Project design document form
(Version 11.0)

Complete this form in accordance with the instructions attached at the end of this form.

BASIC INFORMATION	
Title of the project activity	Liaoning Guoli Fuxin Wangsiyingzi Wind Power Project
Scale of the project activity	☒ Large-scale ☐ Small-scale
Version number of the PDD	04
Completion date of the PDD	28/08/2020
Project participants	Liaoning Guoli Renewable Energy Co. Ltd.
Host Party	People's Republic of China
Applied methodologies and standardized baselines	ACM0002 (version 20.0) – "Grid-connected electricity generation from renewable sources".
Sectoral scopes	01 Energy industries (renewable / non-renewable sources)
Estimated amount of annual average GHG emission reductions	88,260 tCO_2e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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Liaoning Guoli Fuxin Wangsiyingzi Wind Power Project (hereafter referred to as the Proposed Project) is invested and operated by Liaoning Guoli Renewable Energy Co. Ltd. (hereafter referred to as the project owner). The purpose of the Proposed Project is to utilize the wind energy for generating electricity which will be delivered to the Northeast Power Grid (hereafter referred to as the NEPG) through Liaoning Power Grid. The delivered electricity can replace equivalent electricity in the Northeast Power Grid which is generated by fossil fuel. The proposed project has put into commission on 04/09/2016 due to the construction schedule. The delay on the operation is mainly due to difficulties in the negotiation with the grid company on the grid connection scheme, which caused sluggish progress in the construction and installation of the substation and turbines. This situation lasted until the consensus had been reached by both sides in 2016, The Grid-connected Protocol was finally signed between the project owner and grid company in 2016, and meanwhile the construction was completed.

The Proposed Project is located in Furong Town, Fuxin City, Liaoning Province, P. R. China. The total installed capability will be 48MW, consisting of 24 sets of 2 MW wind turbines, where the annual electricity delivered to the grid is 96,576 MWh. The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the proposed CDM project power plant is connected to, i.e. NEPG. The project site includes the power plant, turbines themselves and auxiliary electric equipments that are used to support the turbines operation. The proposed project is connected to the NEPG. Therefore, the NEPG including all power plants connected is selected as the project boundary.

Before the implementation of the Proposed Project, there is no power plant at the project site; the electricity that would have otherwise been generated by the Proposed Project was provided by the NEPG The baseline scenario of the Proposed Project, as fully described in section B.4, is the same of the existing scenario prior the starting of Proposed Project.

The proposed project activity was registered on 24/12/2012 (Ref. 9062) and the first crediting period is from 01/04/2013 to 31/03/2020. This is the second crediting period, which is from 01/04/2020 to 31/03/2027. Following the methodology, the emission reductions of the second crediting period are estimated to be 88,260 tCO_2e per year, and 617,820 tCO_2e over the chosen crediting period.

The development of the Proposed Project is in compliance with the preference of the Chinese energy industry, and it will also optimize the regional energy structure. The Proposed Project will contribute to sustainable development in the following aspects:

- Reduce GHG emissions by replacing electricity predominantly generated by fossil fuel-fired power plants in the Northeast Power Grid with wind energy;
- Reduce the emission of pollutants, such as sulphur dioxide and dust, which result from fossil fuel combustion and consumption;
- The proposed project could be helpful to diversify power mix of Northeast Power Grid;
- Increase local employment during both the assembly and installation of the wind turbines and operation of the wind farm.

A.2. Location of project activity

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The project is located in Furong Town, Fuxin City, Liaoning Province, P.R.China. The geographical coordinates of the wind farm are around 120.9833° E~ 122.1167° E, 41.95° N ~42.05° N. The centre geographical coordinate of the wind farm is N 41.9922°,E122.0563°.

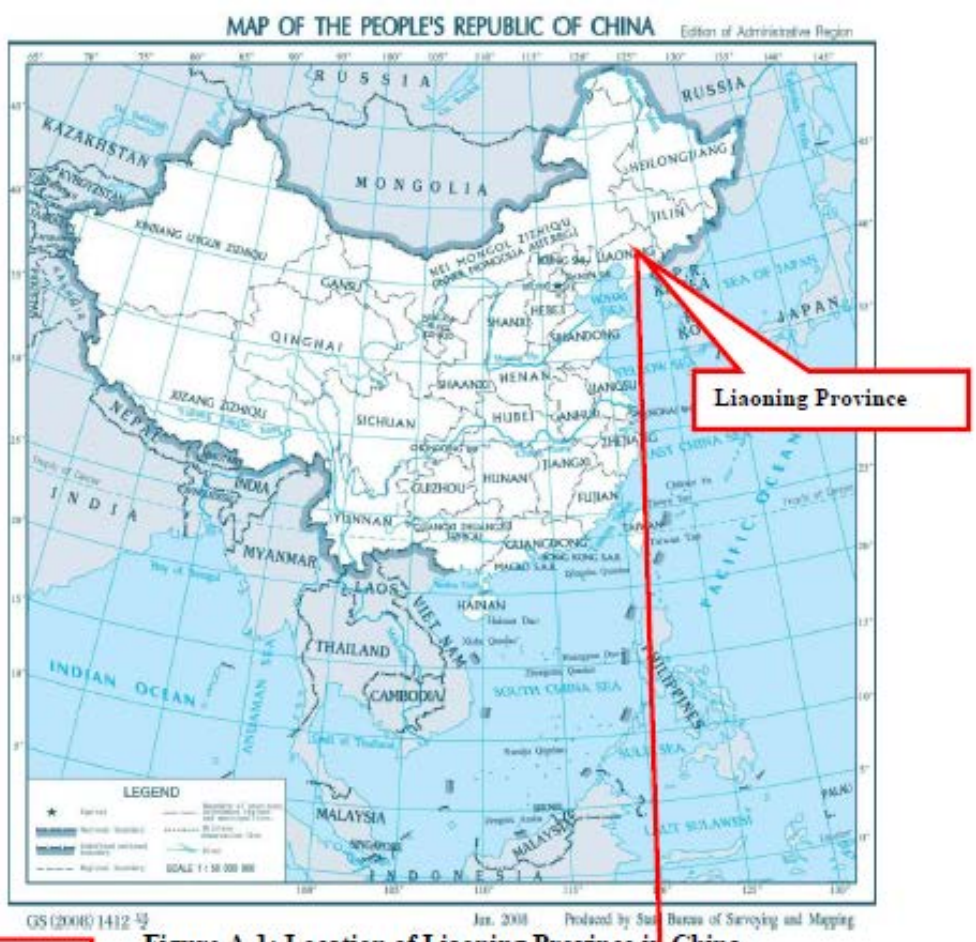
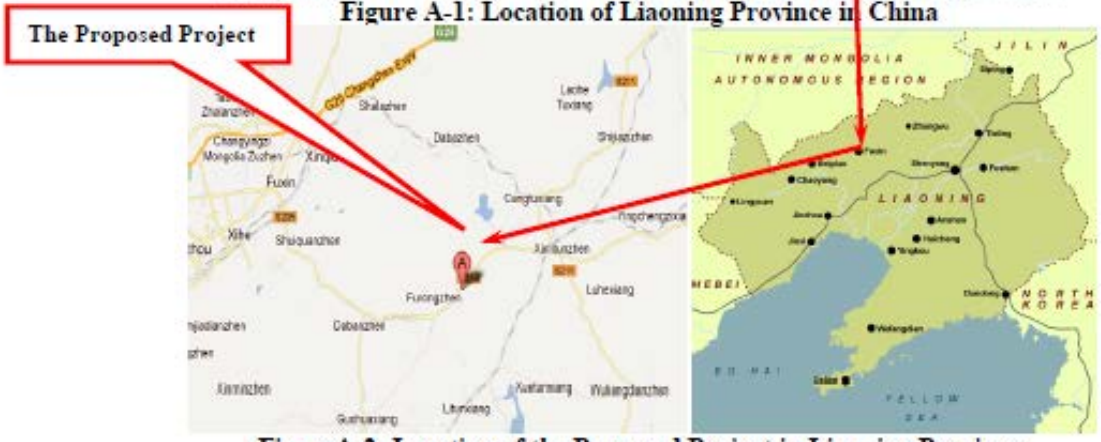


Figure A-1: Location of Liaoning Province in China



FigureA-2: Location of the Proposed Project in Liaoning Province

A.3. Technologies/measures

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The Proposed Project aims to generate electricity from wind resources and to displace the equivalent electricity from the NEPG where the electricity generation is dominated by coal-fired power plants.

The existing scenario prior to the start of the implementation of the Project is: 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 source of NEPG. The baseline scenario as identified in section B.4 of this PDD is the same as the existing scenario prior to the start of the implementation of the Project.

