CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 03 - in effect as of: 28 July 2006

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SECTION A. General description of project activity

A.1. Title of the project activity:

>>
Title: Infravest Taoyuan Wind Farm bundled Wind Farms Project - Taiwan
Version: 01
Date: March 17, 2009

A.2. Description of the project activity:

>> The proposed project is a bundle of two wind energy projects, InfraVest Kuan Yin Wind Farm and InfraVest Hsin Wu Wind Farm. It shall not debundle into separate projects in the future.

Summary

The project involves the development of two wind farms in Taiwan:

- a 43.7 MW onshore wind farm located in Kuan Yin(called hereafter :Kuan Yin wind farm)
- a 34.5 MW onshore wind farm in Hsin Wu (called hereafter : Hsin Wu wind farm)

The two wind farms are constructed and operated by InfraVest Wind Power Group (hereafter InfraVest) which is a subsidiary of Germany based VWind AG. The project comprises 19 (for Kuan Yin) plus 15 (Hsin Wu) Enercon E70 wind turbines, each having a capacity of 2.3MW. At full capacity, the aggregated output of the project is expected to be of 255,656 MWh/year, which is to be delivered to the regional state electricity authority, Taipower. Accordingly, the project will lead to carbon dioxide emission reduction since it will avoid the use of fossil fuel in the electricity generating system. The annual emission reductions are estimated as 197,366 tCO_2e/year.

Contribution to sustainable development:
The project contributes significantly to the region's sustainable development. The specific goals for the project are to:

- reduce the greenhouse gas emissions in Taiwan by replacing fossil fuel based power generation;
- produce clean, renewable energy that contributes to alleviate the global warming;
- contribute to the development of the wind energy sector in Taiwan;
- provide clean electricity to the equivalent of 1,275 households;
- create local employment both during the construction and operational phase;
- technology and know-how transfer as the employees are trained by German wind turbine manufacturer Enercon on maintenance, safety and operational issues;
- contribute to the reduction of pollutants such as sulphur dioxide, nitrogen oxides and particles resulting from the electricity generation from fossil fuels in Taiwan;
- contribute to Taiwan's energy sustainability and security by reducing the dependency on fossil fuel imports.

A.3. Project participants:

>>

Name of Party involved (*) (host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project

		participant (Yes/No)
Taiwan (host)	InfraVest Wind Power Group (private entity)	No
Switzerland	South Pole Carbon Asset Management Ltd. (private entity)	No

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

>>
Taiwan

A.4.1.1. Host Party(ies):

>>
Kuan Yin County and Hsin Wu County

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

>>

A.4.1.3. City/Town/Community etc.:

>>
Kuan Yin Townships; Hsin Wu Townships

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

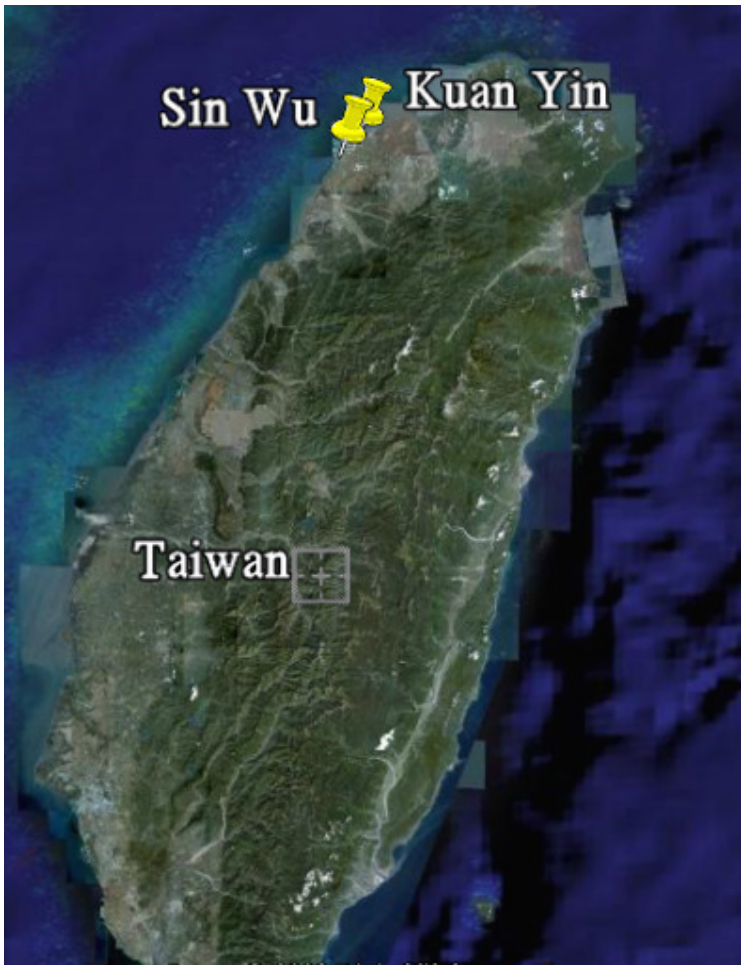
>>

The location of the wind farms are in West Taiwan. Kuan Yin and Hsin Wu wind farm is located in Tao Yuan County.

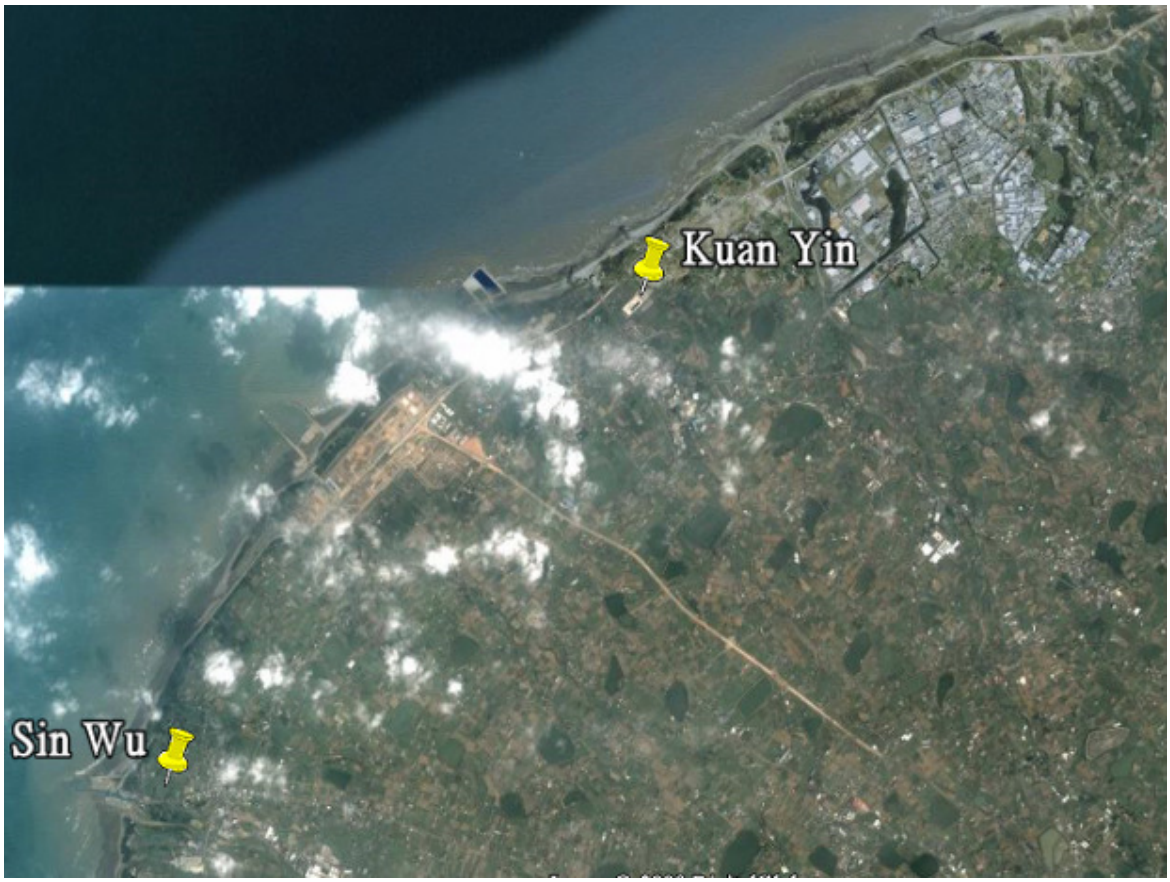
The proposed project activities are distributed in these zones which are at the geographical position of 25° 2'37.69"N, 121° 4'53.51"E for the Kuan Yin wind farm and 24°59'22.83"N, 121° 1'18.04"E for the Hsin Wu wind farm.

The locations are depicted in the pictures shown below.

Picture 1.: Location in Taiwan



Picture 2.: Location of the Kuan Yin plant and Hsin Wu are located.



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

>>
Large-scale project

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

>>
Sectoral Scope 1: Energy industries (renewable - / non-renewable sources)
Type I: Renewable energy projects.

A.4.4. Estimated amount of emission reductions over the chosen crediting period:

>>
The specific project activity applies for fixed crediting periods, and the estimation of the emission reductions during the crediting period (from 2009 to 2016) is shown in the following table. Total estimated emission reductions during the crediting period amount to 1,381,563 tCO2e. The annual average reduction over the crediting period is197,3661tCO2e.

Year	Annual estimation of emission reduction [tCO_2]

2009 (1/10/2009 to 31/12/2009)	49,342
2010 (1/01/2010 to 31/12/2010)	197,366
2011 (1/01/2011 to 31/12/2011)	197,366
2012 (1/01/2012 to 31/12/2012)	197,366
2013 (1/01/2013 to 31/12/2013)	197,366
2014 (1/01/2014 to 31/12/2014)	197,366
2015 (1/01/2015 to 31/12/2015)	197,366
2016 (1/01/2016 to 31/9/2016)	148,025
Total emission reductions [tCO2]	1,381,563
Total length of crediting period (years)	7
Annual average of estimated reductions over the crediting period [tCO2]	197,366

A.4.5. Public funding of the project activity:

>>

There is no public funding from Annex I countries involved in the project activity.

