfarm Project is similar to the El Gallo project in that the impact of the proposed Project Activity is dispersed throughout the electric sectors ongoing operation and expansion (as quantified in Annex 3, Table A3) in a manner that cannot be characterised as the deferral of a specific alternative investment. Furthermore, in accordance with the El Gallo methodology, the estimated ex-ante baseline scenario should account for the effects of the Project Activity on both the operating margin (affecting the operation of the power plants on the grid) and the build margin (delaying or avoiding construction of future power plants) and this should be modified by ex-Post analysis.

The Huitengxile Windfarm Project supplies electricity to the Inner Mongolia Western Grid but this forms part of and is heavily interconnected to the North China Power Grid. As Figure 1 shows, the North China Power Grid is now connected to the North East China Grid via a 500kV 600MW-800MW transmission line, but the power flow between these interconnected grids on this line is less than 1% of power consumption on the grids. Furthermore there are plans for greater interconnection. However, these are not yet implemented and power flows between grids in China in 2002 accounted for only 0.87% of the total (from China Electric Power Yearbook 2003 pages 594 and 117). Therefore the operating margin, EF_OM_y, is approximated by the entire generation mix of the North China Power Grid, excluding its zero emission sources which are hydro and some wind. Emissions of CO_2 for the generation mix of the North China Power Grid can be directly calculated from the China Electric Power Yearbook 2003 (published annually) on pages 584 and 585 and the coal consumption figures for the grid (Page 591). For the Year 2002, the value of the operating margin emission factor was 0.949 tCO_2 / MWh (see details in Annex 3, Table 1). It should be noted here that the choice of the North China Power Grid as the Project Boundary leads to conservative ex-ante estimations of the grid emissions factors because the Generation Fuel Consumption Rates (g standard coal / kWh) of the North China Power Grid are historically lower than the Inner Mongolia Western Grid and also lower than the figures for the whole China Grid (Source: China Electric Power Yearbook).

As per the El Gallo Methodology, the Build Margin, EF_BM_y, is approximated by the five most recent plants built or the most recent 20% of the generating units built, whichever is the greater in capacity (Note: there is a typographical error in the approved methodology on the EB website where “recent” is omitted). Comparing the installed capacity of the North China Power Grid from the China Electric Power Yearbooks of 2000 and 2003, it can be seen that 20% of new capacity was added to the system and 92.47% of this new capacity was coal fired power plant, with the remainder being some zero emission sources, principally hydro. Therefore is it assumed that this mix represents the build margin for the North China Power Grid. For the purposes of the ex-ante estimate of the baseline a weighted build margin emission factor of 0.879 tCO_2 / MWh is calculated.

As in the El Gallo Project, the operating and build margin emission factor are given equal weighting. This means that the baseline scenario is a situation where the Huitengxile Windfarm Project displaces a set of generating units approximating the existing capacity on the North China Power Grid (100% coal fired generation excluding zero source units) and defers or delays the units that are currently planned to cope with electric sector expansion.

Using the Formula under Step M3 in Annex 3 of the El Gallo Methodology gives a baseline emission factor of:

Baseline Emission factor, ER_y, (tCO_2/ MWh) = (0.950 + 0.879) / 2 = 0.915

In line with the published AM0005 Baseline methodology (barrier analysis, baseline scenario development and baseline emission rate, using combined margin) for small grid-connected zero-emissions renewable electricity generation, a test has been carried out to see if this emissions factor needs to be changed due to imports and exports and this shows a negligible upward impact on the emissions factor of 0.001. Therefore this is ignored for the ex-ante estimation (see Annex 3).
The emission reductions calculated from this process for the first full year of operation (2005) are as follows:

The full year annual generation, EG_y, (net of auxiliary power i.e. the on-site electricity usage for the operation of the windfarm) (see Annex 3) is estimated to be: **59,190 MWh**

The baseline emission factor for 2005 is: **0.915 tCO_2/ MWh**
(see Annex 3)

The annual reductions, ER_y, are estimated to be: **54,136 tCO_2**
(see Annex 3)

The net reductions over a ten-year period (including a part year correction for 2005) are therefore estimated to be: **514,296 tCO_2**
(see Annex 3)

It is proposed that this emission factor is calculated ex-post annually in accordance with the monitoring methodology and plan (Section D) using the proposed formulae and official data and information, as per the El Gallo Methodology and using equal weighting for the operating and build margin. A Designated Operational Entity shall determine and confirm that the baseline emission factor has been calculated in accordance with the monitoring plan. The purpose of this ex-post revision is to increase the accuracy of the baseline emission factor and increase the conservatism of the baseline.

Methodology Step M3(b). Justify conservatism of baseline methodology in the case of the project.

With respect to the conservatism of the barrier analysis, it is clear that wind power is not the least cost option for electricity generation in China (the tariff for wind power of RMB0.498 per kWh (excluding 8.5% VAT) is far higher than the 0.231 RMB/kWh (including 17% VAT) for inter-grid sales). This is unlikely to change for the foreseeable future and this will pose significant barriers to investment for wind power projects in China. However there is currently in China a new Renewable Energy Promotion Law being considered which may give specific support to wind power development from 2006 onwards. However such legislation is not guaranteed to enter into force and could also be delayed and as the project is small (under 30MW) and generates only a modest amount of emissions reductions credits, the risks of the project being non-additional after 2006 are small and are offset by the project's technology diffusing benefits. Furthermore there is a concession program running in China for 100MW windfarms and the first two are in Jiangsu and Guangdong – coastal regions where the wind resource is good and capacity to pay of the province is high. These may be extended to other regions, but it is likely that the project developers for these concessions will also need to consider CDM financing within these projects to ensure they are realisable.

In terms of the conservatism of the estimation of the grid emissions factor, it is clear that coal is the dominant form of generation in the North China Power Grid and this is likely to continue for many years to come. Furthermore the 2002 generation emission factor of 352 grams of standard coal equivalent per kWh (gce/kWh) generated is 9 grams lower than in the first baseline study for the project (using 2000 data) and also considerably lower than the 2002 figure for the Inner Mongolia Western Grid (360 gce/kWh). This leads to a much lower estimate for the emission reductions. The exclusion of zero emission sources from the operating margin does not unduly inflate the emissions factor as the excluded sources, which are all low carbon, are unlikely to contribute to marginal generation and they only account for 1.3% of the generation mix in 2002.

