



Project Information Document (PID)

Concept Stage | Date Prepared/Updated: 18-Jun-2021 | Report No: PIDC32028

**BASIC INFORMATION****A. Basic Project Data**

Country Mali	Project ID P176633	Parent Project ID (if any)	Project Name Mali Electricity System Reinforcement and Access Expansion Project (P176633)
Region AFRICA WEST	Estimated Appraisal Date Jan 28, 2022	Estimated Board Date Mar 30, 2022	Practice Area (Lead) Energy & Extractives
Financing Instrument Investment Project Financing	Borrower(s) Republic of Mali	Implementing Agency EDM, AMADER	

Proposed Development Objective(s)

The Project Development Objective (PDO) to increase access to electricity in selected areas of Mali and the integration of least-cost solar energy by leveraging private sector participation.

PROJECT FINANCING DATA (US\$, Millions)**SUMMARY**

Total Project Cost	200.00
Total Financing	200.00
of which IBRD/IDA	157.00
Financing Gap	0.00

DETAILS**World Bank Group Financing**

International Development Association (IDA)	157.00
IDA Credit	78.50
IDA Grant	78.50

Non-World Bank Group Financing

Other Sources	43.00
---------------	-------



Development Grant Facility

43.00

Environmental and Social Risk Classification

Substantial

Concept Review Decision

Track II-The review did authorize the preparation to continue

Other Decision (as needed)

B. Introduction and Context

Country Context

1. **Mali is a large, landlocked, and fragile country with a rapidly growing population of about 19 million and a per capita GDP of US\$879.** Although Mali is a large country with its 1,241,238 sq. km, 60 percent of the land area is desert and economic activity is confined to the riverine area irrigated by the Niger River, pushing population growth mainly into urban or already populated areas. Mali has a low Human Development Index (0.434), ranking 184th among 189 nations, and lacking critical services in health and education. More than 40 percent of the Malian population live under the national poverty line, 90 percent of them in rural areas in the South of the country. There is a large disparity between wealth levels in rural and urban areas and more importantly there are significant gender gaps. Mali ranks 158th out of 162 on the Gender Inequality Index (UNDP 2018).¹ Mali's population is young and has been increasing by 3 percent on average per year and a median age of around 16 years. The population is projected to double by 2045, increasing the demand for social and infrastructure services and natural resources.

2. **The economy grew over the past years, but remains highly vulnerable to security and natural crises, and is now recovering from the COVID-19 crisis.** The structure of the economy remains undiversified with significant dependance on agriculture as the main source of jobs (this sector alone represents around two third of employment). Most exports are gold and cotton (accounting for 70 and 15 percent of total exports respectively), making the economy highly vulnerable to changes in commodity prices and rainfall patterns. The country's economic performance has been relatively strong, with GDP growth averaging 5.7 percent since 2014. But economic activity slowed down in 2019. The real GDP growth contracted by 2 percent (-4.9 percent for GDP per capita) as a result of the impact of COVID-19 pandemic, which pushed the economy into recession resulting in high fiscal pressures. Growth is expected to slow down to below one percent per annum in the next few years and gradually recover over the medium term, with recovery of economic activities especially in the service sector and continued structural reform already underway. The economic slowdown was particularly acute in the tourism, retail and construction sectors. In addition, the country also suffered from the drop in international remittance, general inflation, and drop in labor income, leading to an estimated increase of at least 1.5

¹ The Gender Inequality Index measures three important aspects of human development—reproductive health, empowerment, and economic status.



percentage point in the poverty rate. According to the International Monetary Fund (IMF), economic activity, spillovers from global trade shocks, along with fiscal measures to combat the crisis, have created urgent financing needs which, that if left unaddressed, could represent a threat for development and social spending and represent an additional challenge to an already preoccupying social and security situation in the country.

3. Mali has been experiencing instability and conflict since the violence of 2012, exacerbated by the recent military coups of August 2020 and May 2021. Since the 2012 coup d'état, the country has been experiencing recurrent instability, conflict, and violence with the occupation of its northern regions by armed groups. Despite the 2015 Algiers Peace Accord (*"Accord pour la Paix et la Reconciliation au Mali"*) which includes a wide range of provisions, such as security sector reform, disarmament, demobilization and reintegration (DDR), as well as governance reform, deepening of decentralization, and socio-economic development of northern regions, the northern regions are still experiencing recurrent episodes of violence by extremist groups. More recently, regions in the center and in the south of Mali are increasingly experiencing conflict and violence. Since 2017, the situation has deteriorated in Mopti and Segou regions and recently conflict and violence are also gradually moving to the Koulikoro, Kayes and Sikasso regions. In many regions, the Government of Mali is limited in its ability to provide basic services to the population. Political tensions and insecurity have also led to a surge of internally displaced people, generating new demand for services that the country is not able to meet. This situation has been exacerbated by the recent military coups of August 2020 and May 2021, fragilizing further the country.

4. Electricity access, and the quality of electricity services, are among the top priorities in the country's efforts to support economic recovery post COVID-19, as energy is an important input for job creation, economic diversification, improving human capital outcomes, reducing fragility, and improving the delivery of services in rural areas. To recover from the multiple crises it faces, Mali is elaborating its Strategic Framework for Economic Recovery and Sustainable Development (*Cadre Stratégique pour la Relance Economique et le Développement Durable*, CREDD) (2019-2023), and the transitional government has expressed willingness to implement that strategy. It is articulated around five pillars (i) governance, (ii) peace, security, and the strengthening of peaceful coexistence, (iii) inclusive growth and the structural transformation of the economy, (iv) environmental protection and to strengthening of resilience in the face of climate change, and (v) the development of human capital. It will pave the way to the economic development in the medium term. Increased access to reliable and affordable electricity services is a top priority for the GoM to power socio-economic development activities. The ability to increase electricity access to rural and remote areas will be an important driver for job creation and economic diversification. It would enable the country to improve agriculture production through enabling irrigation and refrigeration, achieve better human capital outcomes through improved health and education services in electrified health clinics and schools, and improve participation in digital economy. The new energy development strategy prioritizes electricity access for economic transformation especially in rural areas. The GoM's objective, as outlined in the new electrification strategy currently being updated with IDA's support, is to expand sustainable access for rural transformation, prioritizing potential economic nodes with agro-processing and mining activities.