SECTION B. Application of a baseline and monitoring methodology

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

>>

The approved consolidated baseline and monitoring methodology ACM0002 (version 08) "Consolidated baseline methodology for grid-connected electricity generation from renewable sources --- Version 8" has been used.

The methodology was applied with the following tools:

- Tool to calculate the emission factor for an electricity system (version 01.1)
- Tool for the demonstration and assessment of additionality (version 5.2)

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

>>

The methodology referenced above is applicable to this project activity because it fulfills the required criteria:

- The project consists of a wind power electricity capacity addition and is a grid-connected electricity generation project;
- The project does not involve switching from fossil fuel use to renewable energy at the site of the project activity; and
- The geographic and system boundaries for the relevant electricity grid can be clearly identified and information on the characteristics of the grid is available.

B.3. Description of the sources and gases included in the project boundary:

>>

According to the methodology ACM0002, since the proposed project is a grid connected wind power project, only CO_2 emission from fossil fuels fired power plants in baseline scenario need to be considered.

	Source	Gas	Included/ Excluded	Justification/Explanation
Baseline	Fossil fuels fired power	CO_2	Included	Main emission source
		CH_4	Excluded	Excluded for simplification. This is conservative.
		N_2O	Excluded	Excluded for simplification. This is conservative.
Project Activity	Emission Sources of Project Activity	CO_2	Excluded	Excluded. It is a clean energy project.
		CH_4	Excluded	Excluded. It is a clean energy project.

		N_2O	Excluded	Excluded. It is a clean energy project.

Spatial extent of the grid is as defined in the "Tool to calculate the emission factor for an electricity system". The PDD will discuss the spatial extent of the grid in B.6 below in details.

B.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

>> The methodology ACM0002 determines the baseline scenario through the following:
If the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following:
"*Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system*".

B.5. 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 (assessment and demonstration of additionality):

>>

ADDITIONAL REQUIREMENTS FOR THE GOLD STANDARD

Early Consideration

There was no public announcement of the project going ahead without the VER for the proposed project.
VERs were also considered and discussed seriously and comprehensively in an early stage of the feasibility study.
The following elements will be disclosed to the DOE upon request during the Validation process:

- InfraVest is familiar with carbon credits and emission reduction projects since the beginning of the CDM. In 2003, they registered one of the first VER projects in China[1]. The Qingdao Huawei Windpower project is a grid connected renewable energy project consisting of 12 wind turbine generators with capacity of 1300 kW and 3 turbines with 250 kW capacity. The total installed capacity is 16.35 MW and the annual amount of VER generated is close to 22,000[2] per year.
- Since its implementation in Taiwan, InfraVest has always considered the potential of carbon credits for financing its wind power projects. InfraVest has thus sought actively for carbon consultants. Copies of mail exchange between InfraVest and carbon consultants (which shall remain in private confidentiality) dealing about the VER in Taiwan will be provided to the DOE at validation.
- The income of VER has also been considered since the early stage of the project development of the two wind-farms. Copy of board decisions from InfraVest to undertake Taoyuan wind-farm as VER projects are presented in Annex 5

The following table shows the different steps of the project development of the Taoyuan's wind-farms, showing all

[1] the project was registered as a VER project and not as a CDM because the Chinese DNA does not allow foreign companies to develop CDM project in China.

[2] http://www.cdmbazaar.net/documents/CN_WPP_CDM_PDD_22_11_2006.pdf

milestones and when and how InfraVest considered the VER.

Tao Yuan project timeline. All emails mentioned in this table shall remain confidential and will only be disclosed to DOE during validation.

Date	Event	Proof
2000	InfraVest opens a new office in Taiwan	Business License
December 2001	First consideration of carbon credits for financing renewable energy projects	Email
2003	Quingdao Huawei Windpower is registered as a VER project	
September 2006	InfraVest approaches a carbon consultant to present its new projects in Taiwan.	Email
April 2007	South Pole starts its activities in Taiwan	
August 20th , 2008	Board decision to undertake the Taoyuan wind-farms with carbon credits = **"proof of early consideration[3]"**	Board decision
September 2008	ERPA is signed between SP and InfraVest	Contract
December 23rd 2008	Early Consideration Letter to GS	Letter
January 2009	Construction start of Taoyuan wind farm project	Prediction by InfraVest
December 2009	Production start of Taoyuan	Prediction by InfraVest

As it can be seen in the table above, InfraVest was aware since 2001 of carbon credits and of its financial impact on wind projects. The VER has always therefore been seriously considered by InfraVest as a mean to compensate low grid tariff in Taiwan.

In the beginning September 2006, InfraVest started to look actively for some carbon consultant that would be able to handle VER projects in Taiwan, but the discussions failed after a few month due to the difficulty for the carbon consultant to find a VER buyer and their rel. In February 2007, InfraVest even asked KfW to help them to find a carbon consultant able to work in Taiwan.

South Pole is the first carbon consultant present on the island; it started its activities in April 2007, and two months after, in May 2007, South Pole established the first contact with InfraVest. The board decisions from InfraVest had been made to undertake Taoyuan wind-farm as a VERs project in August 2008. The ERPA between SP and InfraVest is signed in September 2008. In December of 2008, an early consideration letter was submitted to Golden Standard by InfraVest..

As discussed above, it is clear that:

- InfraVest has always considered the carbon credits as a mean to finance its wind-farms. There are several evidences that InfraVest has considered the carbon credits for these projects before the project start date.
- InfraVest has always sought actively for a carbon credits consultants, before and during the construction of Taoyuan wind farm.

[3] As defined in the "GUIDANCE ON THE DEMONSTRATION AND ASSESSMENTOF PRIOR CONSIDERATION OF THE CDM (version 1)" http://cdm.unfccc.int/EB/041/eb41_repan46.pdf

As prescribed by the Gold Standard the projects' additionality is demonstrated through use of the Tool for the demonstration and assessment of additionality (version 5.2).

STEP 1. Identification of alternatives to the project activity consistent with current laws and regulations

This step involves the definition of realistic and credible alternatives to the project activity that can be part of the baseline scenario.

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

The aim of the proposed project activity is o produce electricity; therefore we can define the alternatives as follows:

Alternative A Taoyuan wind farms without VER credits
Alternative B No action from project participants.
Alternative C *The PPs develop an hydro plant*
Alternative D *The PPs develop a PV power plant*
Alternative E *The PPs develop a power plant fired thanks to biomass resource*
Alternative F *The PPs develop fossil fuel fired power plant*

Infravest is a company created and dedicated to develop wind-power in Taiwan. This company does not have therefore the know-how and the capacities to develop other types of power plant. Furthermore, as per "Tool for the demonstration and assessment of additionality"[4], a hydropower, PV power, biomass power plant and fossil fuel fired power plant may not be an alternative for an independent power producer investing in wind energy. Therefore alternatives are related to technology and circumstances as well as investor and the only relevant and credible options to the proposed project activities are

Alternative A Taoyuan wind farms without VER credits
Alternative B No action from project participants.

Sub-step 1b. Enforcement of applicable laws and regulations

The mandatory preliminary permits have been obtained for the project activity, showing that it is in compliance with the current laws and regulations.

- Tai-power renewable energy premium purchase program[5]
- Electricity law[6]
- Electricity registration law[7]

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[4] Tool for the demonstration and assessment of additionality, version 5.2 page 4, footnote 4.

[5] http://www.moeaboe.gov.tw/opengovinfo/Laws/secondaryenergy/LSecondaryMain.aspx?PageId=l_secondary_list

[6] http://law.moj.gov.tw/Scripts/Query4B.asp?FullDoc=%A9%D2%A6%B3%B1%F8%A4%E5&Lcode=J0030011

All the alternatives to the project outlined in Step 1a above are in compliance with applicable laws and regulations.

For the demonstration of additionality, both UNFCCC and Gold Standard guidelines allow to conduct a barrier analysis or a financial analysis, we choose to conduct a barrier analysis.

Step 3. Barrier analysis

Sub-step 3a. Identify barriers that would prevent the implementation of type of the proposed project activity:

The following barriers would have prevented the implementation of the project if it was not developed as a VER project.

Barrier 1 : Financial Barrier

The main barriers for the development of the project are linked to finance. InfraVest is a non-listed and recent company in Taiwan developing a new type of business requiring a lot of finance. InfraVest had difficulties securing a loan for development of the project, for the following reasons:

- Lack of Project Finance:

  In the past months, Infravest tried hard to negotiate with the banks for a loan. Unfortunately, the bank clearly stated condition for financing and its size is a sufficient Debt Service coverage ratio (DSCR), no the rate of return for the investor. Hermes, the funding bank to InfraVest, requires the tariff to be at least NTD2.30/kwh before they provide the guarantee to Kfw. Without such guarantee, Kfw will not finance this loan.

  At present Infravest has a difficulty in granting a loan from the bank. With the electricity revenues, the income of this project will be 2 NTD/KWh. As a result, the DSCR is lower than 1, meaning that the project cannot repay the debt. With the VERs revenues, the total income will be up to 2.4 NTD (2 NTD + VER). The DSCR comes into the acceptable range mandated by the loan approvals of KFW (Germany Bank). It is clearly show that without the VERs revenues, this project will not be able to carry out.

