SAINT NIKOLA WIND FARM

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Project Details

1.1 Summary Description of the Implementation Status of the Project

The Saint Nikola Wind Farm project is a 156 MW, grid-connected, renewable energy wind farm in the Municipality of Kavarna, Bulgaria initiated and operated by "AES Geo Energy OOD."
The Wind Farm consists of 52 wind turbines, type V90-3.0 MW manufactured by Vestas, each with nominal capacity of 3MW; an underground collection system and; a step-up substation 33/110 kV as well as an overhead high voltage line of 110 kV, connecting the substation with the grid. The wind generated electricity is transmitted through an underground energy collection system of 33 kV to a switchgear of 33 kV located in the step-up substation where it is transmitted to the grid through transformers of 33/110 kV and a switchyard of 110 kV.
The wind farm is expected to generate over 300,000 MWh/y depending on wind conditions and average wind turbines technical availability.
The design life time of the turbines according to the DNV Type Certificate of the V90-3.0 MW turbine is 20 years and therefore they are expected to operate at least until 2030.
The construction of the wind farm started in 2008 and the project was implemented in full according to the technical design without any deviations.
The owner of the project AES Geo Energy OOD. was granted a "Permit of Use" for the wind farm by the Ministry of Regional Development and Public Works - Directorate for National Construction Supervision in two stages.

On December 22nd 2009, a Permit of Use was granted for Saint Nikola sub-site C, and on March 15th 2010 for Saint Nikola sub-site A & B. Together, sub-sites A, B, and C constitute the full operational wind farm and include the 52 wind turbines, the energy collection system, the substation, and the overhead line connecting the wind farm to the grid.
Since March 15th 2010 the wind park is in continuous operation.

The registration of the project under VCS took place on October 27th 2014 when the registration documents had been uploaded at VCS web-site.
The start date of the project has been validated by the Validation Report (*ID* CCL220/VAL/AESGE/CWPP/20130910) issued by Carbon Check (Pty) Ltd. as 01 November 2012.

The total emission reductions generated in this monitoring period is 372,003 tCO_{2e} .

1.2 Sectoral Scope and Project Type

Sectoral scope: 1. Energy (renewable/non-renewable)

The project is not a grouped project.

1.3 Project Proponent

Organization name	AES Geo Energy OOD.
Contact person	Bisera Stoeva

Title	Commercial analyst
Address	Aries Office Building, 32 A Cherni vrah Blvd, 1407 Sofia, Bulgaria
Telephone	+359887773855
Email	Bisera.stoeva@aes.com

1.4 Other Entities Involved in the Project

No other entities have been involved in the project

1.5 Project Start Date

01 November 2012

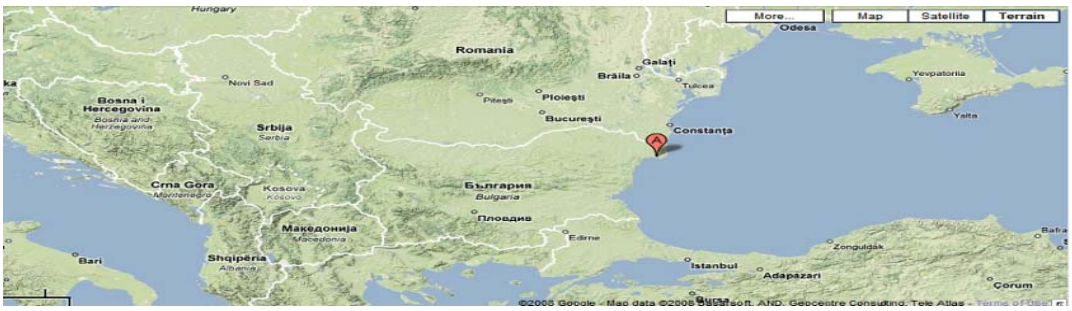
1.6 Project Crediting Period

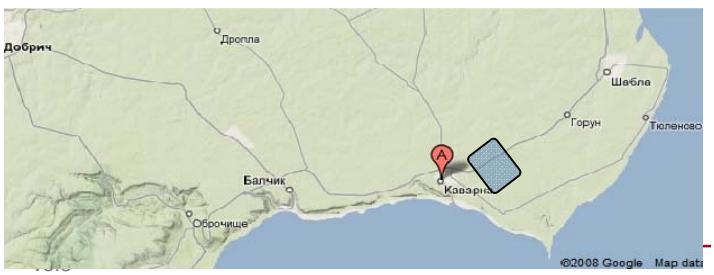
Start date of the project activity: 01 November 2012
End date of the project activity: 31 October 2022
Crediting period of the project activity: 10 years

