



**Verified Carbon
Standard**

MONITORING REPORT

MANANTIALES BEHR WIND FARM

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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

Manantiales Behr (MB) wind farm project (hereinafter referred to as the Project) is a Greenfield wind power plant located in the department of Escalante, Province of Chubut, in the south of Argentina. Its total installed capacity is 99 MW and it is connected to the Argentine Interconnection System (hereinafter referred to as the SADI, from the Spanish “Sistema Argentino de Interconexión”).

It was the first wind farm of YPF Energía Eléctrica S.A. (YPF LUZ) and one of the firsts in the country despite Argentina’s great wind potential. Thus, projects like MB wind farm represent an important renewable and clean non-conventional alternative for electricity generation and a valuable contribution to a sustainable diversification of the Argentine energy matrix.

It consists of 30 aero-generators Vestas, model V-112 3.3 MW IEC IB Class, of 3.3 MW each, totaling 99 MW of installed capacity, with a hub height of 84 meters and a sweep area of 112 meters.

It was constructed in two phases of 49.5 MW each one. The construction started on 19/09/2016. The operation starting dates of the first and second phases were 01/08/2018 and 22/12/2018, respectively.

The net electricity generated by the Project during this first monitoring period, from the 1st of August 2018 until 31 of December 2020, was 1,182,118MWh (140,817 MWh from 01/08/2018 until 31/12/2018, 526,645 MWh in 2019 and 514,656 in 2020).

MB wind farm was in 2019 the largest producer of renewable electricity in the country. According to Wholesale Electricity Market Company (CAMMESA due to its name in Spanish), it produced 526 GWh equivalent to 7% of the total renewable electricity generated in the country, and 11% of wind energy. With a capacity factor of 61% in 2019 MB became the wind farm with the highest performance in Argentina and one of the highest in the world.

The total GHG emissions reductions achieved by the project for this monitoring period are 601,698tCO_{2e}, divided in vintages as follows: 71,676 tCO_{2e} in 2018 (from 01/08/2018), 268,062 tCO_{2e} in 2019 and 261,960 tCO_{2e} in 2020 (up to 31/12/2020).

1.2 Sectoral Scope and Project Type

Sectoral scope: 01; Energy industries (renewable - / non-renewable sources)

The Project is not a grouped GHG project.

1.3 Project Proponent

Organization name	YPF Energía Eléctrica S.A. (YPF LUZ)
Contact person	Santiago Sajaroff
Title	Chief Operation Officer
Address	Macacha Güemes 515, Buenos Aires
Telephone	+54 11 54413985
Email	santiago.sajaroff@ypf.com

1.4 Other Entities Involved in the Project

Organization name	Not applicable
Role in the Project	Not applicable
Contact person	Not applicable
Title	Not applicable
Address	Not applicable
Telephone	Not applicable
Email	Not applicable

1.5 Project Start Date

1st August 2018.

Is the commercial operation date (COD) of the project's phase 1 (49.5 MW) when it officially started to dispatch electricity to the Argentinean electricity system, as allowed by CAMMESA's authorization dated on 31/07/2018.

The commercial operation of the second phase (49.5 MW) was completed on 22nd December 2018 according to CAMMESA's authorization dated on 21/12/2018.

1.6 Project Crediting Period

Project crediting period: 10 years, extendable twice for another 10 years each time.

Start date: 01/08/2018

End date: 31/07/2028

1.7 Project Location

The Project is located in the San Jorge Gulf basin within the Manantiales Behr reservoir operated by YPF S.A., in Escalante Department, province of Chubut, approximately 40 km north-west from Comodoro Rivadavia city, Argentina.

The geographic coordinates of the project are:

Latitude: 45° 40' 12" S

Longitude: 67° 46' 48" W



1.8 Title and Reference of Methodology

The methodology and tools applied by the project are:

- ACM0002 “Grid-connected electricity generation from renewable sources” (version 19.0);
- Tool for the demonstration and assessment of additionality (version 07.0.0);
- Methodological Tool: Investment Analysis (version 09.0);
- Tool to calculate the emission factor for an electricity system (version 07.0);
- Methodological tool: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation (version 03.0).

1.9 Participation under other GHG Programs

The project neither has been registered nor is seeking for registration under any other GHG programs.

1.10 Other Forms of Credit

GHG emissions reductions by the Project are not and will not be included in other emission trading programs or for compliance with binding limits to GHG emissions. Argentina does not have GHG emission compliance nor trading programs in place.

The Project has neither sought nor received another form of GHG-related environmental credit, including renewable energy certificates, during this monitoring period.

1.11 Sustainable Development

Argentina is among the 150 countries that adopted the 2030 Agenda for Sustainable Development, including the Sustainable Development Goals (SDGs) at the United Nations Sustainable Development Summit on 25 September 2015.

The National Government has prioritized its targets based on the SDG 1: End poverty in all its forms everywhere and since 2017 the National Council for the Coordination of Social Policies (CNCPS) is the responsible body for the coordination of the necessary actions for the effective implementation of the 2030 Agenda for Sustainable Development.

