

AFRICAN DEVELOPMENT BANK GROUP



CONSTRUCTION OF A 125 MW COAL-FIRED SENDOU POWER PLANT IN THE VILLAGE OF BARGNY MINAM, SENEGAL

INDEPENDENT REVIEW MECHANISM FIRST MONITORING REPORT ON THE IMPLEMENTATION OF THE UPDATED MANAGEMENT ACTION PLAN

BCRM UNIT

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ACKNOWLEDGMENTS

The Acting Director of the Compliance Review and Mediation Unit (BCRM) and the Expert of the Independent Review Mechanism (IRM) would like to thank the Requestors, the Project Shareholders, the Société Nationale d'Électricité du Sénégal (National Electricity Company of Senegal; SENELEC), the Compagnie d'Électricité du Sénégal (Senegal Electricity Corporation; CES), the Management of the Bank, and the AfDB Country Office in Senegal for their clarifications and cooperation during the preparation of this First IRM Monitoring Report.

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ACRONYMS AND ABBREVIATIONS

ADB	African Development Bank
AfDB	African Development Bank Group
AFG	Advisory & Finance Group Investment Bank
BCRM	Compliance Review and Mediation Unit
BOAD	Banque Ouest Africaine de Développement (West African Development Bank)
BOP	Balance of Plant
BTOR	Back-to-Office Report
CBAO	Compagnie Bancaire de l’Afrique de Occidentale (Banking Company of West Africa)
CES	Compagnie d’Électricité du Sénégal (Senegal Electricity Corporation)
COD	Chemical Oxygen Demand
CTA	Common Terms Agreement
DEEC	Direction of Environment and Classified Establishments
EDF	Électricité de France S.A.
EPC	Engineering, Procurement, and Construction
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
ESAP	Environmental and Social Action Plan
ESIA	Environmental and Social Impact Assessment
FAO	Food and Agriculture Organization of the United Nations
FMO	Nederlandse Financierings-Maatschappij voor Ontwikkelingslanden N.V. (Netherlands Development Finance Company)
GEF	Global Environment Facility
IDA	International Development Association
IRM	Independent Review Mechanism
LTA	Lenders’ Technical Advisor
MOU	Memorandum of Understanding
OE	Owner’s Engineer
PAPs	Project-Affected Persons
PPA	Purchase Power Agreement
QP	Quantum Power
RAP	Resettlement Action Plan
SENELEC	Société Nationale d’Électricité du Sénégal (National Electricity Company of Senegal)
SOCOCIM	Société Commerciale du Ciment
SSC	Supply and Supervision Contract
TSS	Total Suspended Solids
WACA	West African Coastal Area
WSP	WSP Parsons Brinckerhoff

EXECUTIVE SUMMARY

The objective of the First Monitoring Report is to assess the progress made by Management in achieving compliance with Bank policies and procedures applicable to the Sendou Coal-Fired Power Plant Project through the implementation of the Revised Management Action Plan of February 2019. This review is based in part on the documentation provided by Management, and in part on the field-based review by the Monitoring Team of the Independent Review Mechanism (IRM), which visited the Project from 2 to 10 November 2019. The IRM Monitoring Team, which was composed of Dr. Sherif Arif, IRM Expert, and Mr. Birima Fall, Senior Communication, Outreach and Knowledge Management Officer at the Compliance Review and Mediation Unit (BCRM), met with senior Bank staff; representatives of the Ministries of Economy and Environment; the Société Nationale d'Électricité du Sénégal (National Electricity Company of Senegal; SENELEC); the Requestors; the representatives of the “femmes transformatrices [women transformers];” the representatives of the Elders of Bargny and Minam; the Sendou Power Plant shareholder, Nykomb Synergetics of Sweden; the staff of the Compagnie d'Électricité du Sénégal (CES); as well as the Prefect of Rufisque and the Mayor of Bargny. The IRM Monitoring Team reviewed the Bank documents related to this Project and, in particular, the draft Technical Health, Safety, and Environment Red Flag Audit that had been requested by the Lenders as well as the Back-to-Office Reports (BTORs) submitted by the Bank Project Team in 2018 and 2019.

The IRM Monitoring Team has determined that there has been very limited progress on the ground to implement the Updated Bank Management Action Plan of February 2019. The situation has been aggravated by the fact that (a) the Sendou Power Plant has not operated at full performance and capacity since its first commissioning in October 2018, and is now shut down since July 2019; (b) the CES is in serious debt and the shareholders have not reimbursed the Lenders as agreed in the Loan Agreements; (c), QP, withdrew from the Project in November 2019, and its operator, a joint venture between SPIE Oil & Gas Services and Électricité de France S.A. (SPIE/EDF), was demobilized. Further discussion with the chairman of Nykomb Synergetics indicated that his company is taking over the management of CES and has rehired the local staff who operated the Plant under SPIE/EDF. However no formal evidence was provided of this takeover and no date was fixed for the reopening of the Plant.

In February 2019, the Bank Management and staff decided to suspend the monitoring of the Environmental and Social Management Plan (ESMP) as the Plant was scheduled to shut down for a two-month repair. Meanwhile, the Requestors continued to oppose the Project and reacted in writing in March 2019 to the update of the Revised Management Action Plan, maintaining their positions that the Plant is not in compliance with the Bank's environmental and social policies. Their complaint was not addressed.

In return, at the request of the Lenders, SENELEC financed the services of the Energy Consulting Group to conduct an independent Technical Health, Safety and Environment Red Flag Audit whose TOR was prepared with the assistance of the Bank. The draft Audit Report was submitted to SENELEC in September 2019 and was still under examination at the time of the mission. The conclusion of the draft Audit Report is that “the technical condition of the Sendou Power Plant is not permitting reliable long-term operations. The Plant is suffering from numerous short cuts taken during construction and commissioning.” The draft Audit Report identified a total of 25 high priority corrective actions requiring a budget of approximately EUR 31 million and taking 10 months from the moment the funding is secured.¹ The Bank also requested in its June 2018 supervision mission that an independent audit on equity injections (sources and uses) be undertaken. This audit has not been done.

¹ The Energy Consulting Group, “Draft Sendou Coal Power Plant, Technical Health, Safety and Environment Red Flag Audit,” Sep. 2019.

All the above recent events add up to the very serious concern that ten years from the time the Bank approved its loan, Senegal is still deprived of an additional contribution of 40% to its electricity capacity. This certainly poses a reputational risk for the Bank given that the Bank does not have any operational leverage, its loan having been disbursed fully even before the Plant was fully constructed.

The IRM Monitoring Team maintains that the Sendou Power Plant Project is non-compliant with the AfDB Involuntary Resettlement Policy (2003) and with the AfDB Policy on the Environment (2004). The Project is partly compliant with the Environmental Review Procedures for Private Sector Operations (2000).

The IRM monitoring team suggests that its recommendations summarized below and explained in this Report, should be further detailed through a revised Action Plan to be prepared by the Bank Management and shared with BCRM to reach a joint understanding before submitting it to the Boards of Directors. Thereafter, the IRM monitoring report and the revised management action plan would be jointly presented to the Boards of Directors for discussion and consideration in the same session.

The IRM Monitoring Team also recommends that the BCRM should receive from Bank Management all the BTORs, relevant documents, and studies related to this Project. Considering the ongoing discussions on restructuring of the Project, the IRM should conduct its second monitoring mission in 2021.

Should the Sendou Power Plant continue to remain non-operational, The IRM Monitoring Team recommends that the Bank Management should prepare a Preservation Action Plan to protect the Bank assets as well as to mitigate the environmental issues related to ash management, coal storage facility, water drainage system, the waste water treatment and smoke reduction for the women drying fish on the buffer zone .

In case the power plant will resume its operations, the revised action plan to be prepared by the Bank Management should address the following three aspects for which detailed recommendations are provided in this Report, namely: Governance, Pollution Abatement and Health Protection, and Social Support .

With respect to Governance, the Bank should clarify with the Government of Senegal and in particular with SENELEC, the status of the governance of the CES, specifically:

- Status of the shareholders
- CES institutional and management structures
- CES financial status and obligations
- Status of implementation of the Technical Audit Report
- Appointment of an independent monitoring contractor

With respect to the Pollution Abatement and Health Protection, *Bank Management should ensure the following:*

- i) **For the ash**, CES should submit within six months an updated management plan for the ashes, a total retrofitting of the temporary ash facility which is now an open dump, and a revised schedule for the construction of the new ash disposal facility.
- ii) **For reducing the intense smoke from the fish at the facility in Khelcom**, CES, SENELEC and the Municipality of Bargny should (i) Provide masks, gloves, boots, and emergency shelters to all the women (femmes transformatrices) and first-aid assistance; (ii) Conduct a spot medical check-up for women using this facility; (iii) Request assistance from the Food and Agriculture Organization of the United Nations (FAO) to provide training to women on different cleaning methods of fish-drying, which would substitute for the combustion of peanut shells; (iv) Submit a realistic business plan for the new fish-drying facility; and (v) Finance, if appropriate a retrospective health impact assessment study.

- iii) **With respect to the ambient air quality and stack emissions**, the IRM Monitoring Team recommends that the Bank Management should contract the services of a Lenders' Technical Advisor (LTA) for the operational phase to, inter alia, carry out measurements of ambient air, stack, and fugitive emissions; and conduct an emission inventory from all the point and non-point sources of pollution at the level of the Bargny Municipality.
- iv) **Concerning waste water and drainage water**, the IRM Monitoring Team recommends that the Bank Management ensures that SENELEC and CES rehabilitate the water drainage system and waste water treatment facility before the Plant restarts its operations; undertake a technical study to establish the water balance of the Bargny Municipality and the long-term impact of the water demand of the Sendou Power Plant on the public water system; and propose realistic water and groundwater alternatives of water availability, including the alternative of constructing a desalination plant.

With respect to the Social Support:

- ii) **Concerning land disputes**, the Bank should disengage itself from monitoring the land disputes caused by coastal erosion. As stated in the report, coastal erosion is not caused or affected by the Project and it should be addressed by the Government at the national and local levels. Furthermore, the regional West Africa Coastal Area (WACA) Project, co-financed by the World Bank and the Global Environment Facility (GEF), will provide technical and financial assistance to Senegal for resilience towards coastal erosion.
- iii) **With respect to the social plan**, the Bank Management should provide assistance to SENELEC, CES, and the Bargny Municipality to revise the ambitious tripartite Memorandum of Understanding (MOU) of 2017 between these parties, and focus primarily on the social issues that affect the project-affected people (PAPs) and their families, namely: (a) the modernization of the fish-drying facility on the site between Bargny and Minam; (b) the construction of the draining system for rain water; (c) the construction of a brick-making unit for ash; (d) the construction of a footbridge between Bargny and Khelcom; and (e) school supplies for Bargny schools

1. Introduction

- 1.1. The objective of the Project Monitoring Report, as requested by the Boards of Directors of the African Development Bank Group (AfDB), is to assess the progress made by Management in achieving compliance with Bank policies and procedures applicable to the Sendou Coal-Fired Power Plant Project through the implementation of the Revised Management Action Plan. This review is based in part on the documentation provided by the Bank Management, and in part on the field-based review by the Monitoring Team of the Independent Review Mechanism (IRM) from 2 to 10 November 2019.
- 1.2. The Compliance Review and Mediation Unit (BCRM) received two Requests relating to the construction of the Sendou Coal-Fired Power Plant Project (hereinafter “Sendou Project”). The first Request was submitted on 9 May 2016 by two national civil society organizations in Senegal, Takkom Jerry and Lumière Synergie pour le Développement, on behalf of some of the people affected by the project (PAPs). The Requestors asked the BCRM to handle their complaint through both a problem-solving exercise and a compliance review. On 15 July 2016, the BCRM received a second complaint from two national individuals, Mr. Cheikh Fadel Wade and Mr. Daouda Gueye, on behalf of some other members of the affected communities in Bargny. They challenged the representational authority of the First Requestors, whom they claimed cannot act on behalf of all the PAPs. Standing on their own right, they requested the BCRM to register their complaint for a compliance review. The two Requests raised similar issues with regards to the negative impacts of the Sendou Project, which were as follows:
 - (i) Unviable government policy option to use a coal-fired power plant in Senegal because the country does not produce coal and will be obliged to import it from international markets.
 - (ii) The selection of the project site is in violation of the applicable Article L13 of the National Code of the Environment. In particular, the Sendou Project site is located less than 2 km from an existing cement factory and close to another coal-fired power plant with a larger capacity of 250 MW. The latter was scheduled to be built close to the same Project site but was later cancelled.
 - (iii) Increased vulnerability of communities to air pollution and potential disruption of livelihoods because of the proximity of the coal-fired power plant to the town’s water supply; public facilities—including an elementary school, a health center, a kindergarten, and a cemetery; and a fish processing area where about 1,000 women and other seasonal and temporary workers carry out their subsistence activities.
 - (iv) Adverse impact of the coal-fired power plant on a historic site where the protected spirit of the village resides and on a nursery for the regeneration of marine biodiversity.
 - (v) Breach of the environmental, social, and human rights standards of the AfDB since there was no agreement signed with the holders of land titles, and no compensation was paid to most of these holders. In addition, no Resettlement Action Plan (RAP) was prepared to mitigate the Project’s negative social impacts.
 - (vi) Imminent health risks associated with air pollution due to anticipated emissions from the cement factory and the other planned coal-fired power plant with a larger capacity of 250 MW,

all within close proximity to each other and the Sendou Project. There was no cumulative impact assessment study prepared to measure the effects of all three plants.