1.7 Project Location

The geographic coordinates of the plant are:
Site Latitude: 43.448008º or in degrees 43º56'22.83 N
Site Longitude: 28.454943º or in degrees 28º27'17.80 E

The Saint Nikola Wind Farm (SNWF) project is located in the Municipality of Kavarna, Bulgaria. The area of the project site is approximately 6,000 hectares (60 km^2). The site of the Project is situated on the community land of the villages of Bulgarevo, Sveti Nikola, Hadji Dimitar, Rakovski and Porouchik Chounchevo.





Wind potential

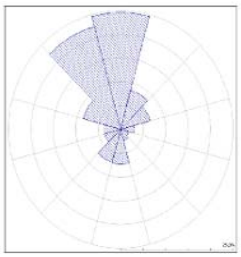


Fig.1: project's location

Fig.2: General view of the project location

1.8 Title and Reference of Methodology

The following methodologies and tools have been applied by the project:

- CDM ACM0002 "Large-scale Consolidated Methodology: Grid-connected electricity generation from renewable sources", Version 14.0, Sectoral scope: 01;
- CDM "Tool for the demonstration and assessment of additionality", Version 07.0.0;
- "Guidelines on common practice", Version 02.0;
- "Combined tool to identify the baseline scenario and demonstrate additionality", Version 05.0.0.

1.9 Other Programs

There are no GHG emission reduction requirements in Bulgaria that the project is subject to and the project does not participate in any other emissions trading program. Any potential GHG reductions from this project will be voluntary, and will be registered through the VCS.

The project neither has nor intends to generate any other form of GHG-related environmental credit for GHG emission reductions or removals claimed under the VCS Program.
However, as Bulgaria is an Annex-1 party the project activity has to meet the requirements of section 3.11.1 of the VCS standard and the required evidence is provided.
The project has received a Letter of Approval No 26-00-3500/13.12.2014 from the Bulgarian Ministry of environment and Water (DNA) confirming that a quantity of AAUs equal to the verified quantity of emission reductions generated by the project, will be cancelled from the Bulgarian Registry. The letter is attached to this Monitoring Report.

2 IMPLEMENTATION STATUS

2.1 Implementation Status of the Project Activity

The final Permit of Use has been issued to the project sub-sites A & B on March 15th 2010 which constitutes the second and final stage of the project's implementation. Since then the wind-park is in continuous operation as per the technical design. No events that may impact the GHG emission reductions and monitoring have been registered.
There is no leakage from the project and no changes to the project proponent have been registered.

2.2 Deviations

2.2.1 Methodology Deviations

No deviations from the methodology for the estimation of the emission reductions have been applied during this monitoring period.

2.2.2 Project Description Deviations

No deviations from the project design have been applied during this monitoring period.

2.3 Grouped Project

N/A

3 DATA AND PARAMETERS

3.1 Data and Parameters Available at Validation

Data / Parameter	$EF_{grid,CM,y}$
Data unit	tCO_2/MWh
Description	Combined margin CO_2 emission factor for grid connected power generation in year y calculated
Source of data	The value applied is based on the summary document: "Baseline Carbon Emission Factor of Bulgarian Electricity and Heat Power System" which was commissioned and published by the Bulgarian Ministry of Environment and Water (MoEW), Climate Change Policy Directorate, International Emission Trading Mechanisms

	Department. Available for download at the web-site of the Ministry of Environment and Water[1] This document provides two forecasts for the grid emission factor. A higher value for minimum demand forecast and a lower value for maximum demand forecast. In order to be conservative the lower value is chosen.
Value applied:	0.791 tCO_2/MW h
Justification of choice of data or description of measurement methods and procedures applied	Official report published by the Bulgarian Ministry of Environment and Water (MoEW), Climate Change Policy Directorate, International Emission Trading Mechanisms Department
Purpose of the data	Calculation of baseline emissions
Comments	The Project Proponent chose the *ex-ante* option for determining EFgrid,CM,y, and therefore this parameter will be fixed at registration