As stated in the country's second Voluntary National Report from June 2020¹, in 2017, the CNCPS prepared a status report on State Companies and Societies and the SDGs, as a starting point to begin to articulate and incorporate them into the 2030 Agenda commitment. Based on this first approach, the CNCPS sponsored and proposed the launch of the Working Group "State-owned companies and the Sustainable Development Goals". With the support of the United Nations Development Program in Argentina and the Argentine Global Compact Network, companies with majority state participation were invited to form this Working Group. YPF is among the state companies that participated in the working group and identified its contributions to the 2030 Agenda

Furthermore, as stated in YPF Luz 2019 Sustainability Report², the company is committed to contribute to the achievement of the SDGs and is focused on those ones that relate to reduction of carbon emissions and sustainable production, in addition to supporting education. Furthermore, YPF Luz conducted an analysis to identify the impact of the company on the SDGs based on: the identification of priority goals in Argentina and among stakeholders; thorough analysis of goals and objectives; and benchmark of the main sustainability initiatives and sector companies. The result shows that the SDGs considered to be a priority for YPF Luz are: 4

¹ https://sustainabledevelopment.un.org/content/documents/26364VNR_2020_Argentina_Report_Spanish.pdf

² <https://ypfluz.com/Sustainability/Report/2019>

(Quality Education), 6 (Clean Water and Sanitation), 7 (Affordable and Clean Energy), 8 (Decent work and economic growth), 9 (Industry, innovation and infrastructure), 11 (Sustainable cities and communities), 12 (Responsible consumption and production), 13 (Climate Action) and 17 (Partnerships for the goals). The report illustrates the company's associated goals with these SDGs and how it contributes through diverse and concrete programs, projects and actions to the achievement of each of them and the 2030 Agenda. For example: internship and new professionals' programs, joint work with communities and NGOs, Loma Campana green lung, and many other educational and local sustainable development activities conducted by YPF Foundation³.

Finally, Manantiales Behr wind farm project contributes to the achievement of the country's sustainable development targets by:

- Stimulating the local economic growth as well as access to decent work by increasing tax revenues for the local government and job opportunities for local workers and service suppliers. The resulting economic stimulus improves capital stock and availability in the region, which in turn allows investment in the improvement of general infrastructure, productive capacity and consequently the satisfaction of the population's basic needs, thus promoting a virtuous cycle in the local economy.
- Stimulating the development of a proficient services sector in the region where the project will be located to be able to satisfy its need of skilled operators and maintenance staff and therefore creating opportunities for education, professionalization, and employment.
- Inducing the development of national technology and improving the domestic know-how. By promoting the establishment and growth of the necessary industry equipment and services, the project will contribute to increase availability of NCRE technologies, which will, consequently, reduce maintenance costs and risks of the technologies in the country.
- Improving energy security and grid stability by increasing diversification of power generation sources in terms of technologies and geographic location.
- Improving the local infrastructure such as roads and electricity transmission systems; and
- Reducing GHGs and local air pollutants (SO₂, NO_x and PM) emissions from the Argentinean energy matrix.

2 SAFEGUARDS

2.1 No Net Harm

The Manantiales Behr wind farm project potential environmental and socio-economic impacts and the steps to mitigate them have been identified in the EIA approved by the Ministry of

³ <https://fundacionypf.org/Paginas/home.aspx>

Environment and Sustainable Development Control of Chubut on 22/07/2016 (Disposición N° 137/16-SGAyDS).

The conclusion of the EIA is that the project activity does not generate significant negative impacts. There are low negative impacts (40%), moderate negative impacts (23%) and positive impacts (37%).

Additionally, according to the analysis of factors most affected by the projects, the most and less affected factors are the economic activity and the workers, respectively, and both are affected positively.

Regarding the wind farm operational stage, as shown in the environmental impact's identification matrix contained in the EIA, all socio-economic impacts identified are positive. The only negative aspects are the impacts on birds' life, the generation of noise and visual impact, although the latter are low impacts given that the project is in an area of hydrocarbon exploitation, not an urban settlement.

To prevent, mitigate and or revert the project negative impacts, an Environmental Management Plan (PGA due to its name in Spanish "Plan de Gestión Ambiental") has been designed as part of the EIA and has been implemented. The main objectives of the PGA are:

- To preserve the environmental quality by minimizing the negative impacts caused in the area of direct influence of the project.
- To encourage the execution of activities planned for the project that cause positive impacts on environmental factors.
- To guarantee the execution of the project in an environmentally responsible manner, controlling the human activities derived from the different stages of the project in a way that they are developed in an appropriate manner.
- To foresee and execute direct and specific actions to prevent or correct the environmental impacts indicated in the environmental report.
- To generate environmental awareness and to promote a responsible attitude that contribute to preserve the environment.

The PGA is divided in general measures and detailed specific measures to mitigate the impacts of each stage of the project. The below table illustrates the preventive, corrective and mitigating measures established for the operational stage:

Action	Impact	Measures
Operation of the energy generation system	Fauna and Flora affectation. Operators.	Before MB operation start, there must be certainty about its perfect operating condition. For this, a series of operations are carried out, including among others: verification of the foundations compaction, control of the laboratory results of materials of all the foundations and towers, circulation situation through the corridors for future maintenance, etc.