(vii) Increased vulnerability of the community to the consequences of coastal erosion.

(viii) Inadequate public consultations with the PAPs.

- 1.3. In keeping with Paragraph 23 of the IRM Rules, the Director of the BCRM registered the two complaints as a single Request on 10 August 2016 for a compliance review since they raised the same substantive issues.² The two Requestors were kept engaged separately in the process. The Nederlandse Financierings-Maatschappij voor Ontwikkelingslanden N.V. (Netherlands Development Finance Company; FMO), which also co-finance the Project, received a complaint from the same Requestors in May 2016 and June 2016, respectively.³ The Lenders' Technical Advisor (LTA) reported that a complaint was also filed with the Swedish National Contact Point.⁴

2. Project Description

- 2.1. The Sendou Project involves the design, development, procurement, construction, operations, and maintenance of a 125 MW coal-fired power plant located 35 km from Dakar in Sendou on a 22 ha site. The Project was approved on 25 November 2009 by the Board of Directors of the African Development Bank (ADB), which provided a senior loan of EUR 55 million as well as a supplementary loan of EUR 5 million on 30 October 2015. The Bank was mandated to arrange the total senior debt of the Project.
- 2.2. In addition to the Bank loan of EUR 60 million, the following lenders participated in the co-financing of the Project: EUR 39.3 million by the Banque Ouest Africaine de Développement (West African Development Bank; BOAD); EUR 35 million by FMO; and EUR 14.8 million by Compagnie Bancaire de l'Afrique de Occidentale (Banking Company of West Africa; CBAO); totaling EUR 149 million from the total project cost of EUR 216.5 million. The AfDB's funding was fully disbursed. The first disbursement of EUR 17 million was made on 31 August 2013, the second disbursement of EUR 38 million was effected on 29 October 2015, and the third and last payment of EUR 5 million was made on 17 May 2017. For the last disbursement, a waiver was obtained from the Board to proceed with the payment despite ongoing delays in the implementation of corrective measures highlighted in the Environmental and Social Action Plan (ESAP). The original project completion date of 31 October 2017 was not met. It was extended to 31 October 2018 and no further extension was requested. The loan matures in 2027 according to the original Loan Agreement.
- 2.3. The Project is developed on a Build-Own-Operate basis and will supply up to 40 percent of Senegal's electricity. The Sendou Project will be the first coal-fired plant in Senegal. The coal (with a sulfur content of 0.3-0.6%) will be imported from the Comptoir Bailand-Brugnaux from South Africa at the rate of 386,000 tons/year. It will be unloaded via 9 shipments of 40,000 tons each, at the Port of Dakar's harbor, and then transported by truck to the plant site. The Project aims to produce at least 925 GWh of electricity per annum, delivered under a Power Purchase Agreement (PPA) with Société

² "Notice of Registration, Request No: RQ 2016/2, Country: Senegal; Construction of a 125 MW Sendou Coal-Fired Power Plant in the Village of Bargny and Minam, Senegal," 10 Aug. 2016.

³ See FMO Compliance Report: "FMO Independent Complaints Mechanism Panel Report No. 2, Sendou I Coal Power Plant, Bargny, Senegal, Final Report, 12 October 2017." https://www.fmo.nl/library/download/urn:uuid:90559906-40f1-4178-83a5-75e4d1a5e8b3/compliance+review+report+sendou_english.pdf.

⁴ Lenders' Technical Advisor Report, p. 16.

Nationale d'Électricité du Sénégal (National Electricity Company of Senegal; SENELEC), which will distribute it through its national interconnected grid system.

- 2.4. The project promotor is Compagnie d'Électricité du Sénégal (CES), whose main sponsor is Nykomb Synergetics of Sweden. Late in 2012, Advisory & Finance Group Investment Bank (AFG) of Morocco joined as an equity partner. Each shareholder has a 50% ownership in the holding company, Nordic Power. In October 2015, Quantum Power (QP) stepped in and acquired the shares of AFG and became the majority shareholder, having 50% plus a golden share, giving them the control and management of the Project. QP therefore appointed a sole administrator for CES and not a Board of Directors. The Lenders agreed to the restructuring of the project loan. A revised agreement was signed between the Lenders and CES.⁵ On 30 October 2015, the Bank's Board of Directors approved the debt restructuring of the Sendou Project through (i) an amendment to the existing loan terms, and (ii) a provision of a supplementary senior loan facility of EUR 5 million.
- 2.5. The Project was suspended between 2013 and 2015 whilst undergoing a shareholding restructuring resulting from the exit of AFG and the acquisition of a controlling 51% stake by QP. The construction of the Sendou Project resumed in January 2016 by two Indian companies: Promac Engineering Industries Ltd (Promac), which provided Balance-of-Plant (BOP) design and procurement, site civil design and works, and erection services for all works under the Engineering, Procurement, and Construction (EPC) Contract; and Bharat Heavy Electricals Limited (BHEL), which provided the 'Power Island' (i.e. the main plant items) under the Supply and Supervision Contract (SSC). CES was supported by an Indian consultancy, Powertec, to provide technical monitoring of the Project in the role of an Owner's Engineer (OE). The operations of the Plant was contracted to SPIE Oil and Gas services with technical support from EDF. WSP Parsons Brinckerhoff (WSP) was hired as the LTA to support the Lenders with quarterly monitoring of the construction of the Project. WSP prepared reports for the AfDB, in accordance with a professional services agreement.

3. The IRM Compliance Review Report and Management Response

- 3.1. The IRM Compliance Review Report was submitted to the Board on 6 June 2018 and was discussed on 11 July 2018 together with the Management Action Plan. The Report determined the following:
- (i) The Sendou Project was non-compliant with the AfDB Involuntary Resettlement Policy (2003) on several accounts:
 - Inadequate due diligence by AfDB in assessing whether the AfDB Involuntary Resettlement Policy (2003) is applicable, particularly in the case of people who claim that they hold rights to the land, as well as women (*femmes transformatrices*) and men engaged in fish-drying businesses within the buffer zone of the plant site;
 - Inadequate consultations with the PAPs;
 - No baseline study done to determine the number of PAPs and the income they derive from their fish-drying and -packaging businesses in the buffer zone; and

⁵ Amendment Agreement to the Common Terms Agreement (CTA), 19 Dec. 2012, signed by Compagnie d'Électricité du Sénégal African Development Bank (the Mandated Lead Arranger), and African Development Bank (ADB), Banque Ouest Africaine de Développement (BOAD), Nederlandse Financierings-Maatschappij voor (FMO), Compagnie Bancaire de l'Afrique de Occidentale (CBAO) Group, Attijariwafa Bank, Citibank International OLC, and Citibank NA.

- No RAP prepared containing compensation measures and livelihood support prior to project approval.
- (ii) There is non-compliance with the AfDB Policy on the Environment (2004) as follows:
- The Environmental and Social Impact Assessment (ESIA; 2009) is inconsistent with the AfDB Policy on the Environment (2004), because:
 - No marine impact assessment has been conducted even though the Project was designed with an open discharge system, where warm water was to be disposed of into the sea;
 - No adequate ash management plan was prepared;
 - The impact study of the Sendou Plant on the water supply system was inadequate because the impact of satisfying future competing demands, including of the Sendou Plant, through the public water system was not satisfactorily investigated;
 - The environmental impacts resulting from the transportation of coal from the Port of Dakar's harbor to the project site was inadequately assessed and mitigation measures proposed were also inadequate.
 - Key policy covenants are not included in the Credit Agreement on environmental and social measures as specified in Paragraph 6.30 of the AfDB Policy on the Environment (2004).
- (iii) There is non-compliance with the Environmental Review Procedures for Private Sector Operations (2000). Only the last two supervision missions conducted in June 2016 and February 2017 considered the Project's compliance with the environmental and social safeguards requirements as mentioned in Paragraph 44 of the Review Procedures.
- (iv) The Project is non-compliant with the consultation requirements outlined in the AfDB Policy on the Environment (2004), the AfDB Involuntary Resettlement Policy (2003), the Bank Group Policy on Poverty Reduction (2004), and the Gender Policy (2001).

3.2. Based on the above findings, the IRM Compliance Review Report recommended:

- a) *With respect to the compliance with the AfDB Involuntary Resettlement Policy (2003)*, the Bank Management should:
- (i) **On issues of dispute over land rights**, become involved and actively support the process underway with SENELEC, the Mayor of Bargny, and the PAPs to find an adequate solution to the land disputes. The Bank should strongly encourage the proposal to allocate to them parcels on another site.
 - (ii) **On the women whose income-generating activities are impacted by the Project (*femmes transformatrices*) and other related workers active in the buffer zone:**
 - Carry out a baseline study to establish precisely the number of *femmes transformatrices* and other workers associated with fish-drying activities in the buffer zone.

- Establish whether the *femmes transformatrices* and other workers associated with fish-drying activities will have to leave the area or whether special permissions could be granted to them to continue with their activities on the project site.
 - If special permissions cannot be granted, consult and conclude with the *femmes transformatrices* and related workers on compensation measures and consider the adoption of a livelihoods support program to compensate for the loss of income resulting from the displacement.
- b) *With respect to the compliance with the AfDB Policy on the Environment (2004) and the Environmental Review Procedures for Private Sector Operations (2000)*, the Bank Management should plan the following measures:
- (i) **Ash disposal:** Develop a contingency plan if the cement manufacturer, Société Commerciale du Ciment (SOCOCIM), does not absorb all the ash produced on a regular basis. An environmentally sound ash storage area must be designed.
 - (ii) **Transport of coal from the harbor to the plant site:** Specify additional mitigation measures to reduce noise and coal dust pollution and improve traffic safety for trucks transporting coal from the harbor to the plant site.
 - (iii) **Impact on marine resources:** Prepare a baseline survey of marine resources in the sea area adjacent to the plant if CES will install a closed cooling system. If CES installs an open cooling system, conduct an assessment of the impact of warm water discharge on marine biodiversity resources.
 - (iv) **Surface and groundwater:** Undertake a technical study that establishes the long-term impact of the water demand of the Sendou Plant on the public water system and propose relevant mitigation measures.
 - (v) **Air quality monitoring:** Establish an appropriate air quality monitoring system to assess the Project's impact on air quality as specified in the LTA Monitoring Report of October 2017.
 - (vi) **Noise impact assessment:** Complete the assessment as specified in the ESAP and the LTA Monitoring Reports.