3.2 Data and Parameters Monitored

Data / Parameter	$EG_{facility,y}$
Data unit	*MWh/y*
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year *y*
Source of data	Electricity meter(s)
Description of measurement methods and procedures to be applied	The following parameters shall be measured: (a) The quantity of electricity supplied by the project plant/unit to the grid; and (b) The quantity of electricity delivered to the project plant/unit from the grid
Frequency of monitoring/recording	Continuous measurement and monthly recording
Value monitored:	The values of the monitored parameters are shown in Table 1 bellow.
Monitoring equipment	There are two electricity meters which are owned and calibrated by the grid operator. Both are commercial measuring ELSTER AINRTAL-X static, accuracy class 0,2S. Serial number: No 07120785 Serial number: No 07120786
QA/QC procedures to be applied	The measuring meters described above are owned by the (ESO or in Bulgarian ECO) and are used for the commercial measurement of the electricity. Commercial

[1] http://www3.moew.government.bg/files/file/Climate/Climate_Change_Policy_Directorate/IETM/Joint_Implementation/JI_documents/Baseline_CEF_Summary.pdf

	electrometer 1 is measuring the amount of the electricity exported through the HV step-up transformer 1, similarly commercial electrometer 2 is measuring the electricity exported through HV step-up transformer 2 into the grid. AES does not have access to the data from the commercial electrometers, except for visual reading. In addition there are two internal control meters that are used to crosscheck the readings and will also serve as backup in case one of the main meters will malfunction. Both are Landis+Gyr static, accuracy class 0,2S. Serial number: No: 97600398 Serial number: No: 97600399 The commercial and control electrometers are calibrated on annual base. Representatives of ESO, AES and the Institute of Metrology attend the calibration. Copies of the protocols for the commercial electrometers are provided by ESO. If the metering equipment fails to meet the standard technical and metrological features, the damaged electrometer(s) shall be replaced and/or repaired at the cost of its owner. Each party may request inspection of the commercial and control electrometers.
Purpose of the data	Calculation of baseline emissions
Calculation method	Not relevant
Comments	All data will be archived and preserved for at least 2 years after the end of the crediting period.

Table 1: Values of the parameters monitored during the reported period[2]

	Y/M	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Gross generation [kWh]	**2015**	39,053,168.000	44,545,353.600	36,683,891.200	34,530,249.600	18,943,408.000	23,346,224.000	11,368,332.800	23,514,233.600	23,806,217.600	31,754,448.000	28,411,222.400	27,289,222.000	343,245,970.800
From the grid [kWh]		73,251.200	29,497.600	60,016.000	47,273.600	109,190.400	116,336.000	143,545.600	82,966.400	125,136.000	52,131.200	90,992.000	90,112.000	1,020,448.000
Net generation [kWh]		38,979,916.800	44,515,856.000	36,623,875.200	34,482,976.000	18,834,217.600	23,229,888.000	11,224,787.200	23,431,267.200	23,681,081.600	31,702,316.800	28,320,230.400	27,199,110.000	342,225,522.800
Total net generation 2015 [MWh]														**342,226**
Gross generation [kWh]	**01/01/2016-30/04/2016**	43,315,184.000	36,244,630.400	26,937,574.400	21,834,771.200									128,332,160.000
From the grid [kWh]		34,777.600	40,444.800	95,251.200	92,153.600									262,627.200
Net generation [kWh]		43,280,406.400	36,204,185.600	26,842,323.200	21,742,617.600									128,069,532.800
Total net generation 01/01/2016-31/03/2016 [MWh]														**128,070**
Total net generation for the monitoring period [MWh]														**470,296**

[2] Copies of the invoices and protocols are available on request by DOE

3.3 Monitoring Plan

The O&M Manager of the Wind Farm is responsible for implementing this monitoring plan.