Action	Impact	Measures
		All security requirements must be met, such as warnings, permanent communication, verification of use of security elements by personnel, team coordination, etc. Within the task plan, the responsibilities of each intervening team must be perfectly defined, according to the management plan to be used. Noise measurements must be carried out in accordance with current laws. Danger sites must be signaled with warning signs. Voltage Installations must be well signaled.
Maintenance	Noise and Particulate Material Generation, fauna and Flora affectation. Operators.	Periodic maintenance of the project's vehicles must be carried out to avoid the disturbance of habitats, shelters and existing natural fauna. Proper functioning of machinery and equipment will be controlled, checking noise control devices. The standards established by the National Communications Commission must be respected. Hunting of wildlife is strictly prohibited. Gathering of wild plants and introduction of non-native not adapted species is prohibited. Regarding the generation of particulate material, trucks that can generate particle emissions from the transported material will be covered with tarpaulins, to avoid loss and dispersion of the material. The maintenance personnel must be provided with all the necessary protective equipment to ensure the health and safety conditions established by the current industrial hygiene and safety standards. Wind turbines will carry out the monitoring and the following records will be implemented (according to ENRE Resolution No. 0197/2011⁴): a) Annual measurements of noise levels. b) Noise measurements after the occurrence of extraordinary natural phenomena. c) Vibrations: periodically verification of compliance with IRAM norm 4078/89 in the borders of the power plant. The purpose of these monitoring is to determine the impact on the neighborhood -structures and people- caused by the operation

⁴ [https://www.enre.gov.ar/web/bibliotd.nsf/\(\\$IDWeb\)/5AC50951F115D82D0325789C0046B0CF](https://www.enre.gov.ar/web/bibliotd.nsf/($IDWeb)/5AC50951F115D82D0325789C0046B0CF)

Action	Impact	Measures
		of the plant. Thus, verification should be carried out when there are neighbors in the perimeter or due to claims. d) Bird impact record: sustained monitoring during at least one year after the wind farm operation started to evaluate the real impact of the structures in operation, considering raptors, migratory birds, and endemic birds.

Furthermore, MB wind farm has in place a Biodiversity Management Plan that defines methodologies for revegetation of affected areas, describes the risk management measures for birds and bats during the different phases of the project and establishes methods to reduce wildlife mortality events.

2.2 Local Stakeholder Consultation

As stated in YPF Luz 2019 Sustainability Report⁵ the company is committed to encouraging the growth of the country and to create value for shareholders, clients, and the communities where it operates. Furthermore, to achieve its strategic guidelines, YPF Luz believes that it is essential to have a smooth and constructive relationship with all its stakeholders. For this reason, they have mapped and prioritized the stakeholders at each site and have an action plan at each site.

As a result, as illustrated in the sustainability report the company has in place several communication and dialogue channels with all their stakeholders, including:

- Employees,
- Trade unions,
- Investors,
- Suppliers,
- Clients,
- Government and controlling authorities,
- Media,
- Chambers and Associations and
- Community.

Particularly, with regards to the community, the below table contained in the 2019 Sustainability report, illustrates the community actors the company have identified and the communication and dialogue channels with them.

⁵ <https://ypfluz.com/Sustainability/Report/2019>

Stakeholders	Who they are	Communication and Dialogue Channels
Community	Communities near the sites and the community at large, Non-for-profit associations with which the company work, Universities, primary and secondary schools.	- Meetings with community leaders at each site where the company operates, - Talks about energy, - Site visits, - Corporate literature, - Conferences, - E-mailings, - Press releases, - Surveys, - Working meetings, - Compliance Channel, - Questions and Grievances Channel, - Corporate Website and - the Sustainability Report itself.

Furthermore, as also stated in the 2019 sustainability report, the company's philosophy is to maintain an open and fluent dialogue that helps identify the impact of its activities and the community needs, to jointly define a social investment program, that is implemented with the involvement of the company volunteer employees.

As above mentioned, YPF Luz website (<http://www.ypfluz.com>) is a communication channel with the community that provides several information about, among others:

- Compliance: code of ethics and the compliance line with the different channels employees and stakeholders can utilize to raise questions or concerns⁶
- Its assets (operational and under construction), including Manantiales Behr wind farm,
- Its quality, health and safety and environmental management systems, in compliance with ISO standards,
- The Sustainability reports,
- News about the company,
- Contact channels,
- Etc.

The website invites stakeholders to send their comments and suggestions to the e-mail address: sugerenciasypfluz@ypf.com Additionally, all third parties can leave a note at any of the company's sites.