The Proposed Project will install 24 sets of 2MW wind turbines. The total installed capacity is 48MW. The annual operating hours of the Proposed Project are 2,012 hours in full load, and the plant load factor is calculated to be 22.97%[1]. The power will be delivered through 220kV transformer station to the Liaoning power grid then to the NEPG. The corresponding power supplied to the grid is estimated to be 96,576 MWh annually.

The selected models of the wind turbines has been given full consideration by the project owner based using the cost & benefit analysis, the construction condition of the land to be used, and the technical development level of the manufacturer etc. done in the Feasibility Study Report.

The main technical specifications of the wind turbine are provided in the following table.

Table A-1 Key Technical specifications of wind turbine[2]

Items	Proposed Wind turbine	Unit
Manufacturer	CSIC(Chongqing) Wind Power Equipment Co.,Ltd.	
Model	H102L-2.0MW	
Installed capacity (each wind turbine)	2	MW
Rotor diameter	102	m
Cut in speed	3	m/s
Rated wind speed	10.2	m/s
Cut out speed	25	m/s
Hub height	80	m
Rated voltage of generator	690	V
Rotational direction	Clockwise (front view)	-
Number of blades	3	pieces
Rated frequency	50	Hz
Designed product life	20	Year

A key meter (M1) and a backup meter (M2) are installed at the high volt side of the 35kV/220kV switch station on the project site. The power was delivered through 220kV transformer station to the Liaoning power grid then to the NEPG.

Based on methodology ACM0002 (Version 20.0) and the delineation of grid boundaries provided by the DNA in China[3], the Northeast Power Grid, including Heilongjiang Power Grid, Jilin Power Grid, Liaoning Power Grid, is a project electricity system. Related analysis is conducted in B.6.1 Step 1.

[1] The PLF is calculated using the equation below: PLF= Net electricity generation /(Designed capacity of the Project ×8760h)= 96576MWh/(48MW×8760h)= 22.97%.

[2] Data source from the Wind Turbine Contract of the proposed project.

[3] http://www.mee.gov.cn/ywgz/ydqhbh/wsqtkz/201812/P020181220579925103092.pdf

A.4. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
P.R. China (host)	Liaoning Guoli Renewable Energy Co. Ltd.	No

A.5. Public funding of project activity

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The Proposed Project will not receive any public funding from Parties included in Annex I of the UNFCCC.

A.6. History of project activity

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The project was registered as CDM project on 24/12/2012, the reference no. is 9062. The PDD is renewal of crediting period. Therefore, it can be confirmed that:

(a) The proposed CDM project activity is neither registered as a CDM project activity nor included as a component project activity (CPA) in a registered CDM programme of activities (PoA);
(b) The proposed CDM project activity is not a project activity that has been deregistered.

And confirm that:

(c) The proposed CDM project activity was not a CPA that has been excluded from a registered CDM PoA;
(d) The proposed project is not a registered CDM project activity or a CPA under a registered CDM PoA whose crediting period has or has not expired (hereinafter referred to as former project) exists in the same geographical location as the proposed CDM project activity.

A.7. Debundling

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NA

SECTION B. Application of methodologies and standardized baselines

B.1. References to methodologies and standardized baselines

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The methodologies and tools applied to the project include:

The approved methodology ACM0002 (version 20.0) – “Grid-connected electricity generation from renewable sources”.
Reference:
https://cdm.unfccc.int/methodologies/DB/XP2LKUSA61DKUQC0PIWPGWDN8ED5PG

“Tool to calculate the emission factor for an electricity system” (Version 07.0). Reference:
https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf

“Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period” (version 3.0.1). Reference:
https://cdm.unfccc.int/methodologies/Pamethodologies/tools/am-tool-11-v3.0.1.pdf

B.2. Applicability of methodologies and standardized baselines

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The methodology ACM0002 (Version 20.0) is chosen and applicable to the Proposed Project due to the following reasons:

Applicability	Conclusion
This methodology is applicable to grid-connected renewable energy power generation project activities that: (a) Install a Greenfield power plant; (b) Involve a capacity addition to (an) existing plant(s); (c) Involve a retrofit of (an) existing operating plants/units; (d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or (e) Involve a replacement of (an) existing plant(s)/unit(s).	The proposed project is the installation of a Greenfield power plant;
The methodology is applicable under the following conditions: (a) The project activity may include renewable energy power plant/unit of one of the following types: hydro power plant/unit with or without reservoir, wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit; (b) In the case of capacity additions, retrofits, rehabilitations or replacements (except for wind, solar, wave or tidal power capacity addition projects) the existing plant/unit started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion, retrofit, or rehabilitation of the plant/unit has been undertaken between the start of this minimum historical reference period and the implementation of the project activity.	a) The proposed project is the installation of a wind power plant. b) Not applicable. The proposed project is a Greenfield plant and does not represent a capacity addition, retrofits, rehabilitations or replacement.
In case of hydro power plants, one of the following conditions shall apply: (a) The project activity is implemented in existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or (b) The project activity is implemented in existing single or multiple reservoirs, where the volume of the reservoir(s) is increased and the power density, calculated using equation (7), is greater than 4 W/m^2; or (c) The project activity results in new single or multiple reservoirs and the power density, calculated using equation (7), is greater than 4 W/m^2; or (d) The project activity is an integrated hydro power project involving multiple reservoirs, where the power density for any of the reservoirs, calculated using equation (7), is lower than or equal to 4 W/m^2, all of the following conditions shall apply: (i) The power density calculated using the total installed capacity of the integrated project, as per equation (8), is greater than 4 W/m^2; (ii) Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity; (iii) Installed capacity of the power plant(s) with power density lower than or equal to 4 W/m^2 shall be: a. Lower than or equal to 15 MW; and b. Less than 10 per cent of the total installed capacity of integrated hydro power project.	Not applicable. The proposed project is the installation of a wind power plant.
In the case of integrated hydro power projects, project proponent	Not applicable. The

shall: (a) Demonstrate that water flow from upstream power plants/units spill directly to the downstream reservoir and that collectively constitute to the generation capacity of the integrated hydro power project; or (b) Provide an analysis of the water balance covering the water fed to power units, with all possible combinations of reservoirs and without the construction of reservoirs. The purpose of water balance is to demonstrate the requirement of specific combination of reservoirs constructed under CDM project activity for the optimization of power output. This demonstration has to be carried out in the specific scenario of water availability in different seasons to optimize the water flow at the inlet of power units. Therefore, this water balance will take into account seasonal flows from river, tributaries (if any), and rainfall for minimum five years prior to implementation of CDM project activity.	proposed project is the installation of a wind power plant.
The methodology is not applicable to the following: (a) Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site; (b) Biomass fired power plants/units.	a) Not applicable. The proposed project does not involve switching from fossil fuels to renewable energy at the site of the proposed project. b) Not applicable. The proposed project is a wind power plant.
In the case of retrofits, rehabilitations, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is "the continuation of the current situation, that is to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance".	Not applicable. The proposed project is the installation of a wind power plant and not a retrofits, rehabilitations or replacement or capacity additions.
Applicability conditions of "Tool to calculate the emission factor for an electricity system", - Version 07.0	
This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity that is where a project activity supplies electricity to a grid or a project activity that results in savings of electricity that would have been provided by the grid (e.g. demand-side energy efficiency projects).	This condition is applicable. OM, BM and CM are estimated using the tool under section B.6.3 for calculating baseline emissions.
Under this tool, the emission factor for the project electricity system can be calculated either for grid power plants only or, as an option, can include off-grid power plants. In the latter case, two sub-options under the step 2 of the tool are available to the project participants, i.e. option IIa and option IIb. If option IIa is chosen, the conditions specified in"Appendix 2: be met. Namely, the total capacity of off-grid Procedures related to off-grid power generation" should power plants (in MW) should be at least 10 per cent of the total capacity of grid power plants in the electricity system; or the total electricity generation by off-grid power plants (in MWh) should be at least 10 per cent of the total electricity generation by grid power plants in the electricity system; and that factors which negatively affect the reliability and stability of the grid are primarily due to constraints in generation and not to other aspects such as transmission capacity.	Since the proposed project is grid connected, this condition is applicable and the emission factor has been calculated accordingly.
In case of CDM projects the tool is not applicable if the project electricity system is located partially or totally in an Annex I country.	The proposed project is located in China, a non-Annex I country. Therefore,

	this criterion is not applicable for the project activity.
Under this tool, the value applied to the CO_2 emission factor of biofuels is zero.	The proposed project is a grid connected wind power project/ unit and does not involve emission from biofuels. Therefore, this criterion is not applicable.