3.3. Management submitted its Response and its Action Plan in response to the IRM Compliance Review Report to the Board of Directors of the Bank. The Board took note of the conclusions and recommendations contained in the IRM Compliance Review Report but considered that the Management Response and the Action Plan should be revised, enriched, and resubmitted. As a result, the Bank Management submitted a Revised Action Plan to the Board, which was approved by the Board on 30 January 2019. The Board also authorized the IRM to conduct annual follow-ups on the implementation of the Revised Action Plan for which the Bank Management submitted an update on 12 February 2019 (Annex 1) as follows:

Table 1: An Update of the Revised Management Action Plan (February 2019)

SENDOU COAL POWER PLANT – REVISED ACTION PLAN (FEBRUARY 2019)

	Issue	Recommendation	Solution Adopted	Action in Progress and to be Taken	Responsible Entity	Achievement Indicator	Schedule
Measures to ensure project compliance with the AfDB Involuntary Resettlement Policy (2003)							
1.1	Land Law Disputes	Person affected by the power plant site (Minam) and coastal erosion	Relocation of the most vulnerable people affected by the power plant site and coastal erosion (category 1)	<ul style="list-style-type: none"> Relocation process for 115 persons affected Household in Bargny Ville Verte Funding by SENELEC, the municipality, and CES 	SENELEC Bargny Municipality Rufisque Prefecture CES	CES will submit regular reports on the relocation process to the Bank	Semi-annual (January and July) until resolution
1.2		Person affected by coastal erosion in the Bargny Municipality	Relocation of the people affected by the power plant site and coastal erosion (category 2 and 3)	<ul style="list-style-type: none"> Confirm the need for FCFA 2 billion estimated by the municipality Reinstate regular meetings of the Monitoring Committee to accelerate the search for funding 	SENELEC Bargny Municipality Rufisque prefecture	CES will submit regular reports on PAPs' relocation to the Bank based on meetings of the Monitoring Committee	Semi-annual (January and July) until resolution
1.3	Women who dry and package fish and people involved in related activities in the buffer zone	Economic displacement	Maintain women on the site and modernize the fish-processing facility	<ul style="list-style-type: none"> Construct a fish-drying and -smoking plant 	SENELEC	CES will submit an indicative works schedule to the Bank	First quarter of 2019
1.4	Livehood support measures	Taking into account the vulnerability of the Bargny community	Support the Bargny community through the Social Action Plan	<ul style="list-style-type: none"> Establishment of a wastewater management system for Minam and Bargny neighbourhoods Construction of a school in Bargny Ville Verte 	CES	CES will submit implementation status report to the Bank on a semi-annual basis	Semi-annual with effect from the resumption of operations until completion
Measures to align the project with the AfDB Policy on the Environment (2004) and the Environmental Assessment Procedures for Private Sector Operations (2000)							
	Issue	Recommendation	Solution Adopted	Action in Progress and to be Taken	Responsible Entity	Achievement Indicator	Schedule
2.1	Ash Management	Prepare ash management plan including temporary storage and final disposal arrangements	Temporary storage: authorization granted by DEEC for ash storage Ash disposal: signing of an ash collection contract with SOCOCIM on 11 October 2017 Construction of an ash-based brickmaking factory	<ul style="list-style-type: none"> Preparation of the ash storage site (geomembrane) Collection of ash by SOCOCIM in progress Feasibility study to be prepared 	CES	Ash disposal site developed Bank will monitor effective ash transportation and / or disposal Build plant	June 2019 Semi-annual from the resumption of operations During operations

2.2	Coal transportation from Dakar to Sendou	Increase in traffic	Establishment of an ESMS in 2017	<ul style="list-style-type: none"> Update the ESMP for the operating period 	CES	Submit the updated operational ESMP to the Bank.	February 2019
				<ul style="list-style-type: none"> Obtain ISO/OHSAS certification form EMS 	Operator	Certification	2020
2.3	Marine impacts and water quality	Effects of cooling water (quality and temperature) on a marine ecosystem	Monitor water quality	<ul style="list-style-type: none"> Conduct a baseline study on marine resources at the cooling water sampling and discharge points Regular sampling of marine, sampling underground water for control of physical and biological parameters 	CES CES	Monitoring report baseline study on marine resources	June 2019 Annually form the resumption of operations
2.4	Water supply from the public network	Availability of fresh water	Possibility of desalinizing seawater	<ul style="list-style-type: none"> Construction of a desalination plant for EUR 3 million 	Operator	Mobilization of funding	During operations
2.5	Emissions inventory and air quality monitoring	Emissions control	Implement the air quality monitoring plan	<ul style="list-style-type: none"> Conduct passive sampling at all 11 receptors for 12 months 	CES	Submit quality monitoring reports	Every 6 months with effect from operations start-up on 21 October 2018
				<ul style="list-style-type: none"> Establish a continuous measuring station in Minam 		Indicate arrangements made for continuous measurements	When operations resume and during operations
2.6	Noise impact assessment	Noise impact monitoring	Noise monitoring during operations	<ul style="list-style-type: none"> Conduct an annual noise measurement campaign at property boundaries and sensitive receptors 	CES	Noise monitoring reports	Annually with effect from resumption of operations start-up and during operations

4. Requestors' Response to the Management Action Plan

- 4.1. On 14 March 2019, the Director of the BCRM as well as the complainants' mechanisms of the Lenders (FMO and BOAD) received a letter from the Requestors (Annex 2) with carbon copies to the Bank Management responsible for the Sendou Project. The letter was not answered. The letter reiterated the non-compliance of the Sendou Project with the issues raised in the Requestors' original complaints and stated that they strongly rejected the proposed Action Plan and recommendations, which, according to them, are essentially based on false information from the Mayor of Bargny and the CES. In their view, the Management Action Plan excludes the community and the applicants from the process of development and consultation. The Requestors also attached the Bank Management Action Plan with their comments on each of the recommendations raised in it (Annex 3) and which can be summarized as follows:

Table 2: Summary of the Response of the Questions to the Bank Management Action Plan

Recommendations of Bank Management	Response of the Requestors
1.1 Relocation of the most vulnerable persons affected by the Power Plant and coastal erosion (category 1)	<ul style="list-style-type: none"> • The relocation, if it should take place, would concern the people affected by the Project, namely the holders of plots of the subdivisions of Minam 1 (683 plots) and Minam 2 (750 plots). • The Bargny “Ville Verte” Project cannot be seen as a solution to the land dispute. • Any resettlement measure must imperatively involve the rights holders directly or through their representatives (duly mandated) and must be based on a methodology and objective criteria previously discussed and approved by the various agencies.
1.2 Relocation of the persons affected by coastal erosion in the Bargny Municipality (category 2 and 3)	<ul style="list-style-type: none"> • Emphasis must imperatively be placed on repairing the damage suffered by those affected by the Plant. • The three categories of affected people whose land rights are affected must receive adequate compensation without any distinction. • The requestors challenge the current committee chaired by the Mayor. The Monitoring Committee must be independent from the Mayor and must be under the supervision of the Prefect (Governor).
1.3 Maintain the site of the women who dry and package fish (<i>femmes transformatrices</i>) on the site of the buffer zone and modernize the fish-processing facility.	<ul style="list-style-type: none"> • The proximity of the Plant to the sites of the <i>femmes transformatrices</i> remains a violation of Senegalese laws and regulations (Art.L13 of the environment code). • In the absence of an independent and reliable scientific study, there is no guarantee that the proximity of public establishments (site of the <i>femmes transformatrices</i>, Minam Elementary School, the daycare center, and health unit) does not constitute a health hazard. • The modernization of the fish-processing facility cannot be an alternative to the problem linked to the proximity of public establishments (site of the <i>femmes transformatrices</i>). • It is in no way conceivable to relocate women whose activities depend exclusively on access to the sea.
1.4 Livelihood support measures (waste water management system for Bargny and Minam) to the Bargny community through a Social Action Plan.	<ul style="list-style-type: none"> • Collect the economic and social priorities of the affected populations. • Preserve the jobs of the <i>femmes transformatrices</i>. • Restore the livelihoods of all PAPs affected economically.
2.1 Ash management: <ul style="list-style-type: none"> • Ash disposal signing of ash collection contract with SOCOCIM (11 October 2017) • Temporary authorization granted by DEEC for ash storage in power plant • Construction of ash-based brickmaking facility 	<ul style="list-style-type: none"> • Ash management remains problematic, there is no management plan while the Plant is in operation. • On what basis did the DEEC grant the temporary ash storage permit? Has there been a study on the storage conditions—according to fly ash and coal ash? • If there is an ash recovery contract by SOCOCIM, what is the content and for what type of ash and how much? • What are the modalities (duration, place, financing, impact) of the construction of bricks from ash and for what quantity and their typology?
2.2 Coal transportation from Dakar to Sendou: Update the ESMP for the operation phase and obtain ISO certification.	<ul style="list-style-type: none"> • The updated operational ESMP has never been the subject of public consultation, much less published. • For the transport of coal from Dakar to Sendou, there is no information on the unloading conditions and the storage conditions. • The cumulative impact assessment must include the transport of coal from Dakar to Sendou.
2.3. Marine impact and water quality: Conduct a baseline study on marine resources at the discharge of the cooling water.	<ul style="list-style-type: none"> • The baseline study on the marine environment was not carried out while the Plant was in operation. • The cooling system has not been the subject of study on the impacts of the marine environment and the impacts on the artificial reef project for the biological recovery of marine species. • What about the effectiveness of the closed cooling circuit advertised as an alternative to the open cooling circuit?

Recommendations of Bank Management	Response of the Requestors
2.4 Water supply for the public network: possibility of desalination for sea water by constructing a desalination plant of EUR 3 million.	<ul style="list-style-type: none"> The city of Bargny already suffers from a water supply deficit (2 million m³); and the ETUC needs amount to 4.12 million m³ per year, which is double the consumption of the whole city of Bargny. The construction methods (ESIA, installation and start of operation) of a desalination plant require at least two years. Already the question of the installation site arises given the lack of space. In the meantime, what are the risks of water supply for the town of Bargny? How will the Plant ensure its supply of fresh water while operations continue?
2.5 Emission inventory and air quality monitoring: implement an air monitoring plan by conducting passive sampling of 11 receptors in 12 months and a continuous monitoring station in Minam.	<ul style="list-style-type: none"> The recommendation of the Technical Advisors for the installation of an air quality measuring station was not followed. The air quality measurement station is not installed even though the operation has already started. Absence of a study of the cumulative impacts between the coal power plant and the SOCOCIM cement plant, which has already polluted the atmospheric basin.
2.6 Noise impact assessment by noise monitoring during operation at the property boundaries	<ul style="list-style-type: none"> Local residents are already suffering from noise impacts and complaining of noise from the power plant which is audible beyond 3 km. No monitoring of the noise impact.

5. IRM Monitoring Team Findings and Recommendations

5.1. The IRM Monitoring Team, which was composed of Dr. Sherif Arif, IRM expert, and Mr. Birima Fall, Senior Communications & Outreach Officer at the BCRM, visited Senegal from 2 to 10 November 2019. The Team met with senior Bank staff; representatives of the Ministries of Economy and Environment; SENELEC; the Requestors; the representatives of the *femmes transformatrices*; the representatives of the Elders of Bargny and Minam; the Sendou Power Plant shareholder, Nykomb Synergetics of Sweden; the CES staff; as well as the Prefect of Rufisque and the Mayor of Bargny. The objective of the IRM Monitoring Mission was to assess the progress made by the Bank Management in the implementation of the Revised Action Plan described in Table 1. The IRM Monitoring Team reviewed the Bank documents related to this Project and, in particular, the draft Technical Health, Safety, and Environment Red Flag Audit that had been requested by the Lenders as well as the Back-to-Office Reports (BTORs) submitted by the Bank Project Team in 2018 and 2019.

A. Status of the Operation of the Sendou Coal-Fired Power Plant

5.2. The IRM Monitoring Mission was informed that the plant was intermittently operational since 17 November 2018 due to several stoppages in the turbines, boilers, and condensers; and has therefore not been able to operate continuously at contractual levels (115 MW net capacity, 91.8% availability). In February 2019, the Bank BTOR indicated that the Plant will be closed down for two months for repair. However, the Plant continued to have technical operational problems to the extent that it was closed down entirely since July 2019 to the date of writing this Report (25 February 2020). The following additional events also contributed to the closing down of the Plant:

- a) At the level of the shareholders, the majority shareholder QP withdrew from the Project in November 2019..
- b) At the level of plant operations, the operator SPIE/EDF demobilized on 11 September 2019 and fired its 82 employees because it had not been paid by CES, the payment amounting to EUR 1 million.

- c) At the financial level, CES is bankrupt. It is indebted to its creditors and to the Bank for not paying the interest during the grace period. The Bank sent a formal notice to the CES administrator, to which there was no response.
 - d) SENELEC financed the draft Technical Health, Safety, and Environment Red Flag Audit Report of the Sendou Project, which was completed on 9 September 2019 by a consulting firm, the Energy Consulting Group, and is being reviewed by SENELEC. The draft report concluded that “the technical condition of the Sendou Power Plant is not permitting reliable long-term operations. The Plant is suffering from numerous short cuts taken during construction and commissioning.” The draft report identified a total of 25 high priority corrective actions requiring a budget of approximately EUR 31 million and taking 10 months from the moment the funding is secured.⁶
 - e) At the level of the Government, SENELEC reiterated that they are very unhappy with the lack of a management team at CES as a credible counterpart. SENELEC also stressed the need for a reputable operations & maintenance management to take over the plant operations. SENELEC expressed its disappointment and the lack of responsiveness from the CES management team on the current issues still faced by the Project. In addition to the Technical Audit Report already completed, SENELEC in agreement with the Lenders requested that an independent audit on equity injections (sources and uses) be undertaken, as mentioned in the June 2018 supervision mission. This audit has not been done.
 - f) At the level of the Bank Management, as a result of a two-month shutdown to address the CES’s technical issues” the implementation of the ESAP was suspended for all activities directly from operations, such as air quality monitoring, effluent quality or noise. The same applies to activities related to the resolution of social issues. Apart from the BTOR of February 2019, Bank staff that supervised the Project did not address any of the environmental and social issues in their BTORs of March 2019 and May 2019.
- 5.3. The IRM Monitoring Team met with Mr. Norland Suzor, Chairman of Nordic Power AB, the only CES shareholder who claimed that he is now holding 94.89% of the CES shares, although no official evidence was provided. Mr. Suzor was briefed by SENELEC on the findings of the Technical Audit Report, but was confident that the Plant should be made operational by the third week of November 2019 in spite of the operational defects—which, according to him, could be repaired sooner but may shorten the lifetime of the Plant. Mr. Suzor claimed that he has rehired from his own funds the 82 employees fired by SPIE/EDF. The IRM Monitoring Team met with some of these employees during its visit to the Plant. As of the date of the preparation of this Report (25 February 2020), the Plant is not yet operational and no update has been provided by Mr. Suzor despite requests for updated information on the status of the Project by the IRM Monitoring Team. The situation now is critical as the Lenders, including the Bank, have no remediation leverage for the environment and social aspects to impose, given that their respective loan was fully disbursed even before the Plant was commissioned in November 2018.