The organizational structure of the project management is presented below:

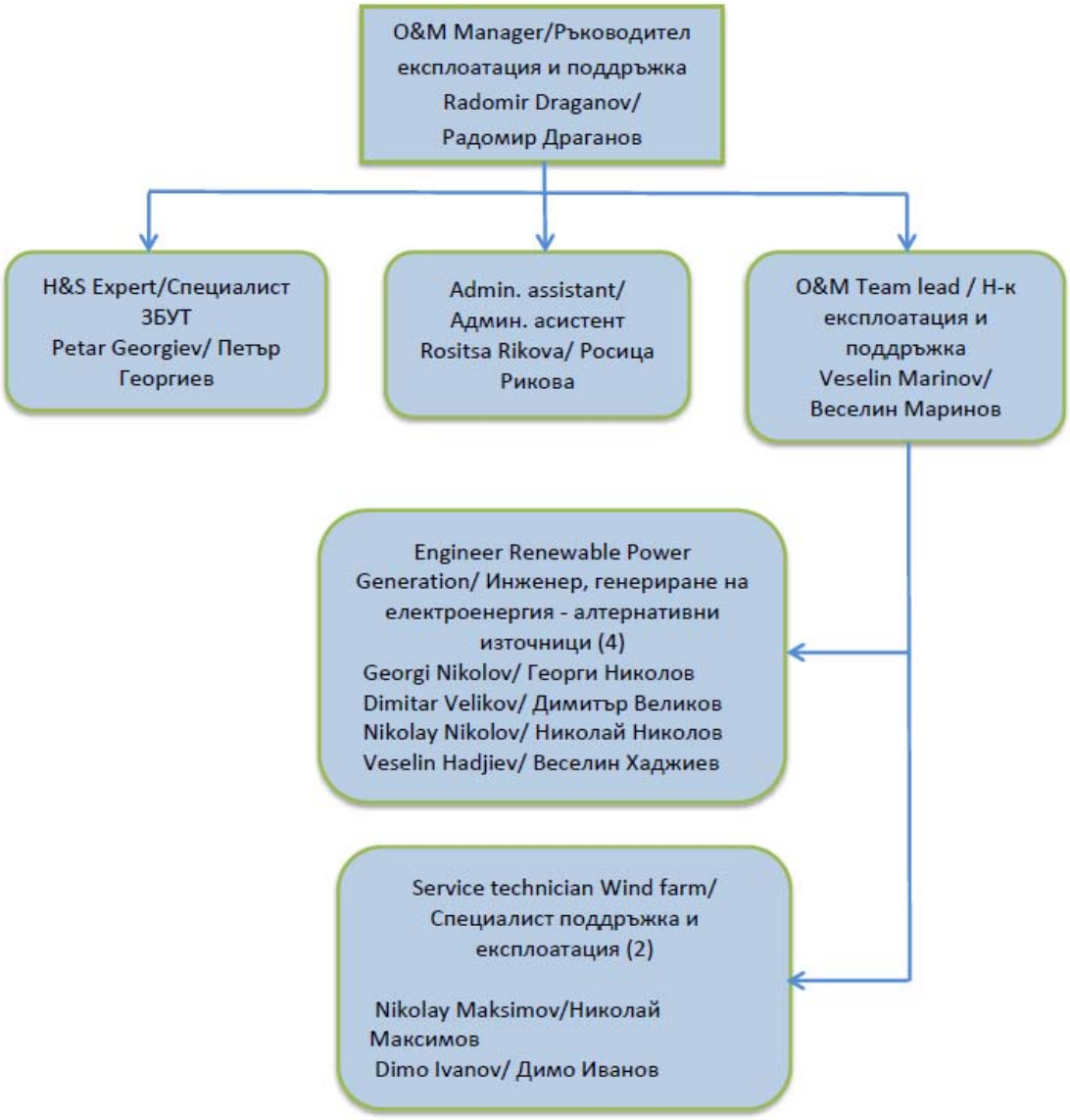


Fig 3: Management structure of the project activity

An up-dated and modern system for control of the wind park and the electric energy generated has been developed by the owner in order to optimize the management. All data and control functions are transferred in real time via specially rented optic MAN connection to the common control center of AES in Galabovo where all decisions and correcting actions are taken by the duty shift engineers.
The data for the generated electricity measured by the commercial electrometers is sent via GSM modem connection to the ESO on a daily basis – around midnight. There are two GSM connections, using two different mobile operators, to ensure the reliability of the data transfer.
The control electrometers are owned by AES Geo Energy and are used to control the accuracy of the commercial electrometers. They are connected to the internal network and are sending and recording their readings directly on the SNWF server. This process is automated and the data is regularly being uploaded. The data from the control electrometers can be accessed by using the manufacturers software.