5. At the regional level, energy poverty has been identified as one of key drivers of fragility in the Sahel, including in Mali. The provision of energy services is a key part of Mali's strategy to improve living conditions of



the population and of the strategy for the mitigation of conflict and violence risks (2020-2023) that the Government recently adopted. Increasing access to electricity in the conflict areas, in the northern and central regions, will increase resilience and serve as prevention measure. In accordance with strategy, the electrification of high-risk areas can contribute to address conflict spreading by preventing conflict spillover effects and increasing trust between the state and citizens, which is a dynamic that is prevalent across the Sahel. Addressing energy poverty will also benefit women and girls as they often have to spend more time fulfilling household chores manually including for example fetching firewood and water, and as a result, have less time for income-generating and educational activities. In Mali, the lack of affordable electricity services also leads to higher reliance on polluting and inefficient solid fuels for various tasks, including cooking or heating, which can negatively affect their health. This is particularly important in the context of Mali as it is estimated that 38.5 percent of women nationwide have experienced physical and/or sexual intimate partner violence at some point in their lives.² The conflicts and insecurity in some areas of the country and the absence of social safety nets have further exacerbated gender issues.

6. The energy sector in Mali continues to face a structural financial deficit and is heavily dependent on government subsidies. The electricity utility, EDM-SA, has been overdrawing the national budget, in the range of US\$ 100-150 million per annum in the last few years, constraining government efforts for socio-economic development. GoM with support of the Bank's series of national and regional development policy financing (DPF) operations, has been and is committed to keep to the implementation of energy sector reforms to improve financial sustainability of the sector, and gradually eliminate subsidies within 5 years, in addition to expanding access to modern energy services.

7. Mali has very low carbon emissions (0.10 percent of world emissions), but it is highly vulnerable to climate change³, which will impact its agriculture sector and pose a direct threat for food security and household income, particularly for rural households. The country's undiversified economy and high dependence on rain-fed agriculture, in a region where droughts, floods and locust infestations occur regularly, makes household incomes and overall GDP growth prone to shocks. Mali is already experiencing high natural risks, including flooding (river and urban), water scarcity, extreme heat and wildfire⁴, which are expected to increase further due to climate change. Increased pressure on water and food resources will exacerbate poverty and conflicts between communities. While already one of the hottest countries in the world, Mali will also suffer from increased temperature (the annual mean temperature is expected to rise by about 2°C by mid-century).⁵ Moreover, Mali ranks 174th (out of 181) in the vulnerability index on climate change.⁶ The lack of adequate infrastructure and social safety nets limit the ability of the country and its population to adapt and respond to climate change impacts. In this context, the country is determined to act on climate change and presented its priorities in its Nationally Determined Contribution (NDC). By 2030, Mali ambitions to reduce its emissions compared to a Business-as-Usual scenario by 29 percent for agriculture, 31 percent for energy (including through developing its solar resources) and 21 percent for forests and land use change and to take ambitious measures for adaptation, particularly for sustainable land management and to combat desertification; but it will require substantial financing to reach its climate objectives. In the energy sector, in addition to the heavy reliance of the power sector on fossil fuel, for cooking and heating households

² Mali Demographic and Health Survey (DHS) 2018.

³ Further details are presented in Annex 3.

⁴ <https://thinkhazard.org/en/report/155-mali>

⁵ <https://climateknowledgeportal.worldbank.org/country/mali/climate-data-projections>

⁶ The ND-GAIN Index summarizes a country's vulnerability to climate change and other global challenges in combination with its readiness to improve resilience. <http://index.gain.org/>



are still heavily dependent on biomass, primarily firewood, which has negative health and environmental impacts, such as desertification and deforestation.

Sectoral and Institutional Context

The Mali Power System

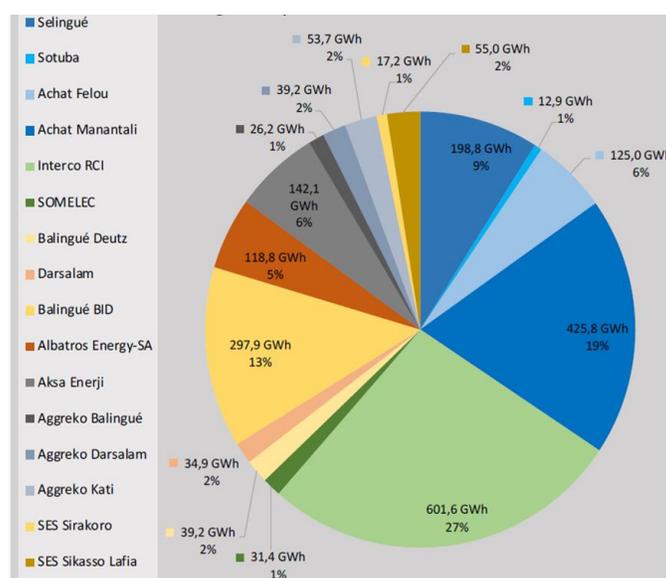
The electricity sector in Mali faces several challenges, including low electricity access rate, aging and saturated grid, high cost of generation, poor performance of the utility, and structural financial deficit of the sector, which represent a fiscal burden to the national budget, and hamper Mali’s social, economic, and industrial development.

Table 1. Key electricity sector indicators (2019)

Key metrics	Value
Electricity access rate	49%
Installed capacity (2019)	772 MW (including 670.2 MW for the interconnected grid and 101.77 MW for isolated grids): hydro 18.7 MW, oil/diesel 488.3 MW, imports 100 MW.
Generation mix	hydro (31.6%), HFO/Diesel (41.8%), imports (26.6%), solar (0.05%) ⁷
Current cost of supply	US\$0.27/kWh per unit of electricity billed in 2020
Average tariff	US\$0.18/kWh for LV customers and US\$0.16/kWh for MV customers (weighted average tariff of US\$0.17/kWh).
Average system losses	22.8% (17% T&D losses and 5.8% commercial losses)
Electricity bill collection rate	93%
DSCR (EBITDA/debt service)	Since 2018 EBITDA has been negative, implying a negative DSCR (even in 2016 and 2017, DSCR was considerably below 1, albeit not negative).
Debt ratio (total debt including debt to suppliers / total assets)	EDM has negative equity from 2018 with Debt ratio of around 1.25 in 2020.
Arrears related to electricity consumption from the public sector	US\$13 million (February 2021)

Figure 1. Electricity generation mix in Mali in 2019

⁷ The presented figures include statistics from the interconnected grid and isolated grids in regional cities, as described in the 2019 annual report of EDM-SA.