The use of an ex-post monitoring methodology to update the baseline emission factor on an annual basis will improve the accuracy of the baseline emission estimation, in part by accounting for continued improvements over time in overall plant efficiency and the possible increase in Combined Cycle Gas Turbine plant in future years. Specifically in the case of China, this is an improvement of an ex-ante estimate for emissions for the following reasons: (1) An emission factor that is updated ex-post better reflects the situation of a rapidly expanding electrical sector (in 2003 China's electricity grew by 11% fuelled by GDP growth of 8-9%) (2) because the proportion of lower emissions generating plant is likely to increase, an ex-post baseline is likely to be more conservative than a baseline estimated fixed at the outset.

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:

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As per the El Gallo Methodology, the steps M1 and M2 establish that this project has occurred due to its registration as a CDM Projects, i.e. it is not part of the baseline. Step M3 estimates the emission factor of the displaced electricity, which is shown to be higher than the emissions of the project (which are zero, if the auxiliary power of the wind turbines is netted out). The project is therefore both additional and reduces anthropogenic emissions of GHG below the levels that would have occurred in the absence of the registered project activity.

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

>>

The Project Boundary that is relevant to the application of the baseline methodology defines where alternatives to the proposed project are likely to be found. For the Huitengxile Windfarm Project this is defined as the North China Power Grid. The North China Power Grid is now connected to the North East China Grid via a 500kV 600MW-800MW transmission line and the exchange of power between the grids is low (see B.2 part E). The impact of the import and export of electricity have been taken into account in determining the emissions factor as per the El Gallo Methodology. The local boundary includes the turbines themselves and there is a small amount of auxiliary power that is used to support the turbines operation.

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:

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This Baseline Study was completed on 9th September 2004 by Dr Alex Westlake with support from the staff at the Chinese Renewable Energy Industries Association and SenterNovem and in close consultation with the staff of the Project Owner. It should be further noted that the first baseline study for this Project was created by Dr John Green in August 2002 for the submission to the CERUPT program and this was then updated in April 2004 for submission to the validator. The key persons involved in determining the baseline are:

1. Mr Jia Yijun, imwpcqq@163.com, 218 Xilin South Road, Huhhot, People's Republic of China, Tel: +86-471-6941456. **IMLYWPDC is a Project Participant.**
2. Mr Gerhard Mulder, G.J.Mulder@senter.nl, Juliana van Stolberglaan 3, PO Box 93144, 2509 AC, The Hague, The Netherlands, Tel: +31 70 37 35 000. **SenterNovem is a Project Participant.**
3. Dr John Green, john.green@itpowergroup.com, IT Power Limited, The Manor House, Lutyens Close, Chineham, Hampshire, RG24 8AG, UK, Tel: +44 1256 392700. Dr John Green is not a project participant.
4. Dr Alex Westlake, alex@westlakeenergy.com, Independent Consultant to CREIA, Room 1202, Tower A, Lucky Tower, No 3 North Road, East Third Ring Road, Chaoyang District, Beijing, P R China, 100027, Tel: +86 13801203874. Dr Alex Westlake is not a project participant.
5. Ms Lin Wei, tonilin@public3.bta.net.cn, Chinese Renewable Energy Industries Association, No.A2106 Wuhua Plaza, A4 Che Gong Zhuang Dajie, Xicheng District, Beijing 100044, P.R.China, Tel: +86-10-68002617/18. CREIA is not a project participant.

SECTION C. Duration of the project activity / Crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

>>

01/01/2004.

Please Note: The starting date of construction of the Project Activity is before its registration as a CDM Activity and this is due to the long lead time in developing this Project as one of the first CDM projects in China. Official documentation exists to show that the Project can comply with Step 0 of the Additionality Tool proposed in Annex 3 to the Methodology Panel's 11th meeting which states:

"Assuming project construction started during the eligible time frame, evidence should be publicly provided that the incentive provided by the CDM was seriously considered in the decision to proceed with the project activity. This evidence shall be based on (preferably official) documentation clearly showing that the CDM incentive played a role at or before the moment of decision making."

The documentation that IMLYWPDC can provide to the DOE for this includes:

- Contract with CREIA to develop the project as a CDM project dated 30th June 2002
- Letter of Approval for the Project from the Government of China issued on September 30th 2002
- Contract Award from Senter, dated March 13th 2003
- Company memo to Agricultural Bank of China and to equity investor

All of this activity took place prior to the start of construction. Clearly this documentation highlights the role that the CDM incentive played in the decision to proceed with the project.

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

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At least 20y-0m.

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:

>>
Not applicable

C.2.1.2. Length of the first crediting period:

>>

Not applicable

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>

01/01/2005

C.2.2.2. Length:

>>

10y-0m.

SECTION D. Application of a monitoring methodology and plan

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

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AM0005 Baseline methodology (barrier analysis, baseline scenario development and baseline emission rate, using combined margin) for small grid-connected zero-emissions renewable electricity generation

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

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Applying the AM0005 Baseline methodology (barrier analysis, baseline scenario development and baseline emission rate, using combined margin) for small grid-connected zero-emissions renewable electricity generation to the Huitengxile wind farm is justified because:

- The Huitengxile windfarm falls into the same proposed Project Category as the El Gallo Hydroelectric project;
- Renewable energy projects in China are similarly disadvantaged to the El Gallo project because of the barriers and lack of effective support policies when compared with traditional energy sources;
- The Huitengxile project has also faced financial and investment barriers for which the project developer has sought a variety of means to overcome;
- The Huitengxile windfarm is located in a grid system which is experiencing demand growth and related supply side investments which will alter the generation mix over time.

In line with AM0005 Baseline methodology (barrier analysis, baseline scenario development and baseline emission rate, using combined margin) for small grid-connected zero-emissions renewable electricity generation, Option 1 is chosen as the monitoring method.

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

Being a windfarm project, no emissions from the Project Activity were identified, There are therefore no entries in the following Table.

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

ID number *(Please use numbers to ease cross-referencing to D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

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

>>

Being a windfarm project, no emissions from the Project Activity were identified, There are therefore no formulae included here.