⁶ “Technical Health, Safety, and Environment Red Flag Audit.”

B. Monitoring of the Bank Management Action Plan of February 2019

5.4. **Issues No. 1 and 2: Land disputes as a result of the PAPs affected by the project site (Minam) and coastal erosion, as well as the PAPs affected by coastal erosion in the Bargny Municipality:** *CES is required to report to the Bank on a semi-annual basis.*

5.4.1. The above two issues still persist and no adequate solution has been envisaged in the short- or mid-term. CES was paralyzed by its management and technical problems, and the Bank Management could not take any action because it unilaterally suspended reporting on such activities in February 2019 because the Plant was in repair. The IRM Monitoring Team updated the information as follows:

- a) Separate meetings with the two Requestors, PAP representatives, and the representatives of the Elders of Bargny and Minam indicated their total disapproval of this Project and requested that the Plant should be shut down indefinitely based on the arguments presented to the Lenders in March 2019 (see Table 2). Their frustration due to the inaction by the local government was very high, especially because they had not been consulted and that the Mayor of Bargny and the Prefect of Rufisque did not meet with them.
- b) The Requestors maintained that compensation should be provided in terms of land for those that had houses in the buffer zone as well as for those that are affected by coastal erosion. The Requestors stated that a survey of the buffer zone by the Bargny and Minam municipalities showed that 350 persons are affected in Bargny and 120 persons in Minam. In addition, 1,400 inhabitants are concerned, of which 700 are affected by coastal erosion.
- c) Representatives of the PAPs maintained that “the administrative certificate related to the conditions of the occupation of building (*certificat administratif relative aux conditions de l’immeuble*)” is considered as an act of title. This interpretation was rejected by both the Mayor of Bargny and the Prefect of Rufisque during their meeting with the IRM Monitoring Team. Both maintained that this certificate provides them with the right to occupy (*usufruit*) the land which is public and belongs to the state .
- d) Contrary to what was stated in the Action Plan, SENELEC made a contribution of CFCA 1 billion (USD 1.69 million)—and not CFCA 2 billion —supposedly to resettle 100 families impacted by coastal erosion in a new 183 ha allotment, Ville Verte. The Prefect of Rufisque acknowledged the allocation of this fund, indicating that the Monitoring Committee which he presides has received 1,200 requests for reallocation because of coastal erosion. Further investigation by the Prefect of Rufisque Monitoring Committee showed that only 200 persons qualify. However, no construction is underway because of the delay of the rebidding process. CES did not contribute to this fund.
- e) In addition to the persons affected by coastal erosion, the Requestors also stated that some houses exist in the buffer zone in addition to the site for fish drying by the *femmes transformatrices*. The CES and SENELEC stated that at the time of the land purchase by CES in 2008, there were no persons occupying the 29 ha of land. However, in 2010, eleven houses were constructed within the buffer zone of 9 ha belonging to the state, as well as 21 parcels had been partly constructed. This is in addition to the site for fish drying in which 1,000–1,300 women are using to date.
- f) Furthermore, the Bank Country Manager sent a letter in February 2019 to SENELEC requesting an update on the resolution of the land issue, which was not answered.

5.4.2. It is the opinion of the IRM Monitoring Team that the land issue is unlikely to be resolved in the short- or medium- term, and should no longer be monitored by the Bank for the following reasons:

- a) The Bank, under the pressure from the Requestors, got involved into a potential reallocation of the persons affected by coastal erosion, an issue that is totally unrelated or impacted by the Project. Coastal erosion is a natural phenomenon, including climate change, affecting coastal communities and areas not only in Bargny, Minam, and Senegal, but existing along 2,186 km of coastline, including in Benin, Cote d'Ivoire, Mauritania, São Tomé and Príncipe, Senegal, and Togo. Coastal erosion is transboundary in nature of the large marine ecosystems, and has become a regional development issue requiring multi-sectoral solutions.
- b) Mitigation and remediation of coastal erosion are therefore the responsibility of the Government, and national physical and social investments should be left to the Government separately from the Bank Project. In fact, in April 2018, the World Bank approved the West Africa Coastal Area (WACA) Project, a package of USD 210 million in financing to build the resilience of coastal communities in Benin, Cote d'Ivoire, Mauritania, São Tomé and Príncipe, Senegal, and Togo.⁷ With such funding envisaged, the AfDB Management should consider potentially joining the GEF, GEF France, and the International Development Association (IDA) in co-financing with the World Bank such regional programs, with an emphasis on those coastlines where its projects are being implemented.
- c) Concerning the persons living on the buffer zone, it is the understanding of the IRM Monitoring Mission that such buffer zones are necessary to protect the public from the harmful effects of high consequential accidents resulting from the Power Plant. The buffer zone defines the fenced area of the Plant, the Power Plant area, and the public area. The AfDB Involuntary Resettlement Policy (2003) does not apply to persons that have occupied public land in the buffer zone (which is considered to be an area of influence of the Project), given that the land was sold and titled to CES in 2008 and that these persons occupied the land in 2010. These persons should not be compensated as per the AfDB Involuntary Resettlement Policy (2003). However, the site used by the *femmes transformatrices* for fish-drying activities existed long before the selling of the land and, as explained in the next section, the women are entitled to compensation measures.
- d) The IRM Monitoring Team has determined that there is no short-term adequate solution that can be implemented in the near future as the management of coastal ecosystems is complex and requires coordinated and integrated planning at the local, regional, and national levels—which is inexistent at present. Furthermore, the Mayor and/or the Prefect are presently unable to cause the removal of the persons living in the buffer zone, though the lack of such enforcement would constitute a liability to CES in the event that potential consequences of accidents occur at the Power Plant.

5.4.3. The IRM Compliance Review Report did not take rightly so a position concerning the non-compliance of the Sendou Project with the AfDB Involuntary Resettlement Policy (2003), but instead requested the Bank Management to become involved and actively support the process of relocation as part of the Bank's moral responsibility and reputation. Consequently, the role of the Bank Management is likely to be limited to "ticking the box" for monitoring an uncertain progress with no short- or medium-term solutions on the ground. **The IRM Monitoring Team strongly recommends that, given the actual situation faced by CES—the under-funding provided by**

⁷ <https://www.worldbank.org/en/news/press-release/2018/04/09/world-bank-board-approves-west-africa-coastal-areas-waca-resilience-investment-project>

the Government for the relocation of people, the availability of WACA funds for remedying the coastal erosion, and the lack of compliance and enforcement in the buffer zone—the Bank management should no longer be responsible for monitoring this issue.

- 5.5. **Issue No. 3: Women who dry fish (*femmes transformatrices*) in the buffer zone:** *CES to submit an indicative work schedule by the first quarter of 2019 for maintaining the existing site and modernizing the fish-processing facility.*

A. Findings

- 5.5.1. There has been little progress towards addressing this issue. In the interest of forging solid relationships with local communities, CES has verbally committed to allowing the *femmes transformatrices* to stay for as long as they wish to pursue their activities on the Khelcom site. However, CES has not yet submitted a work schedule concerning the establishment and operations of the fish-processing facility situated in a non-coastal site.
- 5.5.2. The IRM Monitoring Team met with 37 representatives of the *femmes transformatrices* (estimated at 1,000–1,300 women) who bitterly complained about the status quo of the establishment of the Power Plant, which they wanted closed. They numerated a series of adverse impacts related to the pollution created by the Plant, and in particular, by the coal and the ash dust, which would affect their health, such as lung disease, burning sensation on the skin, and depigmentation of the exposed areas. The plant will discharge untreated waste water to their sites, which along with the prevalence of coastal erosion and the flooding during the rainy period (July–October), will result in a decrease of fish catches, that will in turn lead to a decrease in their revenues.
- 5.5.3. The *femmes transformatrices* were aware that the Bargny Municipality will be establishing a modern fish-processing facility in a non-coastal site outside Khelcom. The women have objected to this site because it is far from the sea. However, drawing plans and specifications for the processing facility were prepared by a consulting firm the Sénégalaise D'Études et d'Entreprises Général, and were shown to the IRM Monitoring Team. The processing facility will be partly financed by SENELEC, which has already provided a contribution of CFCA 100 million (USD 170,000).
- 5.5.4. In its meeting with the Mayor of Bargny, the IRM Monitoring Team was informed that the construction of the facility started four months ago. However, the SENELEC contribution of CFA 100 million will only benefit 25% of the women, and additional financing was not made available by CES as required in the tripartite protocol between CES, SENELEC, and the Municipality of Bargny.
- 5.5.5. One of the Requestors, the Lumière Synergie pour le Développement, published a study entitled “Qualitative study on the impacts linked to the coal power plant on the fish processing site “Khelcom” in Bargny Guedj.”⁸ The study, undertaken by Engineer Bassirou Ndiaye, described the issue related to the *femmes transformatrices*, their “cohabitation” with the Power Plant, a detailed synthesis of the study related to the lack of adequate measures, the source and management of the conflict, the responsibility of the public authorities, community participation, as well as a global perception of the success, failures, and recommendations.

⁸ B. Ndiaye, « Etude qualitative Sur les des impacts lies à la centrale à charbon sur le site de transformations poissons "Khelcom" de BARGNY GUEDJ, Rapport Final 2018 »

- 5.5.6. While waiting for an alternative solution for resolving the outstanding issue of the *femmes transformatrices*, it is still possible to ensure a peaceful and secure environment via the following measures:
- (i) Taking security measures to protect people and property, including:
 - The establishment of first aid health infrastructures
 - The modernization of the site including the unambiguous delimitation of areas and the areas of action of each party
 - The closure of the open channel through which the Plant's wastewater passes, which periodically overflows to flood the products
 - The solution to the question of women who are expropriated and who are forced to stay near their place of work
 - (ii) The initiation of strong measures to establish a permanent dialogue, in particular:
 - The establishment of a local monitoring committee
 - Holding regular meetings
 - Recognition of leaders chosen by women as interlocutors, as the authorities are tempted to rely on a group of less demanding women to lead the operations; however, such an attitude will only delay the problems and difficulties
- 5.5.7. Based on the above and after visiting the Khelcom site, the IRM Monitoring Team has determined that there has not been sufficient progress towards finding an alternative solution to the *femmes transformatrices* which would require, in the short term, to protect them against all sorts of pollution—including the pollution created by the fish-drying process (see below)—as well as to determine the type of compensation that CES should provide as a result of their potential economic displacement.
- 5.5.8. In fact, based on their visit to the site, the IRM Monitoring Team found that the process of fish-drying represents a serious pollution issue that could affect not only the health of the women but also the workers of the Plant, as well as contribute to the polluting of the beach. Part of the process consists of stripping and cleaning of the fish, of which the waste is thrown back into the sea; and the fish-drying process consists of burying the fish in pits covered by peanut shells and cardboards that are burned for three days, producing thick ground-based smoke (Figure 1) that is inhaled by the women themselves. Peanut shells are known to be extremely inflammable, providing a good blaze, and as a result its burning emits carbon monoxide, nitrous oxide, and methane. It is interesting to note that the complaint made by the women and the Requestors did not address this serious pollution issue for which these women are exposed to daily, but attributed all the health impacts to the Power Plant which has been inoperational since July 2019 .
- 5.5.9. There are also persistent gaps in the establishment and operations of the new modern fishing facility: notably a lack of consensus among the women to relocate to a non-coastal site; lack of financing to accommodate the 1,000–1,300 working women; and the lack of available information on the ownership, management, operations, and maintenance costs of this facility. All these issues should be addressed in a document that should be shared with the representatives of this community as there is a risk that the construction could be completed without ensuring its proper operation and maintenance.