8. **Mali's power system has a total installed capacity of 772 MW (as of 2019), including 150 MW of rental capacity, generating about 2,413 GWh per year, to be expanded by about 1,000 MW additional capacity by 2025 with additional imports and ongoing renewable energy generation projects to meet the increasing demand.** The power system in Mali is characterized by an interconnected grid serving 35 urban centers and localities including the capital Bamako (**Error! Reference source not found.**), 33 isolated distribution networks in rural areas, and two localities connected to the Ivorian distribution network. The key sector indicators are presented in **Error! Reference source not found.** The annual energy generated in 2019 was about 2,413 GWh and the peak demand on the interconnected network was 395.9 MW. The total installed capacity of the interconnected network is 670.2 MW (including imports from Côte d'Ivoire), but it is not fully exploited due to the poor state of the generation and transmission infrastructure. The isolated grids in regional centers are powered by small and costly diesel generators of about 101.77 MW (2019) of total installed capacity operated by the national electricity utility, Electricité du Mali (EDM). The Malian rural electrification agency (AMADER) also manages about 250 privately operated mini-grids in remote areas, out of which about 50 are hybridized with solar PV.

9. **GoM is committed to shift the mix towards least-cost imports (despite recent unfortunate incidents that led to reduction of imports from Cote d'Ivoire⁸ during the summer of 2021), and domestic renewable energies, to meet its increasing demand.** About 42 percent of energy is generated from thermal power plants. Mali also relies on imports, mainly from Côte d'Ivoire to meet its demand (imports amounted to 27 percent of energy supplied in 2019). The projected peak demand for the interconnected network, including demand created by the project, is estimated at around 495 MW by 2025 and 722 MW by 2035. The annual energy demand is projected to be 4 942 ,6 MWh GWh and 5,482 GWh by 2025 and 2035 respectively. The ongoing and planned capacity would be sufficient to meet the projected demand⁹, including

⁸ A series of generation supply incidents in the Ivorian power sector have led to a temporally non-delivery of the contracted amount of imports to Mali. Instead of 100 MW, the delivered capacity is currently constrained to less than 50 MW. This represented a major shortage for Mali, which led to a further increased reliance on thermal generation and forced load shedding, and the situation is likely to remain until August 2021 when full capacity of hydropower will be restored.

⁹ Plans to expand generation mix include the commissioning of ongoing hydropower plants Gouina HPP (with 60 MW of the 140 MW allocated to Mali), Kenie HPP (56 MW), IsDB financed 100 MW HFO in Bamako to be commissioned in April 2022, the additional imports from Cote d'Ivoire (from 100 MW to 200 MW) and Guinea (150 MW) by 2023 when the ongoing interconnections⁹ are completed; and the planned IPP Solar PV projects totaling about 630⁹ MW by 2025, including the IDA/IFC supported Segou Solaire 33 MWp project (P148355) and the 60 MW with battery storage to be supported by the proposed operation.



the demand created by the proposed access expansion project. The country aims to eliminate its rental power plant by 2023 when the ongoing projects will be commissioned.

10. **Least-cost solar energy procured on a competitive basis is expected to increase security of supply and bring down the high production costs.** Mali is endowed with high solar radiation (average solar radiation in Mali is well distributed and estimated at 5-7 kWh/m²/day and a daily sun lighting duration of 7-10 hours). The continuous decline in prices of solar electricity generation¹⁰ capital expenditure and battery storage represent a unique opportunity for the country. Yet, today solar remains largely unexploited and much-needed network reinforcements and updates limit the integration of new generation projects. Developing least-cost solar power projects (with storage and required grid improvements) could contribute to increase domestic generation capacity, diversify sources of electricity supply, accelerate the shift away from expensive thermal production, and lower the cost of electricity production. Development of least cost solar PV is a top priority of the 2021-2025 sector investment plan adopted by the Board of Directors of EDM to complement hydropower, and it is part of the least-cost generation plan, to be adopted in July 2021. However, the successful implementation of the least cost generation plan will depend on the renewed commitment of GoM to adhere to the competitive selection of IPPs as per the provision of the PPP law and the power sector law. Today, the country has signed directly negotiated memoranda of understanding and/or concession agreements with about 13 unsolicited bidders, which are 30 to 40 % more costly than competitively selected and well-structured IPPs (IRENA 2021).

11. **Mali has decided to fast-track the implementation of solar park approach as part of its medium-term solar deployment strategy.** Pursuant to the US\$ 21 million technical assistance to the WAPP (P162580), which was approved in mid-2018¹¹, the Bank is working with several countries to develop regional solar projects at scale, which are included in the WAPP master plan to share energy resources at the regional level. Contrary to the current market practice with negotiated deals, the solar park approach aims to support Mali in piloting an innovative large-scale solar tender with battery storage, following a fully structured approach to drive down costs, reduce delays to reach financial close and increase penetration of least-cost domestic generation. Mali is leveraging the work done under the Sustainable Renewables Risk Mitigation Initiative (SRMI)¹² on the best practice for competitive bidding, as well as the World Bank experience, most recently in the regional solar park IPP with storage, supported by the Burkina Faso Solare Energy and Access Project (P166785). As part of SRMI, GoM has access significant resources from the Green Climate Fund SRMI Facility. GoM would provide pre-arranged comprehensive de-risking measures such as financing for the provision of land, permits, power evacuation, as well as off-take risk mitigation instruments and financing package available to bidders. The country plans to develop the solar park at three sites for a total of 300 MWp, to be deployed in phases with a first phase of 60 MWp (with about 60 MWh of battery storage). The competitive selection of the IPPs for the first phase is expected to be launched mid-2022.

12. **The transmission and distribution infrastructure is limited and constrained, and the quality of electricity services has been deteriorating due to aging infrastructure, poor planning, lack of funding and maintenance.** Planned and unplanned outages have increased sharply in both frequency and duration in the

¹⁰ The unit cost of solar PV has reduced by 82 percent between 2010 and 2019.