⁶ <https://www.ypfluz.com/Compliance/En>

The questions and grievances handling system in place ensures traceability, follow-up of and response to each grievance or comment received, both internally and from third parties. In accordance with the Questions and Grievances Policy, any question or grievance received must be recorded for follow-up purposes. Any suggestion, question and grievance received is recorded in a single database, where follow-up on the issue is recorded until closure, including details about the claimant, areas involved and other relevant data. The system is confidential and is managed by the Institutional Relations Department, which grants access on a case-by-case basis to the areas that are required to act. Efforts are made to respond all questions and grievances within 10 days. If no satisfactory response can be given within this period, the stakeholder is informed on progress. As stated in YPF Luz 2019 Sustainability Report, in 2019, 119 questions and grievances were received, and they were answered within no more than 10 days. In this regard, it is important to clarify that, according to the questions and grievances handling system records, none of the 119 questions and grievances received by YPF Luz in 2019 were regarding Manantiales Behr wind farm project. According to the records, 65 of the questions and comments from stakeholders to the company were general comments and the other 54 questions and comments were about other projects of the company, none of them related with Manantiales Behr wind farm project.⁷

Particularly, regarding Manantiales Behr wind farm, as part of the quality and occupational health and safety management systems of the company, the project has in place a procedure for communication which establishes the method used for documenting internal and external communications.

Since the project operation start date on 1st August 2018 until the end of the present monitoring period (31 December 2020), MB has not received comments and/or questions from local stakeholders.⁸

Finally, during the present monitoring period MB has conducted several activities with local stakeholders to provide information and engage the community. Among others⁹:

⁷ YPF Luz questions and grievances handling system records from June 2018 until 31/12/2020 provided to the VVB at verification.

⁸ YPF Luz questions and grievances handling system records from June 2018 until 31/12/2020 provided to the VVB at verification.

⁹ Detailed information about the activities has been provided to the VVB at verification.

Activity	Photographic registry
Site visit of journalists from local press and other provinces with the aims of disseminating the achievements of the project to the population; 31/05/2019	
Distributed generation seminar held by the YPF Foundation as part of its Sustainable Comodoro Program. The activity included the mobile classroom self-supplied with solar energy, which is utilized to train teachers of the Comodoro Rivadavia city; 12/06/2019	
Comodoro Rivadavia Industry Expo Presentation about YPF energy transformation and renewable energies, including the outstanding results of MB in terms of capacity factor, the competitive advantages of the area for the development of the wind industry and the actions of the environmental and social plan. From 30/09/2019 to 06/10/2019	
Presentation of birdlife monitoring results to members of the local Bird Observers Club and site visit, strengthening the bonds of trust with the stakeholders of the community; 07/10/2019	

Other activities conducted with the local community included:

- Interview with a teacher from the “Colegio Universitario Patagónico” and representatives of the Comodoro Rivadavia Bird watchers club (COA, due to its name in Spanish “Club de Observadores de Aves”) during a site visit in February 2019. Both interested parties were aware of the project and its progress and stated that they had received information from YPF LUZ and had a favorable opinion of the Project.
- Interview with the Mayor of Sarmiento city located about 140 km from MB: in August 2019 the mayor of Sarmiento city and the prosecutor of the Chamber of Commerce, Industry and Production of Comodoro Rivadavia visited MB and talked with the project staff. Both stakeholders were aware of the project and its progress and had a favorable opinion.
- Talk with the Austral Institute of Education of Comodoro Rivadavia within the cycle Open talks with the community, MB gave a conference for the teachers and students of the institute on wind energy; 2020.

2.3 AFOLU-Specific Safeguards

Not applicable. The present project activity is a non-AFOLU project.

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

As stated in section 1.5 above, the project was implemented in two phases of 49.5 MW each one. The first phase started to operate on 01/08/2018 and the second one on 22/12/2018.

There has not been any event of break down or non-operational phase of the entire wind farm during the present monitoring period. There have been only stops of some equipment during short periods (less than a day) due to maintenance or minor failures with minimum impact on the GHG emissions reductions.

With regards to MB monitoring, the organizational structure, responsibilities, and competencies of the monitoring personnel has been established as stated in the registered PD. The methods for measuring, recording, storing, aggregating, collating and reporting data and parameters has followed the Wholesale Electricity Market Administrator Company (CAMMESA) technical procedures regarding the Commercial Measurement System (“SMEC” from the Spanish Sistema de Medición Comercial) and the Real Time Operation System (“SOTR” from the Spanish Sistema de Operación en Tiempo Real)¹⁰ as required for projects that dispatch electricity to the Wholesale Electricity Market (“MEM” from the Spanish Mercado Eléctrico Mayorista). The

¹⁰ CAMMESA Procedures Version XXVI, Anexo 24 (Sistema de operación y despacho (SOD)); <http://portalweb.cammesa.com/Pages/Institucional/Empresa/procedimientos.aspx>

electricity meters have been and are high accuracy measurement devices in compliance with CAMMESA requirements and the procedures for maintenance of the monitoring equipment have been conducted in accordance with national procedures and standards.

In conclusion, there have not been any changes in the Project during the present monitoring period and MB has operated and has been monitored in line with the registered PD.

3.2 Deviations

2.3.1 Methodology Deviations

There have not been any methodology deviations during the present monitoring period.

2.3.2 Project Description Deviations

There have not been any project description deviations during the present monitoring period.