Barrier 2 : Lack of prevailing practice/ first of its kind

Taoyuan, as well as Changbin and Taichung are the first wind projects over the 50MW threshold built in Taiwan by an independent power producer. Environment Protect Administration states that wind farms over 50MW built in "Non Planned City District" are required to conduct an environmental impact assessment[8]. The EIA takes time for both government and environmental NGOs to conclude whether the impact of a wind farm meets the requirement.

As the first IPP to undertake a wind-farm of that scale, InfraVest bears the financial risks when waiting for the administrative process.

Barrier 3 : Absence of a clear regulatory framework

Taiwan is a country highly dependent on imported primary energy for power generation, viewing the trend for pricier crude oil; Taiwanese government initiated a National Energy Conference in hope to restructure the

[7] http://law.moj.gov.tw/Scripts/Query4B.asp?FullDoc=%A9%D2%A6%B3%B1%F8%A4%E5&Lcode=J0030012

[8] Standards for determining specific items and scope of environmental impact assessments for development activities, Article 29, IV,5 (http://law.epa.gov.tw/en/laws/571925793.html)

country energy mix and to come out an intergovernmental plan to realize CO2 reduction. In 2005 during the National Energy Conference, an Energy Policy Whitebook[9] was elaborated. The project of Renewable Energy Act [10] is derived from this Whitebook. Because of the political stalemate in the past 8 years, the government hasn't enacted the whole package of Renewable Energy Act yet. According to the draft:

- There would be soft loans, with an interest rate depending on the post bank's 2-year deposit rate plus 2.45% with a loan period of maximum 10 years.
- Tax incentives: Parts of the turbine not produced in Taiwan are tax free.
- Feed in Tariff is NTD2/KWh, the electricity from IPP will be purchased by Taipower, the state run utility. But the calculation of the feed in tariff is still controversial.

The entire Renewable Energy Act has not been enacted. At this moment, the tax incentives are limited to waiver on certain imported equipments for renewable energy power generation and the green tariff remains low at 2TWD/KWh. Without successful legislation of Renewable Energy Act has stopped many international prudent investors from Japan and Europe to the market. This is confirmed by Dr.Yan[11] from ITRI, a well known specialist of wind power in Taiwan; the absence of a clear regulatory framework and the low grid tariff proposed are the main barriers that prevent wind developers to invest in Taiwan and is therefore the reason why only one IPP is active now on this market.

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

Alternative B, no action by the project participants is not hindered by the identified barriers. Since Alternative A faces several barriers, the Project is the only alternative that faces several barriers.

Step 4 : common practice analysis

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

As far as similar activities to the Project are concerned, wind power plants under IPP[12] model with comparable installed capacities can be identified.

Wind Farms in Taiwan, till 2007 plus IPP projects under development[13],.

Location	Total Capacity (MW)	Completion Date	Project Owner		Turbine unit capacity	Benefits from VER

[9] Energy Policy Whitebook (http://web2.moeaboe.gov.tw/ECW/Policy/EnergyWhitePaper/94/main/main.html)

[10] Draft of Renewable Energy Act (www.ey.gov.tw/public/Attachment/20050615160058780.doc)

[11] Please consult ITRI (Contact: Yan, Wen-Jyh wenjyh@itri.org.tw)

[12] Independent Power Producer

[13] Statistics from ITRI (Contact: Dr. Wen, Wen-jih wenjyh@itri.org.tw)

Taipower 1st Nuclear Power Plant	3.96	Dec-04	Taipower		660KW	No
Taipower 3rd Nuclear Power Plant	4.5	Jan-05	Taipower		1.5 MW	No
Datan Power Plant	4.5	Jun-05	Taipower		1.5 MW	No
Sinjhu Project	12	Feb-06	Taipower		2 MW	No
Guanying Project	30	Dec-05	Taipower		2 MW	No
Taichung Power Plant	8	Feb-06	Taipower		2 MW	No
Taichung Harbour Project	36	Aug-06	Taipower		2 MW	No
Jhangbin Project	46	Dec-06	Taipower		2 MW	No
Chungfen Project	3.5	2003	Chengloong Paper Company	IPP	1.75MW	No
Mailiao	2.64	November 2000	Formosa Heavy	IPP	660KW	No
Zhunan and Dapeng (Miaoli) Project	49.8	February 2006	InfraVest	IPP	2MW	NO
Changbin (Phase I)	75.9	Nov 2007	InfraVest	IPP	2.3MW	Yes
Changbin (Phase II)	27.6	Aug 2007	InfraVest	IPP	2.3MW	Yes
Taichung	52.9	Nov 2008	InfraVest	IPP	2.3MW	Yes
Taoyuan	75.9	Oct. 2009	InfraVest	IPP	2.3MW	Yes

As shown in the table above, InfraVest is the only wind power IPP really active in Taiwan. Of the projects, two other private projects can also be identified (Mailiao and Chungfen), but they are not comparable in size with Taoyuan project and therefore do not face significant access to finance barriers. Moreover Mailiao and Chungfen were subsidized[14,15] by the government[16] and these projects are below the 50MW benchmark that allows them not to conduct an EIA. These are therefore definitely not comparable to Taoyuan project and are excluded from the analysis.

Since the unit capacity of the turbine installed by Taipower company is 1.5 or 2 MW, it definitely are not comparable with Infravest ones whose unity capacity is 2.3 MW. There are therefore no activities similar to the project in Taiwan.

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

Not applicable, there are not similar activities to the project in Taiwan.

Conclusion of the common practice analysis

[14] Communication by Dr.Wen, ITRI. Maialo (Formosa, total investment NTD90,000,000, subsidy 38,000,000). Chungfen (Chenloong paper company, total investment NTD115,000,000, subsidy 56,000,000).

[15] http://www.fhi.com.tw/english/wind.htm

[16] http://www.fhi.com.tw/english/wind.htm

Similar activities to the proposed project activity cannot be observed in Taiwan, thus the proposed project activity is not a common practice.

Conclusion of the additionality demonstration

The proposed project activity faces several barriers and cannot be considered as a common practice. VER revenues help the project activity to overcome these barriers by reducing the overall risk profile of the project. The emissions reductions from the proposed project are therefore additional to what would have occurred in absence of the project activity.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

>>

The approved consolidated baseline and monitoring methodology ACM0002 (version 07, 14 Dec 2007) "Consolidated baseline methodology for grid-connected electricity generation from renewable sources --- Version 8" has been used.

The methodology was applied with the following tools:

- Tool to calculate the emission factor for an electricity system (version 01.1)
- "Tool for the demonstration and assessment of additionality" (version 5.2)

The methodology referenced above is applicable to this project activity because it fulfills the required criteria:

- The project consists of a wind power electricity capacity addition and is a grid-connected electricity generation project;
- The project does not involve switching from fossil fuel use to renewable energy at the site of the project activity; and
- The geographic and system boundaries for the relevant electricity grid can be clearly identified and information on the characteristics of the grid is available.

1. ACM0002**Project Emission**

As per ACM0002, the project emission for most renewable energy (including wind farm) project activities is zero ($PE_y = 0$)

2. **Baseline Emission**

As per ACM0002, baseline emissions include only CO2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the Taoyuan project activity, calculated as follows:

$$BE_y = (EI_y - EG_{baseline}) \cdot EF_{grid,CM,y} \qquad \text{Equation (1)}$$

where:

$EF_{grid,CM,y}$	Combined Margin Emission Factor in year y
EI_y	Net electricity delivered to grid by the Project

$EG_{baseline}$ Baseline electricity supplied to the grid in the case of modified or retrofit facilities

For a new grid-connected renewable power plant/unit, $EG_{baseline} = 0$.

3. **Leakage**

For the leakage, according to ACM0002, it can be regarded as follows:

> *The main emissions potentially giving rise to leakage in the context of electric sector projects are emissions arising due to activities such as power plant construction, fuel handling (extraction, processing, and transport), and land inundation (for hydroelectric projects – see applicability conditions above). Project participants do not need to consider these emission sources as leakage in applying this methodology. Project activities using this baseline methodology shall not claim any credit for the project on account of reducing these emissions below the level of the baseline scenario.*

The leakage in this project therefore is zero as well ($LE_y = 0$).
The emission reductions are defined as per methodology ACM0002 version 08:

$ER_y = BE_y - PE_y - LE_y$ Equation (2)

in which:

ER_y Emission reduction in year y

PE_y Project Emission in year y

BE_y Baseline emissions in year y

LE_y Leakage emissions in year y

After the simplification steps, the final result for calculating this project's emission reduction is the following:

$ER_y = EF_{grid,CM,y} * EI_y$ Equation (3)

Emission factor

The Baseline Emission Factor is calculated as a Combined Margin, using the weighted average of the operating margin and building margin.

$$EF_{grid,CM,y} = w_{OM} \cdot EF_{grid,OM,y} + w_{BM} \cdot EF_{grid,BM,y}$$ Equation (4)

$EF_{grid,OM,y}$ Operating Margin Emission Factor (tCO_2e/MWh)

$EF_{grid,BM,y}$ Building margin emission factor (tCO_2e/MWh)

w_{OM} Weighting of operating margin emissions factor

w_{BM} Weighting of build margin emissions factor

The operating margin emission factor ($EF_{grid,OM,y}$) of Taiwan is 0.801 tCO_2e/MWh and the build margin emission factor ($EF_{grid,BM,y}$) is 0.684 tCO_2e/MWh. The defaults weights for wind power are used as specified in the emission factor tool: $w_{OM} = 0.75; w_{BM} = 0.25$.