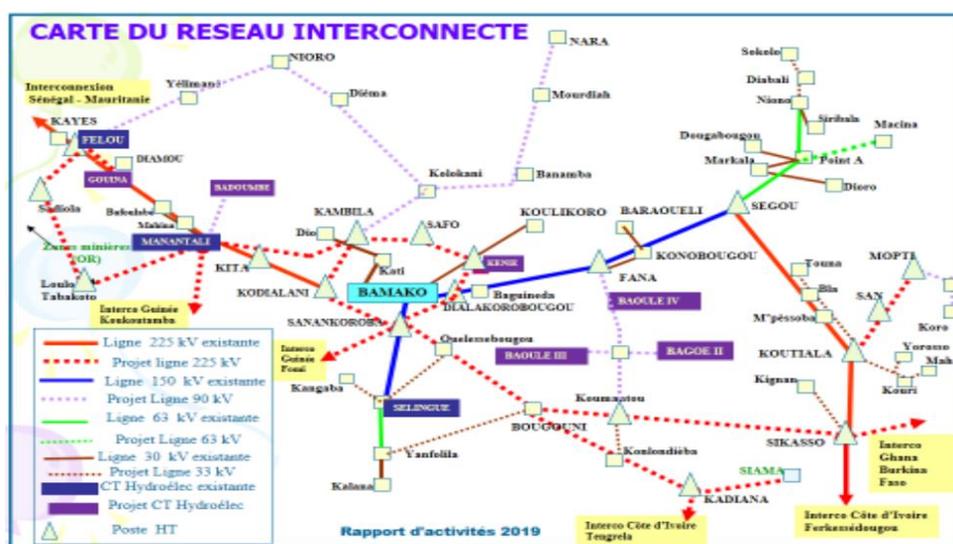
¹¹ Solar Development in Sub-Saharan Africa - Phase 1 (Sahel) - (P162580).

¹² The World Bank with AFD, IRENA and ISA are working together in a implementing an Initiative – SRMI – to support a sustainable solar deployment leveraging private investments in development countries.



past years. This is due to multiple factors, including the lack of maintenance of existing generation and transmission infrastructure, lack of appropriate planning and fast increase in the number of customers of EDM. The current transmission network is saturated and is not adequate to integrate new power plants, including Albatros (92 MW) HFO power plant stranded capacity¹³, Gouina and Kénié hydropower plants, and additional imports from Cote d’Ivoire. As detailed in **Error! Reference source not found.**, the ongoing multi donors financed investments are expected to significantly boost the transmission capacity to deliver energy from the current stranded and planned capacity to end consumers. The Mali’s high-voltage ring around Bamako where most of the load is concentrated, is underdeveloped, but reinforcement investments are being implemented with financial support from different donors including the AFD, the African Development Bank (AfDB), the Exim Bank of India, the West African Development Bank and the World Bank, as detailed in **Error! Reference source not found.** These ongoing reinforcement and grid expansion activities are expected to be completed by 2023 to allow the absorption of additional generation capacity and grid expansion. The Electricity Master Plan has identified investment needs at US\$1.3 billion through 2034, including the secured US\$867 million in 2021, which highlights the scale of the challenges the Mali’s grid is facing today.

Figure 2. Simplified map of the interconnected grid



Source: EDM

Electricity Access

13. **Despite significant investments over the last 12 years, Mali’s access rate to electricity services remains low, especially in rural areas (see Figure 3 and**

14. **Table 1), and overall unreliable.** The current access rate of about 49 percent is about the average of Sub-Saharan Africa. In the past 12 years, Mali utility’s customer base grew from 120,000 households to over 600,000. There are

¹³ The Albatros HFO power plant was commissioned in 2019. The energy output can not be transmitted to Bamako due to limited capacity of the existing transmission line. A parallel line Manantali – Bamako is being constructed to full evacuate that energy by 2023.



currently 552,480 customers in the interconnected network and 75,202 in the isolated generation centers. But rural areas still suffer from very limited access to electricity (less than 10 percent on average), and primarily rely on direct wood fuel for cooking and kerosene lamps for lighting. Rural electrification for socio-economic transformation is a priority in the economic development agenda of the government.

15. **Mali has been a pioneer in mini grid development in West Africa, but its business model requires improvement to enhance their sustainability and reliability, in particular in remote localities.** Mini grids in Mali have enabled rural access to increase from 2 to 10 percent in one decade. The country started the rollout of diesel-powered mini grids back in 2003. About 250 systems are operational in different regions, under concessions with private operators. The ongoing IDA REHSP was designed in 2013 to reduce cost of supply and increase reliability through hybridization of 45 diesel mini grids with solar PV. The AFD is also financing the hybridization of about 60 mini-grids and the IsDB is providing a complementary funds to develop 24 mini grids. However, new concerted efforts are needed to scale up access to electricity in rural areas. A geospatial electricity access rollout program is under preparation with IDA financing, to guide investments in grid extension and off grid solutions. At the same time, GoM through AMADER, is revising its mini grid development model to be able to scale up solar PV mini grids with private sector participation. The current model does not attract private investors, but rather local operators with no visibility on the replacement of the aging assets, and hence lack of sustainability. The new business model will inform the preparation of the proposed project to help the government meet its ambitious energy access goals.

Figure 3. Maps of unelectrified localities in Mali

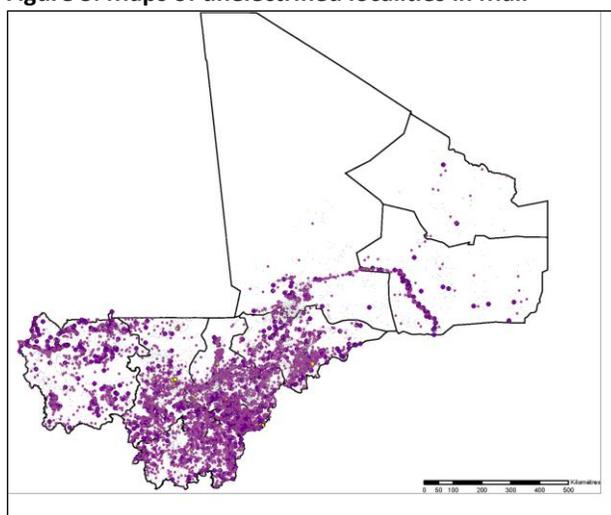


Table 1. Access rate by region

Region	Regional access rate
Kayes	39.60%
Koulikoro	14%
Sikasso	36.70%
Ségou	22%
Mopti	6%