The commercial electrometers are recording the consumed and the generated electricity by SNWF. At the beginning of each month a representative of ESO is delivering the protocol for the generated electricity by the SNWF. Obligation of the Management is to compare the data from the protocol with the data collected from the control electrometers, before signing the protocol. If the difference between the measurements of the commercial and control electrometers fall into the acceptable boundaries of 1.0%, the protocol can be signed. If the difference between the readings exceeds the limit of 1.0% the reason should be investigated. In such case the detailed data from the commercial and the control electrometers is to be compared.
Detailed instruction on the protocol checking procedure can be found in the internal Instruction 0-01.23 for monthly reporting of the readings from the control electrometers and comparing with the ESO protocol.

The following table shows the technical specifications of the commercial electric meters used for the monitoring:

Measuring equipment	Measured parameter variable	Equipment producer and type	Serial number	Installation date	Date of latest calibration	Periodicity of calibration	Measurement error data	Comments
Digital electric meter	$EG_{facility,y}$	ELSTER AINRTAL-X Static	07120785	2009	03.06.2015	1 year	Class 02S +/- 0.3%	Property of the electric transmission company (ESO)
Digital electric meter	$EG_{facility,y}$	ELSTER AINRTAL-X Static	07120786	2009	03.06.2015	1 year	Class 02S +/- 0.3%	Property of the electric transmission company (ESO)

Table 2: Technical specifications of the commercial electric meters

Fig 4: Commercial electric meters – control panel

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

Baseline emissions cover CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants.

For the baseline emission factor the emission factors of the Bulgarian Ministry of Environment and Water were taken as a basis and verified by the Validation Report issued by the Designated Operational Entity (DOE). The emission factors had been determined ex-ante in the "BASELINE STUDY OF JOINT IMPLEMENTATION PROJECTS IN THE BULGARIAN ENERGY SECTOR. CARBON EMISSION FACTOR"[3]. The value of the emission factor approved ex-ante is 0.791 tCO_{2e}/MWh.

The baseline emissions are calculated using the following equation*:*

$$BE_y = EG_{Pj,y} * EF_{grid,CM} \quad (1)$$

Where

BE_y = Baseline emissions in year y (tCO_{2e})

$EG_{Pj,y}$ = Net electricity supplied by the project activity to the grid in year y (MWh)

$EF_{grid,CM}$ = Grid emission factor (tCO_2/MWh)

Taking into consideration the values recorded in the monitored period subject to this report the baseline emission reductions are equal to:

BE_{2015} = *342,226*0.791 = 270,700 tCO_{2e}*

*BE_{2016} = 128,070*0.791 = 101,303 tCO_{2e}*

The total quantity of baseline emissions for the period 01 January 2015 to 30 April 2016 is 270,700 + 101,303 = 372,003 tCO_2

4.2 Project Emissions

The project emissions from this activity are zero*.*

$PE_y = 0$

4.3 Leakage

There are no leakage emissions from this project activity.

[3] http://www.moew.government.bg/?show=top&cid=357

$LE_y = 0$

4.4 Net GHG Emission Reductions and Removals

The emission reductions generated by the project are calculated as follows:

$$ER_y = (BE_y – PE_y – LE_y) \quad (2)$$

Where:

BE_y = Baseline Emissions in year y (t CO_{2e}/yr)

PE_y = Project Emissions in year y (t CO_{2e}/yr)

LE_y = Leakage Emissions in year y (t CO_{2e}/yr)

Year	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Net GHG emission reductions or removals (tCO_2e)
2015	*270,700*	0	0	*270,700*
01/01/2016 – 30/04/2016	*101,303*	0	0	*101,303*
Total	372,003	0	0	372,003

Table 3: Annual emission reductions generated by the project activity

THE ANNUAL EMISSION REDUCTIONS IN 2015 CALCULATED IN THIS REPORT ARE 5.4% HIGHER THAN THE ESTIMATED REDUCTIONS STATED IN THE VALIDATED PDD. THE REASON FOR THAT ARE THE MORE FAVOURABLE WEATHER CONDITIONS DURING THE REPORTED PERIOD AND THE HIGHER GENERATION OF ELECTRIC ENERGY. FROM THE OTHER HAND THE EMISSION REDUCTIONS IN THE PDD ARE CALCULATED BASED ON THE AVERAGE 10 YEAR PROJECTION OF ELECTRICITY GENERATION AND THE PROBABILITY OF EXCEEDANS HENCE ANNUAL VARIATIONS FROM THE QUANTITY STATED IN THE PDD ARE POSSIBLE.