The result of the Baseline Emission Factor (EF_y) calculation is 0.772 tCO_2e/MWh. The calculations are presented in Annex 2

B.6.2. Data and parameters that are available at validation:

Data / Parameter:	**EG_y**
Data unit:	GWh
Description:	The net electricity generation excluding the low-cost must-run (2003-2007)
Source of data used:	"Taiwan Energy Balance Sheet – New Format"
Value applied:	See Table A1
Justification of the choice of data or description of measurement methods and procedures actually applied :	The net electricity generation excluding the low-cost must-run has been determined by subtstracting from the total gross generation the hydro, nuclear, wind and "own energy sector use".
Any comment:	

Data / Parameter:	**$FC_{i,y}$**
Data unit:	ton or 1000 m^3
Description:	Total amount of fossil fuel type i consumed by power plants/units in year y
Source of data used:	Taiwan Energy Balance Sheet – New Format
Value applied:	Step 4 Table A4 in Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Fuel consumption breakdown by power plant/unit is unavailable, total consumption amounts are published annually.
Any comment:	

Data / Parameter:	$NCV_{i,y}$
Data unit:	TJ/kt or TJ/milion m^3
Description:	Net calorific value of fossil fuel type i in year y
Source of data used:	Bureau of Energy, Ministry of Economic Affairs
Value applied:	Step 2 **Error! Reference source not found.**e A1 in Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	The BoE provides directly emission factor by unit of mass or volume iwhich is equal to the product of $NCV_{i,y}$ and $EF_{CO2,i,y}$

Data / Parameter:	$EF_{CO2,i,y}$
Data unit:	tCO_2/TJ
Description:	CO_2 emission factor of fossil fuel type i in year y
Source of data used:	Bureau of Energy, Ministry of Economic Affairs
Value applied:	Step 2 **Error! Reference source not found.**e A1 in Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	The BoE provides directly emission factor by unit of mass or volume iwhich is equal to the product of $NCV_{i,y}$ and $EF_{CO2,i,y}$

Data / Parameter:	EFy
Data unit:	tCO_2e/MWh
Description:	Combined Emission factor
Source of data used:	Calculated
Value applied:	0.772

Justification of the choice of data or description of measurement methods and procedures actually applied :	The Baseline Emission Factor is calculated as a Combined Margin, using the weighted average of the Operating Margin and Build Margin.
Any comment:	The emission of the build and operating margin are calculated according to the ex-ante option.

B.6.3. Ex-ante calculation of emission reductions:

>>

According to ACM0002, baseline emissions include only CO2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to Taoyuan project activity, calculated as follows:

$BE_y = (EI_y - EG_{baseline}) \cdot EF_{grid,CM,y}$ Equation (1)

where:

$EF_{grid,CM,y}$ Combined Margin Emission Factor in year y

EI_y Net electricity delivered to grid by the Project

$EG_{baseline}$ Baseline electricity supplied to the grid in the case of modified or retrofit facilities

For a new grid-connected renewable power plant/unit, $EG_{baseline} = 0$.
Thus the baseline emission is as follow:

$BE_y = (EI_y) \cdot EF_{grid,CM,y}$ Equation (3)

The estimated anthropogenic emissions by sources of greenhouse gases of the baseline are shown as follows:

Total Emission Reduction of Taoyuan project

EI_y	Net electricity delivered annually to grid by the Project at full capacity	255,656	MWh/year
ER_y	Emission reduction yearly	197,366	tCO_2e/year

The baseline emission factor of Taiwan is fixed during the first crediting period by ex-ante calculations.

According to ACM0002, the project emission for most renewable energy (including wind farm) project activities is zero ($PE_y = 0$)

Based on ACM0002 methodology, there is no need of leakage calculation or monitoring for this kind of activity, thus leakage is considered to be 0 (zero) tCO_2e.

B.6.4 Summary of the ex-ante estimation of emission reductions:

The specific project activity applies for fixed crediting periods, and the estimation of the emission reductions during the crediting period (from 2009 to 2016) is shown as below. Total estimated emission reductions during the crediting period amount to **1,381,563** tCO_2e.

Year	Estimation of baseline emission reduction (tonnes CO_2e)	Estimation of leakage (tonnes CO_2e)	Estimation of emission reductions (tonnes CO_2e)
2009 (1/12/2009 to 31/12/2009)	49,342	0	49,342
2010 (1/01/2010 to 31/12/2010)	197,366	0	197,366
2011 (1/01/2011 to 31/12/2011)	197,366	0	197,366
2012 (1/01/2012 to 31/12/2012)	197,366	0	197,366
2013 (1/01/2013 to 31/12/2013)	197,366	0	197,366
2014 (1/01/2014 to 31/12/2014)	197,366	0	197,366
2015 (1/01/2015 to 31/12/2015)	197,366	0	197,366
2016 (1/01/2016 to 31/10/2016)	148,025	0	148,025
Total	**1,381,563**	**0**	**1,381,563**

B.7. Application of the monitoring methodology and description of the monitoring plan:

B.7.1 Data and parameters monitored:

Data / Parameter:	EI_y
Data unit:	MWh
Description:	Net electricity delivered to grid by the Project
Source of data to be used:	*Calculated*
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Not needed
Description of measurement methods and procedures to be applied:	Monitored monthly. The project owner will collect electricity receipts for the power delivered to the grid.
QA/QC procedures to be applied:	The energy meters will undergo maintenance/calibration according to Taiwan national standards (based on The Weight and Measures Act, Regulation no. CNMV 46, 'Technical Specification for Verification and Inspection of Electricity Meters')
Any comment:	

Data / Parameter:	$EI_{i,y}$
Data unit:	MWh
Description:	Electricity imported from the grid
Source of data to be used:	*Taipower*

Value of data applied for the purpose of calculating expected emission reductions in section B.5	Not needed
Description of measurement methods and procedures to be applied:	*Taipower will handle the parameter.*
QA/QC procedures to be applied:	The energy meters will undergo maintenance/calibration according to Taiwan national standards (based on The Weight and Measures Act, Regulation no. CNMV 46, 'Technical Specification for Verification and Inspection of Electricity Meters')
Any comment:	

Data / Parameter:	$EI_{e,y}$
Data unit:	MWh
Description:	Electricity delivered to the grid by the Project
Source of data to be used:	*Taipower*
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Not needed
Description of measurement methods and procedures to be applied:	Monitored annually.
QA/QC procedures to be applied:	The energy meters will undergo maintenance/calibration according to Taiwan national standards (based on The Weight and Measures Act, Regulation no. CNMV 46, 'Technical Specification for Verification and Inspection of Electricity Meters')
Any comment:	

B.7.2. Description of the monitoring plan:

>>

Monitoring the meters

(1) Monitoring Objectives:

As per ACM0002, the emission reductions achieved by the project activity will be determined ex-post through direct measurement of the amount net electricity exported to the grid multiplied by the combined margin emission:

$ER_y = EF_{grid,CM,y} * EI_y$ Equation (3)

Where :

$EF_{grid,CM,y}$ Combined Margin Emission Factor in year y

EI_y Net electricity delivered to grid by the Project in year y

ER_y Emission reduction in year y

ACM0002
As the emission factor is fixed for the whole crediting period, the aim of the monitoring is therefore only to monitor the net electricity generated using energy meters. The project proponent may use electricity from the grid for start up purpose so both electricity imports and exports will be monitored:

$Ely = Ele,y – Eli,y$ Equation (5)

Ely	Net electricity delivered to grid by the Project
Ele,y	Electricity delivered to grid by the Project
Eli,y	Electricity imported from grid t

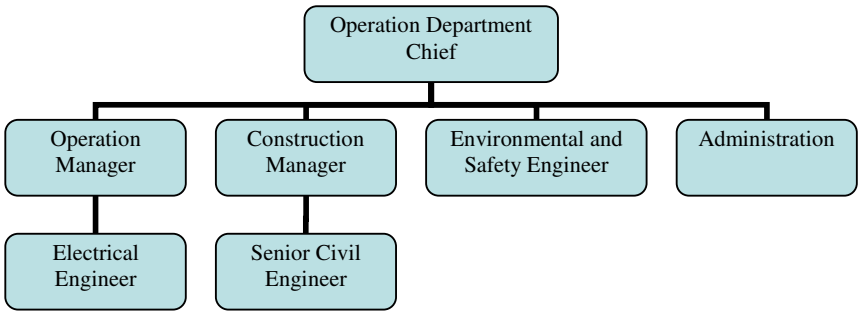
(2) Monitoring meters:

Electricity exports (Ele,y**)**
The electricity generated by the wind turbines will be transmitted to Taipower's substation in which an electricity meter is installed to record the transmitted electricity.

Electricity imports (Eli,y**)**
The wind farm needs to import electricity from grid during the turbines start up. Electricity imports are also recorded by Taipower.

Monitoring Management and Procedures

For Infravest, the operation department is in charge of overall monitoring and operation of Taoyuan project. It is the authority of project operation, maintenance, monitoring, training and report. The team will appoint specific civil engineer, electric engineer, environmental and safety experts for relevant work of proposed project. The organization chart for monitoring the meters is shown in the following:



Name	Organization	Responsibility
Dr. Karl Eugen Feifel	InfraVest	Dr. Feifel is the president of InfraVest Taiwan and is responsible for overall project management.
Mr. Nils Casemir	InfraVest	Mr. Casemir is the chief of operation department of Taoyuan wind-

		farms. He is in charge of data recording processing and reporting for the project. The data wfill be either automatically recorded or manually recorder by operators. All data will be imported to Excel for validation or verification.
South Pole Carbon	South Pole	South Pole Carbon Asset Management Ltd. will provide review of reported data before they are submitted to DOE for validation or verification.

Monitoring Procedures:

The monitoring is done according to the following procedure:

- 10 days report: download the P_I data from SCADA to calculate the daily electricity generation.
- Monthly report: the operation department of Infravest has to do several thing:
  1. Meter (P_T) reading with Taipower company (TPC)
  2. Confirm the amount of bill
  3. Monthly generation report
  4. Sending the invoice to Taipower
- Annually, the operation department of Infravest has to do several thing:
  1. Making annual report
  2. Generating the next two year's plan to Taipower

Procedures for maintenance of monitoring equipment and installations

Since Taipower is in charge of the electricity meter, all maintenance procedures are stated in Taipower's Regulations No. 21to 33[17]. Taipower follows these procedures to maintain the equipment and installations.