Therefore, the Proposed Project is a new grid-connected wind power generation project and the approved consolidated baseline and monitoring methodology ACM0002 (Version 20.0) and the "Tool to calculate the emission factor for an electricity system" are applicable to the Proposed Project.

B.3. Project boundary, sources and greenhouse gases (GHGs)

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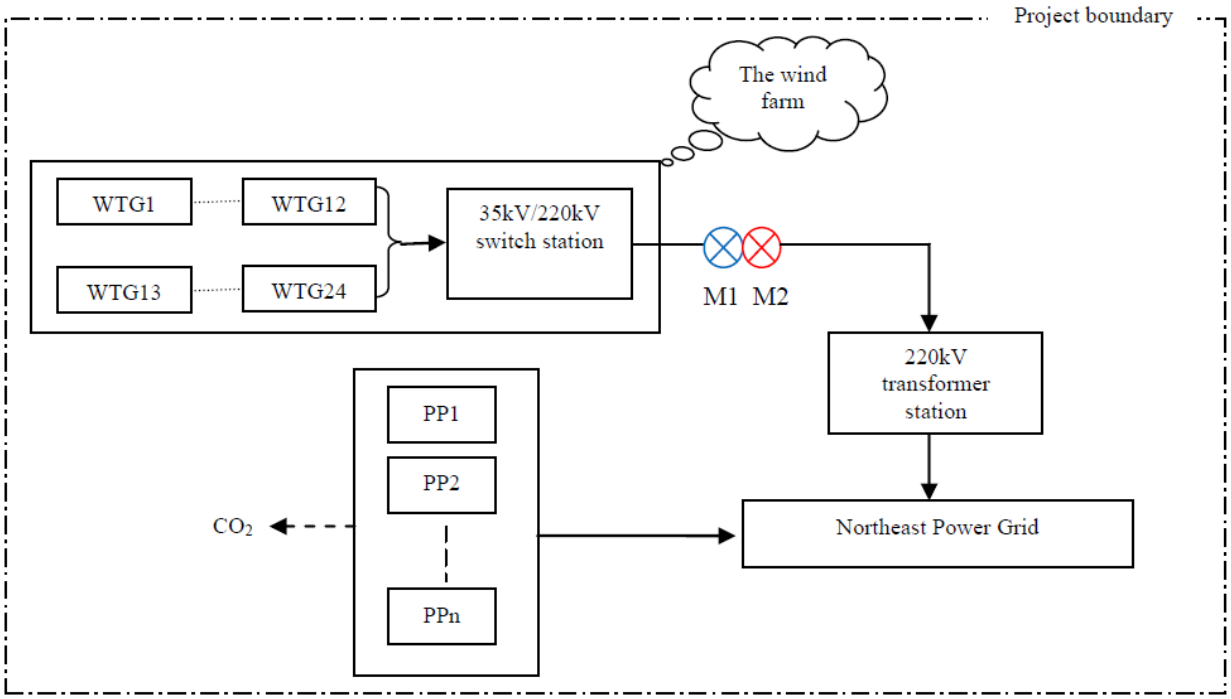
Emission sources:

For the baseline determination only CO_2 emissions from electricity generation by fossil fuel fired power plant that is displaced due to the project activity are taken into account.

Spatial boundary:

Based on methodology ACM0002 (Version 20.0) and the delineation of grid boundaries provided by the DNA in China[4], the Northeast Power Grid, including Heilongjiang Power Grid, Jilin Power Grid, and Liaoning Power Grid, is a project electricity system. Related analysis is conducted in B.6.1 Step 1. Thus, the spatial extent of the project boundary includes the project site and all power plants physically connected to the Northeast Power Grid. The figure below shows the boundary of the Proposed Project.



[4] http://www.mee.gov.cn/ywgz/ydqhbh/wsqtkz/201812/P020181220579925103092.pdf

Where:

PP1, PP2, …, PPn: fossil fuel fired power plants physically connected to the Northeast Power Grid;
WTG_1, WTG_2...WTG_{24}: the power generating units including wind turbines and generators;
⊗ M1: The key meter;
⊗ M2: The backup meter;
Broken line: the project boundary;
Dotted arrow: the baseline emissions.

According to ACM0002 (Version 20.0), the GHGs included or excluded from the project boundary are listed as follows:

Source		GHG	Included?	Justification/Explanation
Baseline	CO_2 emissions from electricity generation in fossil fuel-fired power plants connected into the NEPG that is displaced due to the project activity.	CO_2	Yes	Main emission sources
		CH_4	No	Minor emission source.
		N_2O	No	Minor emission source.
Project activity	Project emission	CO_2	No	The project is a wind power project. Project emissions should not be considered according to ACM0002.
		CH_4	No	
		N_2O	No	

B.4. Establishment and description of baseline scenario

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The project is the installation of a new Greenfield power plant, and is not a capacity addition, retrofit, rehabilitation or replacement of existing grid-connected renewable power plant/unit. Therefore, the baseline scenario is prescribed in the methodology:

Electricity delivered to the grid by the project 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*".

The selected methodology prescribes the baseline scenario; thus, no further analysis is required. The combined margin is calculated in Section B.6 below.

According to the ACM0002 (Version 20.0) and Project Standard (Version 02.0), the methodological tool "*Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period*" (Version 3.0.1) is adopted to assess the continued validity of the baseline and to update the baseline. This tool provides a stepwise procedure to assess the continued validity of the baseline and to update the baseline at the renewal of a crediting period, as required by paragraph 49 (a) of the modalities and procedures of the clean development mechanism.

Step 1: Assess the validity of the current baseline for the next crediting period

Step 1.1: Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies

If the current baseline complies with all relevant mandatory national and/or sectoral policies which have come into effect after the submission of the project activity for validation or the submission of

the previous request for renewal of the crediting period and are applicable at the time of requesting renewal of the crediting period, go to Step 1.2.

- There are no new national and/or sectoral policies that could affect the baseline scenario at the time of requesting renewal of the crediting period. The current baseline complies with all relevant mandatory national and/or sectoral policies. Hence in the absence of the project the electricity would still have 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*".

Step 1.2: Assess the impact of circumstances

Assess the impact of circumstances existing at the time of requesting renewal of the crediting period on the current baseline emissions, without reassessing the baseline scenario.

In the situation where the baseline scenario identified at the validation of the project activity was the continuation of the current practice without any investment, an assessment of the changes in market characteristics is required for the renewal of the crediting period.

- The baseline scenario identified at the validation of the project was the continuation of the current practice without any investment. Baseline emissions are primarily derived from the fossil fuel power plants in the NEPG. The total electricity generation is still mainly produced by fossil fuel power plants in NEPG in recent years. Therefore, market characteristics do not have impact on the baseline emissions.
- Evaluate whether the conditions used to determine the baseline emissions in the previous crediting period are still valid. Assess the availability of new fuels or raw materials and the impact of electricity or fuel prices in the identification of the current practice for the baseline emissions.
- The conditions used to determine the baseline emissions in the previous crediting period are still valid. The availability of new fuels or raw materials or the level of fuel prices has no impact on the identification of the current practice for the baseline emissions. Presently the NEPG is dominated by the fossil fuel power plants. The availability of new fuels or raw materials or the level of fuel prices has no impact on the baseline emissions.

If the new circumstances make a continued validity of the current baseline not plausible, then the current baseline needs to be updated for the subsequent crediting period.

As there are no new circumstances that make a continued validity of the current baseline not plausible, the current baseline does not need to be updated for the second crediting period.

Step 1.3: Assess whether the continuation of use of current baseline equipment(s) or an investment is the most likely scenario for the crediting period for which renewal is requested

This sub-step should only be applied if the baseline scenario identified at the validation of the project activity was the continuation of use of the current equipment(s) without any investment and, the projects proponents or third party (or parties) would undertake an investment later due, for example, to the end of the technical lifetime of the equipment(s) before the end of the crediting period or the availability of a new technology.

Assess whether the remaining technical lifetime of the equipment that would have continued to be used in the absence of the project, as determined in the renewal CDM-PDD, exceeds the crediting period for which renewal is requested.

Take into consideration the market penetration of different technologies. Evaluate the penetration rate of different technologies that are available in the market and evaluate how they could affect the baseline.

- As determined in the renewal CDM-PDD, the baseline scenario is that the electricity delivered to the grid by the project would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources in NEPG, as reflected in the combined margin (CM) calculations described in the "*Tool to calculate the emission factor for an electricity system*". The projects proponents or third party (or parties) would not undertake an investment later due. The combined margin calculation automatically takes account of any issues regarding remaining technical lifetime or market penetration.