3.3 Grouped Projects

Not applicable. Manantiales Behr wind farm project is not a grouped project.

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	EF _{grid,OM,y}
Data unit	tCO ₂ /MWh
Description	Operating Margin Emissions factor
Source of data	Argentinean Grid CO ₂ EF calculation 2015; Ministry of Energy and Mining; Argentinean National Government ¹¹
Value applied	0.532
Justification of choice of data or description of measurement methods and procedures applied	Calculated according to the Tool to calculate the emission factor for an electricity system.
Purpose of Data	Calculation of baseline emissions

¹¹Available at: <http://datos.minem.gob.ar/dataset/calculo-del-factor-de-emision-de-co2-de-la-red-argentina-de-energia-electrica> Accessed on: 30/11/2020

Comments	-
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Data / Parameter	$EF_{grid,BM,y}$
Data unit	tCO ₂ /MWh
Description	Build Margin Emissions factor
Source of data	Argentinean Grid CO ₂ EF calculation 2015; Ministry of Energy and Mining; Argentinean National Government ¹²
Value applied	0.440
Justification of choice of data or description of measurement methods and procedures applied	Calculated according to the Tool to calculate the emission factor for an electricity system.
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	$EF_{grid,CM,y}$
Data unit	tCO ₂ /MWh
Description	Combined Margin Emissions factor
Source of data	Argentinean Grid CO ₂ EF calculation 2015; Ministry of Energy and Mining; Argentinean National Government ¹³
Value applied	0.509
Justification of choice of data or description of measurement methods and procedures applied	Calculated according to the Tool to calculate the emission factor for an electricity system.
Purpose of Data	Calculation of baseline emissions
Comments	-

4.2 Data and Parameters Monitored

Data / Parameter	$EG_{facility,y}$ (or $EG_{PJ,y}$)
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¹² Available at: <http://datos.minem.gob.ar/dataset/calculo-del-factor-de-emision-de-co2-de-la-red-argentina-de-energia-electrica> Accessed on: 30/11/2020

¹³ Available at: <http://datos.minem.gob.ar/dataset/calculo-del-factor-de-emision-de-co2-de-la-red-argentina-de-energia-electrica> Accessed on: 30/11/2020

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		
Description of measurement methods and procedures to be applied	All commercial transactions in the Wholesale Electricity Market (MEM) require measurement of active energy at MEM nodes, where generators are connected to the grid (delivery point). CAMMESA's Electric-Commercial Metering System (Sistema de Medición Eléctrico Comercial – SMEC) includes all the equipment required for the measurement and recording of energy dispatched at each node.¹⁴ In line with these requirements, MB SMEC comprise a main meter (the billing meter) and a “control” (back-up) meter located at Escalante Substation. They are sealed and controlled by CAMMESA. The SMEC deliver measurements of generated energy every 15 minutes. Daily CAMMESA remotely downloads the records and elaborates the “Post-Operative Reports”. The values monitored illustrated below come from CAMMESA monthly reports.¹⁵		
Frequency of monitoring/recording	Continuous measurements and monthly recorded.		
Value monitored	Year	EG _{P,y} (MWh/yr)	
	2018 (from 01/08/2018)	140,817	
	2019	526,645	
	2020 (up to 31/12/2020)	514,656	
	Total	1,182,118	
Monitoring equipment		Main (billing) meter	Back-up (control) meter
	ID	MBEHM61P	MBEHM61C
	Brand & model	CIRCUTOR/ CIRWATT 402-MT1A	CIRCUTOR/ CIRWATT 402-MT1A
	Serial number	351608472	351608473

¹⁴ <https://smec.cammesa.com/>

¹⁵ CAMMESA web site / Downloads / Various / Monthly report; <https://cammesaweb.cammesa.com/2021/01/18/sintesis-mensual/?wpdmc=sintesis-mensual>

	Accuracy class	0.2S ¹⁶	0.2S ¹⁷
	Location	Escalante Substation	Escalante Substation
	Verification/Calibration	13/08/2018	13/08/2018
QA/QC procedures to be applied	Regarding calibration, according to CAMMESA's Technical Procedure 14 (SMEC External Audits)¹⁸, CAMMESA, as responsible for the certainty of the data used in transactions between MEM Agents and to supervise the accuracy of the data generated in the SMEC, must carry out the tests and verifications of equipment and facilities affected to it, by itself or through the total or partial contracting of the service to third parties. Annually, verifications are conducted on a sample of SMECs of the MEM determined by CAMMESA. As a result, MB SMEC (main and back-up meters) are verified (calibrated) according to CAMMESA scheduling and as per its procedures. The MB SMEC is out of the control of the project participant. During the present monitoring period the MB SMEC was verified in one occasion, on 13/08/2018. In case of meters failures CAMMESA procedure is followed.¹⁹ The electricity generation data from MB SMEC, contained in CAMMESA monthly reports publicly available, has been cross-checked with MB electricity sales records contained in CAMMESA monthly Economic Transactions Documents (DTE, due to its name in Spanish) available to the MEM Agents. It has been verified that there has not been any difference between the electricity generation data and the electricity sales records during the present monitoring period. All data collected during the monitoring period has been archived electronically and will be kept at least for 2 years after the end of the last crediting period.		