B. Recommendations

5.5.10. Based on the observations, the IRM Monitoring Team recommends the following:

- a) The Bank Management should ensure that CES and SENELEC, as part of their corporate social responsibility (CSR), address the most pressing issue, namely: the health of the people impacted by the emissions of the plants (once in operation) and by the pollution created from the fish-drying process. This would require:
 - Providing masks, gloves, boots, and emergency shelters to all the women that are on the Khelcom site during the burning phase for the fish-drying process.
 - Establishing an alert and security system for any fatal incidents that may occur in the Sendou Plant.
 - Providing first aid health assistance by CES, which should immediately reestablish the health facility and ambulance, neither of which are currently operational as stated in the Technical Audit Report ⁹ and as observed by the IRM Monitoring Mission.
 - Conducting a comprehensive medical checkup, including X-rays of lungs for all the women using this facility and maintaining a medical register for each.
 - Requesting the assistance of the Food and Agriculture Organization of the United Nations (FAO) through a request by the Government of Senegal to train the women on different methods of fish-drying, which would substitute for the combustion of peanut shells.
- b) The Bank should subsequently cause SENELEC and CES to finance a comprehensive retrospective health impact assessment study to respond to the concerns of the inhabitants of the Bargny Municipality on the health impacts resulting from all the point sources (such as the Sendou Power Plant, the SOCOCIM cement factory, the dry fishing combustion, and non-point sources of pollution such as traffic). CES financed a study¹⁰ in 2014 on the dispersion modelling of pollutants from coal-fired steam generators and its health effects, and determined—based on theoretical modelling—that the Sendou Power Plant is not expected to affect public health. Now that the Plant has been constructed and commissioned in November 2018 (four years after the study), this study has been overtaken by events as it was focused on the impact of the Sendou Power Plant and did not take into consideration the cumulative impact of actual pollution emissions from all point and non-point sources.
- c) CES should provide to the Bank by no later than August 2020 an indicative work schedule and progress made on the above IRM recommendations as well as for the type of compensation required for the potential relocation of the *femmes transformatrices*.

⁹ “Technical Health, Safety, and Environment Red Flag Audit.”

¹⁰ Fluidyn France, “Dispersion modelling of pollutants from coal fired power ad health effects associated,” Aug. 2014.

Figure 1: Fish-drying activities on the Khelcom site in the buffer zone.¹¹



- 5.6. **Issue No. 4: Livelihood Support Measures:** *Support the Bargny Municipality through the Social Action Plan:* CES to report on implementation of status report on semi-annual basis from the resumption of operations of the Plant until its completion.

A. Findings

- 5.6.1. There has been little progress by CES in addressing this issue. The Social Action Plan was presented in the form of a tripartite Memorandum of Understanding (MOU) signed in 2017 between the Municipality of Bargny, CES, and SENELEC.¹² This MOU, which includes the implementation of eleven projects with an estimated investment of USD 168,000 and CFCA 98,784,000 during the construction phase, and seven projects during the operational phase of the Power Plant, has not been implemented as agreed upon. The implementation status of these projects has not been reported by CES as required, but were partly mentioned in the Bank BTOR dated November 2018, which indicated that the implementation of the actions is progressing very slowly. In this BTOR, the Mayor of Bargny had been skeptical that these actions would be implemented. Since the November 2018 reporting, no progress has been made in implementing the projects under the MOU. The status of implementation as noted by the IRM Monitoring Mission is as follows:

¹¹ « Etude qualitative sur les impacts liés à la centrale à charbon. »

¹² *Protocole D'accord Tripartite, Commune de Bargny, Compagnie d'Électricité du Sénégal, SENELEC, 2 Mars 2017* (Tripartite Memorandum of Understanding, Municipality of Bargny, Senegal Electricity Company [SEC], National Electricity Company of Senegal [SENELEC], 2 March 2017).

Table 3: Status of Implementation of the Tri-partite Memorandum for Understanding

Projects	Status of Implementation
CONSTRUCTION PHASE	
1. Compensation paid to the parcel owners in Minam I and II	NOT IMPLEMENTED
2. Partnership in the establishment of the “Enterprise House”	NOT IMPLEMENTED
3. School supplies for the Bargny schools	IMPLEMENTED for 2018
4. Construction of a school in Bargny	NOT IMPLEMENTED
5. Modernization of the fish-drying facility on the site between Bargny and Minam	NOT IMPLEMENTED
6. Study for the construction of the draining system for rainwater in Minam and Bargny	NOT IMPLEMENTED
7. Study for the construction of a brick-making unit for the ash	NOT IMPLEMENTED
8. Sponsoring of football tournaments and support to environmental associations	NOT IMPLEMENTED
9. Local employment by CES with priority given to Bargny and Sendou	IMPLEMENTED
10. Visit to a coal power plant in Morocco	IMPLEMENTED
11. Study for the substitution of coal with gas	NOT IMPLEMENTED
OPERATIONAL PHASE	
1. School supplies for the Bargny schools	NOT IMPLEMENTED
2. Modernization of the fish-drying facility on the site between Bargny and Minam	IMPLEMENTED partially. Drawings were completed, tender was issued, and construction started four months ago.
3. Construction of the draining system for rainwater	NOT IMPLEMENTED
4. Construction of a brickmaking unit for the ash	NOT IMPLEMENTED
5. Sponsoring of football tournaments and support to environmental associations	NOT IMPLEMENTED
6. Rehabilitation of the municipal stadium	NOT IMPLEMENTED
7. Construction of a footbridge between Bargny and Khelcom	NOT IMPLEMENTED

B. Recommendations

- 5.6.2. The IRM Monitoring Team recommends that the tripartite MOU should be revised and updated in view of the changes in the CES governance and the completion of the construction phase. This MOU should reflect (a) the priority of actions to be **REALISTICALLY** implemented during the operational phase; (b) the responsibility of each of the three partners with the actual funding provided; and (c) a realistic schedule of implementation. Furthermore, a tripartite meeting should occur semi-annually and reporting to the Bank and the partners should be carried out semi-annually by CES.
- 5.7. **Issue No. 5: Ash management:** *Prepare an ash management plan for temporary storage and final disposal:* The Bank will review technical specifications and monitor effective transportation and/or disposal.

A. Findings

- 5.7.1. This issue has not yet been addressed. Ash management is basically absent and its temporary disposal is technically and environmentally inadequate. CES did not prepare an update for the ash management plan of 2014, which had described different options and requirements for ash management but had not specified which one will be pursued. As such, CES failed to address the proper impoundment of the temporary disposal facility and has not yet begun the construction of a new site. Furthermore, the feasibility study for the brickmaking facility has also not started.
- 5.7.2. A contractual agreement was reached in October 2017 with SOCOCIM to take all the ash. SOCOCIM would be responsible for the collection, transportation, and use of 115 to 175 tons of ash per day. The contract covers a period of twenty-five years. CES installed a 700 ton silo for the ash, which would be continuously collected by 5 to 6 SOCOCIM trucks each day. SOCOCIM has a 1,500 ton silo for the storage of ash on site. At present, there is no regular pick-up by SOCOCIM given that the Plant is not operational and, as such, the ash has accumulated in a totally inadequate site near the coal storage facility. An updated ash management plan has not been prepared that would address in detail how the ash produced will be disposed, including a secure temporary reserve storage facility on site and a final disposal site.
- 5.7.3. The Sendou Plant is supposed to generate 52,000 tons of ash per year (i.e. 150 tons per day) for a period of 25 years. In its BTOR of 13-15 November 2018, Bank staff had reported that CES would provide the Bank with information on the storage and disposal of the ash from the Power Plant on a semi-annual basis. In its BTOR of February 2019, Bank staff had stated that CES would start the development of the ash disposal site in the surrounding quarries identified and for which an authorization had been obtained. The development would include waterproofing with a geomembrane recovery of runoff water. This work was expected to be completed in the second quarter of 2019. Despite the temporary planned shutdown, CES would take necessary actions to pursue the implementation of these activities listed under the Action Plan. In its BTOR of March 2019, Bank staff indicated the commitment of the then major shareholder, QP, for the completion, testing, and full commissioning of safety and environmental control systems, including fire protection, lifting equipment, and ash and water discharge. This did not happen and no reporting was made by the Bank thereafter.
- 5.7.4. In September 2019, the draft Technical Audit Report¹³ conducted an assessment of the ash- and coal-handling, which was limited to visual inspection in stand-still, analysis of past performance measurements, and reports and interviews with site staff. The auditor found an unacceptable level of ash leakage due to a malfunctioning fly ash system, and that the root cause was the improper design of the transport system that was sensitive to leakages, and the improper design of the silo.
- 5.7.5. The IRM Monitoring Team visited the temporary onsite ash facility and found it totally inadequate as shown in Figure 1. The ash was spread unevenly all over the area near the coal storage, with some areas infiltrated by water. The whole temporary disposal facility is in fact an uncontrolled open dump site with no housekeeping at all, as shown in Figure 2.

¹³ “Technical Health, Safety, and Environment Red Flag Audit.”

Figure 2: Temporary ash disposal facility



- 5.7.6. Concerning the final ash disposal site, a study on the technical and environmental validation of the rehabilitation of the quarry as the ash storing facility for the coal power plant was conducted in November 2017.¹⁴ The study is comprehensive and includes an impact analysis as well as an Environmental and Social Management Plan (ESMP).
- 5.7.7. In February 2019, a report on the implementation of the ash disposal facility was prepared,¹⁵ which included some of the content of the environmental validation study. The report provides for the construction and operation of a sanitary landfill, which is a carefully designed and monitored structure that isolates the ash from the surrounding environment (e.g., groundwater, air, rain) with a bottom geomembrane and a layer of clay. The landfill will occupy an area of 68,208 m² and is designed to store 53,000 tons of ash per year in separate cells. The landfill can be constructed in 10 weeks at an estimated cost of CFCA 143.35 million (USD 240,000). CES obtained the approval of its construction in April 2019 from the Environmental Agency [Direction of Environment and Classified Establishments (DEEC)]. The site was planned to be completed in June 2019 as reflected in the Bank update of the Revised Management Action Plan; however, this did not happen. The IRM Monitoring Team also visited the potential site for the final ash disposal. It is an ancient quarry inside the buffer zone, which has not been developed yet and is still full of rainwater and bushes (Figure 3). CES claims that it has obtained authorization for the construction, although there was no apparent plan for starting the construction of this facility.

¹⁴ Mamadou Dia, « Rapport D'étude Pour La Validation Technique Et Environnementale Du Projet De Rehabilitation Des Carrieres Avec Les Cendres De La Centrale A Charbon, » Nov. 2017.

¹⁵ Mamadou Dia, « Plan d'exécution des points de stockage des cendres dans la zone de servitude de la Centrale, » Feb. 2019.

Figure 3: Potential site for the final ash disposal facility



B. Recommendations

5.7.8. The IRM Monitoring Team considers that the mishandling of ash and poor disposal pose serious environmental risks and health impacts. Remedying this situation should be a major priority that CES should address even when the Plant is not operational. The Bank Management should ask CES to submit to the Bank within the next six months:

- a) An update of the ash management plan of 2014, which should be reviewed by the Bank
- b) A revised schedule for the construction of the new ash disposal facility
- c) CES should also carry out a total retrofitting of the temporary ash disposal facility into a landfill facility in accordance with international standards

5.8. **Issue No. 6: Coal transportation from Dakar to Sendou:** *CES to update the operational ESMP and obtain a certification of ISO 14001 or OHSAS 18001.*

A. Findings

5.8.1. This issue was partly resolved. CES has prepared and updated its traffic management plan and its environmental and social management and monitoring system as required in the IRM Compliance Review Report. However, the certification of ISO 14001 is still pending as the plant operator has demobilized and the Plant is still not operational.

5.8.2. In 2017, CES developed an Environmental and Social Management System (ESMS) based on ISO 14001 and OHSAS 18001 standards. The ESMS had stated that operational procedures were underway, and the certification process was to be initiated by the operator, SPIE/EDF, at the end of 2019 with an expected certification approval by 2020. This did not happen as SPIE/EDF demobilized in November 2019.

5.8.3. In September 2019, the Energy Consulting Group submitted a draft Technical Health, Safety, and Environment Red Flag Audit Report to SENELEC. The Report classified traffic management as a medium of non-compliance since traffic signalization on site is not clearly marked.

- 5.8.4. The IRM Monitoring Team did not focus on traffic management during the transportation of coal from the Dakar Port to the site of the Sendou Project because the Plant was not operational.

B. Recommendation

- 5.8.5. The IRM Monitoring Team recommends that the ESMS should be made public on the SENELEC website until such a time when CES will have its own website so that the Requestors can review the remedial measures for traffic management.