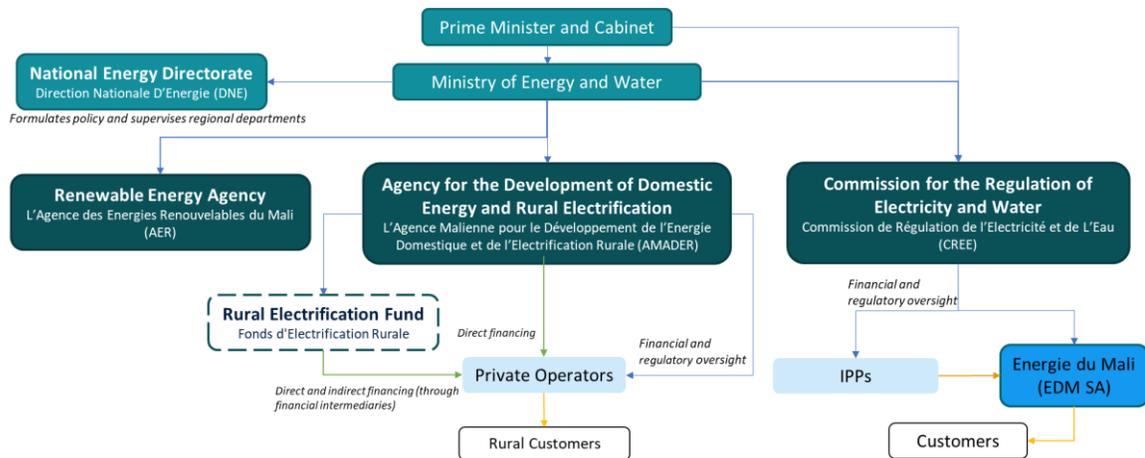
16. **Despite progress made in the last decade, the energy sector in Mali continues to face structural financial deficit and heavily relies on government subsidies.** The generation mix (presented in



17. Figure 1) relies on expensive thermal including rental power, and it is exposed to fluctuating fuel costs in international markets. In 2020, the weighted average realized tariff was US\$0.18/kWh for LV customers and US\$0.16/kWh for MV customers. This tariff is relatively high and yet, it is not sufficient to cover the cost of service, which stood at US\$0.27/kWh per unit of electricity sold, resulting in a deficit of around US\$ 9.5c/kWh. This imbalance contributes to the critical financial situation of the sector and, in turn, to the lack of adequate maintenance and investments. To respond to these multiple challenges and restore the financial viability of the sector, a sector recovery plan was adopted in 2019 and updated in 2020 as part of the DPF series, which sought to eliminate subsidies within five years. This plan should improve the cost of production from around 87 FCFA/kWh in 2021 to 63 FCFA/kWh in 2025. These objectives are aligned with the electricity master plan adopted in 2015 (covering 2016-2035) and with the electricity sector investment plan (2021 – 2025), which aims at recovering costs while also accelerating energy access.

Institutional context

Figure 4. Institutional framework for the energy sector in Mali



Other agencies include the National Center for Solar and Renewable Energies (CNESOLER) and the National Agency for the Development of Biofuels (ANADEB).
Sources: Government of Mali; African Development Bank, Mali Country Profile.

18. Though Mali’s electricity sector is dominated by public sector institutions, it is liberalized by the presidential order no. N°00-019/P-RM of March 15, 2000. The Ministry of Mines, Energy and Water (*Ministère des Mines, de l’Energie et de l’Eau*, MMEE) is responsible for the formulation, promotion, coordination, monitoring and evaluation of the national energy policy. GoM has a concession agreement with the vertically integrated state-owned utility, (*Energie du Mali*, EDM), which is responsible for electricity service delivery in Mali. EDM owns the interconnected grid and manages the isolated small grids in regional centers. Within the perimeter of its concession, EDM has monopoly over power transmission and distribution, while generation is open to the private sector¹⁴, but EDM is the single off-taker. EDM is also responsible for cross-border electricity trade (export and import). EDM supplies energy from its owned and rented thermal generation plants, electricity imports from Côte d’Ivoire, Mauritania, and from the regional OMVS hydropower facilities (Manantali and Felou). The Water and Electricity Regulatory Commission (*Commission de Régulation de l’Electricité et de l’Eau*, CREE), established in 2000, is in charge of the regulation of the water and electricity sectors and reports to the Prime Minister’s Office. CREE’s mandate, which is limited to EDM’s concession perimeter, is to protect customers, promote competition when possible, arbitrate disputes between GoM and operators, and approve adjustments to ensure cost-reflective tariffs. The capability of the regulator to effectively regulate the sector remains, however, very limited today, especially with regard to tariff setting. Outside the EDM concession area, the Malian Rural Electrification Agency (*Agence Malienne pour*

¹⁴ The presidential Order No. 00-019/P-RM of 15 March 2000 amended by Implementing Decree No. 00-184 /P-RM of 14 April 2000 liberalized the power sector. Independent power producers supply about 23% of energy generated per annum.



le Développement de l'Energie Domestique et l'Électrification Rurale, AMADER) was created in 2003, with the mandate to provide electricity services to the population in remote areas. It supplies electricity through a public-private partnership approach and acts as de facto regulator for rural electrification. Finally, to encourage the development of renewable energy, the Renewable Energy Agency (*l'Agence des Energies Renouvelables du Mali*, AER) was created in 2014 (replacing the National Center for Solar Energy). It has the mandate to expand and accelerate the use of renewable energies in Mali.

19. **Mali's electricity sector also benefits from regional integration.** Mali is a member of the Senegal River Basin Development Organization (*Organisation pour la Mise en Valeur du Fleuve Sénégal*, OMVS) which also includes Guinea, Mauritania and Senegal. OMVS developed Manantali and Félou hydropower plants. EDM is also a member of the West African Power Pool (WAPP), an institution established in 1999 as part of ECOWAS to harmonize national electricity systems within the region and deliver power in a stable, reliable and cost-competitive manner. Through the Solar Development in Sub-Saharan Africa – Phase 1 (Sahel) Project (P162580), the World Bank has been supporting the WAPP to strengthen the regional technical capacity for preparation of large-scale solar parks and integration of solar electricity into the grids.

Financial situation of EDM

20. **EDM has been facing a structural financial deficit and dependent on an operational subsidy from the Government, which is not sufficient to cover the tariff deficit.** The sector suffers from a structural financial deficit mainly due to: (i) the high electricity costs and non-cost reflective tariffs; (ii) the inability to significantly raise tariffs in a fragile environment resulting in a deficit of US\$0.095 per kWh per unit of electricity sold in 2020; and (iii) operating inefficiencies at EDM with combined technical and commercial losses of about 21% in 2020. The amount of subsidy provided to the sector stood at US\$52 million in 2020, which corresponds to about US\$0.026 per kWh per unit of electricity sold that year, significantly below the tariff revenue shortfall the sector is facing today. Hence, such subsidy is not sufficient to cover the sector costs in view of the considerable tariff revenue shortfall, which reached US\$182 million in 2020, hence EDM reported a net loss of around US\$130 million in that year. This loss added to the already accumulated loss from previous years, bringing the total equity to negative of US\$206 million as at the end of 2020. The insufficient sector revenues mean that EDM has to rely on expensive short-term commercial loans to be able to continue to provide electricity services, fund necessary O&M costs and pay debt service. In addition, EDM has accumulated significant debt towards fuel and power suppliers with trade payables estimated at US\$385 million at the end of 2020. Very little funding (if any) is left to carry out investments necessary for sector expansion and improvement of the quality of service provided.