Training Procedures for the staffs:

- In construction phase, the following trainings will be carried out:.
  1. The introduction of driven pile and planted pile.
  2. The introduction for safety regulations and procedures
- In operation and maintenance phase, the following trainings will be carried out:.
  1. The introduction of climbing system for windmills
  2.The introduction of wind energy.
  3.The introduction for SCADA operation
  4.The introduction for control of wind turbines

Emergency management procedures:

Since Taipower is in charge of the electricity meter, all emergency management procedures are stated in Taipower's Regulations No. 84 to 88[18]. In case of emergency, Taipower follows these procedures to recalculate the amount of electricity dispatched by InfraVest.

[17] http://www.taipower.com.tw/TaipowerWeb//upload/files/1/main_3_6_1_3.pdf, rules No.21~33.

Name	Organization	Responsibility
Dr. Karl Eugen Feifel	InfraVest	Dr. Feifel is the president of InfraVest Taiwan and is responsible for overall project management.
Mr. Nils Casemir	InfraVest	Mr. Casemir is the chief of operation department of Taoyuan wind farms. He is in charge of data recording processing and reporting for the project. The data will be either automatically recorded or manually recorder by operators. All data will be imported to Excel for validation or verification. He will also manage all training courses.
South Pole Carbon	South Pole	South Pole Carbon Asset Management Ltd. will provide review of reported data before they are submitted to DOE for validation or verification.

Quality Assurance and Quality Control

Internal audit will be carried out to check compliance with operational procedures outlined in this monitoring plan. This internal audit will also identify potential possible adjustments for operational procedures to improve monitoring and reporting in future years. If such adjustments are proposed, reports will be made to the DOE. Adjustments will only take into effect after getting approval from the DOE.

Data Storage and Filing

The electricity meter (P_T) in Taipower's substation will be recorded on paper by the monitoring staff of Taipower. The data will be digitized and listed in the Meter of Facility (MOF) monthly and annual report. Then, Taipower sends a confirmation to InfraVest. MOF Data copies and the confirmation records will be archived for at least two years after the end of the crediting period by InfraVest.
Electricity consumption billings for the wind farm activity are sent monthly by Taipower to InfraVest. Data copies will as well be archived for at least two years after end of the crediting period.

Calibration

Taipower's calibration procedures are in accordance to The Weight and Measures Act, Regulation no. CNMV 46, 'Technical Specification for Verification and Inspection of Electricity Meters'[19], governed by the Bureau of Standards, Metrology and Inspection, Ministry of Economic Affairs, Taiwan. According to Taiwan government's regulation CNMV46, the official period of validity for the *electronic electricity meter* in this project is defined as 8 years. However, Taipower has agreed to shorten the calibration period to 3 years. Furthermore, the accuracy class of the electricity meter (P_T) is 0.5, which is in line with the official standard error for this type of meter (ranging ±0.5%)

B.8. Date of completion of the application of the baseline study and monitoring methodology and the

[18] http://www.taipower.com.tw/TaipowerWeb//upload/files/1/main_3_6_2_6.pdf, rules No.84~88.

[19] The Weight and Measures Act http://www.bsmi.gov.tw/wSite/public/Attachment/f1224553686797.doc

Technical Specification for Verification and Inspection of Electricity Meters
http://www.bsmi.gov.tw/wSite/public/Attachment/f1224657229438.doc Clause 3.9.3

name of the responsible person(s)/entity(ies):

>>
Date of completing the final draft of this baseline section: March 17, 2009

The baseline has been prepared by South Pole Carbon Asset Management Ltd. in consultation with InfraVest GmbH.

Name and contact details of the person responsible for the baseline section:

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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:

>>1/2/2009

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

>> 20 years

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:

>>N/A

C.2.1.2. Length of the first crediting period:

>>N/A

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>1/10/2009 or the day of registration, which ever comes later.

C.2.2.2. Length:

>> 7 years

SECTION D. Environmental impacts

>>

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

>> The assessment of Environmental Impacts (EIA) of the project activity was carried out by InfraVest and was supervised by the Environmental Protection Agency (EPA). As every requirements set by the EPA were completed for both projects, the project activity will start to take place.

Copy of the EIA reports will be provided to the DOE during validation upon request.

Table 1 : Requirements and main conclusions of the EIA

Requirement of the EPA		Conclusion		Actions to take
Physics and Chemical Environment Assessment	1. Terrain, Geology and Earth	Construction stage	No liquefaction and no other negative effects result from the wind farm construction.	
		Operation stage	No negative effects rise from the wind farm operation.	
	2. Water Quality	Construction Stage	The project is not in the water quality protection area and is in a safe distance of any source of drinking water. No pumping takes place during the operation. The waste water due to the construction will be well managed and stored in the construction stage. Thus EIA reported that the construction activities will	

			not give any negative impacts on the water quality.	
		Operation Stage	Wind farm will not produce waste water during its operation. Thus no negative effects are reported in EIA.	
	3. Waste from projects	Construction Stage	Wind farm produce few wastes during its construction. The waste management company will be commissioned to well manage these wastes. The impacts therefore considered very limited.	
		Operation Stage	During the operation phases, only 3 persons are needed to maintain 34 turbines. The impact on the waste is thus considered negligible.	
	4. Noise and Vibration	Construction Stage	The noise generated due to transportation and construction is blew the standard requirement 74dB. It thus can be negligible.	
		Operation Stage	Wind turbines produce low frequency noises, but the measured values are blew the standard requirement. No vibration takes place during the operation. The impact is thus considered very limited and can be negligible.	

	5. Air Quality	Construction Stage	Concerns over dust that might fly in the air during the construction phase are raised. Another impact on the air quality might be the SO2and NO2 emissions during construction. However, the emissions reported by EIA are blew the standard. Thus the impacts on air quality are very limited.	InfraVest responded that they will water the land (dust is emitted when moisture content of land is insufficient) during construction to minimize the impact on the air quality InfraVest commits to adopt low sulphur diesel engines to reduce the pollution during construction.
		Operation Stage	No emissions take place during the operation phase.	
Ecology Environment	6. Animals	Construction Stage	The construction areas are not lactated in protected and sensitive regions. Thus construction activities do not increase the burden of environment.	.
		Operation Stage	Concerns regarding the impact of the wind farm on birds' activity is raised, but the turbines' height are blew the birds' migration (flying) altitude. During landing, birds will dodge these wind turbines. Thus bird's issues are considered very limited in EIA report.	
	7. Plants	Construction Stage	By investigating, no protected or rare plants are found in the construction areas. The impacts on the plants can be negligible.	
		Operation Stage	The wind turbines and blades are higher than the	

			plants. They will not impede the growth of plants.	
Sociology and Economy	8. Residents Characteristics	Construction Stage	The project activity will make the second industry (manufacturing) and third industry	
		Operation Stage	(services) more prosperous by bringing almost 50 job opportunities	
	9. Economic Environment	Job opportunities are increased and the service industry and income of the local residents will be promoted as well		
	10. Industry Structure	The wind-farm is expected to promote tourist activities in the area and increase opportunities to the local industries. Farming will not be influenced by the project activity.		
	11. Usage of Land	Concerns over the usage of land arise from. However, the project is to develop in terms of dots not facets, meaning the distance between every turbine is considered significant and there is plenty of room for other purpose of land, if any. Basically there will be no severe impact on the usage of land. Furthermore, the turbines are built on public land, managed by the government, and it is not dedicated for agrarian or residential purposes.		
	12. Infrastructure	The employment will be mainly offered to local residents that there would not be extra demand for existing infrastructure.		
	13. Transportation: overview and traffic analysis	Impact on traffic depends on the service quality of the road during the transportation of staff, machine and material. The project-derived one way traffic is 16 p.c.u[20]/hr. However, the construction period is short and the transportation will avoid the heavy hours in such extend that generally the overall impact on traffic is very limited		
Tourism	14. Scenery Study	The location of these wind turbines are far from		

[20] Passenger car unit

Impact	and Entertainment Study	the residential areas. No any specific scenery is sited around or within these locations. Thus the impacts on the scenery and entertainment places are very limited.	
Cultural Environment	15. Excavation	No excavation found.	
	16. Ancient Buildings	No ancient buildings in the designated site have been reported.	
	17. Cultural Customs and Religions	No impact on close cultural customs and religions activities	

D.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:

>>

SECTION E. Stakeholders' comments

>>

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

>>In concern of the interests of the local stakeholders, the project owner collected opinions from them in various occasions and forms.