¹⁶ CAMMESA Procedures, Annex 24 (Operation and Dispatch System (SOD)); Version 22/06/2016; Page 4 (Characteristics of equipment and accuracy class/Meters of power utilities with installed capacity equal or greater than 20 MW; <http://portalweb.cammesa.com/Pages/Institucional/Empresa/procedimientos.aspx> Accessed on: 02/12/2020

¹⁷ CAMMESA Procedures, Annex 24 (Operation and Dispatch System (SOD)); Version 22/06/2016; Page 4 (Characteristics of equipment and accuracy class/Meters of power utilities with installed capacity equal or greater than 20 MW; <http://portalweb.cammesa.com/Pages/Institucional/Empresa/procedimientos.aspx> Accessed on: 02/12/2020

¹⁸ CAMMESA Technical Procedure PT-14 (SMEC External Audits); Version 07-March-2014; <http://portalweb.cammesa.com/Pages/Institucional/Empresa/procedimientos.aspx>

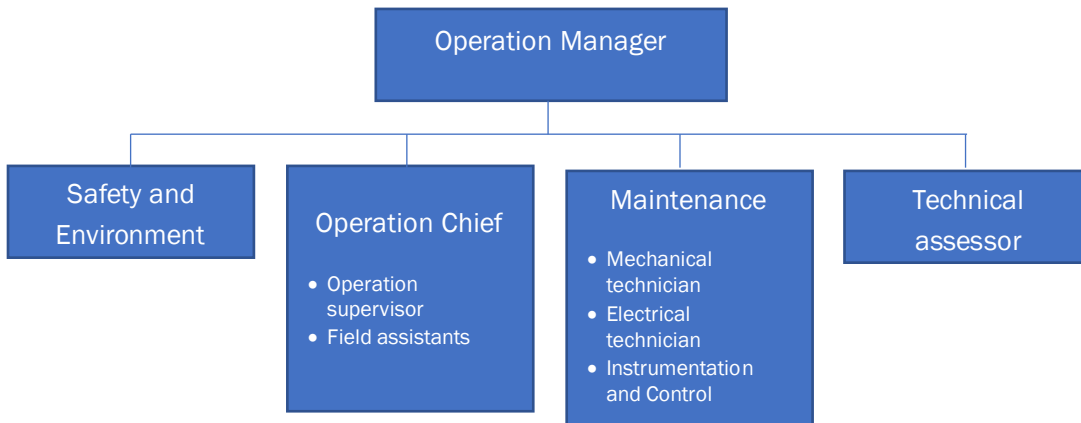
¹⁹ CAMMESA Technical Procedure PT-N°3; Commercial Measurement System (SMEC) Procedure of data collection in emergency; <http://portalweb.cammesa.com/Pages/Institucional/Empresa/procedimientos.aspx>

Purpose of the data	Calculation of baseline emissions
Calculation method	Not applicable
Comments	-

4.3 Monitoring Plan

Organizational structure, responsibilities and competencies of the personnel that carried out monitoring activities

The organizational structure of the project for the operation, maintenance, safety, and environment task is illustrated in the diagram below.



The operation supervisor and field assistants are responsible for monitoring the operation and electricity generation of the wind farm in accordance with CAMMESA requirements. They have permanent presence in the control room of MB. Detailed roles and responsibilities of the relevant staff involved in monitoring have been established and they have received relevant training, when required, to ensure that monitoring duties are performed by trained staff.

They have the required skills, experience and have been trained to perform these activities.

Methods for measuring, recording, storing, aggregating, collating and reporting the data on monitored parameters

As above mentioned, MB electricity generation is dispatched to the Wholesale Electricity Market (MEM). Therefore, measuring, recording, storing, aggregating, collating and reporting data and parameters follow CAMMESA technical procedures regarding the SMEC and the Real Time Operation System ("SOTR" from the Spanish Sistema de Operación en Tiempo Real).²⁰

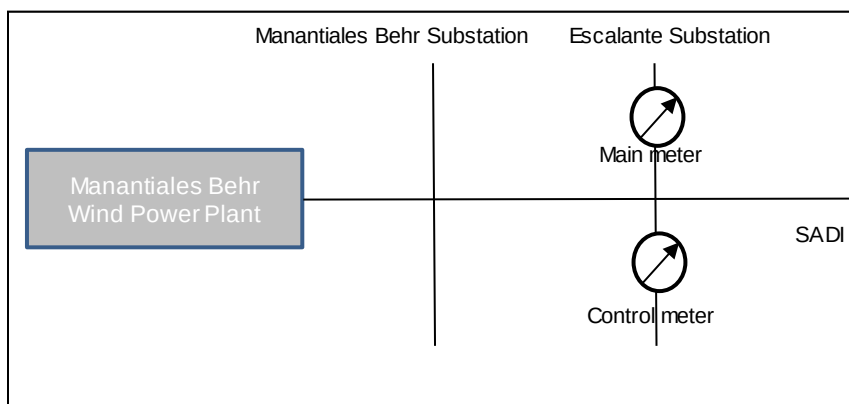
²⁰ CAMMESA Procedures, Annex 24 (Operation and Dispatch System (SOD));
<http://portalweb.cammesa.com/Pages/Institucional/Empresa/procedimientos.aspx>

All commercial transactions in the MEM require measurement of active energy at the MEM nodes, where generators are connected to the grid (delivery point). The SMEC established by CAMMESA for commercial purposes includes all the equipment required for the measurement and recording of energy delivered at each node. Communication systems allow direct remote access for auditing purpose to the records at all the nodes.