If the baseline scenario of the project activity is the continuation of use of the current equipment(s) without any investment and the projects proponents or third party(ies) will undertake an investment later, but before the end of a crediting period, then the current baseline needs to be updated for that crediting period or the crediting of emission reductions should be limited to the period before the baseline equipment would cease its operation.

Therefore, the current baseline does not need to be updated for the second crediting period.

Step 1.4: Assessment of the validity of the data and parameters

Assess whether data and parameters that were only determined at the start of the crediting period and not monitored during the crediting period are still valid or whether they should be updated. Updates should be undertaken in the following cases:

- Where IPCC default values are used, the values should be updated if any new default values have been adopted and published by the IPCC, for example, in guidelines for national GHG inventories, IPCC assessment report or special reports by the IPCC;
- Where emission factors, values or emission benchmarks are used and determined only once for the crediting period, they should be updated, except if the emission factors, values or emission benchmarks are based on the historical situation at the site of the project prior to the implementation of the project and cannot be updated because the historical situation does not exist anymore as a result of the CDM project activity.

If any of the data and parameters that were only determined at the start of the crediting period and not monitored during the crediting period are not valid anymore, the current baseline needs to be updated for the subsequent crediting period.

In accordance with the methodology, the grid emission factor and all the values in its calculation are updated in section B.6.

If the application of Steps 1.1, 1.2, 1.3 and 1.4 confirmed that the current baseline as well as data and parameters are still valid for the subsequent crediting period, then this baseline, data and parameters can be used for the renewed crediting period. Otherwise, proceed to Step 2.

The original baseline scenario needs to be updated to incorporate the latest grid emission factor in accordance with the methodology.

Step 2: Update the current baseline and the data and parameters

This step is only applicable if any of the Steps 1.1, 1.2, 1.3 and/or 1.4 showed that the current baseline needs to be updated.

Step 2.1: Update the current baseline

Update the current baseline emissions for the subsequent crediting period, without reassessing the baseline scenario, based on the latest approved version of the methodology applicable to the project activity. The procedure should be applied in the context of the sectoral policies and circumstances that are applicable at the time of request for renewal of the crediting period.

As shown in step 1.1 above, in accordance with the procedures for renewal of the crediting period of a registered CDM project activity, the original baseline, as updated, remains valid taking new relevant national and/or sectoral policies and circumstances into account.

Step 2.2: Update the data and parameters

If the application of Step 1.4 showed that the data and/or parameter(s) that were only determined at the start of the crediting period and not monitored during the crediting period are not valid anymore, project participants should update all applicable data and parameters, following the guidance in Step 1.4.

As discussed above in step 1.4, the grid emission factor and all the values in its calculation are updated in section B.6.

Conclusion regarding the assessment of the validity of the original baseline scenario

In accordance with the procedures for renewal of the crediting period of a registered CDM project activity, the original baseline, as updated in accordance with step 2.2 in section B.6, remains valid taking new relevant national and/or sectoral policies and circumstances into account.

B.5. Demonstration of additionality

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Not applicable for the second crediting period.

In accordance with the procedures for renewal of the crediting period of a registered CDM project activity and the applied methodology, it does not require a reassessment of the baseline scenario or additionality, it is only required to assess whether the original project baseline is still valid or has been updated taking account of new data where applicable.

B.6. Estimation of emission reductions

B.6.1. Explanation of methodological choices

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As mentioned in section B.2, the methodology ACM0002 (Version 20.0) is applicable to the Proposed Project. The emission reductions (ER_y) for the Proposed Project are calculated according to the methodology ACM0002 as following:

$$ER_y = BE_y - PE_y - LE_y \quad (1)$$

Where:
ER_y = Emission reductions in year y (t CO_2e)
BE_y = Baseline emissions in year y (t CO_2e)
PE_y = Project emissions in year y (t CO_2e)
LE_y = Leakage emissions in year y (t CO_2)

- **Project emissions**

The Proposed Project is a wind farm. The Proposed Project will not use any fossil fuel during the operation. Hence, the project emissions shall be accounted by using the following equation:

$PE_y = 0$ (2)

PE_y = Project emission in year *y* (t CO_2e)

- **Baseline emissions**

Baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity, calculated as follows:

$BE_y = EG_{PJ,y} \times EF_{grid,CM,y}$ (3)

Where:

BE_y = Baseline emissions in year y (t CO_2).
$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh)
$EF_{grid,CM,y}$ = Combined margin CO_2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (version 07.0) (t CO_2/MWh).

Calculation of $EG_{PJ,y}$

The calculation of $EG_{PJ,y}$ is different for (a) greenfield plants, (b) retrofits and replacements, and (c) capacity additions. The Proposed Project is involves in a new grid-connected wind project. So case (a) is selected.

If the project activity is the installation of a new grid-connected renewable power plant/unit at a site where no renewable power plant was operated prior to the implementation of the project activity, then:

$EG_{PJ,y} = EG_{facility,y}$ (4)
Where:

$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh)
$EG_{facility,y}$ = Quantity of the total electricity generation of the existing plant(s) or unit(s) and the added plant(s) or unit(s) to the grid in year y (MWh).

Calculation of $EF_{grid,CM,y}$

This methodological tool "Tool to calculate the emission factor for an electricity system" (version 07.0) determines the CO_2 emission factor for the displacement of electricity generated by power plants in an electricity system, by calculating the combined margin emission factor (CM) of the electricity system. The CM is the result of a weighted average of two emission factors pertaining to the electricity system: the operating margin (OM) and the build margin (BM). The operating margin is the emission factor that refers to the group of existing power plants whose current electricity generation would be affected by the proposed CDM project activity. The build margin is the emission factor that refers to the group of prospective power plants whose construction and future operation would be affected by the proposed CDM project activity.

The tool "Tool to calculate the emission factor for an electricity system" (version 07.0) provides procedures to determine the following parameters:

Parameter	SI Unit	Description
$EF_{grid, CM,y}$	t CO_2/MWh	Combined margin CO_2 emission factor for the project electricity system in year y
$EF_{grid, BM,y}$	t CO_2/MWh	Build margin CO_2 emission factor for the project electricity system in year y
$EF_{grid, OM,y}$	t CO_2/MWh	Operating margin CO_2 emission factor for the project electricity system in year y

The following six steps are applied to calculate the emission factor for an electricity system:

STEP 1: Identify the relevant electricity systems.
STEP 2: Choose whether to include off-grid power plants in the project electricity system (optional).
STEP 3: Select a method to determine the operating margin (OM);
STEP 4: Calculate the operating margin emission factor according to the selected method.
STEP 5: Calculate the build margin emission factor.
STEP 6: Calculate the combined margin (CM) emissions factor.

Step 1. Identify the relevant electricity systems

In accordance with the boundary definitions of the DNA in China, the spatial extent of the project boundary includes the wind farm project and all other power plants connected physically to the Northeast Power Grid that the Proposed Project power plant is connected to. The Northeast China Power Grid is defined as the Project electricity system, which consists of independent province-level electricity systems including Heilongjiang, Jilin and Liaoning province that are physically connected through transmission and distribution lines to the project activity (e.g. the renewable power plant location or the consumers where electricity is being saved) and that can be dispatched without significant transmission constraints. Power plants within the connected electricity system can be dispatched without significant transmission constraints but transmission to the project electricity system has significant transmission constraints. Hence, the electric power system is identified as the Northeast Power Grid.

Electricity transfers from connected electricity systems to the Northeast Power Grid are defined as electricity imports and electricity transfers to connected electricity systems are defined as electricity exports.

For the purpose of determining the build margin emission factor, the spatial extent is limited to the project electricity system (the Northeast Power Grid).

Step 2. Choose whether to include off-grid power plants in the project electricity system (optional)

The following two options to calculate the operating margin and build margin emission factor can be chosen:
Option I: Only grid power plants are included in the calculation.
Option II: Both grid power plants and off-grid power plants are included in the calculation.

For the proposed activity, option I is used to calculate the OM and BM emission factor.

Step 3. Select a method to determine the operating margin (OM)

The calculation of the operating margin emission factor ($EF_{grid, OM,y}$) is based on one of the following methods:

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

Simple OM (option a)

Any one of the four methods can be used, however, the simple OM method (option a) can only be used if low-cost/must-run resources [5] constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production. The share of low-cost/must-run generation in NEPG is less than 50% of total grid generation in average of the five most recent years. Therefore, the Simple OM (option a) is chosen to calculate OM emission factor for the Proposed Project.

The simple OM emissions factor can be calculated using either of the two following data vintages:

Ex ante option: 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period, or

Ex post option: The year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring. If the data required for calculating the emission factor for year *y* is usually only available later than six months after the end of year *y*, alternatively the emission factor of the previous year (y-1) may be used. If the data is usually only available 18 months after the end of year *y*, the emission factor of the year proceeding the previous year (y-2) may be used. The same data vintage (y, y-1 or y-2) should be used throughout all crediting periods.