- 5.9. **Issue No. 7: Marine impact and water quality:** *Conduct a baseline study on marine resources at the cooling water sampling and discharge point by June 2019 and regular sampling of marine surface and underground water annually from the resumption of operation.*

A. Findings

- 5.9.1. Despite the statement made in the Bank BTOR of February 2019 that CES would pursue the implementation of these activities during the Plant's shutdown, no action was taken. There is, therefore, non-compliance with the actions required in the Revised Management Action Plan for both the marine resources and the water and wastewater quality, for which the Technical Audit Report had recommended to close the Plant until rectified.¹⁶
- 5.9.2. The IRM Compliance Review Report recommended that a baseline survey of marine resources in the sea area adjacent to the Plant should be prepared if CES will install a closed cooling system. In fact, CES has installed a closed circulation system. As a result, the discharge system will return a small amount of water into the sea to maintain the water quality flowing through the condenser.
- 5.9.3. In October 2017, CES prepared an addendum to the marine impact study,¹⁷ which included a baseline of the marine environment, the environmental conditions of the marine environment, as well as the potential impacts of the marine environment, marine resources, and the socio-economic conditions—which were very general. The analysis of the environmental impacts of the cooling circuit on the marine environment performed in this Report shows that these are almost insignificant. Based on the recommendations of the updated impact study, CES prepared an implementation plan that would indicate that the baseline survey (fishery resources and benthic fauna) will be done prior to the commissioning of the Plant, which did not happen. In addition, the monitoring of the benthic fauna would be done 1 year after the commissioning of the Sendou Plant, which again did not occur, and that the monitoring of fishery resources will be conducted every two years.
- 5.9.4. In the BTOR of November 2018, it is stated that the “project implemented a semi-closed circuit cooling system with a discharge of 800 m³/h. The water at the outlet is -1° C lower than the standard set by the World Bank, which is -3° C.” The report also indicated that CES would submit in the first quarter of 2019 a study on the impact of the discharge of cooling water on groundwater, surface water, and marine water, which was not provided in the addendum to the marine impact study. This study has not yet been submitted. The Technical Audit Report¹⁸ of September 2019 has therefore determined a high level of non-compliance for the lack of monitoring of the marine ecosystem.

¹⁶ “Technical Health, Safety, and Environment Red Flag Audit,” p. 55.

¹⁷ Anis Diallo, ENVOCEAN SARL, “Marine Impact Study,” Oct. 2017.

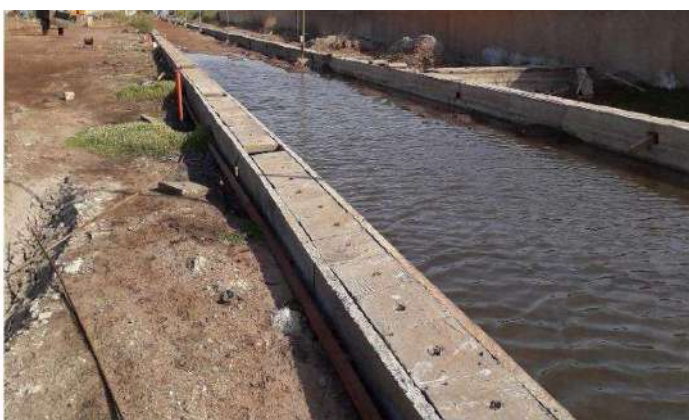
¹⁸ Technical Health, Safety, and Environment Red Flag Audit,” p. 60.

- 5.9.5. Concerning the wastewater and water quality, the Technical Audit Report has also determined that there is a high level of non-compliance.¹⁹ There is no treatment plant, no sampling of wastewater quality before discharge, and no treatment of wastewater before discharge. On 19 February 2019, following the request of a non-profit organization, the Henry Boelle Foundation, the result of the chemical analysis (see Annex 4) of the wastewater was undertaken by the Laboratoires d'Analyses et d'Essais. It showed that the effluent is loaded with total organic matter with very high chemical oxygen demand (COD) of 1,737 mg/l (the standard being 200 mg/l) and total suspended solids (TSS) of 734 mg/l (the standard being 50 mg/l), also indicating non-compliance with water discharge standards. A decrease of these elements could be undertaken by a decantation/filtration system in the sewerage collection basin, which during the visit of the IRM Monitoring Mission was not working, causing an overflow of the sewerage on the road as shown in Figure 4. In fact, the same collector is used for rainwater drainage and sewage disposal and there is no drainage run-off, causing water stagnation on the site.
- 5.9.6. The Technical Audit Report²⁰ on water quality stated that the water team cycle was also out of specification and was found to be too acidic as recorded manually (Figure 5). This could cause over time corrosion within the boiler and turbine, ultimately leading to fatal equipment failure. In addition, the water demineralization plant²¹ was found to be poorly designed, with poor condition of the equipment and dangerous manual manipulation of chemicals, causing spilling and representing significant danger for staff and equipment.

¹⁹ Idem., pp. 55-56.

²⁰ Ibid.

²¹ Idem., p. 34.

Figure 4: Overflow of the sewerage collection basin**Figure 5:** Manual recording of water

Date: 24/08/19
Heure: 10h30
Prélevé par: ACIL/EEHaf

Paramètres chimiques	DRLM-DM Tank	Saturated steam MB-2	Superheated steam Deaerator	Reheated steam Cond	Feed water
pH	4.80	4.46	7.73	4.55	
Conductivité int. (µS/cm)	0.8	0.8	22.3	30.4	
Silice (ppm)	0.089	0.016	0.425		
Fe (ppm)	0.0	0.0	3.55	10.65	
Hydrazine					

B. Recommendation

- 5.9.7. The IRM Monitoring Team recommends that Bank Management should formally inform SENELEC and CES within two months of the approval of this Report by the Board, that the Plant should not operate again unless evidence and a plan is provided in which the ecosystem will be monitored and that the water drainage system and wastewater treatment system will be fully functional.

- 5.10. **Issue No. 8: Water supply from the public network:** *Mobilization of funding during the plant operation for the construction of a desalination plant for EUR 3 million*

A. Findings

- 5.10.1. There is no progress made on the implementation of this action because CES is in a serious financial crisis. The BTOR of November 2018 stated that “the monthly water consumption from the public service was 1,500m³ in June 2018 and 1,250 m³ in October 2018; the freshwater supply solution is temporary, but the problem could arise due to the country's structural deficit until 2030.” By assuming that the yearly consumption of the Plant could attain 20,000 m³/year as a result of the construction of the closed cooling system, such consumption is much less than what the Requestors have indicated in their reply to the Management Action Plan, which is 4.12 million m³.
- 5.10.2. The fact that the Action Plan proposed the construction of a desalination plant without requesting that a feasibility study and an ESIA be undertaken is a matter of concern to the IRM Monitoring Team, because such installations require not only funding but management and operation by an experienced external operator.

B. Recommendation:

- 5.10.3. The IRM Monitoring Team believes that the fundraising of a desalination plant during the operation of the Plant is premature in the absence of water balance of water resources at the level of the Bargny Municipality. The IRM Monitoring Team recommends that before undertaking such a possibility, a full water balance with a 25-year projection be undertaken by CES in cooperation with the Municipality of Bargny and SENELEC, as well as develop alternative options with the related costs.

- 5.11. **Issue No. 9: Emission inventory and air quality monitoring:** *CES should submit a semi-annual report to the Bank on the air quality monitoring system as of October 2018.*

A. Findings

- 5.11.1. No reporting was submitted by CES as required. The Bank in its BTOR of November 2018 had stated that "... a continuous monitoring system in the chimney should be installed to control the release of the various gases (Sulfur Oxides - SO²; Nitrogen Oxides - NO²; Carbon Monoxide - CO). In addition, for air quality, monitoring is scheduled to start 3 months after the start of operations. The results of the air quality monitoring will be provided to the Bank on a semi-annual basis." No subsequent reporting was provided in the Bank's BTOR of February 2019 and May 2019, probably on the grounds that the Power Plant was not fully operational.
- 5.11.2. Because of the Plant shutdown, the IRM Monitoring Mission could not verify the air emissions and the ambient air quality; although CES verbally maintained that based on its atmospheric emissions air quality management plan,²² it had complied with the emissions and ambient air quality standards based on its 10 passive receptors and the continuous air monitoring station in the Minam school. However, no report on each of the topics was provided in the Action Plan.²³
- 5.11.3. The IRM Monitoring Mission has to rely instead on the draft Technical Audit Report, which stated that with respect to particulate matters,²⁴ current emissions of suspended particulate matter (SPM) are frequently above World Bank standards of 50 mg/Nm³. Sometimes, the SPM reaches up to 400 mg/Nm³ because:
- Ash/dust is the main root cause for the high SPM values
 - Transfer of ash in dump trucks (open) and storage inside the Plant results in air pollution by fine dust, especially in dry and windy conditions
 - Recurring technical problems with the electrostatic filter (ESP) often forces the operators to dump the ash on the ground by opening the hoppers, leading to consequent air pollution by fine dust and the risk of occupational diseases for the exposed personnel
 - Poor quality of fly ash that is not recovered by SOCOCIM has to be stored on-site
- 5.11.4. SO² emission was also an issue during the first three months of 2019, but it was successfully reduced to compliant emission limits by purchase of coal with low sulphur content. Table 3 provides an overview of the exceedance of air quality measurements.²⁵

²² CES, "Atmospheric emission and air quality management plan for SENDOU Coal Power Plant," Oct. 2017.

²³ *Idem.*, p. 17.

²⁴ "Technical Health, Safety, and Environment Red Flag Audit," pp. 53-54.

²⁵ *Idem.*, p. 54.

Table 4: Exceedance of ambient air quality measurements

% of the time exceeding the Alarm Limit	suspended particulate matter - SPM(mg/Nm3)	Carbon monoxide- CO(mg/Nm3)	Nitrogen Oxides- NOX(mg/Nm3)	Sulfur dioxide- SO2(mg/Nm3)
Alarm Limit	50	200	510	1500
March	15%	0%	0%	99%
April	27%	0%	0%	62%
May	18%	2%	0%	27%
June	47%	1%	0%	0%

5.11.5. With respect to emissions²⁶ from the stack, the Technical Audit Report noted that “the control of atmospheric emissions from the Plant is difficult and even impossible because an opacimeter and a gas analyser have already been on the chimney for monitoring the pollutants emitted (SO_x, NO_x, CO, PM). The equipment installed on the chimney is currently inaccessible because the elevator to the chimney (height of 150 m) is not functional because of its non-certification by an accredited body. This does not allow access to equipment and therefore reliably check and monitor the air emissions of the plant.” Based on these findings, the audit report recommended that the Plant be closed until the deficiency of the air quality management system be rectified.²⁷

B. Recommendations:

5.11.6. The IRM Monitoring Team has determined that based on the above findings, there is non-compliance with the monitoring of ambient air quality and stack and diffused emissions. The IRM Monitoring Team recommends that the ambient air quality monitoring as well as air pollution from stack emissions be carried out by a third independent party. The independent party should be a LTA during the operational phase as the LTA for the construction phase (WSP) is no longer available.

5.11.7. Furthermore, in order to address the concern of the Requestors that the pollution originating from the Plant is the major cause of health deterioration, the IRM Monitoring Team cannot assess with certainty that the air emissions are solely to blame for the negative impacts on the health of the population since all previous air quality analyses were carried out on theoretical modelling using anticipated air emissions. Now that the construction of the Plant is completed and the Plant was intermittently in operation, the emissions from the Sendou Power Plant can be monitored and measured. The only method to determine the impact of the coal power plant emissions is to conduct an emissions inventory from all point and non-point sources of pollution at the level of the Bargny Municipality with key parameters—including particulate matters (PM_{2.5}, PM₁₀), sulfur dioxide (SO₂), nitrous oxide (NO_x), carbon monoxide (CO), carbon dioxide (CO₂), and mercury (Hg)—so as to determine the percentage contribution from these various sources to the ambient particulate pollution. Combined with the health assessment that the IRM Monitoring Team recommended in issue 2 above, a determination of the health impact could be deducted. Such an approach is costly and should be carried out whenever the Plant is in full operation.

²⁶ Ibid.

²⁷ Idem., p. 53.

- 5.12. **Issue No. 10: Noise Impact Assessment:** *Submit an annual noise monitoring report at the start-up and during operations.*

A. *Findings*

- 5.12.1. The Bank BTOR of November 2018 had stated that the noise performance tests were underway to measure the real level of noise in accordance with the requirements of the environmental permit and the ESMP. Semi-annual monitoring reports would be provided to the Bank. These monitoring reports were not submitted to the Bank and the IRM Monitoring Mission could not find any evidence for the noise tests because the Plant has been shut down since July 2019.