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

ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

1 EG_y	Electricity	Electricity supplied to the Grid (net of parasitic consumption – estimated to be 0.42%– see below)	MWh	Directly Measured	Hourly measurement and monthly recording	100%	Electronic and paper	*Double checked against receipt of sales*
2 EF_y	Emission factor	GHG emission factor of the grid	tCO_2 eq / MWh	Calculated	Yearly	100%	Electronic	*Calculated as a weighted sum of emission factors of Operating Margin and Build Margin*
3 EF_OM_y	Emission factor	GHG emission factor of the grid (operating margin)	tCO_2 eq / MWh	Calculated	Yearly	100%	Electronic	*Calculated as TEM_y divided by $TGEN_y$*
4 EF_BM_y	Emission factor	GHG emission factor of the grid (Build margin)	tCO_2 eq / MWh	Calculated	Yearly	100%	Electronic	*Calculated as per the AM0005 Baseline methodology (barrier analysis, baseline scenario development and baseline emission rate, using combined margin) for small grid-connected zero-emissions renewable electricity generation taking into account local data availability*
5 TEM_y	Emissions	Total emissions of the grid	tCO_2 eq / year	Calculated	Yearly	100%	electronic	*Calculated as the sum of GHG emissions of all plants*
6 $TGEN_y$	Electricity	Total electricity generation of the grid excluding zero or low operating cost sources	MWh	Calculated	Yearly	100%	electronic	*Calculated as the sum of electricity generated of the grid excluding zero or low operating cost sources and obtained from the China Electric Power Yearbook.*
7 F_{iy}	Fuel	Amount of fossil fuel consumed in the grid	Physical unit	Measured	Yearly	100%	electronic	*Obtained from the China Electric Power Yearbook*
8 $COEF_i$	CO_2 coefficient	GHG emission coefficient of each fuel i	tCO2/eq (physical unit of fuel)	Measured	Yearly	100%	electronic	*Obtained from the latest local statistics. If not available, IPCC default values are used.*

9 $GEN_{j,y}$	Electricity	Electricity Generation of the Plant j	MWh/year	Measured	Yearly	100%	electronic	*Obtained from the China Electric Power Yearbook*
10	Plant Name	Plant Identification for OM	-	Measured	Yearly	100%	electronic	*Plant by plant information is not publicly available for a grid the size of North China Power Grid and therefore aggregated data obtained from the China Electric Power Yearbook is used*
11	Plant Name	Plant Identification for BM	-	Measured	Yearly	100%	electronic	*As above and the build margin is obtained from the China Electric Power Yearbooks for last 20% of plants*
12 W_{OM} and B_{OM}	Non-dimensional number	Weight factor of OM (BM)	-	Measured	Fixed	100%	electronic	*Default weight factor of 0.5 is chosen.*
13	-	Documented evidences	-	-	Once at Validation	100%	-	*Documented evidences of the prohibitive barriers to the proposed project activity*
14	-	Documented evidences	-	-	Once at Validation	100%	-	*Documented information related to the alternatives to the project, especially the diffusion data*

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

>>

The same formula as in AM0005 Baseline methodology (barrier analysis, baseline scenario development and baseline emission rate, using combined margin) for small grid-connected zero-emissions renewable electricity generation are used to estimate the baseline emissions and the data for this is included in Annex 3. Baseline emissions are therefore calculated by the following formula:

“(The annual generation dispatched to the grid, net of on-site usage which is estimated to be 0.42% per MWh) times (the CO_2 emission factor of the estimated baseline)”

The full year generation (net of auxiliary power i.e. the on-site electricity usage for the operation of the windfarm) (see Annex 3) is estimated to be: **59,190 MWh per annum**

The baseline emission factor for 2005 is: **0.915 tCO_2/ MWh**
(see Annex 3)

The annual baseline emissions are estimated to be: **54,136 tCO_2**
(see Annex 3)

Note on the estimation of auxiliary power factor for the turbines

The on-site use of power by the wind turbines at the Huitengxile site was 265,800 kWh in 2001. This includes electricity used by heating elements in the nacelle to keep the gearbox from freezing in the harsh winters and also electricity used to control the turbines. In comparison, electricity generated by the turbines during 2001 was approximately 62.9 GWh.

Also, 559,200kWh/year of electricity is used in the switchgear and control centre, primarily due the need for heating the control room (using electric heating) and for lighting. However, introduction of additional capacity will not lead to a significant increase in the energy requirements for the building. There will not need to be any additional site offices or housing for employees at the site, and there is sufficient spare capacity within the existing switchgear and control station to cope with the output from the additional turbines. Therefore the impact of the new capacity on such electricity usage can be discounted.

Also, figures for electricity used by the tourist centre established at the site are not included in the direct on-site emissions.

Taking the same electricity use per GWh output for the 59.19 GWh per year that will be generated on average by the project from 2005, will lead to 0.25 GWh of electricity being used by the site equivalent to a factor 0.42%.

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 selected as it is not appropriate to AM0005 Baseline methodology (barrier analysis, baseline scenario development and baseline emission rate, using combined margin) for small grid-connected zero-emissions renewable electricity generation.

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

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

>>

Option 2 is not selected as it is not appropriate to AM0005 Baseline methodology (barrier analysis, baseline scenario development and baseline emission rate, using combined margin) for small grid-connected zero-emissions renewable electricity generation.

D.2.3. Treatment of leakage in the monitoring plan

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

ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
15 EL^{in}_y	Electricity imports	*Obtained from the China Electric Power Yearbook*	MWh	Measured	Yearly during the crediting period	100%	Electronic and paper copy of the yearbook	The China Electric Power Yearbook typically has a value for the inter-grid net imports into the North China Power Grid for the preceding year.
16 EL^{out}_y	Electricity Exports	*Obtained from the China Electric Power*	MWh	Measured	Yearly during the crediting	100%	Electronic paper copy of the yearbook	The China Electric Power Yearbook typically has a value for the inter-grid net exports out of the North China Power Grid for the preceding year.