For the Proposed Project, the ex ante option of the data vintages is chosen to calculate the emission factor of the Northeast Power Grid.

Step 4. 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 (t CO_2/MWh) of all generating power plants serving the system, not including low-cost / must-run power plants / units. It may be calculated:

- Based on the net electricity generation and a CO_2 emission factor of each power unit; (Option A)or
- Based 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. (Option B)

Option B can only be used if:

- The necessary data for Option A is not available; and
- Only nuclear and renewable power generation are considered as low-cost/must-run power sources and the quantity of electricity supplied to the grid by these sources is known; and
- Off-grid power plants are not included in the calculation (i.e., if Option I has been chosen in Step 2).

According to Option B, the simple OM emission factor is calculated based on the net electricity supplied to the grid by all power plants serving the system, not including low-cost/must-run power

[5] Low-cost/must-run resources are defined as power plants with low marginal generation costs or power plants that are dispatched independently of the daily or seasonal load of the grid. They typically include hydro, geothermal, wind, low-cost biomass, nuclear and solar generation. If coal is obviously used as must-run, it should also be included in this list, i.e. excluded from the set of plants.

plants/units, and based on the fuel type(s) and total fuel consumption of the project electricity system, as follows:

$$EF_{grid,OMsimple,y} = \frac{\sum_{i} FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{EG_y} \quad (5)$$

Where:

$EF_{grid,OMsimple,y}$	=	Simple operating margin CO_2 emission factor in year *y* (t CO_2/MWh)
$FC_{i,y}$	=	Amount of fossil fuel type *i* consumed in the project electricity system in year *y* (mass or volume
$NCV_{i,y}$	=	Net calorific value (energy content) of fossil fuel type *i* in year *y* (GJ / mass or volume unit)
$EF_{CO2,i,y}$	=	CO_2 emission factor of fossil fuel type *i* in year *y* (t CO_2/GJ)
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 (ex ante option)

With reference to the *2017 Baseline Emission Factors for Regional Power Grids in China*[6], the simple OM emission factor for NEPG is *1.1082*tCO_2e/MWh

Step 5. Calculate the build margin (BM) emission factor

According to "Tool to calculate the emission factor for an electricity system (Version 07.0)", in terms of vintage of data, project participants can choose between one of the following two options:

Option 1: For the first crediting period, calculate the build margin emission factor *ex ante* based on the most recent information available on units already built for sample group *m* at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

Option 2: For the first crediting period, the build margin emission factor shall be updated annually, *ex post*, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be calculated *ex ante*, as described in Option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

The project participants chose the Option 1 to calculate the build margin emission factor *ex-ante*.

[6] http://www.mee.gov.cn/ywgz/ydqhbh/wsqtkz/201812/P020181220579925103092.pdf

The sample group of power units *m* used to calculate the build margin should be determined as per the following procedure, consistent with the data vintage selected above:

(a) Identify the set of five power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently ($SET_{5\text{-units}}$) and determine their annual electricity generation ($AEG_{SET\text{-}5\text{-}units}$, in MWh);

(b) Determine the annual electricity generation of the project electricity system, excluding power units registered as CDM project activities (AEG_{total}, in MWh). Identify the set of power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently and that comprise 20% of AEG_{total} (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) ($SET_{\geq 20\%}$) and determine their annual electricity generation ($AEG_{SET\text{-}\geq 20\%}$, in MWh);

(c) From $SET_{5\text{-units}}$ and $SET_{\geq 20\%}$ select the set of power units that comprises the larger annual electricity generation (SET_{sample});

In China, the power plants see the build margin as the vital business data, so it is very difficult to find the available data about the power units consists of either the set of 5 power units that have been built most recently, or the set of power capacity additions in the electricity system generation (in MWh) and that have been built most recently. To resolve this problem, the Executive Board (EB) has approved the project participants to use the methodological deviation[7] as follows:

(1) Use of capacity additions during the last 1-3 years for estimating the build margin emission factor for grid electricity.

(2) Use of weights estimated using installed capacity in place of annual electricity generation. And it is suggested that the project participants use the efficiency level of the best technology commercially available in the provincial, regional or national grid of China, as a conservative proxy.

The build margin emissions factor is the generation-weighted average emission factor (t CO_2/MWh) of all power units *m* during the most recent year *y* for which power generation data is available, calculated as follows:

$$EF_{grid,BM,y} = \frac{\sum_{m} EG_{m,y} \times EF_{EL,m,y}}{\sum_{m} EG_{m,y}} \quad (6)$$

Where:

$EF_{grid,BM,y}$	=	Build margin CO_2 emission factor in year y (t CO_2/MWh)
$EG_{m,y}$	=	Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
$EF_{EL,m,y}$	=	CO_2 emission factor of power unit m in year y (t CO_2/MWh)
m	=	Power units included in the build margin
y	=	Most recent historical year for which power generation data is available

[7] EB guidance for "Request for guidance: Application of AM0005 and AMS-ID in China, 2005.10.7": Request for clarification on use of approved methodology AM0005 for several projects in China. http://cdm.unfccc.int/Projects/deviations/87512

No matter how to identify sample group to calculate BM factor mentioned in step 4, the same issue on data availability must be addressed. Currently, it is very difficult to obtain the capacity margin data of power plants in China, since these data as well as net quantity of electricity generated and delivered to the grid and fuel consumption data in power unit m are regarded as commercial secrets or only for internal usage. Then the following deviation was adopted to calculate the Build Margin emission factor.

1. The breakdown data by power plants are not while the aggregate data by different types of fuels are available. Considering this situation, the *m* sample group will consist of capacity addition by power sources with same fuel instead of by power plants. For the proposed project the *m* sample group will consist of fossil fuel fired capacity addition, hydropower capacity addition and other capacity addition;

2. Assuming that all the power plants with same fuel type have equal annual operation hours, and identify the starting year t_0 which the power capacity additions from t_0 to t_0 (i.e. the recent year of which the latest data is available) in the electricity system that comprise 20% of the system generation (in MWh).

3. To be conservative, zero emission factors were selected for hydropower capacity and other capacity. Moreover, since specific data on coal fired capacity, oil fired capacity, and gas fired capacity could not be separated from current statistical data on fossil fuel fired capacity, the following approach was adopted for calculating the emission factor of fossil fuel fired capacity addition:

Sub-step 1: Calculate the proportion of CO_2 emissions related to consumption of coal, oil and gas fuel used for power generation as compared to total CO_2 emissions from the total fossil fuelled electricity generation (sum of CO_2 emissions from coal, oil and gas).

$$\lambda_{Coal,y} = \frac{\sum_{i \in COAL, j} FC_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,y}}{\sum_{i,j} FC_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,y}} \quad (7)$$

$$\lambda_{Oil,y} = \frac{\sum_{i \in OIL, j} FC_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,y}}{\sum_{i,j} FC_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,y}} \quad (8)$$

$$\lambda_{Gas,y} = \frac{\sum_{i \in GAS, j} FC_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,y}}{\sum_{i,j} FC_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,y}} \quad (9)$$

Where:

$FC_{i,j,y}$	=	The amount of fossil fuel type *i* consumed by power plants / units in province *j* in year y (mass or volume unit);
$NCV_{i,y}$	=	Net calorific value (energy content) of fossil fuel type *i* in year *y* (GJ/ mass or volume unit), National fixed value;
$EF_{CO2,i,y}$	=	CO_2 emission factor of fossil fuel type *i* in year *y* (t CO_2/GJ) Coal, Oil and Gas is solid fuel, liquid fuel and gas fuel respectively (See details of calculation in Annex 4).

Sub-step 2: Calculate the emission factor of fuel-based generation:

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

Where:
$EF_{Coal,Adv}$, $EF_{Oil,Adv}$ and $EF_{Gas,Adv}$ are the emission factors for the best commercially available technology of coal fired power generation, oil fired power generation, and gas fired power generation, respectively.