Local Stakeholder Consultation for Taoyuan wind farm project

The local stakeholder consultation was started on 1st Oct. 2008. South Pole Carbon Asset Management Co., Ltd. invited international stakeholders through emails. Recipients of invitation included Gold Standard, local supporters of Gold Standard, Climate Group, Mercy Crops, Greenpeace and WWF in Hong Kong. Meanwhile, plant owner invited the local residents near plant site and representatives of plant staff through the invitation letters. Public hearing was held on 17th Oct. 2008, introduction of the project was made and comments were collected. The list of the recipients is shown below:

Organisation (if relevant)	Name of invitee	Way of invitation	Date of invitation	Confirmation received? Y/N
Guan Yin Residents Representatives Association	Ou, Dao-Xin	Invitation Letter sent via Post	01-10-2008	Y
Guan Yin Township Office	Mai-Lv, Guo-Zhi	Invitation Letter sent via Post	01-10-2008	Y
Local Residents	Xu, Xiu-Bin	Invitation Letter sent via Post	01-10-2008	Y

Local Residents	Xie, Chun-Wen	Invitation Letter sent via Post	01-10-2008	Y
Local Residents	Chen, Shun-Lang	Invitation Letter sent via Post	01-10-2008	Y
Local Residents	Liao,Zhen-Jian	Invitation Letter sent via Post	01-10-2008	Y
Local Residents	Zeng, Xian-Long	Invitation Letter sent via Post	01-10-2008	Y
Local Residents	Zhuo, Sheng-Shen	Invitation Letter sent via Post	01-10-2008	Y
Local Residents	Ni, Yong-Quan	Invitation Letter sent via Post	01-10-2008	Y
Local Residents	Huang, Yuan-Ri	Invitation Letter sent via Post	01-10-2008	Y
Local Residents	Zhang, Zhao-Mei	Invitation Letter sent via Post	01-10-2008	Y
Local Residents	Peng, Shi-Gao	Invitation Letter sent via Post	01-10-2008	Y
Environmental Quality Education Foundation		Invitation Letter sent via Post	01-10-2008	Y
The Climate Group	Josh Harris	Email Invitation	03-10-2008	N
Green Peace	Steve Sawyer	Email Invitation	06-10-2008	N
Mercy Corps	Dorothy McIntosh	Email Invitation	06-10-2008	N
WWF Hong Kong	Lim Salter	Email Invitation	03-10-2008	N
Secretariat of Gold Standard		Email Invitation	03-10-2008	N

GS Main Stakeholder Consultation (MSC)

The Main Stakeholder Consultation started at the 1st of Nov.. 2008. Some invitations are sent via emails and the documents related to the project are published on South Pole Carbon Asset Management Ltd. official website.

At this monment, the documents that are posted on the website are:

- The original GS-Passport
- Local Stakeholder Consultation Report

E.2.	Summary of the comments received:

>>

A. Opening of the meeting

The meeting was opened by Mr. Roger Lee, the Assistant of Vice General Manager of InfraVest Wind Power Group. Mr. Lee introduced himself and thanked all the participants for coming to the meeting.

B. Explanation of the project

Mr. Lee started with a brief introduction of the background of InfraVest Wind Farm Group and its various records in wind farm constructions. He particularly referred to several wind farm projects in Taiwan that are built by the InfraVest Group, and pointed out the productivity of those sites.

Afterwards, he started to explain the project background of Taoyuan Wind Farm. Mr. Lee described the exact location of the wind farm, and gave a simple description of the technical facts of the project. Then, he proceeds to the impacts of the project towards the environment. Wind power generation is a zero-pollution renewable energy project. It has gained interest among countries, along with the increasing global popularity of emission reduction and sustainable environment. In terms of replacing the fossil fuel electricity generation which dominates the national grid, a wind power project leads to GHG emission reduction, thus improves air and water quality. At the same time, with a proper development plan with the government, wind farm sites could also be cultivated as a tourism spot.

C. Summary of the comments

Mr. Yong-Quan Ni, a local resident who lives in Fu Lin Village, Guan Yin Township expressed a comment. He pointed out that a wind farm built several years ago by Taipower Ltd. (the national power company) in another area of Taiwan was proven to lack maintenance, which leads to many technical problems and low productivity. He questioned InfraVest Group in regards of productivity and technical maintenance for Taoyuan wind farm.

Mr. Ni then expressed his concerns on the possible impact of the turbine towards signal reception for televisions.

Mr. Lee responded, the signal interference mostly is caused by the rotation of the metal rotor blade of the turbines. However, the blades of the wind turbines used in the proposed project are built using Fiber Reinforced Polymer (FRP) material, in order to minimize the interference. In addition, the location of the wind farm is considerably far from the residential area, therefore, the signal interference effect, if any, is very minimal.

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

>>

The summary of the comments are list in blew:

Stakeholder Comment	Response to comment
Question on InfraVest's productivity and technical maintenance plan for Taoyuan wind farm	InfraVest applies advanced, automated monitoring system for the wind farm. Safety precautions regarding the operation are also considered to better maintain performance of the turbines, including different approach in various weather conditions, etc. Furthermore, the experts would also do a periodical maintenance.
Possible impact of the turbine towards signal reception for televisions	Signal interference mostly is caused by the rotation of the metal rotor blade of the turbines. Yet, the blade of the wind turbines used in the proposed project is built of Fiber Reinforced Polymer (FRP) material, to minimize this affect. In addition, the location of the wind farm is considerably far from the residential area; therefore, the signal interference effect is very minimal.

No negative comment was received via the public hearing, Internet, or email. The project will be implemented following the original design and plan.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Host Participant

Organization:	InfraVest GmbH
Street/P.O.Box:	10-2F, No. 9, Sec. 2, Roosevelt Rd.,
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Telephone:	+886 2 2395 4886
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E-Mail:	info@infra-vest.com
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Represented by:	Karl Eugen Feifel
Title:	President
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Last Name:	Feifel
Middle Name:	
First Name:	
Department:	
Mobile:	
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VERs Buyer

Organization:	South Pole Carbon Asset Management Ltd.
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Direct tel:	+41 44 633 78 70
Personal E-Mail:	r.heuberger@southpolecarbon.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding involved in proposed project activity.

Annex 3

BASELINE INFORMATION

STEP 1. Identify the relevant electric power system

A *project electricity system* is defined by the *spatial extent* of the power plants that are physically connected through transmission and distribution lines to the project activity and that can be dispatched without significant transmission constraints.

Taiwan is an island with no cable connection with the continent; the spatial extent of the Project Boundary is defined as the insular electricity grid of Taiwan operated by Taipower.

Two main sources of data are publicly available in Taiwan:

- Taipower provides power plant level data net generation of all the power plant dispatched by itself (which mainly include all power plants except circa 200 cogeneration plants operated by independent producers but representing only a small fraction of the total generation).

- National electric statistics (from the Bureau of Energy or from the Ministry of Economic Affairs[21]), which give access to electricity production and fossil fuel consumption in Taiwan by sector.

As it will be explained below, the second set of data will be used for calculating the operating margin and the first one for calculating the build margin.

[21] http://www.moeaec.gov.tw/opengovinfo/Plan/all/files/EnergyStatisticalDataBook.pdf

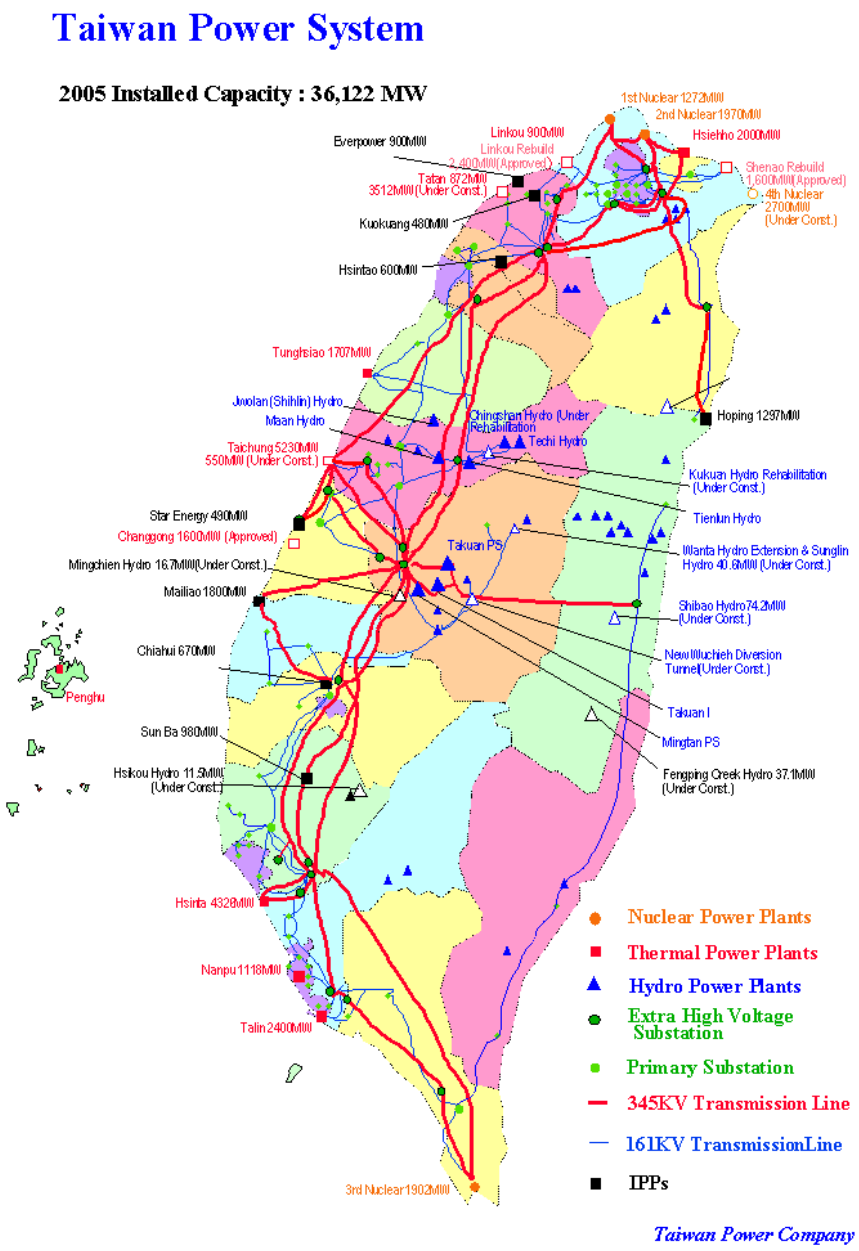

Figure A1: Taiwan power grid map in 2005[22]

Taiwan is an island, and it does not have any transmission line with its neighbouring countries, therefore electricity imports or exports will not be considered in the following calculations.