		Yearbook			period			
17 EF^{in}_{y}	Emission Factor	*Obtained from the China Electric Power Yearbook*	MWh	Measured	Yearly during the crediting period	100%	Electronic paper copy of the yearbook	The emissions factor for the importing grid can be calculated in the same manner as the AM0005 Baseline methodology (barrier analysis, baseline scenario development and baseline emission rate, using combined margin) for small grid-connected zero-emissions renewable electricity generation calculation for the emission factor of the local Grid. For this calculation leakage effects in the importing grid are ignored.
18 EF^{out}_{y}	Emission Factor	*Obtained from the China Electric Power Yearbook*	MWh	Measured	Yearly during the crediting period	100%	Electronic paper copy of the yearbook	The emissions factor where the NCPG electricity is exported to can be calculated in the same manner as AM0005 Baseline methodology (barrier analysis, baseline scenario development and baseline emission rate, using combined margin) for small grid-connected zero-emissions renewable electricity generation. For this calculation leakage effects in the exported to grid are ignored.

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

>>

Indirect emissions can result from project construction, transportation of materials and other upstream activities. In the case of the proposed Project, these emissions are thought to be comparable or less to the life cycle emissions which would result from the eventual construction and operation of alternative capacity. The life cycle emissions of alternative power generation plants, in particular fossil fuel plants, are typically higher than from wind power plants when including emissions due to mining, refining and transportation of fossil fuel. The project does not claim emissions reductions from these activities. Therefore no significant net leakage from the above activities were identified.

The AM0005 Baseline methodology (barrier analysis, baseline scenario development and baseline emission rate, using combined margin) for small grid-connected zero-emissions renewable electricity generation does take into account leakage effects from the import and export of electricity to the local grid to which the Project Activity supplies electricity, in this case the North China Power Grid, and therefore the formula included on page 3 of AM0005 Baseline methodology (barrier analysis, baseline scenario development and baseline emission rate, using combined margin) for small grid-connected zero-emissions renewable electricity generation is used to calculate whether leakage from grid imports/exports are significant. Data needs to be collected and archived for this each year.

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 avoided emissions, ER_y, by the project activity during a given year y[10] are calculated as follows:

Determination of baseline emission factor for given year (as per AM0005 Baseline methodology (barrier analysis, baseline scenario development and baseline emission rate, using combined margin) for small grid-connected zero-emissions renewable electricity generation) (tCO_2/MWh)

⇩

Monitoring generation output from the Project net of auxiliary usage (MWh)

⇩

Calculation of ERs generated by the project using the formula:

Periodic net annual electricity dispatched (EG_y) x baseline emission factor for this period (EB_y) (tCO_2)

The ex-ante estimated of leakage emissions – see Annex 3 – calculated according to AM0005 Baseline methodology (barrier analysis, baseline scenario development and baseline emission rate, using combined margin) for small grid-connected zero-emissions renewable electricity generation show the effects of leakage to be negligible and these are therefore excluded from the ex-ante estimate. Therefore the net reductions over the 10-year crediting period (including a part year correction for 2005) are estimated to be: **514,296 tCO_2**

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.

[10] Throughout the document, the suffix y denotes that such parameter is a function of the year y, thus to be monitored at least annually.

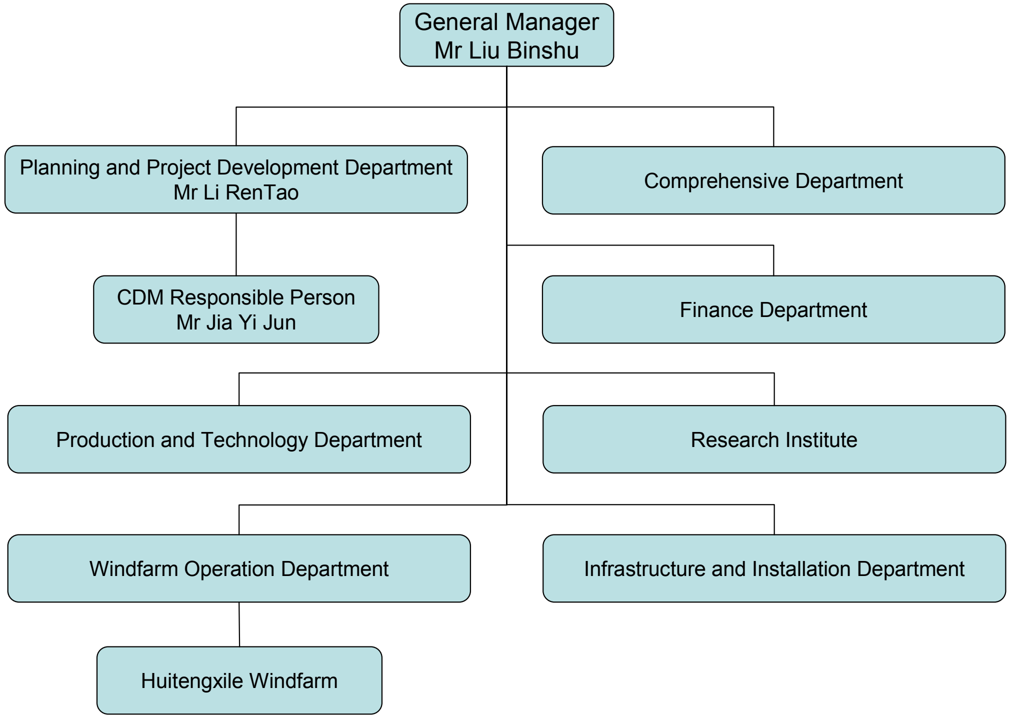
1	Low	QA/QC procedures for this are planned. The electricity output from each wind turbine to the grid will be monitored and recorded at the on-site control centre using a computer system. Electricity sales invoices from the commercial metering system for power wheeled into the Inner Mongolian Western Grid will also be obtained as an additional check.
7, 8, 9, 10, 11	Low	QA/QC procedures for this are planned. Data is acquired from published source from State Power Grid Corporation (China Electric Power Yearbook). These will be checked against other sources.
13, 14	Low	QA/QC procedures for this are not planned. These data are validated at registration to check whether applicability conditions are met.
others	Low	QA/QC procedures for this are planned. Data calculations will be kept as part of the company QA system and checked by a third party verifier prior to issuance of CERs.