Sub-step 3: Calculate the Building Margin emission factor:

$$EF_{grid,BM,y} = \frac{CAP_{Thermal,y}}{CAP_{Total,y}} \times EF_{Thermal,y} \quad (11)$$

Where:

CAP_{Total}	=	The total capacity addition
$CAP_{Theremal}$	=	The fossil fuel fired capacity addition

With reference to the *2017 Baseline Emission Factors for Regional Power Grids in China*, the build margin emission factor($EF_{grid,BM,y}$)of NEPG is 0.3310 tCO_2e/MWh

Step 6. Calculate the combined margin emissions factor

The combined margin emissions factor is calculated as follows:

$$EF_{grid,CM,y} = \omega_{OM} \times EF_{grid,OM,y} + \omega_{BM} \times EF_{grid,BM,y} \quad (12)$$

Where:

$EF_{grid,BM,y}$	=	Build margin CO_2 emission factor in year y (tCO_2/MWh)
$EF_{grid,OM,y}$	=	Operating margin CO_2 emission factor in year y (tCO_2/MWh)
ω_{OM}	=	Weighting of operating margin emissions factor (%)
ω_{BM}	=	Weighting of build margin emissions factor (%)

For the Proposed Project activities: ω_{OM} = 0.75 and ω_{BM} = 0.25 (owing to their intermittent and non dispatchable nature) for the first crediting period and for subsequent crediting periods.

The default weights are adopted for the Proposed Project, the baseline emission factor is:
$EF_{grid,CM,y} = \omega_{OM} \times EF_{grid,OM,y} + \omega_{BM} \times EF_{grid,BM,y}$
$= 0.75 * 1.1082 + 0.3310 * 0.25 = 0.9139\ t\ CO_2 / MWh$

Leakage

No leakage emissions are considered, $LE_y = 0$.

Emission reductions

The project activity mainly reduces carbon dioxide through substitution of grid electricity generation with fossil fuel-fired power plants by renewable electricity. The emission reduction ER_y by the

project activity during a given year y is the difference between baseline emissions (BE_y), project emissions (PE_y) and emissions due to leakage (LE_y).

The Proposed Project is a new installed wind power farm. As mentioned above, PE_y = 0, LE_y = 0. Therefore,

$$ER_y = BE_y \quad (14)$$

B.6.2. Data and parameters fixed ex ante

(Copy this table for each piece of data or parameter.)

Data/Parameter	**ω_{OM}**
Data unit	%
Description	Weighting of operating margin emissions factor
Source of data	"Tool to calculate the emission factor for an electricity system" (Version 07.0)
Value(s) applied	75
Choice of data or measurement methods and procedures	Follow the "Tool to calculate the emission factor for an electricity system" (Version 07.0)
Purpose of data	Calculation of baseline emissions
Additional comment	N/A

Data/Parameter	**ω_{BM}**
Data unit	%
Description	Weighting of build margin emissions factor
Source of data	"Tool to calculate the emission factor for an electricity system" (Version 07.0)
Value(s) applied	25
Choice of data or measurement methods and procedures	Follow the "Tool to calculate the emission factor for an electricity system" (Version 07.0)
Purpose of data	Calculation of baseline emissions
Additional comment	N/A

Data/Parameter	**$EF_{grid,OM,y}$**
Data unit	tCO_2/MWh
Description	Simple operating margin CO_2 emission factor in year y
Source of data	2017 Baseline Emission Factors for Regional Power Grid in China
Value(s) applied	1.1082
Choice of data or measurement methods and procedures	Calculated follow the "Tool to calculate the emission factor for an electricity system" (Version 07.0)
Purpose of data	Calculation of baseline emissions
Additional comment	N/A

Data/Parameter	$EF_{grid,BM,y}$
Data unit	tCO_2/MWh
Description	Build margin CO_2 emission factor in year y
Source of data	2017 Baseline Emission Factors for Regional Power Grid in China
Value(s) applied	0.3310
Choice of data or measurement methods and procedures	Calculated follow the "Tool to calculate the emission factor for an electricity system" (Version 07.0)
Purpose of data	Calculation of baseline emissions
Additional comment	N/A

Data/Parameter	$EF_{grid,CM,y}$
Data unit	tCO_2/MWh
Description	Combined margin CO_2 emission factor in year y
Source of data	Calculated follow the "Tool to calculate the emission factor for an electricity system" (Version 07.0)
Value(s) applied	0.9139
Choice of data or measurement methods and procedures	Calculated follow the "Tool to calculate the emission factor for an electricity system" (Version 07.0)
Purpose of data	Calculation of baseline emissions
Additional comment	N/A

B.6.3. Ex ante calculation of emission reductions

>>

According to the Feasibility Study Report of the Proposed Project, the electricity supplied by the Project activity to the Grid is 96,576MWh per year once fully operation. The Project is a new wind power farm. Thus,

$EG_{PJ,y} = EG_{facility,y} = 96,576$ MWh

The baseline emission factor is calculated by using operating and build margins as described in the detail in sector B.6.1.

$EF_{grid,CM,y} = 0.9139$ tCO_2/MWh

Thus baseline emissions are:

$BE_y = EG_{PJ,y} \times EF_{grid,CM,y} = 96,576$ MWh $\times 0.9139$ tCO_2/MWh $= 88,260$ tCO_2e

Both project emission (PE_y) and leakage emissions (LE_y) are zero, therefore, $ER_y = BE_y$

The total estimated emission reductions from the Proposed Project are 88,260 tCO_2e /yr.

B.6.4. Summary of ex ante estimates of emission reductions

Year	Baseline emissions (t CO2e)	Project emissions (t CO2e)	Leakage (t CO2e)	Emission reductions (t CO2e)
01/04/2020-31/03/2021	88,260	0	0	88,260
01/04/2021-31/03/2022	88,260	0	0	88,260
01/04/2022-31/03/2023	88,260	0	0	88,260
01/04/2023-31/03/2024	88,260	0	0	88,260
01/04/2024-31/03/2025	88,260	0	0	88,260
01/04/2025-31/03/2026	88,260	0	0	88,260
01/04/2026-31/03/2027	88,260	0	0	88,260
Total	617,820	0	0	617,820
Total number of crediting years	7years			
Annual average over the crediting period	88,260	0	0	88,260

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

According to ACM0002, the monitored data and parameters are listed as following:

Data/Parameter	$EG_{facility,y}$
Data unit	MWh/yr
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year *y*
Source of data	Electricity meter(s)
Value(s) applied	96,576
Measurement methods and procedures	Net electricity generation is calculated as the difference between power exported ($EG_{out,y}$) to and imported ($EG_{im,y}$) from the grid, which are continuously measured and recorded monthly. Calculated as $EG_{facility,y} = EG_{out,y} - EG_{im,y}$ $EG_{out,y}$: electricity supplied by the project activity to the grid in year y $EG_{im,y}$: electricity imported from the grid by the proposed project in year y The value of $EG_{out,y}$ in the PDD is from the FSR, the real value will be measured by electricity meters installed with the relevant and applicable standard. The value of $EG_{im,y}$ in the PDD was assumed to be 0, the real value will be measured by electricity meters installed with the relevant and applicable standard.
Monitoring frequency	Continuously measured and recorded monthly
QA/QC procedures	Cross check measurement results with the invoices of electricity or receipts for electricity sales.
Purpose of data	Calculation of baseline emissions
Additional comment	--

Data/Parameter	$EG_{im,y}$
Data unit	MWh
Description	Electricity imported from the grid by the project activity in year y
Source of data	Measured by electricity meter
Value(s) applied	0
Measurement methods and procedures	The electricity generation from the plant will be monitored and recorded at the central control room. The project operator is responsible for recording such data. A key meter (M1) and a backup meter (M2) are installed at the high volt side of the 35kv/220kv switch station on the project site. The accuracy of the meters will no lower than 0.5S.
Monitoring frequency	Continuously measurement and monthly recording
QA/QC procedures	The meters would be calibrated according to relative national standards. Invoices of electricity or receipts for electricity sales will be kept for further verification, when necessary. Data will be archived for 2 years following the end of the last crediting period.
Purpose of data	Used to calculate the $EG_{facility,y}$ of the proposed project
Additional comment	--

Data/Parameter	$EG_{out,y}$
Data unit	MWh
Description	Electricity export to the grid by the project activity in year y
Source of data	Measured by electricity meter
Value(s) applied	96,576
Measurement methods and procedures	The electricity generation from the plant will be monitored and recorded at the central control room. The project operator is responsible for recording such data. A key meter (M1) and a backup meter (M2) are installed at the high volt side of the 35kv/220kv switch station on the project site. The accuracy of the meters will no lower than 0.5S.
Monitoring frequency	Continuously measurement and monthly recording
QA/QC procedures	The meters would be calibrated according to relative national standards. Invoices of electricity or receipts for electricity sales will be kept for further verification, when necessary. Data will be archived for 2 years following the end of the last crediting period.
Purpose of data	Used to calculate the $EG_{facility,y}$ of the proposed project
Additional comment	--

B.7.2. Sampling plan

>>
Not applicable.

B.7.3. Other elements of monitoring plan

>>
This section details the steps taken to monitor the GHG emissions reductions on a regular basis from the Liaoning Guoli Fuxin Wangsiyingzi Wind Power Project in the Host Country.