21. **The proposed post crisis reengagement DPO will support GoM's efforts to sustain the implementation of the power sector recovery plan adopted in 2019 and updated in 2020 as part of the national and regional DPFs, which sought to turn around the sector performance and gradually eliminate subsidies within 5 years.** The measures to be taken to achieve this objective include: (i) a significant shift in the energy mix, from a high reliance on fossil fuel, to least cost imports and local renewable energy; (ii) reduction in debt service costs through debt restructuring; (iii) reduction in fuel costs through open and competitive bulk procurement (and strategic storage) and remote control of fuel consumption; (iv) improvements in EDM operational efficiency and governance; and (v) modest and gradual tariff increases. The Mali Sustainable Energy and Improved Service Delivery for Increased Stability Development Policy Financing (P167547) supported the clearance of arrears of GoM to EDM for public electricity consumption, the elimination of subsidies for connection fee for large consumers (MV clients), the increase of MT and public lighting tariffs (aligned them to the consumer price index), and the establishment of an advance payment mechanism for electricity consumption of public institutions. While the West Africa Regional Energy Trade Development Policy Financing Program (P171225) supported reforms to facilitate trade and ensure increased imports, the proposed reengagement DPL is expected to establish a transparent regulatory mechanism for tariff adjustments and compensation, strengthen the Government's oversight on the sector performance improvement. It will also support reforms to cut down the costs of fuel and reduce the financial losses due to poorly negotiated deals with IPPs.



Relationship to CPF

22. **The proposed project is fully consistent with the 2015 Systematic Country Diagnostic (SCD) and the World Bank Group Country Partnership Framework (CPF) for Mali for the period FY16-FY19 (extended to FY21)¹⁵.** The SCD identified priorities necessary to end extreme poverty and increase shared prosperity in Mali. These include (i) restoring security in the north, (ii) redistributive efforts to reduce extreme vulnerability and (iii) increasing the incomes of the rural poor, by improving productivity in the agricultural sector. However, several constraints were identified to reach these objectives, including the lack of adequate governance and policy environment conducive to sector reforms, the low productive capacity of poor farmers and pastoralists, and uninsured risks. A new SCD is under preparation as well as a country engagement note. The latest draft indicated that the broad development challenges facing Mali have not changed since the previous SCD, but insecurity, continued and escalated conflicts, the COVID-19 crisis, and the military coup d'état in 2020 have further deteriorated the economic, political, and social context. The FY16-19 CPF¹⁶ identified three areas of focus: (i) improving governance, by strengthening public resource management at central and local levels and fostering citizen engagement; (ii) creating economic opportunities, notably by enhancing the productive capacity of smallholders and improving basic services by developing infrastructure and connectivity; and (iii) building resilience, including by developing human capital, improving risk management mechanisms and mitigating climate shock. This project will support critical energy infrastructure that will directly contribute to the priorities of the CPF by improving basic services, productive capacity, and strengthening the resilience and diversification of the economy.

C. Proposed Development Objective(s)

The Project Development Objective (PDO) is to increase access to electricity in selected areas of Mali and the integration of least cost solar energy by leveraging private finance.

Key Results (From PCN)

23. The following indicators have been selected to measure progress toward achieving the PDO:
- (a) People provided with new or improved electricity service (number) (Corporate Results Indicator), of which female (%);
 - (b) Micro-small enterprises in rural areas provided with new electricity services (number), of which female-led (%);
 - (c) Public institutions (schools, health centres and local administrative offices) provided with new or improved electricity services (number); and
 - (d) Solar generation capacity constructed under the project (MW).
 - (e) Private capital mobilized
 - (f) Female-headed households with new or improved electricity service (number)

D. Concept Description

24. **The proposed project will increase access to sustainable, reliable, and affordable energy in Mali. It will target mainly four key areas:** (i) grid rehabilitation, upgrading and extension to areas/localities around the interconnected grid (i.e. transmission lines and substations in the regional cities); (ii) development of mini-grids in rural areas with solar PV

¹⁵ Report No. 94005-ML; November 3, 2015.

¹⁶ No new CPF has been published yet as the Performance and Learning Review of the CPF implementation, undertaken in late FY19, led to the extension of the CPF period to cover FY20.



under PPP arrangement to ensure sustainability; (iii) off-grid solar electrification in health, education and administration facilities and households in remote communities; and (iv) increase in generation capacity through a solar auction to secure large scale solar IPP with storage. Given the high natural and climate risks in Mali, the team will explore TF funding to conduct a vulnerability analysis of the planned investments and identify adequate measures to increase the resilience of the project.

The proposed project would be comprised of four main components as indicated below.

Component 1: Rehabilitation and upgrading of grid infrastructure and access extension in secondary cities (IDA, US\$95 million)

25. This component would finance: (i) rehabilitation, upgrading, densification and extension of distribution networks in communities/localities under the interconnected grid in secondary cities; (ii) electrification of localities around the existing HV substations (about 100 km of radius); (iii) electrification of localities along the existing transmission lines (HV and MV); and (iv) interconnection of selected regional cities to the main grid to eliminate expensive diesel generation and ensure sustainability of power supply in these cities. While specific investments will be selected during project preparation based on ongoing geospatial planning study to be commissioned by August 2021, these will cover in selected geographical areas construction of new MV lines, installations of new MV/LV transformers, associated distribution (LV) networks, consumption meters to new customers and new connections. Selection criteria for new areas to electrify will include economic nodes and high-income communities with potential to increase revenues of the utility. Preliminary estimates indicate that the project would add 140,000 connections by 2025 as part of this component, but this estimate will be refined during preparation. This component will also reduce technical and commercial losses by regularizing connections in peri urban areas to improve financial performance of EDM.