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

>>

Figure 3 outlines the operational and management structure that the project owner will implement for the Project Activity and to monitor emissions reductions and any leakage effects, generated by the project activity. The nominated CDM responsible person for the Project who will ensure it follows the requirements of the Monitoring and Verification Plan is initially Mr Jia Yijun, CDM Project Manager for Project Activity from IMLYWPDC.

Figure 3. Operational and Management Structure for Monitoring the Project Activity



These procedures are to be encapsulated in a CDM manual that the Project Owner and Project Developer has developed for the CDM aspects of the Project and which contains the following sections:

1.0 Introduction
2.0 Overall Project Management
3.0 CDM Project Management and Calculations
  3.1 Data to be monitored and recorded (as per the PDD)
  3.2 Emissions Reduction calculation for the Project
  3.3 Monitoring Leakage
4.0 Procedures to be followed
  4.1 Monitoring Procedures
  4.2 Calibration Procedures
  4.3 Maintenance Procedures

4.4 Procedure for Training of Personnel engaged in this MVP
5.0 Records Keeping, Error Handling and Reporting Procedures
5.1 Records Keeping and Internal Reporting Procedure
5.2 Error Handling Procedure
5.3 External Reporting Procedure
5.4 Procedure for corrective actions arising
5.5 Change of CDM Responsible Person
6.0 Confirmation of the adoption of these CDM Operating Procedures

These documents are available for validation by the validator. They will be updated post-validation with the latest information and once the Project Design Document and accompanying methodologies have been approved.

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

>>

The monitoring methodology was applied from the AM0005 Baseline methodology (barrier analysis, baseline scenario development and baseline emission rate, using combined margin) for small grid-connected zero-emissions renewable electricity generation to the Project Activity by the following persons:

1. Mr Jia Yijun, imwpcqq@163.com, 218 Xilin South Road, Huhhot, People's Republic of China, Tel: +86-471-6941456. **IMLYWPDC is a Project Participant**.
2. Dr John Green, john.green@itpowergroup.com, IT Power Limited, The Manor House, Lutyens Close, Chineham, Hampshire, RG24 8AG, UK, Tel: +44 1256 392700. Dr John Green is not a project participant.
3. Dr Alex Westlake, alex@westlakeenergy.com, Independent Consultant to CREIA, Room 1202, Tower A, Lucky Tower, No 3 North Road, East Third Ring Road, Chaoyang District, Beijing, P R China, 100027, Tel: +86 13801203874. Dr Alex Westlake is not a project participant.
4. Ms Lin Wei, tonilin@public3.bta.net.cn, Chinese Renewable Energy Industries Association, No.A2106 Wuhua Plaza, A4 Che Gong Zhuang Dajie, Xicheng District, Beijing 100044, P.R.China, Tel: +86-10-68002617/18. CREIA is not a project participant.

SECTION E. Estimation of GHG emissions by sources

E.1. Estimate of GHG emissions by sources:

>>

There are no emissions as this project is a renewables project.

E.2. Estimated leakage:

>>

As per section D.2.3.2, the Huitengxile project gives rise to emissions only from the initial manufacture of the equipment and construction. It is further assumed that the emissions caused by this activity are far less than that for other sources of generation included in the baseline. Therefore no formulae for estimating this leakage are required here.

AM0005 Baseline methodology (barrier analysis, baseline scenario development and baseline emission rate, using combined margin) for small grid-connected zero-emissions renewable electricity generation caters for leakage effects due to imports/exports from the grid and these are included in the baseline emissions factor so there is no leakage calculation included in this section.

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

>>

The ex-ante estimate of the sum of E1 and E2 is zero.

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

>>

The full year generation (net of auxiliary power i.e. the on-site electricity usage for the operation of the windfarm) (see Annex 3) is estimated to be: **59,190 MWh per annum**

The baseline emission factor for 2005 is: **0.915 tCO_2/ MWh**
(see Annex 3)

The annual reductions are estimated to be: **54,136 tCO_2**
(see Annex 3)

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

>>

This is calculated as E4 – E3. With the emissions from the project (E3) being zero, the emission reductions of the project activity are equivalent to the emissions of the baseline (E4).

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

>>

The net reductions over the 10-year crediting period (including a part year correction for 2005) are estimated to be: **514,296 tCO_2.** Please refer to Annex 3 for the detailed Tables which will be updated ex-post.

SECTION F. Environmental impacts

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

>>

The analysis of the potential environmental impacts of the Huitengxile Windfarm Project is attached as Exhibit A.

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:

>>

Impacts are not considered significant.

SECTION G. Stakeholders' comments

>>

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

>>

In 2002, there were consultations carried out by staff from IMLYWPDC with the local community and the local government, which represents the local community who currently use the small area of land to be affected by the Project. These were not well documented but resulted in a clear support letter for the Project from the local government - see G.2.1 below. There have also been stakeholder comments gathered from the posting of the original baseline study and EIA on the SenterNovem website – see G.2.2 – including from NGOs.

Additionally to stakeholder consultations carried out by IMLYWPDC, a World Bank survey team surveyed about 50 householders and received 38 replies from the nearby villages of Caoduoshan and Hongpan in April 2004 to understand their attitudes to wind power development in the Huitengxile area.

In August 2004, staff from IMLYWPDC carried out a survey of the local villagers in the area. A summary of this is included in Exhibit B.

G.2. Summary of the comments received:

>>

G2.1. Overleaf is a translation of the letter received from the local government.

Comments from Local Government about the Huitengxile Wind Farm Project

Huitengxile Windfarm locates at Chayouzhong County. Since the operation of the wind farm, it has increased the local taxation contribution, and promoted the development of related construction material industry and tourism. It is a demonstration project representing the feature of utilising local resources to realise the sustainable development of the remote region of Western China. As the local government, we fully support the enlargement and development of the Huitengxile Windfarm.

CHAYOUZHONG COUNTY WULANCHABU REGION INNER MONGOLIA

Stamp

1st July, 2002

G.2.2. The comments received on the original baseline study, posted on the SenterNovem website, include commentary from NGO's such as CDM Watch[11] and also the Worldwide Fund for Nature. The key concern was over the additionality of the 5.4MW installed in 2002.

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

>>

This revised PDD has taken into account the comments of the NGOs by removing the 5.4MW from the Project Activity. No negative comments were received with regard the 25.8MW of Wind Turbines to be installed after the CDM funding was secured as these were seen to be additional.