The monitoring set-up for this Project has been developed to ensure that from the start, the Project is well- organised in terms of the collection and archiving of complete and reliable data.

CDM monitoring organisation

Roles and responsibilities will be defined for relevant staff involved in CDM monitoring, and the prospect of nominating a CDM Manager will be considered. If appointed, the CDM Manager will have the overall responsibility for the monitoring system on this project. All staff involved in the collection of data and records will be coordinated by him. The Project owner will take the responsibility for the monitoring plan implementation. A CDM team is to be established and consists of project manager, CDM manager, technical staff, and statistic staff.

Organizing structure of the CDM team is shown as figure B-2.

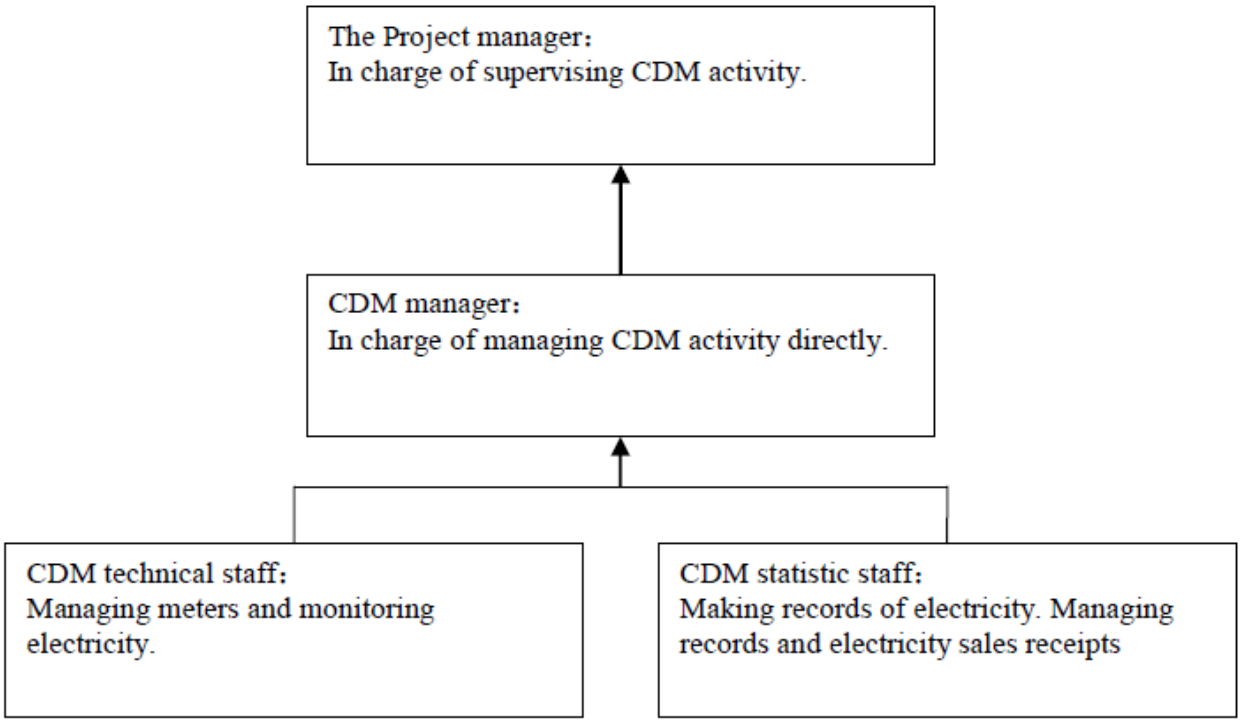

Figure B-2 Structure of the CDM team

Monitoring program and equipments

The quantity of net electricity generation supplied by the Proposed Project to the grid ($EG_{facility, y}$) will be calculated as following:

$EG_{facility,y} = EG_{out,y} - EG_{im,y}$

A key meter (M1) will be installed to monitor the electricity supplied to the grid and the electricity imported from the grid. In order to keep the consistency of measuring, a backup meter(M2) will also be installed. The final electricity sent to the grid will be determined by the key meter and when the key meter is out of operation, the backup meter will be used. Before being put into operation, the meters should be checked by a third party co-authorized by the owner and the local grid company.

The calibration procedures will be implemented in accordance with *Technical administrative code of electric energy metering (DL/T448—2016)*, which was updated in 2016, the owner and the grid company should co-authorize a third party, qualified metrical organization to conduct the calibration of the devices accordance with *Electronic energy meter testing procedures (JJG 596-2012).*

Maintenance and calibration of monitoring equipment

The electricity meters measuring power output & input to the grid will be calibrated in line with the relevant and applicable standard. This will ensure that the equipment operates at no less than the stated level of accuracy 0.5s. The metering equipments will be calibrated annually by the qualified organization according to the requirement from the *Technical administrative code of electric energy metering (DL/T448—2016)*.

Data collection and record-keeping arrangements
All CDM relevant data will be measured and collected as detailed in Section B.7.1. All data required for verification and issuance will be backed-up and retained for at least two years after the end of the crediting period or the last issuance of CERs of the Project, whichever occurs later.

Data quality control and quality assurance
All data collected on-site will be checked internally, the data should be checked by relevant electricity sales receipt of the project owner for the purpose of quality control, before being compiled in an electronic format, to ensure that it is complete and of appropriate quality, and will perform a final check of the data, and analyse project performance prior to any verification.

SECTION C. Start date, crediting period type and duration

C.1. Start date of project activity

>>
28/02/2012 (the date on which the main equipment purchase contract was signed).

C.2. Expected operational lifetime of project activity

>>
20 years and 0 month.

C.3. Crediting period of project activity

C.3.1. Type of crediting period

>>
Renewable (the second period)

C.3.2. Start date of crediting period

>>
01/04/2020.

C.3.3. Duration of crediting period

>>
7 years and 0 month.

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

>>
The Environmental Impact Assessment (EIA) of the Proposed Project activity was approved by Liaoning Provincial Environmental Protection Bureau on 29th December, 2011 (Document number: Liao Huan Shen Biao [2011] #52). In accordance with Chinese regulation, the EIA report has been reviewed by relevant experts. The EIA identified the potential environmental impacts during the period of project construction and operation, and proposed the response measures to mitigate environmental impacts.

The outcome of EIA indicated that there are no significant environmental impacts caused by development and implementation of the project activity under the circumstances that recommended ecological protection and pollution control have been fulfilled. According to the EIA report and comments in Environmental Impact Statement Form issued by Liaoning Provincial Environmental Protection Bureau, environmental impacts possibly caused by the project and mitigating measures adopted by the project owner during stages of the project construction and operation are analyzed as follows:

Construction stage

Ecological impact

There are only ordinary plants and animals without any scarce plant and animal in the site of the Proposed Project. No extermination of plant and animal will result from the project. The vegetation area will not be changed because the project owner will replant during the project construction.

Atmosphere

Due to the earthwork excavation and the construction transportation dust, re-entrainment of dust is possibly generated around working area and nearby. The project owner will control suspended dust by means:

1) Stack all construction materials in a settled area;
2) Prohibit operation under strong wind and spray in windy weather;
3) Wet dust.

Waste water

Water will be transported from the urban area and stored in the working area. Since wastewater quantity is fairly small, the impact of wastewater is not significant.

Noise

The running noise of mechanical facilities and the traffic noise are the main source of noises in the construction process. However, as the construction site is far from local residence, there is less impact on local residents. The Project owner will control and manage the noise pollution source during the construction in order to be in line with the relevant rules of the Noise Limits on the Border of the Construction Site (GB12523-90).

Solid Waste

Solid waste mainly comes from excavated soil. The volume of excavated soil will be equal to the volume of the soil applied in back-fill and road construction basically. The project owner will pile up the excavated soil in designated area and use to back-fill as soon as possible. Therefore, the impact of solid waste is not significant.

Operation stage

Ecological impact

Overseas research on modern wind farms shows that the probability of bird injury caused by wind turbine is only 10% of that caused by high-voltage transmission lines, and is similar with the probability caused by cars on the highway. The Proposed Project is far from natural reserve and migration route of the birds, which is protected by the regulations. Therefore, the project will not impact birds significantly.

Atmosphere

Electrical appliances, including heating systems will be applied for the living activity of the staff of the project.

Waste water

Wastewater will be mainly domestic wastewater generated by living activities of the staff, which will use only small quantity of water. Wastewater and sanitary wastewater will not be directly

discharged into the surrounding waters. The waste water will be treated by separation sedimentation tank, and then reutilized for flushing roads and irrigation. There will be an environmental friendly toilet which will be able to treat sanitary wastewater in the site of the project. Therefore, the impact of wastewater is limited and mitigated.