Component 2: Electrification of selected communities with mini grids in remote areas (IDA, US\$ 50 million)

26. This component would finance: (i) the hybridization of existing diesel mini grids, including in conflict zones to increase resilience to increase affordability and reliability of supply. Foreseeable activities under the ongoing REHSP (P131084) that would not be completed at the closing date of the project in March 2022¹⁷, would be financed under this component; (ii) promotion of greenfield PPP solar mini-grids in selected economic nodes and areas that are closer to conflict zones to increase conflict prevention capacity; and (iii) electrification of public institutions (health centers, schools and local administrative offices) and households in off-grid rural areas. These efforts will contribute to reducing disparity of access to electricity, between urban and rural areas with poorer households, and in particular poorer female-headed households. A commercial approach for the distribution of SHS through private distribution companies will be used learning from lessons of REHSP and in coordination with ROGEP, potentially including strategies for increasing women's participation in SHS distribution and maintenance. Community development initiatives including solar water pumping stations in remote areas would be supported. This component will be designed in such a way that private operators are involved in supply of and installation of the systems and operation and maintenance, and beneficiaries pay regular consumption fee to guarantee sustainability of the installations. A technical audit of the existing mini grids development model is being undertaken by AMADER to inform the project design. Mini grids will be developed in in relatively high population density areas with relatively high income per household to attract private investments in remote areas. Financing under this component will subsidize end-users by reducing the cost of supply. Subsidies will be designed in such a way that they address both investment mobilization and operational constraints to ensure sustainability of service delivery in remote areas. Preliminary estimates indicate that the project would add 10,000 connections by 2025 as part of this component, but this estimate will be refined during preparation. While REHSP reduced costs of services and increased

¹⁷ An extension of project closing date by six months to remain in the same fiscal year, as per the client request, is recommended to complete the ongoing activities and maximize the achievement of the project development objectives.



reliability of the existing diesel mini grids, it did not target economic nodes that attract private investments and ensure sustainability of mini grid systems.

Component 3: Utility-Scale grid Solar IPP with Storage to secure additional least-cost renewable energy generation (GCF/SRMI, US\$43 million)

27. This component will contribute to increase generation capacity, improve security of supply through diversification of sources, lower costs of generation, and improve grid stability while increased amount of variable energy gets integrated. It will support the efforts of GoM to increase domestic least-cost renewable energy generation. Mali has a great solar potential, and in the past years, these resources have generated increasing interest. The government received many unsolicited solar development projects. Several privately-owned solar projects (without storage) are currently in different stages of preparation (see Table), and the negotiated prices reached are so far well above the regional standards (with prices well above US\$0.10 per kWh). Given Mali’s limited fiscal space, leveraging private sector financing is critical to deploy grid-connected and off-grid solar generation projects. However, unstructured and often noncompetitive processes have impeded the timely delivery of cost-effective electricity supply by IPPs. Experiences from other countries show that for IPPs to deliver the lowest possible tariffs specific regulatory, structural, and technical conditions are required, particularly for solar projects, which present grid integration, planning, and dispatch capacity challenges. Moreover, while an IPP regulatory framework exists in Mali, it has not been implemented at the sectoral level and line ministries lack experience with IPPs.

28. Following the World Bank’s Sustainable Risk Mitigation Initiative’s approach, this component will help GoM to de-risk investments to attract the private sector, minimizing tariffs and maximizing local co-benefits of solar projects. The solar PV deployment would be phased taking into account the commissioning of the ongoing regional interconnections and planned solar projects to avoid oversupply and financial losses with take or pay IPP arrangements and will help GoM to rationalize the IPP pipeline. The Bank’s engagement would help GoM to follow a plug and play approach, whereby a solar auction is launched to competitively procure an IPP on a pre-selected and pre-authorized site, thus ensuring the best value for money for Mali. In addition, Mali is eligible for a US\$5 million GCF funding grant and US\$38 million loan through the SRMI Facility. This additional least cost capacity would enable the country to eliminate the expensive thermal generation, increase energy security and reduce the power sector’s carbon footprint.

Table 4. List of the potential pipeline of solar projects in Mali (2020)

Plant name	Targeted connection date	Capacity in 2023 (MW)	Capacity in 2025 (MW)	Status
TIKADOUGOU (SELINGUE)	2022	50	50	Signed contracts
SÉGOU	2022	33	33	Signed contracts
SIKASSO	2022	50	50	Signed contracts
KOUTIALA	2022	25	25	Signed contracts
BLA (SEGOU)	2023		93	Contracts not signed
FANA	2024		50	Contracts not signed
SAFO	2025		45	Contracts not signed
FANA	2023	60	60	Solar park with storage
Sanankoroba 1	2024	90	190	
Bougouni	2025		50	
TOTAL		308	646	

29. Preliminary analyses have been conducted for the development of a solar park with storage following a phased approach: 150 MW of PV with storage (150 MWh) around 2025 (provided planned grid improvements are completed on scheduled) and a possibility for another 150 MW of PV with storage (150 MWh) after 2025, contingent to major grid improvements and on the realization of a detailed VRE analysis reflecting the state of grid at that point. These analyses



showed that this solar park could contribute to reduction of Mali's average generation cost by 8 percent in 2022 and by 9 percent in 2025 compared with a business as usual case. It would mainly contribute by reducing fuel costs, leading to a saving of US\$31 million in 2022 and US\$50 million in 2025 and hence contributing to the efforts toward EDM's financial recovery. It would reduce generation costs from US\$0.158 to US\$0.152 per kWh in phase 1 and US\$0.118 to US\$0.109 per kWh in phase 2 of the solar park, compared to the scenario without park. It could also allow for more solar penetration thanks to storage capacity. Three sites have been identified for phase 1, namely the existing substation of Fana (to be fast-tracked under the project for 60 MW), and Sanankoroba and Bougouni substations under construction as part of HV transmission system reinforcement. This component will finance the publicly-financed shared infrastructure required for the development of the solar park as well as the grid upgrades necessary for the integration of VRE, including the public battery storage.