The villagers and local government are all supportive of the Project and to date there has been no need to modify the project due to the comments received.

[11] www.cdmwatch.org contains a review of the CERUPT program tender projects

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

The following are the contact details for the Project Participants:

Organization:	Inner Mongolia Long Yuan Windpower Development Company Limited
Street/P.O.Box:	218 Xilin South Road
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FAX:	+86 (0) 471 6943462
E-Mail:	imwpcqq@163.com
URL:	
Represented by:	
Title:	CDM Project Manager
Salutation:	Mr
Last Name:	Jia
Middle Name:	
First Name:	Yijun
Department:	Development Department
Mobile:	+86 13947108871
Direct FAX:	
Direct tel:	
Personal E-Mail:	

Organization:	SenterNovem
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Title:	
Salutation:	Mr
Last Name:	Mulder
Middle Name:	
First Name:	Gerhard
Department:	

Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	

The following are the contact details for the other Parties involved:

Organization:	The Chinese Renewable Energy Industries Association
Street/P.O.Box:	A4 Chegongzhuang Street, Xicheng District
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E-Mail:	tonilin@public3.bta.net.cn
URL:	www.creia.net
Represented by:	
Title:	Director of International Relations Department
Salutation:	Ms
Last Name:	Lin
Middle Name:	
First Name:	Wei
Department:	International Relations Department
Mobile:	+86 13910229411
Direct FAX:	
Direct tel:	
Personal E-Mail:	

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URL:	www.itpower.co.uk
Represented by:	
Title:	Director, Head of Climate Change Strategy Unit
Salutation:	Dr
Last Name:	Green
Middle Name:	
First Name:	John

Department:	Climate Change Strategy Unit
Mobile:	+44 (0) 7732 323590
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Organization:	Dr Alex Westlake, Independent Consultant to CREIA
Street/P.O.Box:	Lucky Tower, No 3 North Road, East Third Ring Road, Chaoyang District,
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Direct FAX:	
Direct tel:	As Tel
Personal E-Mail:	As Above

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no public funding for the Huitengxile Windfarm Project.

Annex 3

BASELINE INFORMATION

The following Tables summarise the numerical results from the equations listed in the AM0005 Baseline methodology (barrier analysis, baseline scenario development and baseline emission rate, using combined margin) for small grid-connected zero-emissions renewable electricity generation. The Table presents data, data sources and the underlying computations that are available in the excel spreadsheet attached to the PDD. The Tables have changed slightly versus the El Gallo PDD due to the availability of data and the slight differences between the EL Gallo PDD and the published AM0005 Baseline methodology (barrier analysis, baseline scenario development and baseline emission rate, using combined margin) for small grid-connected zero-emissions renewable electricity generation, especially for the consideration of imports and exports. This is explained in the last section of this Annex.

Table A1	A	B	C	D	E	F
Data	North China Power Grid Generation in 2002	North China Power Grid Fossil fuel Consumed in 2002, $F_{i,y}$	Carbon Coefficient, $COEF_i$	Total GHG emissions of the NCPG in 2002, TEM_y	North China Power Grid Generation excluding excluded generation 2002, TGENy	Operating Margin Emissions Factor (EF_Omy)
Units	% split of fossil fuels	Tons of standard coal equivalent (tce)	tCO_2 / tce	tCO_2 / year	GWH	tCO2 / MWh
Source	China Electric Power Yearbook 2003 – page 585	From Table A7	= (average carbon content for power Coal in China * 44/12 * 100%)	=A * B * C	From Table A2	= D / (E * 1000)
Coal	100%	98474464	2.7	265881052.8	279757	**0.950**

Table A2	A	B	C	D
Data	Generation GENj,y	Excluded sources	Included generation, TGENy	Excluded Generation
Units	GWh		GWh	GWh

Source	China Electric Power Yearbook 2003 - page 585	Baseline Methodology	(=A) if included	(=A) if excluded
Hydro	3440	x	-	3440
Coal	279757		279757	-
Nuclear	0	x	-	0
Gas	0		0	-
Other (wind)	171	x	-	171
	283368		279757	3611

For Table A3 there is another change versus the EL Gallo PDD as the new build cannot be represented by just one generating type and so the build margin is estimated by the most recent 20% of generating additions which covers a range of plant types.

Table A3	A	B	C	D	E	F
	Installed Capacity 1999	Installed Capacity 2002	New Capacity Additions	Split of New Capacity	Emissions factor	Weighted Average Build Margin Emissions Factor, EF_BM_y
	MW	MW	MW	%	tCO_2 / MWh	tCO_2 / MWh
	China Electric Power Yearbook 2000 - page 572	China Electric Power Yearbook 2003 - page 584	= B – A	= D / (Total of column C)	From Table A1	= D * E
Hydro	2631.1	3206.9	575.80	6.51%	0	0.000
Coal	42328.7	50505.2	8176.50	92.47%	0.950	0.879
Nuclear	0.0	0	0.00	0.00%	0	0.000
Gas	0.0	0	0.00	0.00%	0.404 (from El Gallo)	0.000
Other (wind)	0.0	90.1	90.10	1.02%	0	0.000
Total / % change	44959.8	53802.2	8842.40	20%		**0.879**

Assuming a default weighting for W_{OM} and W_{BM} of 0.5:

Table A4		Units	equation or source	
A	Estimated operating margin emission factor	tCO_2 / MWh	Table A1	0.950
B	Estimated Build Margin Emission factor	tCO_2 / MWh	Table A3	0.879
C	Estimated Baseline Emission factor	tCO_2 / MWh	(= (A + B) /2)	**0.915**

A new Table A5 is inserted here to test the impact of exports and imports on the emission factor as per AM0005 Baseline methodology (barrier analysis, baseline scenario development and baseline emission rate, using combined margin) for small grid-connected zero-emissions renewable electricity generation. This shows that the small amount of imports from the North East Power Grid to the North China Power Grid has a negligible impact upwards on the emissions factor and therefore can be conservatively ignored.