[22] http://www.taipower.com.tw/TaipowerWeb//upload/images/3/e_main_14.gif

STEP 2. Calculation of the Operating Margin ($EF_{OM,y}$)

In order to calculate Operating Margin, the emission factors of fossil fuels are listed in the following table:

Table A1 Net Calorific Values ($NCV_{i,y}$) multiplied by ($EFCO_2,i,y$) of fossil fuel used for OM and BM calculation

Fuel Type	EFCO2,i,y * NCVi,y [23]	Unit
Bituminous Coal-Steam Coal	2.53	tCO2/t
Sub-bituminous	2.37	tCO2/t
Coke oven gas	0.78	KgCO2/M3
Blast Furnace Gas	0.85	KgCO2/M3
Oxygen Steel Furnace Gas	1.42	KgCO2/M3
Diesel	2.73	KgCO2/L
Fuel oil	2.98	KgCO2/L
LNG	2.66	KgCO2/M3
Petroleum Coke	3.35	KgCO2/Kg
Natural Gas	2.09	KgCO2/M3
Refinery gas	2.17	KgCO2/M3

According to the experts' opinions, coal should not be considered as low cost/must run[24]. Thus only nuclear, hydro and wind power plants are included as low-cost/must-run resources, hereafter referred as lc-mr, which turns out to be between 22.082% and 20.563% of the total electricity generation on average during years 2003 and 2007:

[23] http://www.ghgregistry.tw/upload/tools/%E6%BA%AB%E5%AE%A4%E6%B0%A3%E9%AB%94%E6%8E%92%E6%94%BE%E4%BF%82%E6%95%B8%E7%AE%A1%E7%90%86%E8%A1%A83.0%E7%89%88.xls

[24] According toDr. Chung-Huang Huang (黃宗煌教授), a professor in Economics Department at Taiwan Tsing Hua University, , coal power plants are not "low cost" in doing the emission reduction projects because except the internal cost (such as the operational cost, construction cost, etc…), the external cost has to be taken into account in evaluating the costs of all electricity generation technologies. As the external cost being considered in the project, the total social cost (internal cost + external cost) of coal power plants is higher than the cost of renewable energies. Furthermore, when the Grid would reduce the operation of parts of power plants, during the lower load demand period, some of the coal-fired power plants will be asked to undertake such function firstly. Thus coal cannot be considered as "must-run".

According to Dr. Chien-Ming Lee (李堅明教授), a professor at National Taipei University, Natural Resources Management Department, coal power plants cannot be considered as the low cost since the operational cost of coal power plant is higher than the operational cost of renewable energies during the operation phase. When the Grid would reduce the operation of parts of power plants, during the lower load demand period, some of the coal-fired power plants will be asked to undertake such function firstly. Thus coal cannot be considered as "must-run".

Table A2: Gross and Net Electricity Generation (EGy) in Taiwan[25].

	Units	2003	2004	2005	2006	2007
Total electricity generation	MWh	209,070,385	218,396,634	227,364,220	235,464,738	243,094,925
Total LCMR	MWh	46,167,957	46,487,205	48,266,756	48,578,286	49,988,751
Electricity Own Use						
Total Own Use in power plants	MWh	8,860,403	9,291,992	9,812,126	10,502,785	10,949,893
Total Own Use of LCMR power plants	MWh	1,550,099	1,579,261	1,593,556	1,587,321	1,615,139
net generation excl. LCMR	MWh	155,592,124	164,196,698	170,878,894	177,970,988	183,771,420
share of LCMR	MWh	22.082%	21.286%	21.229%	20.631%	20.563%

Source: Energy Balances Sheet in Taiwan-New Format.

The baseline methodology allows a choice among four methods for the calculation of OM emission factor;

(a) Simple OM, or

(b) Simple adjusted OM, or

(c) Dispatch Data Analysis OM, or

(d) Average OM

Since the average share of electricity generation by lc-mr plants for five most recent years is found to be less than 50%, option (a) is chosen. The simple OM emission factor can be calculated using either of the two data vintages:

- *Ex-ante option*, where a 3-year generation-weighted average based on the most recent data is used. Monitoring and recalculation of the emission factor is not required, or
- *Ex-post option*, where the data of the year is used, in which the project activity displaces grid electricity. Yearly update of the emission factor is required.

The *ex-ante option* is selected to carry out the baseline methodology for the Project.

STEP 3. Calculate the operating margin emission factor according to the selected method

The Simple OM emission factor is calculated as the generation weighted average CO_2 emissions per unit net electricity generation of all generating power plants serving the system, excluding lc-mr sources using one of the following approaches;

- Option A: Based on data on fuel consumption and net electricity generation of each power plant/unit, or
- Option B: Based on data on net electricity generation and the average efficiency of each power unit and the fuel types used in each power unit, or

[25] Extracted from the "Energy Balances Sheet in Taiwan-New Format" Bureau of energy, MOEA, http://www.moeaboe.gov.tw/opengovinfo/Plan/all/energy_balance/main/en/default.htm

- Option C: Based on data on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.

Complete plant-specific data required by Options A and B are unavailable, Taipower can furnish some plant specific data but only for the power plants they operate, these numbers do not comprise all IPP for which plant specific statistics are not available.

Option C can be used, as only renewable sources and nuclear are considered as lc-mr power sources and the quantity of electricity supplied to the grid by these sources is known. According to the "Tool to calculate the emission factor for an electricity system";

$$EF_{grid,OMsimple,y} = \frac{\sum_i FC_{i,y} * NCV_{i,y} * EF_{CO2,i,y}}{EG_y} \qquad \text{Equation (6)}$$

where :

$EF_{grid,OMsimple,y}$	Simple operating margin CO_2 emission factor in year *y*(tCO_2/MWh)
$FC_{i,y}$	Amount of fossil fuel type *i* consumed in the project electricity system in year *y* (mass or volume unit)
$NCV_{i,y}$	Net calorific value (energy content) of fossil fuel type *i* in year *y* (energy unit / mass or volume unit)
$EF_{CO2,i,y}$	CO_2 emission factor of fossil fuel type *i* in year *y* (tCO_2/energy unit)
EG_y	Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost / must-run power plants / units, in year *y* (MWh)
I	All fossil fuel types combusted in power sources in the project electricity system in year *y*
Y	the three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation

Table A3: The total CO2 emissions by fuels of 2005, 2006 and 2007. .

Total Emission in 2005	TCO2	140,565,145
Total Emission in 2006	TCO2	147,954,256
Total Emission in 2007	TCO2	152,028,180

Thus we have the results of Operatin Margin:

EFgrid,OMsimple,y (component 2007)	tCO_2/MWh	0.801
EFgrid,OMsimple,y (component 2006)	tCO_2/MWh	0.684

EFgrid,OMsimple,y (component 2005)	tCO_2/MWh	0.772
EFgrid,OMsimple,y	tCO_2/MWh	0.801

The result of Operating Margin is **0.801** tCO2e/MWh

STEP 4. Calculate the build margin emission factor

In accordance to the method of Chinese NDRC which was accepted by CDM EB, since there is no way to separate the different generation technology capacities based on coal, oil or gas fuel etc from the generic term "thermal power" in the present energy statistics, the following calculation measures will be taken:

First, according to the energy statistics of the selected period in which approximately 20% capacity has been added to the grid, the ratio of CO_2 emissions produced by solid, liquid, and gas fuel consumption for power generation is determined; then multiply this ratio by the respective emission factors based on commercially available best practice technology in terms of efficiency. Finally, this emission factor for thermal power is multiplied with the ratio of thermal power identified within the approximation for the latest 20% installed capacity addition to the grid. The result is the BM emission factor of the grid.

Sub-step 1

All emission factors of fossil fuels used in calculation of the emissions of fossil fuels are referred to the table "the emission factors of fossil fuels in Taiwan" in Step 2.

Calculate the proportion of CO2 emissions related to consumption of coal, oil and gas fuel used for power generation as compared to total CO2 emissions from the total fossil fuelled electricity generation (sum of CO2 emissions from coal, oil and gas).

$$\lambda_{Coal,y} = \frac{\sum_{i \in COAL, j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,j,y}} \qquad \text{Equation (7)}$$

$$\lambda_{Oil,y} = \frac{\sum_{i \in OIL, j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,j,y}} \qquad \text{Equation (8)}$$

$$\lambda_{Gas,y} = \frac{\sum_{i \in GAS, j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,j,y}} \qquad \text{Equation (9)}$$

Where:

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

$NCV_{i,y}$ the net calorific value of fuel i in year y (GJ/t for solid and liquid fuels, GJ/m³ for gas fuels)

$EF_{CO2,i,j,y}$ the CO_2 emission coefficient of fuel i (tCO_2/GJ)

Coal, Oil and *Gas* stands for solid, liquid and gas fuels respectively.

Table A4 The total CO2 emissions by fuel of 2007 ((FCi,y):

	Fuel	Units	Emission (tCO2e)	Λ
Solid	Bituminous Coal-Steam Coal	t	96,819,299	-
	Coke oven Gas	M3	96,215	-
	Blast Furnace Gas	M3	2,187,866	
	Oxygen Steel Furnace Gas	M3	371,271	-
	Sub-bituminous coal	t	13,703,679	-
	Sub-total	-	113,178,330	76.86%
Liquid	Diesel	L	376,827	-
	Refinery gas	M3	46,433	-
	Petroleum Coke	t	1,251,439	
	Fuel oil	L	9,554,982	-
	Sub-total	-	11,229,681	7.63%
Gas	Natural Gas	M3	6,287	
	LNG	M3	22,835,485	-
	Sub-total	-	22,841,772	15.51%
Total		-	147,249,783	100%

Data Source: Energy Balances in Taiwan-New Format by Taiwan's Bureau of Energy[26]

Sub-step 2

Calculate the operating margin emission factor of fuel-based generation.

$$EF_{Thermal,y} = \lambda_{Coal,y} \times EF_{Coal,Adv,y} + \lambda_{Oil,y} \times EF_{Oil,Adv,y} + \lambda_{Gas,y} \times EF_{Gas,Adv,y} \qquad \text{Equation (10)}$$

Where,

$EF_{Thermal,y}$ the weighted emissions factor of thermal power generation with the efficiency level of the best commercially available technology in Taiwan in the previous three years.