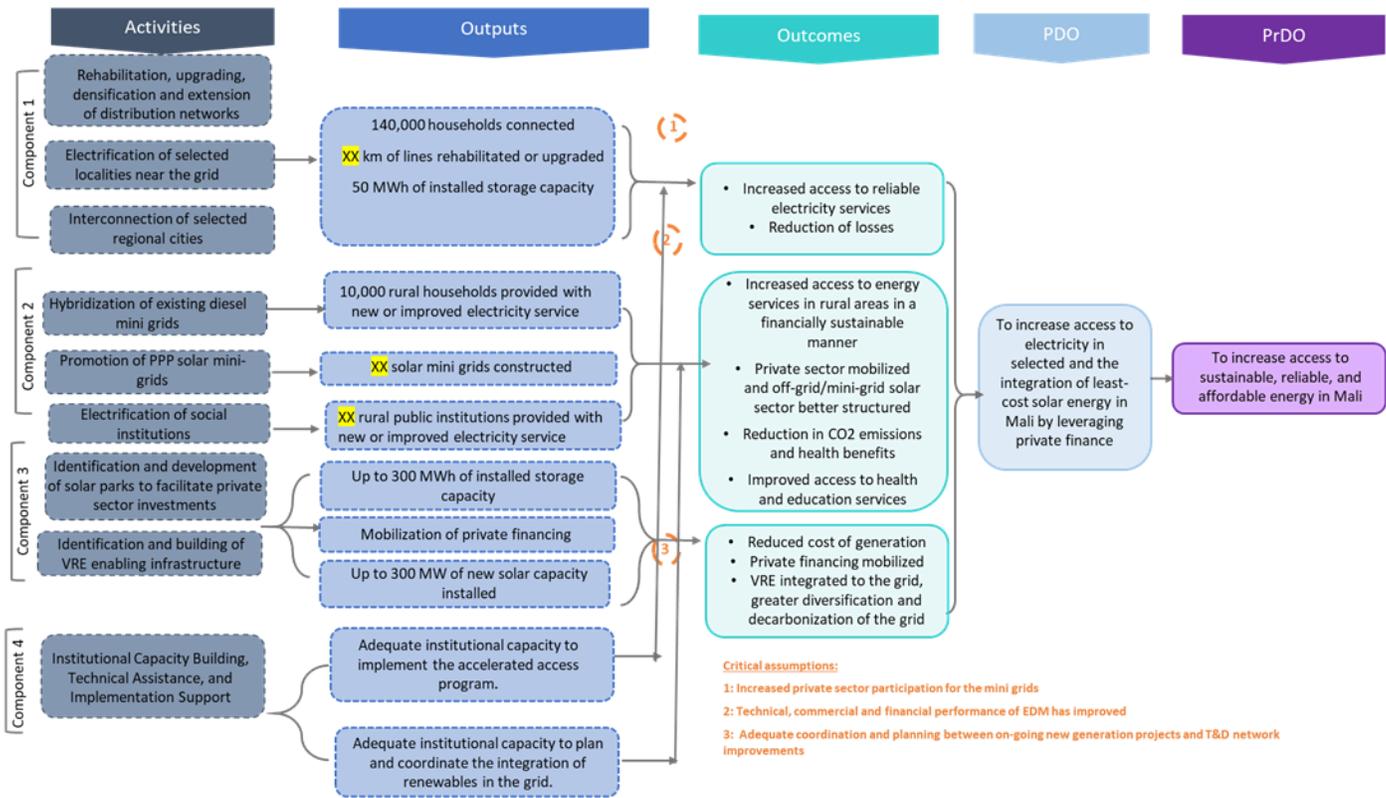
Component 4: Institutional Capacity Building, Technical Assistance, and Implementation Support (US\$12.0 million)

30. The component will finance activities to create a robust institutional arrangement to implement an accelerated access rollout program. It will strengthen the capacity of the Ministry in sector planning, resource mobilization and overall oversight of the program implementing agencies namely EDM-SA for grid extension components 1 and 3, and AMADER for component 2. Component 4 will be implemented by both EDM-SA and AMADER. It will finance the operationalization and running of the Project Implementation Units within EDM for grid access and AMADER for off-grid access for the duration of the project. Specifically, costs will include: (i) the recruitment specialized consultants to strengthen fiduciary, engineering, safeguard, and community development implementation capacity; (ii) office equipment; (iii) transport equipment needed for supervision of the implementation especially in the regions; and (iv) monitoring and evaluation. It will also strengthen the capacity of AER to actively participate in the implementation of component 3, as well as the regulatory commission to prepare the required regulatory and monitoring instruments and capacity-building activities for its technical staff. Gender integration activities in key public sector institutions will be implemented to facilitate coordination and development of an overall gender-energy framework of intervention. Dedicated activities addressing gender disparities will aim to (i) reduce disparity of access to electricity of poor rural households and in particular female-headed households following a gap assessment to determine main barriers and design appropriate measures such as awareness campaigns and pro-poor measures to alleviate these; (ii) increase the uptake of productive uses of electricity to enhance women's livelihoods and time savings and promote women-led businesses; and (iii) increase female participation in the energy sector, mainly in the public sector, and in off-grid solutions. This component will also finance the transaction advisory needed for the Regional Solar Park.

31. This component will also finance all activities related to the awareness-raising, technical and managerial training, and communication with respect to the roll-out of access investments in rural areas. It will specifically target private sector and local community players, building upon the experience acquired through REHSP. In addition, it will support capacity development of local service providers (SMEs) to implement the grid access program through the construction of LV lines and household connections.



Theory of Change



Legal Operational Policies

Triggered?

Projects on International Waterways OP 7.50

No

Projects in Disputed Areas OP 7.60

No

Summary of Screening of Environmental and Social Risks and Impacts

The project environmental and social risks are substantial due to the nature of activities which will be financed through project four components. It is expected that the electricity infrastructures construction/rehabilitation such as transmission lines (HV and MV), interconnected grid in the suburbs of Bamako and regional cities; HV substations, hybrid solar mini-grids, solar park and floating solar at Manantali will generate significant environmental and social risks/impacts which will be in number through several sites. Those impacts will occur both in Bamako and surrounded areas and rural areas certain a long side of electric line with security limit. However, those risks/impact can be mitigated by easily identifiable measures. EDM and AMADER have World Bank IPF project implementation under OP with relevant safeguards staffs, not in ESF. The institutional capacity will be assessed during project preparation and any gap will be filled.



CONTACT POINT

World Bank

Yussuf Uwamahoro, Celine Sarah Marie Ramstein
Senior Energy Specialist

Borrower/Client/Recipient

Republic of Mali
Fadeby Doumbia
Ministry of Economy and Finances
doumfad@yahoo.fr

Moussa OMBOTIMBE
Ministry for Energy and Water
mombotimbe2@yahoo.fr

Implementing Agencies

EDM
Oumar Barou DIARRA
DG
odiarra@edmsa.ml

AMADER
Amadou Sidibe
PDG
amadousidibe25@yahoo.fr

FOR MORE INFORMATION CONTACT

The World Bank
1818 H Street, NW
Washington, D.C. 20433
Telephone: (202) 473-1000
Web: <http://www.worldbank.org/projects>



APPROVAL

Task Team Leader(s):

Yussuf Uwamahoro, Celine Sarah Marie Ramstein

Approved By

Country Director:

Soukeyna Kane

30-Jul-2021