Table A5	Import/Exports 2003	Source
	GWH	
Imports to NCPG from NEPG	400	China Electric Power Yearbook - page 122
Exports from NCPG	0	China Electric Power Yearbook - page 122
Efiny	0.975	Calculated as for NCPG EF_OMy and calculations included in accompanying spreadsheet
EFOuty (same as NCPG)	0.915	From Table A4
Corrected EF	0.916	Calculated as per AM005 but change is minimal and upwards so is

		conservatively ignored

Table A6				
		Units	Source	
A	Huitengxile Windfarm Project Capacity	MW	Project Developer	25.8
B	Capacity Factor	%	Project Developer	26.30%
C	Annual Generation (net aux power estimated to be 0.42% per MWh)	MWh	(=A * B * 8760*(1-0.0042))	59190
D	Baseline emission Factor, Efy	tCO2/MWh	See Table A4	0.915
E	Annual emissions reductions	tCO2	(=C * D)	54136
F	crediting period	Years	Project Developer	2005-2014
G	crediting lifetime	Years	Project Developer	10
H	total emissions reductions over crediting period (including 2005 part year correction)	tCO2	(=E * G)	514,296

Explanation of how publicly available data in China can be re-worked to be the same data as in the AM0005 Baseline methodology (barrier analysis, baseline scenario development and baseline emission rate, using combined margin) for small grid-connected zero-emissions renewable electricity generation.

The key columns of the El Gallo Methodology for Table A1 are columns D, E and F where the emission factor of $tC0_2$ / MWH is calculated for the Operating Margin of the included generation sources. Columns A, B and C in the El Gallo Methodology are providing the input data by fuel type as this is the data which is publicly available in Mexico. For China the publicly available data is provided in terms of generation hours and tons of standard coal consumption per generation hours and also the coal carbon content is published for standard coal for power use (this ranges between 72% and 75% which assuming complete oxidation gives an average coal carbon content factor of 2.7)[12]. Oil, gas and diesel

[12] The source for the carbon content of coal is the average of the power coal content from a leading coal mine group in Shanxi, the province which provides most of the coal to the NCPG. The source is from http://www.jccoal.com/e/wym/w06.htm - column titled fixed carbon content, row 8-9 for standard coal, which is the type of coal quoted for the China Electric Power Yearbook figures. This carbon content is the lowest of the stated figures on the page and therefore is considered conservative. Furthermore the TC/TJ content of this coal is equivalent to 25.1 which is lower than the 1996 IPCC value of 25.8 which is included in the El Gallo PDD – this is calculated from the calorific value of standard coal in China which is 7000 kCal/kg.

are not currently recorded as fuel types for electricity generation and are therefore not included in Table A1. The following is the re-working of the available data to match the data required by the AM0005 Baseline methodology (barrier analysis, baseline scenario development and baseline emission rate, using combined margin) for small grid-connected zero-emissions renewable electricity generation.

Table A7	Conversion of publicly available data in China to as required in AM0005 Baseline methodology (barrier analysis, baseline scenario development and baseline emission rate, using combined margin) for small grid-connected zero-emissions renewable electricity generation		
	Data in China	Data in China	Data equivalent in AM0005 Baseline methodology (barrier analysis, baseline scenario development and baseline emission rate, using combined margin) for small grid-connected zero-emissions renewable electricity generation

Type	Generation GENj,y	North China Power Grid Generation Fuel Efficiency in 2002	North China Power Grid Generation Fuel Efficiency in 2002
Unit	GWh	gce/kWh	tons of standard coal
Source	China Electric Power Yearbook 2003 - page 585	China Electric Power Yearbook 2003 - page 591	= A x B
Value	279757	352	98474464

If oil, gas and diesel are added to the fuel mix in significant quantities, then the source data should be updated to reflect this.

Annex 4

MONITORING PLAN

There are three key types of information that must be monitored according to AM0005 Baseline methodology (barrier analysis, baseline scenario development and baseline emission rate, using combined margin) for small grid-connected zero-emissions renewable electricity generation:

1) Measurable/calculated information that is collected once prior to validation of the Project Design Document
2) Documented evidences of various sorts that are collected once prior to validation of the Project Design Document
3) Information that must be monitored ex-post, notably:
    i. The Generation output from the Project Activity, EG_y
    ii. The data required to calculate the baseline emissions factor for the local Power Grid, in this case the North China Power Grid, EB_y
    iii. The data required to estimate the impact of the imports and exports of the local power grid on the baseline emissions factor.

For items 1 and 2 above, copies of these values/documents will be shown to or provided to the Validator and then included in the final version of the Project's CDM Manual and Monitoring and Verification Plan.

For item 3 above, an outline of the specific ex-post monitoring plan for the Project is now described.

1) Monitoring of the generation output from the Project Activity, EG_y

The output from each wind turbine will be monitored and recorded at the on-site control centre using a computer system. Electricity sales invoices from the commercial metering system for power wheeled into the Inner Mongolian Western Grid will also be obtained as an additional check.

The qualified staff of IMLYWPDC will monitor the generated electricity sent to the grid and net of auxiliary turbine power as per the normal reporting procedures of the Production and Technology Department and in accordance with the technical guidelines laid down in the Company and State Power Regulations. This will be reported to the CDM responsible person on a monthly basis. The technical guidelines are included in section 2 of the CDM Manual and are available to the Validator. IMLYWPDC have confirmed in a letter that they will comply with the necessary QA/QC controls for monitoring these meters.

These meters for the main electricity generated meet the National Guidelines for accuracy and reliability.

2) The data required to be monitored to calculate the baseline emissions factor for the local Power Grid, in this case the North China Power Grid, EB_y

Most of the data required to calculate the baseline emissions factor for the North China Power Grid is derived from calculations based on the data included in the China Electric Power Yearbook. The CDM responsible person in IMLYWPDC will ensure that they procure a copy of the China Electric Power Yearbook and submit the revised ex-post calculation to the verifier on an annual basis. One factor that comes from a different source is the carbon coefficient of the local coal used which comes from the website of the Jincheng coal group, a major local supplier of coal to the power sector in China. This will be checked annually to see if there is a difference in carbon content but this is unlikely as the quality in the mined coal seams is unlikely to change during the crediting period.

3) The data required to estimate the impact of the imports and exports of the local power grid on the baseline emissions factor.

As per 2 above.