6. General Conclusions

- 6.1. The IRM Monitoring Team has determined that there has been very limited progress on the ground to implement the Revised Bank Management Action Plan. The situation has been aggravated by the fact that (a) the Sendou Power Plant has not been in full performance and capacity since its first commissioning in November 2018, and is now shut down since July 2019; (b) the CES is in serious debt and the shareholders have not reimbursed the Lenders as per the terms of the Loan Agreements; (c) The major shareholder, QP, withdrew from the Project in November 2019 and its operator, SPIE/EDF, was demobilized. Discussion with the chairman of Nykomb Synergetics indicated that his company is taking over the management of CES and has rehired the local staff which operated the Plant under SPIE/EDF. However no formal evidence was provided from this takeover and no date was fixed for the reopening of the Plant.
- 6.2. The Requestors continued to oppose the Project and reacted in writing to the update of the Revised Management Action Plan of February 2019, maintaining their positions that the Plant is not in compliance with the Bank's environmental and social policies. There was no response to their complaint.
- 6.3. The draft Technical Health, Safety, and Environment Report, which was submitted to SENELEC in September 2019, is still under examination by SENELEC. The conclusion of this Report is that "the technical condition of the Sendou Power Plant is not permitting reliable long-term operation. The Plant is suffering from numerous short cuts taken during construction and commissioning." The Audit Report identified a total of 25 high priority corrective actions requiring a budget of approximately EUR 31 million and taking 10 months from the moment the funding is secured.²⁸ The Bank also requested in its June 2018 supervision mission that an independent audit on equity injections (sources and uses) be undertaken. This audit has not yet been done.
- 6.4. All the above recent events add up to the very serious concern, which is that ten years from the date of approval of the loan by the Bank, Senegal is still deprived from an additional contribution of 40% of its electricity. This certainly poses a reputational risk for the Bank given that the Bank does not have any operational leverage related to environment and social aspects, because its loan was disbursed fully even before the Plant was fully constructed.
- 6.5. The IRM Monitoring Mission maintains that the Sendou Project is non-compliant with the AfDB Involuntary Resettlement Policy (2003) on several accounts:

²⁸ Idem.

- (i) No indicative work schedule was submitted by the first quarter of 2019 for maintaining the existing site and modernizing the fish-processing facility for the women that carry out fish-drying activities on the buffer zone (*femmes transformatrices*).
 - (ii) No baseline study was done to determine the number of the *femmes transformatrices* and the income they derive from their fish-drying and -packaging businesses in the buffer zone;
 - (iii) The social action plan in the form of a tripartite MOU signed in 2017 between the Municipality of Bargny, CES, and SENELEC has not been adequately implemented. Out of the 18 projects, only the visit to the Moroccan power plant, the drawings of the modernization of the fish-drying facility, providing supplies to the Bargny schools, and providing local employment were implemented or partly implemented.
- 6.6. There is also non-compliance with the AfDB Policy on the Environment (2004) on several accounts:
- (i) No update on the marine impact assessment has been conducted, and the wastewater and drainage water are not treated before discharge.
 - (ii) No adequate ash management plan has been prepared; in fact, the temporary ash facility on-site is an open dump site.
 - (iii) The mobilization of funding during the Plant's operation for the construction of a desalination plant for EUR 3 million to compensate for the water supply did not take place as CES is in a serious financial situation.
 - (iv) The submission of semi-annual reports to the Bank on the air quality monitoring system as of October 2018 did not take place. No subsequent reporting was provided in the Bank's BTOR of February 2019, March 2019, and May 2019, probably on the grounds that the Power Plant was not fully operational. The independent Audit Report determined that there has been exceedance of particulate matters in the ambient air quality standards and no assessment could be made on the stack emissions as the elevator to the chimney was not working. This did not allow access to the equipment to reliably check and monitor the air emissions of the Plant.
- 6.7. There is partial compliance with the Environmental Review Procedures for Private Sector Operations (2000). Five supervision missions conducted by the Bank staff in June 2018, November 2018, February 2019, March 2019, and May 2019 were consistent with the provisions of Paragraph 44 of the Environmental Review Procedures. However, since February 2019, the Bank project supervision team did not report on the environmental and social issues related to this Project.

7. General Recommendations

- 7.1. With regards to the recommendations of the IRM Monitoring Team on how to bring the Project into compliance with AfDB policies and procedures and to remedy adverse material impacts, it should be noted that the recommendations presented below should be further detailed through a revised Action Plan to be prepared by the Bank Management. The IRM Monitoring Team suggests that such revised Action Plans should be submitted to the BCRM first before being shared with Boards of Directors. The purpose is to be able to reach joint understanding and agreement of the revised Action Plan based on the recommendations of the IRM Monitoring Report because of the gravity of the situation in this Project and its potential impact on the Bank's reputation. Thereafter, the IRM Monitoring Report and the revised Management Action Plan would be jointly presented to the Board of Directors for discussion and consideration in the same session.
- 7.2. The IRM Monitoring Team recommends to receive from Bank Management all the BTORs and the relevant documents and studies related to this Project. Considering the ongoing discussions on restructuring of the Project, the IRM should conduct its second monitoring mission in 2021.
- 7.3. Should the Sendou Power Plant continue to remain non-operational, The IRM Monitoring Team recommends that the Bank Management should prepare a Preservation Action Plan to protect the Bank assets as well as to mitigate to the environmental issues related to ash management, coal storage facility, water drainage system, the waste water treatment and smoke reduction for the women drying fish on the buffer zone .
- 7.4. In case the Sendou Power Plant will resume its operation, the IRM Monitoring Team recommends that the revised Management Action Plan to be prepared should address the following three aspects:
- (i) Governance
 - (ii) Pollution abatement and health protection
 - (iii) Social support
- 7.5. *Governance*
- 7.5.1. The Bank should clarify with the Government of Senegal and in particular with SENELEC the status of the governance of CES, specifically:
- (i) The shareholders, their respective shares, and financial contributions
 - (ii) The institutional and management structure with the appointment of new board members and a qualified plant operator
 - (iii) The financial status, obligations, and debt repayments based on a financial audit (including the CES balance sheet) that should take place within three months from the date of approval of this Report by the Board of Directors
 - (iv) The implementation of the recommendations of the Technical Health, Safety, and Environment Red Flag Audit based on a realistic action plan
 - (v) The appointment of an independent monitoring contractor to ensure full adherence to all the commitments to be made for the resumption of the operation of the Plant.

7.6. *Pollution abatement and health protection*

7.6.1. **Concerning Ash management:** The Bank Management should pursue CES to submit within the next six months:

- a) An update of the ash management plan of 2014, which should be reviewed by the Bank
- b) A total retrofitting of the temporary ash disposal facility into a landfill facility in accordance with international norms
- c) A revised schedule for the construction of the new ash disposal facility

7.6.2. **With respect to the intense smoke from the fish-drying facility,** the Bank Management should ensure that SENELEC and CES:

- Provide masks, gloves, boots, and emergency shelters to all the women (*femmes transformatrices*) that are on the Khelcom site during the burning phase for the fish-drying process.
- Establish an alert and security system for any fatal incidents that may occur in the Sendou Plant.
- Provide first aid health assistance by CES, which should immediately reestablish the health facility and ambulance, neither of which are currently operational as stated in the Technical Audit Report.²⁹
- Conduct a spot medical checkup, including X-rays of lungs among the women using this facility and maintaining a medical register for each.
- Request FAO assistance through a request by the Government of Senegal to train the women on different methods of fish-drying, which would substitute for the combustion of peanut shells.
- Submit a realistic business plan for the new fish-drying facility using the report prepared by the independent consultant for providing full access to the *femmes transformatrices*.
- In case many women refuse to relocate, consider the adoption of a livelihoods support program to compensate for loss of income resulting from the displacement.
- Finance if appropriate a retrospective health impact assessment study to respond to the concerns of the inhabitants of the Bargny Municipality on the health impacts resulting from all the sources of point (such as the Sendou Power Plant, the SOCOCIM cement factory, the dry fishing combustion, and non-point sources of pollution such as traffic).

7.6.3. **With respect to the ambient air quality and stack emissions,** the IRM Monitoring Team recommends that the Bank Management contract the services of a LTA for the operational phase to *inter alia*:

- Carry out the measurements of ambient air, stack, and fugitive emissions.
- Conduct an emissions inventory from all point and non-point sources of pollution in the Bargny Municipality so as to determine the percentage contribution from these various sources to the

²⁹ Idem.

ambient air pollution. This will address the concern of the Requestors and the Municipality of Bargny that the Sendou Power Plant is the major source of health deterioration and will provide remedial measures for all the parties generating pollution.

7.6.4. Concerning wastewater and drainage water, the IRM Monitoring Mission recommends that the Bank Management ensure SENELEC and CES take the following measures:

- Rehabilitate the water drainage system and wastewater treatment facility before the Plant restarts operations, so that these can be treated before being discharged in an area that should be identified and monitored by the LTA.
- Undertake a technical study that establishes the water balance of the Bargny Municipality and the long-term impact of the water demand of the Sendou Power Plant on the public water system and propose realistic water and groundwater alternatives of water availability, including the alternative of constructing a desalination plant.

7.7. *Social Support*

7.7.1. **Concerning the land disputes**, the Bank should disengage itself from monitoring the land disputes caused by coastal erosion. As stated before, the coastal erosion is not caused by or affected by the Project and should be addressed by the Government at the national and local levels. Furthermore, the regional WACA Project will provide technical and financial assistance to Senegal for resilience towards coastal erosion.

7.7.2. **With respect to the social plan**, the Bank Management should provide assistance to SENELEC, CES, and the Bargny Municipality to revise the ambitious tripartite MOU of 2017 and focus primarily on the social issues that affect the PAPs and their families, namely: (a) the modernization of the fish-drying facility on the site between Bargny and Minam; (b) the construction of the draining system for rain water; (c) the construction of a unit to manufacture bricks from the ash; (d) the construction of a footbridge between Bargny and Khelcom; and (e) school supplies for Bargny schools.

ANNEX 1

Requestors' E-mail Rejecting the Bank Management Action Plan

Bargny, 14 March 2019

Via email:

Mr. Sékou Touré

Director, Compliance Review and Mediation Unit (BCRM)/AfDB

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Ms. Emilfreda Bianca MIRANDA DE OLIVEIRA

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CC: Rokhaya Diop Diallo, Private Sector Operations/AD, r.diop@afdb.org; **Gisèle Belem, Environmental and Social Safeguards** Department/AfDB, g.belem@afdb.org; **Monika Smolenska-Green**, Special Operations/FMO, m.smolenska-green@fmo.nl; **Eduardo Carriles**, Environmental & Social Officer I Credit & Special Operations/FMO, E.Carriles@fmo.nl;

Ref: Complaint about the "Sendou" Coal-fired Power Plant Project in Senegal

Dear Sir/Madam,

We, representatives of the communities impacted by the Bargny "Sendou" Coal-fired Power Plant Project and **applicants** (Takkom Jerry, Affected Communities Association of Bargny and LSD) **appreciate the consideration given** by the **AfDB, FMO and BOAD** to the complaint we filed in 2016 against this project for non-compliance with your various social and environmental policies.

Meeting on **9 March 2019**, we **examined the various** compliance and audit reports on the power plant³⁰.

We note that despite their acknowledgement of serious violations of social and environmental standards, the AfDB, FMO and BOAD have all continued to make inappropriate disbursements.

Therefore, we strongly reject the proposed action plan and recommendations which are essentially based on false information from the Mayor of Bargny and the Compagnie d'Électricité du Sénégal (CES) and which exclude the community and the applicants from the drafting and consultation process.

Specifically, we would like to bring to your attention our position on the following main request initially contained in our request.

³⁰ See Annex 1: Comments on the African Development Bank Management' Action Plan

1. Lack of Adequate Consultation with the Community

We note that the action plan proposed by the AfDB does not include the community, just like the CES communication strategy which is still not inclusive and tends to highlight the differences between stakeholders.

2. Lack of Proper Land Compensation

Only 13 people have received compensation for the land on which the buildings are located.

We condemn the lack of appropriate compensation for the allotments and the confusion deliberately caused regarding the destination of the funds allocated by SENELEC (CFAF 1 billion).

3. Lack of Resettlement of Women Engaged in Processing

We regret that no Resettlement Action Plan has been proposed to women who are engaged in processing. Therefore, it is hard to imagine that the project can coexist with the Bargny women who are engaged in processing.

4. Violation of Article L13 of the Environmental Code (500 m buffer zone)

We deplore the proven violation of the law brought about by the project's proximity to the Khulup River, the processing site, the homes, the primary school and the Minam 1 and Minam 2 sub-divisions.