$EF_{Coal,Adv}, EF_{Oil,Adv}, EF_{Gas,Adv}$ the emission factors of coal, oil and gas-fired power generation with efficiency levels of the optimal commercially available technology in Taiwan in the previous three years.

The optimal efficiency and emission factors of commercialized coal-fired, oil-fired and gas-fired power plant are shown as below:

[26] Energy Balances in Taiwan-New Format, http://www.moeaboe.gov.tw/opengovinfo/Plan/all/energy_balance/main/en/default.htm

Type of power plant	Variables	Emission factor (tCO2e/MWh)
Coal fire power plant	$EF_{Coal,Adv}$	0.792
Gas fired power plant	$EF_{Gas,Adv}$	0.367
Oil fired power plant	$EF_{Oil,Adv}$	0.506

$$EF_{grid,BM,y} = \frac{CAP_{Thermal}}{CAP_{Total}} \cdot EF_{Thermal} \qquad \text{Equation (11)}$$

Where,

CAP_{Total} the total capacity addition of the selected period in which approximately 20% capacity has been added to the grid,

$CAP_{Thermal}$ the total thermal power capacity addition of the selected period in which approximately 20% capacity has been added to the grid.

The below is shown the Installed capacity of Taiwan Power Grid:

	Installed capacity in 2001 (MW)	Installed capacity in 2002 (MW)	Installed capacity in 2003 (MW)	Installed capacity in 2004 (MW)	Installed capacity in 2005 (MW)	Installed capacity in 2006 (MW)	Installed capacity in 2007 (MW)	Proportion against newly added installed capacity
Thermal power	25960.422	28431.88	30441.982	32292.7	33467.502	35290.546	36016.446	97.12%
Hydro-power	4422	4510.75	4510.75	4511.73	4511.73	4511.73	4534.73	1.09%
Nuclear power	5144	5144	5144	5144	5144	5144	5144	0.00%
Wind power and others	4.86	8.47	8.59	8.71	25.18	105.35	190.18	1.79%
Total	35531	38095	40105	41957	43148	45052	45885	100.00%
share in 2007 installed capacity	22.57%	16.98%	12.60%	8.56%	5.96%	1.82%	0.00%	

The result of Build Margin emission factor calculation is **0.684** tCO2e/MWh.

Step 5. Calculate the combined margin emissions factor

The Baseline Emission Factor is calculated as a Combined Margin, using the weighted average of the Operating Margin and Build Margin.

$$EF_{grid,CM,y} = w_{OM} \cdot EF_{grid,OM,y} + w_{BM} \cdot EF_{grid,BM,y} \qquad \text{Equation (4)}$$

The operating margin emission factor ($EF_{grid,OM,y}$) of Taiwan is 0.801 tCO_2e/MWh and the build margin emission factor ($EF_{grid,BM,y}$) is 0.684 tCO_2e/MWh. The defaults weights for wind power are used as specified in the emission factor tool: $w_{OM} = 0.75; w_{BM} = 0.25$

The result of the Baseline Emission Factor (EF_y) calculation is **0.772** tCO_2e/MWh.

Annex 4

MONITORING INFORMATION

Please see Section B 7

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Annex 5

EARLY CONSIDERATION FOR GOLD STANDARD

觀威風力發電股份有限公司
董事會開會通知書

致：觀威風力發電股份有限公司之所有董事

主旨：召開董事會

說明：

一、 根據公司法第二〇三條及二〇四條規定，召集人得召開董事會：

時間：民國九十七年八月二十日下午五點，以視訊會議行之。

二、 召集事由：

有關申請Gold Standard碳排放減量認證交易機制事宜。

召集人

費佛樂
董事長
日期：民國九十七年八月十五日

The Gold Standard Foundation
79 Avenue Louis-Casai, CH-1216
Geneva-Cointrin, Switzerland.

23/12/2008

Development of a wind farm project as Gold Standard VERs projects

Dear Sir/Madam,

We herewith inform you that the company InfraVest is currently in the initial development stage of the wind farm project "**Taoyuan Wind Farm Project**" in Taiwan.

The project activity will be carried out and registered as a Gold Standard VERs project activity due to the crucial contribution of emission reduction credits towards the financial viability of the project.

The approval procedure will start in the next few months with the support of South Pole Carbon Asset Management Ltd. (Switzerland).

Best Regards

Weilin Ma
Director
Infravest Co. Ltd.

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Taiwan

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Fax: +886 2 23951580
Email: maweilin@infra-vest.com

Annex 6

OFFICIAL DOCUMENT AS INVITATION FOR STAKEHOLDER CONSULTATION

Email Invitation

Dear Secretariat of Gold Standard,
Dear GS Local/Global Supporters,
Dear Sir/Madam who it might concern,

Guanwei Wind Power Co. Ltd., Taowei Wind Power Co. Ltd., and South Pole Carbon Asset Management Ltd. are inviting you to attend the Local Stakeholder Consultation meeting for "Guanyin Wind Farm" project" and "Hsinwu Wind Farm" project". The proposed VER projects are going to apply for Gold Standard.

To be fully in line with the GS rules and regulations we would like to invite the Gold Standard, local Gold Standard Supporters and local NGOs to attend and participate the Local Stakeholder Consultation Meeting. Per local invitees' request, this meeting will be re-scheduled (previously scheduled at 10:00 am on Oct. 4th, 2008) and held at the same venue, 82 Chung-Cheng Road, Guanyi Village, Guanyin Township, Taoyuan, Taiwan (桃園縣觀音鄉觀音村中正路 82 號), at 10:00 am on Oct. 17, 2008.

Please find attached following information and documents of the above mentioned project:
* Meeting invitation in local language (Chinese)
* Non-technical summary of the project in local language (Chinese)
* Gold Standard Passport draft (English)

Please kindly attend our meeting as scheduled above.

If you have anything furher question, please kindly send an e-mail or a letter to the address as below.

Thank you very much in advance.

Invitation in Local Language (sent by post to locals)

各位先生、女士：

您好！

鑒於"桃園縣觀音鄉及新屋鄉風力發電專案"意向申請成為黃金標準之減碳專案，故與瑞士南極碳資產管理股份有限公司簽訂協定並由其協助相關開發工作。雙方認為此專案在應對全球氣候變化，減排溫室氣體方面作出企業應有的貢獻並希望通過聯合國指定的經營實體（DOE）之認證使本項目以及企業的社會責任感得到國際認可。

會議《桃園縣觀音鄉及新屋鄉風力發電專案 利益相關方研討會》本著集思廣益，以人為本的精神，在專案建成投產以前我們已於2006年1月6日在觀音鄉公所三樓會議室及新屋鄉公所三樓會議室各舉行召開一次相關方的公開說明會，諮詢社會各界對此專案的意見和建議以確保本專案不會對當地社會、環境以及相關人員的健康造成重大的負面影響。

為申請黃金標準認證之碳信用額度，依其申請規定在此謹代表觀威風力發電股份有限公司，桃威風力發電股份有限公司和瑞士南極碳資產管理公司謹此邀請您於本（九十七）年十月十七日上午十時於桃園縣觀音鄉觀音村中正路82號（立法委員廖正井觀音服務處）出席本會議，希望您能在百忙之中撥冗與會並提出您對本案的批評與指教。

順祝，

安好！

桃威風力發電股份有限公司
觀威風力發電股份有限公司
聯繫人： 費佛樂 (博士)
地址:10093 台北市中正區羅斯福路二段 9 號 10 樓之 2
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瑞士南極碳資產管理公司
聯繫人：莊昇勳(先生)
聯繫電話：+886 4 2358 1592
電子郵件：j.chuang@southpolecarbon.com

infra Vest

Guanwei and Hsinwu Wind Farm Project

Local Stakeholder consultation - Invitation Tracking

Category Code	Organization (if relevant)	Name of Invitee	Means of Invitation	Date of Invitation	Confirmation received? (Y/N)
1	竹塘鄉鄉民代表會	邱道信	邀請信	2008/10/1	Y
2.	竹塘鄉公所	秀宮國治	〃	〃	Y
3.	村民	許修誠	〃	〃	Y
4.	〃	謝春文	〃	〃	Y
5.	〃	陳順郎	〃	〃	Y
6.	〃	應夏鑑	〃	〃	Y
7.	〃	曾現隆	〃	〃	Y
8.	〃	卓聖森	〃	〃	Y
9.	〃	倪永生	〃	〃	Y
10.	〃	黃遠旦	〃	〃	Y
11.	〃	張照妹	〃	〃	Y
12.	〃	彭詩富	〃	〃	Y
13.	環境品質文教基金會		〃	〃	Y

infra Vest

Guanwei and Hsinwu Wind Farm Project
Local Stakeholder consultation - Participants List

利益相關方會議 - 與會者名單

Date and Time / 日期及時間: Oct. 17, 2008 - 10:00 am

Location / 地點: 82 Chung-Cheng Road, Guanyi Village, Guanyin Township, Taoyuan, Taiwan R.O.C.
桃園縣觀音鄉觀音村中正路 82 號

Name 姓名	Sex 性別	Organization 單位名稱	Position 職稱	Contact Details 聯絡方式	Signature 簽名
張照妹				(03) 4730138	
李昌鵬	男			0928133283	
管紹捷	男			0926270006	
北修村				0910112195	
張郭榮				0932-010-213	
梁金枝				4983069	
倪永全	男			0932108879	
劉詩茜				0921982966	