MB electricity generation supplied to the grid is measured at Escalante substation which is connected through a 21 km high tension transmission line to Manantiales Behr substation.

The SMEC system located at Escalante substation measures the net electricity generated by MB and result in the final value that is used for commercial purposes. All the SMEC devices measure, record and store the delivered electricity data. They are sealed and controlled by CAMMESA. The SMEC deliver measurements of generated energy every 15 minutes and has a storage capacity of information in circular memory is no less than 35 days.

The line diagram below illustrates the measurement arrangements:



CAMMESA elaborates with the recorded data received from the SMEC a “Post-Operative Report” which is published by CAMMESA in its web site every 4 days and each generator agent is allowed to look all the recorded data of CAMMESA. MB operation personnel are well trained and have the resources to gather and process all the information from the SMEC.

CAMMESA monthly reports, which are publicly available, are the official source utilized to report the net electricity generated by the project plant to the grid and calculate the GHGs emissions reductions.²¹

No sampling approaches are applicable to this project activity.

All data collected as part of monitoring has been archived electronically and will be kept at least for 2 years after the end of the last crediting period.

²¹ CAMMESA web site / Downloads / Various / Monthly report;
<https://portalweb.cammesa.com/memnet1/Pages/descargas.aspx>

Procedures used for handling any internal auditing performed and any non-conformities identified

MB has in place a quality and environmental management system certified ISO 90001:2015 and ISO 14001:2015.

Audits and non-conformities and improvement opportunities procedures has been established as part of the management system. The non-conformities procedure covers the detection of a non-conformity or opportunity for improvement, the analysis of causes, the proposal of corrective or improvement actions, their implementation and monitoring, the closing of actions and finally the evaluation of their effectiveness. It also states the roles and responsibilities through the process and system utilized to report and treat the non-conformity or the improvement opportunity.

According to the registries of MB quality and environmental management system non-conformities and their treatment, no non-conformities regarding MB monitoring system have been identified during the present monitoring period.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

According to the methodology ACM0002 “Grid-connected electricity generation from renewable sources” (Version 19.0) ²² baseline emissions include only CO₂ 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 would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants.

The baseline emissions are calculated as follows:

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

Where:

BE_y	=	Baseline emissions in year y (tCO ₂ /yr)
$EG_{PJ,y}$	=	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the project activity in year y (MWh/yr)
$EF_{grid,CM,y}$	=	Combined margin CO ₂ emission factor for grid connected power

²² Available at: <https://cdm.unfccc.int/methodologies/DB/XP2LKUSA61DKUQCOPiWPGWDN8ED5PG>

generation in year y calculated using the latest version of the “*Tool to calculate the emission factor for an electricity system*” (tCO₂/MWh)

Calculation of $EG_{PJ,y}$

As the project activity is the installation of a Greenfield power plant, then:

$$EG_{PJ,y} = EG_{facility,y}$$

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 project activity in year y (MWh/yr)

$EG_{facility,y}$ = Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh/yr)

MB $EG_{PJ,y}$ during each calendar year of the present monitoring period have been:

Year	$EG_{PJ,y}$ (MWh/yr)
2018 (from 01/08/2018)	140,817
2019	526,645
2020 (up to 31/12/2020)	514,656
Total	1,182,118

The combined margin CO₂ emission factor for grid connected power generation in year y ($EF_{grid,CM,y}$), as stated in the registered PD, is obtained from the Ministry of Energy and Mining (MEM) of Argentina 2015 EF_{grid} calculator²³. Its value is:

$$EF_{grid,CM,y} = 0.509 \text{ tCO}_2/\text{MWh}$$

As a result, the baseline emissions during each year of the present monitoring period have been:

Year	BE_y (tCO _{2e} /yr)
2018 (from 01/08/2018)	71,676
2019	268,062
2020 (up to 31/12/2020)	261,960
Total	601,698

²³ Available at: <http://www.energia.gob.ar/contenidos/verpagina.php?idpagina=2311>; Accessed on: 03/12/2020

5.2 Project Emissions

According to the methodology project emissions (PE_y) for wind projects that do not use fossil fuels for electricity generation are zero.

Therefore,

$$PE_y = 0$$

5.3 Leakage

According to the methodology ACM0002 “Grid-connected electricity generation from renewable sources” (version 19.0) the following is stated: “No leakage emissions are considered. The emissions potentially arising due to activities such as power plant construction and upstream emissions from fossil fuel use (e.g. extraction, processing, transport) are neglected”.