Quality Assurance and Quality Control

The IMLYWPDC's quality assurance and quality control procedures for recording, maintaining and archiving data be improved as part of this CDM project. This is an on-going process which will be ensured through the CDM mechanism in terms of the need for verification of the emissions on an annual basis according to this Project Design Document and the CDM manual.

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Exhibit A. An analysis of Environmental Impacts

Noise

I.

Major sources of noise pollution include construction vehicles and aerodynamic interaction between the wind and turbine blades. During construction, all equipment will be operated during daytime hours. It has been determined that noise levels will be in compliance with the standards set forth in the Chinese environmental guidelines. Sound levels produced by turbine operation will be naturally attenuated by ambient conditions and were determined to be within Chinese Standards (GB3096-93, GB12348-90, and GB12523-90).

Impacts on Birds

Birds can collide with wind turbines as well as other structures that they have trouble seeing, including road traffic. Studies on existing wind power facilities in Europe and North America indicate that raptors and migratory waders are the most susceptible species. These species are less common near the windfarm site. All sites have been selected with due consideration for avoiding migratory bird routes as well as areas with large bird populations. The sites were determined to pose no significant impacts for birds. Turbines will be erected on tubular towers (i.e., not lattice towers) to reduce perching sites for birds.

Visual Impacts

In several countries (most notably the United Kingdom), development of windfarms has met local opposition due to the visual effect of the turbines on the landscape. However in China, the wind turbines are considered an attraction and have served as the basis for a small tourism industry at the Huitengxile site in Inner Mongolia.

Interference with Communications - Turbine Blades

Turbine blades are capable of deflecting radio and microwaves used for communication purposes and can cause interference with television and radio broadcasting, microwave and cellular radio communications and various navigational and air traffic control systems. Blades made from metallic materials present the greatest potential for interference; fibreglass blades and wood blades (presently the most common blade materials) have lesser effects. Experience with existing turbines at the Huitengxile site shows no effects on communication systems. If effects do surface, they can generally be corrected using inexpensive, directional receivers/transmitters.

Interference with Communications - Electrical Transmission and Distribution

Corona noise from electrical conductors interferes primarily with lower frequency signals normally associated with AM radio broadcasting. This noise is more problematic during rainstorms. The layouts for all transmission and distribution lines have been designed with due consideration for maintaining minimum distances between the lines and broadcasting and receiving stations, households, etc. In addition, the electric field strength from all transmission/distribution lines and substations has been investigated and compared to applicable Chinese standards. The calculated field strength values fall within the Chinese guidelines. No interference is expected.

Land Use Impacts

Land acquired for turbine foundations will be permanently removed from its current use. However, the amount of land is minimal (less than 60 mu, approximately 4 ha). An additional 113 mu (approximately 7 ha) will be temporarily occupied during construction of the windfarm. The temporarily and permanently occupied land is primarily used for husbandry and other agricultural purposes.

Air Quality

Air quality impacts are limited to increased level of dust from use and movement of construction equipment. Increased dust levels are short-lived and localised. No significant impacts are expected.

Exhibit B. A Summary of the Local Stakeholder Consultation

Summary of stakeholder survey

During August 2004, the Inner Mongolia Long Yuan Windpower Development Company carried out a project specific survey of the local population in Caoduoshan the nearest village to the Huitengxile 26MW windfarm Project to assess their attitudes to the 26 MW wind power project. The survey was carried out through distributing and collecting responses to a questionnaire. This follows a similar World Bank survey on wind power development in the Huitengxile area that was carried out in April 2004.

The 1 page questionnaire was designed to be easy to fill in and had the following sections:

1) Project introduction
2) Respondent's basic information and education level
3) Questions on:
   - What is their opinion on their current environment?
   - Is there interference with the television and other reception?
   - Will the project have a negative impact on their livelihood?
   - Will the project bring improvements to their livelihood?
   - What improvement will the project have from a noise perspective?
   - What are the concerns they have with respect to the project – interference, noise or water contamination from construction?
   - Do they agree with the construction of the project?
   - What special issues should be considered during construction and operation?
   - What other comments and suggestions do the respondents have for the company regarding the Project?
4) Space for the response to be signed and dated

The survey had a 55% response rate and the following is a summary of the key findings:

1) Most respondents were farmers with primary level education.
2) Most respondents believed they lived in a pleasant, un-noisy environment but suffered from TV interference currently (72.7%).
3) 100% of respondents agreed with the development of the Project and 81.8% believed that the Project construction would have little impact on their livelihoods or did not know the impacts.
4) The two main concerns were TV interference (72.7%) and noise (22.3%).
5) 90.9 % of respondents believed there would be positive benefits from the Project.
6) No additional comments were received on other issues to consider or comments to the company on how to proceed with the Project.

Conclusion

The survey shows that the project has strong local support amongst the local people, as further evidenced by the local government support letter. The two main issues seem to be noise and interference with communication signals e.g. TV and radio. The environmental impact assessment shows that the noise levels would be within China national standards so this maybe a perceived problem rather than a real one. Furthermore the TV interference already seems to be present and is not as a result of the proposed Project Activity. However the Inner Mongolia Long Yuan Wind Power Development Company acknowledges these two issues and will carry out “check” measurements for noise once the site is constructed and will also discuss with the local communications provider the issues for the interference and how it might be solved.

The survey forms are available from the company.

Annex 5. List of key abbreviations

CER	Certified Emission Reduction
gce	gram of standard coal equivalent
gce/kWh	gram of standard coal equivalent per kilowatt-hour
g CO_2/gce	gram of carbon dioxide per gram of standard coal
GHG	Greenhouse Gas
GWh	Gigawatt-hour
HV	High Voltage
kWh	kilowatt-hour
MOST	Ministry of Science and Technology
Mt	million tonnes
MW	Megawatt
NDRC	National Development and Reform Commission
NGO	Non-governmental organisation
PPA	Power Purchase Agreement
SETC	State Economic and Trade Commission
SDPC	State Development and Planning Commission
SPC	State Power Corporation
TWh	Terawatt-hour
VAT	Value Added Tax
RE	Renewable Energy
t	tonne
CO_2e	Carbon Dioxide Equivalent

The assumed exchange rate is US$1 = 8.28 Yuan, which has been the average dollar exchange rate in the last few years and is the rate posted on the People's Bank of China website (www.bank-of-china.com/info/qpindex.shtml).