Noise
The noise of wind power turbine generator system over the operation period comes from the friction between wind and blades and from the running mechanical parts inside it. The mechanical noise inside the wind turbine is the main noise source. The noise value on the tower base is less than 60 dB(A). Resident area will be over 800m far away from the wind turbines. The buildings for the wind farm staff will be far away from the wind turbines as well. The noise impact will be in line with the rules in the national standard "Noise Limits on the Border of the Industrial Corporation (GB12348-90) – Class II".

Solid Waste
Solid waste will be mainly generated by living activities of the project. The project owner will control the solid waste by:

1) Piling up solid waste centrally and disposing of it regularly in a designated place;
2) Using an environmental friendly toilet for biological treatment of sanitary waste;
3) Collecting used lubricants of the wind turbines, which will be disposed by qualified corporation and reutilized.

Electromagnetic Interference
Electromagnetic interference is inverse-proportional to the distance between transformer equipments and the object. The Electromagnetic interference will be lower than the limits defined in national environmental protection standard in the place, which is 20m far away from the transformer station. And there will be not any objective sensitive to electromagnetic interference within 20m around the transformer station.

In conclusion, the Proposed Project is located on a site rich in wind resources. The development of the Proposed Project is in compliance with the developing objective of the Chinese energy industry, and obviously it will contribute to the sustainable development in the way of GHG emission reduction, local air-pollution reduction, the improvement of local living standards etc. The construction of this project has no negative impact on local environment. Therefore, the Proposed Project is feasible from the environmental point of view.

D.2. Environmental impact assessment

>>
The environmental impacts of the Proposed Project are not significant.

SECTION E. Local stakeholder consultation

E.1. Modalities for local stakeholder consultation

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From April 20th, 2012 to April 30th, 2012, the project owner put up posters of proposed project in the market fair of Furong Town which is the nearest residents' settlement to the proposed project. The project owner also requested local broadcasting station to disseminate information of the proposed project to the local community. When the villagers reading the announcements, the project owner randomly sent out questionnaires to local people and returned with comments. The project owner went to the farmers' family who are near to the proposed project, communicated on the impact from the proposed project and invited 50 people of them to fill out the questionnaires.

The questionnaire was made to investigate the impacts on local ecological environment and economy and the opinions from the potential stakeholders. The survey of questionnaires focus on the following issues:

- Whether stakeholders know the Proposed Project and CDM?
- What is the attitude of stakeholders to the project?
- Whether there exists any impact on the environment?
- Whether the project can improve the local economy and living quality?

General background of participants to fill out the questionnaires is listed as follows:

Overview of general background of participants

Gender	Number	Percentage
male	30	60%
female	20	40%

Age	Number	Percentage
18-35	23	46%
36-55	20	40%
over 55	7	14%

Education Level	Number	Percentage
University level	1	2%
High school	20	40%
Middle school	29	58%

Occupation	Number	Percentage
Public Servant	3	6%
Farmers	27	54%
Workers	20	40%

The respondents are representative in terms of gender, age, education level and occupation. Their opinions on project could be the general reaction of the stakeholders toward Proposed Project.

E.2. Summary of comments received

>>

As received 50questionnaires, 100% of the respondents of the Proposed Project and 34% of them know CDM, and the respondents expressed their fully support on the development of the project.

The outcome of the survey indicated that it is generally believed that the constructions and the implementation of the project will contribute to the local environment and living quality. The public would like the projects could be put into operation as soon as possible.

The survey had a 100% response rate (all questionnaires returned) and the following is a summary of the key findings:

- 50 (100%) of the respondents know the Proposed Project;
- On the livelihoods of local residents: 100% of the respondents believe the Proposed Project will improve their livelihoods. 28% believe that the project will ease the shortage of power supply,

40% of the respondents agree that the Proposed Project will improve the transportation environment, 62% believe that the Proposed Project will improve the living quality and 44% believe that the Proposed Project will increase their income.

- On the local environment: 100% of the respondents believe the project will not bring significant bad impacts on local environment;
- On the local economy: 100% of the respondents believe that the Proposed Project will promote the local economic development by ease the shortage of power supply, increase job opportunities, reduce environment pollution and Contribute to development of tourism resources .

Conclusion:

The survey shows that the Proposed Project receives strong support from local people, which is closely linked to the fact that the majority of local residents have some understanding of the Proposed Project.

All of the respondents believe that the project will have overall positive impacts on their livelihoods with an increase in job opportunities, increase of income, ease the shortage of power supply and others impacts. All the respondents believe the project will not bring significant bad impacts on local environment and the concern about the environmental impacts has been clarified in EIA and all the impacts will be reduced by mitigating measures.

The government and authorities at all levels support the project construction actively, confirm its social and environmental benefits, and wish the construction could be started early and accelerated.

E.3. Consideration of comments received

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The major concerns of the local stakeholders on the Project are environmental and economic impacts on the local community. Regarding these concerns, the project owner gave a thorough and clear explanation, which is summarized as above.

Considering full support from the local stakeholders, there is no need to make adjustments on the design and implementation of the Project. Meanwhile, the project owner expressed that they would take full advantage of the CDM opportunity to facilitate the development of the project and also express their wishes that local stakeholders are welcome to monitor the course of the construction and implementation of these projects.

SECTION F. Approval and authorization

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The letter of approval (LoA) from DNA of China was issued on 27/07/2012, which has been provided to the DOE for validation.
Reference:
https://cdm.unfccc.int/Projects/DB/ERM-CVS1356102264.45/view

Appendix 1. Contact information of project participants

Organization name	Liaoning Guoli Renewable Energy Co. Ltd.
Country	People's Republic of China
Address	No.2 Building, Area 12, No.188 west of South 4th ring road, Fengtai District, Beijing City
Telephone	+86 10 63705765
Fax	+86 10 63705875
E-mail	cgnwind@163.com
Website	-
Contact person	Shi Lei

Appendix 2. Affirmation regarding public funding

There is no public funding from Annex I Party available for the project.

Appendix 3. Applicability of methodologies and standardized baselines

All the details on applicability of methodologies and standardized baselines are described in B.2.

Appendix 4. Further background information on ex ante calculation of emission reductions

All the details on ex ante calculation of emission reductions are described in B.6.

Appendix 5. Further background information on monitoring plan

All the details on monitoring plan are described in B.7.

Appendix 6. Summary report of comments received from local stakeholders

There is no comments received for Liaoning Guoli Fuxin Wangsiyingzi Wind Power Project.

Appendix 7. Summary of post-registration changes

NA

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Document information

Version	*Date*	*Description*
11.0	31 May 2019	Revision to: • Ensure consistency with version 02.0 of the "CDM project standard for project activities" (CDM-EB93-A04-STAN); • Make editorial improvements.
10.1	28 June 2017	Revision to make editorial improvement.
10.0	7 June 2017	Revision to: • Improve consistency with the "CDM project standard for project activities" and with the PoA-DD and CPA-DD forms; • Make editorial improvement.
09.0	24 May 2017	Revision to: • Ensure consistency with the "CDM project standard for project activities" (CDM-EB93-A04-STAN) (version 01.0); • Incorporate the "Project design document form for small-scale CDM project activities" (CDM-SSC-PDD-FORM); • Make editorial improvement.
08.0	22 July 2016	EB 90, Annex 1 Revision to include provisions related to automatically additional project activities.
07.0	15 April 2016	Revision to ensure consistency with the "Standard: Applicability of sectoral scopes" (CDM-EB88-A04-STAN) (version 01.0).
06.0	9 March 2015	Revision to: • Include provisions related to statement on erroneous inclusion of a CPA; • Include provisions related to delayed submission of a monitoring plan; • Provisions related to local stakeholder consultation; • Provisions related to the Host Party; • Make editorial improvement.

Version	*Date*	*Description*
05.0	25 June 2014	Revision to: • Include the Attachment: Instructions for filling out the project design document form for CDM project activities (these instructions supersede the "Guidelines for completing the project design document form" (Version 01.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for the application of the methodology (ies) to the project activity in B.7.4 and Appendix 1; • Change the reference number from F-CDM-PDD to CDM-PDD-FORM; • Make editorial improvement.
04.1	11 April 2012	Editorial revision to change version 02 line in history box from Annex 06 to Annex 06b.
04.0	13 March 2012	Revision required to ensure consistency with the “Guidelines for completing the project design document form for CDM project activities” (EB 66, Annex 8).
03.0	26 July 2006	EB 25, Annex 15
02.0	14 June 2004	EB 14, Annex 06b
01.0	03 August 2002	EB 05, Paragraph 12 Initial adoption.

Decision Class: Regulatory
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