Therefore,

$$L_y = 0$$

5.4 Net GHG Emission Reductions and Removals

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
Year 2018 (from 01/08/2018)	71,676	0	0	71,676
Year 2019	268,062	0	0	268,062
Year 2020 (up to 31/12/2020)	261,960	0	0	261,960
Total	601,698	0	0	601,698

The GHG emission reductions of MB in the present monitoring period have been 5.7% higher than the emission reductions estimated ex ante in the registered PD (569,497 tCO₂) due a 5.7% higher net electricity generation (1,182,118 MWh) than the estimated net electricity generation (net yield) for the period (1,118,855 MWh) based on a P50 basis, according to the “Certificate of the resource and annual energy production” conducted by EAPCSUR Wind Energy during the project development.

As stated in the registered PD, MB phase 1 and phase 2 load factors were determined by a third-party specialized company (EAPCSUR Wind Energy) based on 3 years historical data during the project development in 2016. The load factors were estimated based on the long-term average electricity generation with 50% probability of occurrence in any given year (P50) and the Project net electricity generation or P50 net yield was estimated to be 502,900 MWh/year with an uncertainty or standard deviation of 4.2% (4.0% phase 1 and 4.4.% phase 2).²⁴

According to page 9 of EAPCSUR report, the annual energy production (net yield) of MB, obtained after deducting (from the estimated gross yield) the estimated losses of the project, corresponds to the central value of the Annual Energy Production (PAE, due to its name in Spanish) forecast, which is exceeded with a probability of 50% in the long term (P50). This means that there is a 50% probability that the estimated PAE will not be reached in any year in a 20-year period (the project lifetime). Nevertheless, there is also a 50% probability that the estimated value will be exceeded.

Thus, the P50 net yield is the mean value of a normal distribution and the differences between this forecasted value and the real net electricity generation of the project are explained by the wind resource and the project losses.

The total losses of the project were estimated by EAPCSUR to be 16.4%, composed of wake effect losses (4.2%), unavailability losses (6.3%), power performance losses (1%), electrical losses (1.9%), and environmental conditions losses (3.8%).

However, according to YPF EE operational registries during the present monitoring period, the real losses were 13.90% due to lower real unavailability losses (3.41%), which is technically reasonable for a new, well operated and maintained wind farm.

Thus, YPF EE has calculated and ex post adjusted P50 net yield based on the P50 gross yield after power adjustment estimated by EAPCSUR (600,600 GWh/year) and the real losses during the present monitoring period. The result is an adjusted P50 net yield of 517,138 MWh/year.

For the period August 2018 – December 2018 additional ex post adjustments have been made to calculate the adjusted P50 net yield for this subperiod considering that according to 2019 and 2020 monthly real net generation, the average monthly net generation for the period August-December is 5.5% higher than the average monthly generation on a yearly basis which was utilized for the ex-ante estimations based on the annual P50 net yield. The adjustment also considered the operation start dates of phase 2 turbines between November and December 2018 as per CAMMESA partial authorizations until completion of phase 2 on 22/12/2018. The result is an adjusted P50 net yield from this period of 134,621 MWh.

Due to the above ex post adjustments, the adjusted P50 net yield for the present monitoring period has been estimated to be 1,168,898 MWh. Thus, the real net generation (1,182,118 MWh) during the present monitoring period was 1.1% higher than the adjusted P50 net yield.

²⁴ Certificate of the resource and annual energy production (PAE) – Wind Power Project Manantiales Behr; EAPCSUR Wind Energy; page 11 (PAE with exceedances levels (20 years). Provided to the VVB at verification.

In conclusion, the higher net electricity generation and emission reductions compared to the ex-ante estimations in the PD are mostly explained by the lower unavailability losses during the present monitoring period than the estimated ex ante by EAPCSUR. After the ex-post adjustment of the P50 net yield, the real net electricity generation is only 1.1% higher than the adjusted P50 net yield. The difference is within the 4.2% standard deviation of the P50 net yield according to EAPCSUR study (as above stated) and is technically feasible considering that as above stated P50 means that there is 50% probability that the estimated net yield will not be reached but there is also a 50% probability that it will be exceeded in any year of the project lifetime.

Several news confirm the high performance of Manantiales Behr wind farm during the period covered by the present monitoring report^{25,26,27}.

²⁵ With nine months of operation, the Manantiales Behr wind farm breaks records;
<https://www.tresmandamientos.com.ar/2019/06/11/con-nueve-meses-de-operacion-el-parque-eolico-manantiales-behr-rompe-records/>.

²⁶ YPF Luz obtains high wind performance at Manantiales Behr; Energy & Business;
<https://www.energiaynegocios.com.ar/2019/06/ypf-luz-obtiene-alto-rendimiento-eolico-en-manantiales-behr/>.

²⁷ Manantiales Behr was the wind farm that generated the most renewable energy in 2019; YPF Luz;
<https://www.ypluz.com/Noticias/NoticiaCompleta/59>.