5. Risks of Air and Marine Ecosystem Pollution and Threat to Artisanal Fisheries

We condemn pollution which is already perceptible and measurable. In January 2019, incidents of discharge of wastewater from the power plant's process water at Khelcom's fish products processing site were noted³¹. According to the analyses of the National Analysis and Monitoring Laboratory, these discharges *"do not comply with standard NS05-061 of July 2001 and Directive No. 2008/105/EC of 16 December 2008 on Suspended Solids, COD, BOD5 and Faecal Coliforms"*. Other analyses by the ESP-UCAD Analysis and Testing Laboratory also confirm this³².

The decimation of livestock and a decline in vegetable crops were also noted.

In addition, there is no sign of improvement in CES' environmental performance (chimney, closed cooling system and particle collectors), let alone a published baseline study on air and marine eco-system quality.

6. No Consideration of Cumulative Impacts (Sendou 1, SOCOCIM)

We are shocked by the absence of a cumulative impact assessment with SOCOCIM. 3

³¹ See Annex 2: Bailiff's report on the discharge of waste water from the power plant on the processing site.

³² See Annex 3: Analysis report of wastewater from the Power Plant discharged on the women's processing site

7. Preservation of Heritage and Cultural Sites

We unanimously condemn the continuing threat to the cultural heritage due to the restriction of community access to the sacred site within the plant perimeter, and the Minam Cemetery is still in danger.

In view of the above, the population impacted by the construction of the coal-fired power plant notes that the AfDB, the FMO and the BOAD have violated **their own environmental and social safeguard policies**.

The population holds that the Government of Senegal, SENELEC and the CES have violated the economic, social and cultural rights of the communities.

Consequently, the communities reaffirm their opposition to the building of the coal-fired power plant in Bargny.

Sincerely,

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Signatories

- Takkom Jerry,
- Bargny Affected Communities Association
- Lumière Synergie pour le Développement (LSD)

Cc:

- President of the Republic of Senegal;
- Rufisque Prefect;
- Mayor of Bargny;
- SENELEC Director;
- DEEC Director; and
- Compagnie d'Électricité du Sénégal (CES) General Director.

ANNEX 2

Response of the Requestors to the Bank Management Action Plan

Comments on the Action Plan of the African Development Bank Management

	Challenges	Recommendations	Solution Retained	Actions in Progress and to be Undertaken	Responsible	Achievement indicator	Schedule	Complainants' Remarks
Measures to ensure the Project's Compliance with the Involuntary Resettlement Policy (2003)								
1.1	Land tenure conflicts	Persons affected by the occupation of the plant site (Minam) and coastal erosion	Resettlement of most vulnerable persons affected by the plant site and coastal erosion (Category 1)	Process of relocating 115 affected households to Bargny Ville Verte. Financing by Senelec, the City Council and CES	Town Hall of Bargny SENSOR CES	CES Will provide the Bank with regular reports on the resettlement process	Half-yearly (January and June until resolution)	<ul style="list-style-type: none"> ✓ Relocation, if it must take place, would involve those affected by the project, namely, the holders of plots of the Minam 1(683 plots) and Minam 2 (750 plots) sites. ✓ The <i>Bargny Ville Verte</i> (Green town) project cannot be considered a solution to the land conflict. ✓ Any resettlement measure must involve the rights-holders directly or through their representatives (duly mandated) and must be based on a methodology and objective criteria previously discussed and

	Challenges	Recommendations	Solution Retained	Actions in Progress and to be Undertaken	Responsible	Achievement indicator	Schedule	Complainants' Remarks
								approved by the various stakeholders
1.2		Persons affected by coastal erosion in the municipality of Bargny	Resettlement of persons affected by the plant site and coastal erosion (Category 2 and 3)	* Confirm the need for FCFA 2 billion estimated by the City Council. * Re-establish regular meetings of the Monitoring committee to accelerate the search for financing	SENELEC and State of Senegal Bargny City Hall Rufisque Prefecture	CES Will provide the Bank with regular reports on the resettlement of all PAP on the basis of the meetings of the Monitoring Committee	Half-yearly (January and June until resolution)	<p>✓ Although the community welcomes the interest in coastal erosion, it points out that emphasis must be placed on repairing the harm suffered by the persons affected by the power plant.</p> <p>✓ The three categories of affected persons whose land rights are affected must be adequately compensated without distinction.</p> <p>✓ We reject the current committee headed by the Mayor. The Monitoring Committee must be independent of the Mayor and must be under the supervision of the Prefect.</p>

	Challenges	Recommendations	Solution Retained	Actions in Progress and to be Undertaken	Responsible	Achievement indicator	Schedule	Complainants' Remarks
1.3	Women processors and persons carrying out related activities in the buffer zone	Economic resettlement	Maintenance of women on the site and modernization of fish processing facilities	* Build a platform for drying and smoking fish	CES	CES Provide the Bank with an indicative schedule of works	In Q1 2019	<p>✓ The proximity of the power plant to processing women remains a violation of Senegal's laws and regulations (Art.13 of the Environmental Code).</p> <p>✓ In the absence of reliable and independent scientific studies there is no guarantee that the proximity of the establishments receiving public (processing women's site, Minam elementary school, child care and dispensary) is not a health hazard.</p> <p>✓ The modernisation of the fish products processing site cannot be an alternative to the problem of proximity to establishments receiving the public (processing women's site).</p> <p>✓ It is absolutely not possible to relocate women whose activities depend exclusively on access to the sea.</p>

	Challenges	Recommendations	Solution Retained	Actions in Progress and to be Undertaken	Responsible	Achievement indicator	Schedule	Complainants' Remarks
1.4	Measures to support livelihoods	Taking into account the vulnerability of the community of Bargny	Support to the Community of Bargny through the Social Action Plan	* Establishment of a wastewater management system for the Minam neighbourhoods and Bargny. * Construction of a school in Bargny Ville Verte (Green town)	CES	CES will provide the Bank with half-yearly reports of progress of works	Half-yearly from the beginning of operations on 21 October 2018 until completion	<ul style="list-style-type: none"> ✓ Garner the economic and social priorities of affected populations ✓ Preserve the jobs of processing women ✓ Restore the livelihoods of all economic PAP

Measures to align the Project with the Environmental Policy (2004) and Environmental Assessment Procedures for Private Sector Operations (2000)

2.1	Ash management	Prepare an ash management plan including temporary storage and final disposal arrangements	<p>Ash disposal: Signature of an ash recovery contract with SOCOCIM</p> <p>Temporary storage: Permit granted by DEEC for ash storage</p> <p>Construction of a brick-making plant from ashes</p>	<p>*Study on technical specifications taking into account the environmental and social issues of temporary storage where appropriate. CES feasibility study</p> <p>*Provide the Bank with the technical specifications study. The Bank will monitor the effective implementation of ash transport and/or disposal in January 2019 at 6 months from the start of operations on 21 October 2018 and</p>	CES	<p>Provide to the Bank the study on technical specifications. The Bank will monitor the effective implementation of ash transport and/or disposal</p>	<p>In January 2019. At 6 months from the beginning of operations on 21 October 2018 and during the duration of operations</p>	<ul style="list-style-type: none"> ✓ Ash management remains problematic, there is no management plan whereas the plant is in operation. ✓ On what basis did the CEED grant the temporary ash storage permit? Has there been a study of storage conditions based on fine ashes and household ashes? ✓ If there is an ash recovery contract by SOCOCIM, what is the content and type of ash and what quantity?
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	Challenges	Recommendations	Solution Retained	Actions in Progress and to be Undertaken	Responsible	Achievement indicator	Schedule	Complainants' Remarks
				during the duration of operations. 20 Issues				✓ What are the terms (duration, location, financing, impact) of construction regarding a brick-making plant from ashes and for what quantity and typology.
2.2	Transportation of coal from Dakar to Sendou	Increase in traffic	Establishment of an SMS	* Update the ESMP for the operation period * Obtain certification ISO/OHSAS of EMS	CES SPIES-EDF	Provide the updated Operational ESMP to the Bank Certification	January 2019 Last quarter 2019	✓ The updated operational ESMP has never been subject to public consultation, let alone published. ✓ For the transport of coal from Dakar to Sendou, there is no information on the conditions of stripping and storage. ✓ The cumulative impact assessment should include the transport of coal from Dakar to Sendou.
2.3	Marine impacts and water quality	Effects of cooling water (quality and temperature) on the	Perform water quality control	Regular marine inventory as part of monitoring.	CES	Monitoring reports	March 2019	✓ The baseline study on the marine environment was not conducted whereas the

	Challenges	Recommendations	Solution Retained	Actions in Progress and to be Undertaken	Responsible	Achievement indicator	Schedule	Complainants' Remarks
		marine ecosystem		Marine, surface and groundwater collection for monitoring physical and biological parameters	CES	Baseline study of marine resources	Annual during operations from 21 October 2018 and during the duration of operations	<p>plant is in operation.</p> <p>✓ The cooling system has not been the subject of a study on the impacts of the marine environment and the impacts on the project of artificial reefs for the biological recovery of marine species.</p> <p>✓ What about the effectiveness of the promised closed cooling system as an alternative to the open cooling system?</p>
2.4	Provision of water on the public network	Availability of fresh water	Possibility of desalinating seawater	Construction of a desalination plant at a cost of EUR 3 million	SPIES-EDF	Mobilisation of financing	During operations	<p>✓ The town of Bargny already suffers from a water supply deficit (2 million cubic meters) and the needs of CES amount to 4.12 million cubic meters per year, double the consumption of the entire town of Bargny.</p> <p>✓ The terms of construction (ESIA, installation and start of operation) of a desalination plant require at</p>

	Challenges	Recommendations	Solution Retained	Actions in Progress and to be Undertaken	Responsible	Achievement indicator	Schedule	Complainants' Remarks
								<p>least two (2) years. And already the issue of installation site arises because of the lack of space.</p> <p>In the meantime, what are the risks of water supply to the town of Bargny? How will the plant ensure its fresh water supply while the operation goes on?</p>
2.5	Inventory of emissions and air quality monitoring	Emission control	Implement the air quality monitoring plan	<p>* Perform passive sampling at 11 receivers for 12 months *</p> <p>Install a continuous measuring station at Minam</p>	CES	Provide air quality monitoring reports. Indicate the arrangements for continuous measurements	<p>At 6 months from the beginning of operations on 21 October 2018 and during the duration of operations</p>	<p>✓ The CTB recommendation concerning the installation of an air quality measuring station was not complied with.</p> <p>✓ The air quality measurement station is not installed whereas operation has already begun.</p> <p>✓ Absence of a cumulative impact study between the coal-fired power plant and the Sococim cement plant, which has</p>

	Challenges	Recommendations	Solution Retained	Actions in Progress and to be Undertaken	Responsible	Achievement indicator	Schedule	Complainants' Remarks
								already polluted the airshed.
2.6	Sound impact assessment	Monitoring of noise impact	Noise monitoring during operation	* Conduct an annual noise measurement campaign at property boundaries and sensitive receptors.	CES	Noise monitoring reports	Annually from the beginning of operations on 21 October 2018 and during the duration of operations	✓ Riparian populations are already experiencing sound impacts and complaining about noise from the power plant audible over 3 km. ✓ No monitoring of noise impact

ANNEX 3

Chemical Analysis of Waste Water Discharge

Laboratory Testing and Analysis

Ecole Supérieure Polytechnique Cheikh Anta Diop, BP 5085, Dakar Fann Senegal
(221) 33825, 08.94

N. Ref. : CM bd / 0138/0095/2019 Dakar, February 18, 2019

No. Client: 13

CERTIFICATE N 0 0159/2019

Applicant: FOUNDATION IENRICH BOELL

Address: Rue 3 Point E

Sample: Waste water

Number of samples: 01

Analyses: Chemistry

Date of receipt: 08/02/2019

Your reference: Without ref.

Table of Results

ELEMENTS	RESULTS	STANDARDS (NS 05 - 061)
	Waste water (E03)	
PH	8.45	6-9
COD mg / l	1747.2	200
DBO5 mg /l	60	80
MES mg /l	744	50
Conductivity mS/cm	48.6	-
Nitrogen /l	84	30
phosphorus (mg/l)	4.14	10
Hydrocarbon (mg/)	5.2	15
Nitrates (mg/l)	13.61	-

OBSERVATIONS: The results show that the effluent is loaded with total organic matter and especially with hydrocarbons, the contents of which require reduction. Decantation-filtration made it possible to reduce the suspended solids, the COD and the hydrocarbons.

N.B: The validity of this certificate of analysis only concerns the sample or samples submitted to the analyzes carried out at the Laboratory,

"Reproduction of this certificate 'is authorized only in the form of a full photographic facsimile"

The Director of the Laboratory

Prof Codou MAR DIOP