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Output-Based Aid in Mali
Rural Electrification Hybrid System Project

Photo courtesy of Curt Carnemark/World Bank

Electrification can be a significant driver for improving livelihoods in rural communities. In rural Mali, where more than 80 percent of the country's population lives, the electrification rate is only 15 percent. Increasing access to electricity in rural Mali is crucial for economic development, social cohesion and reconstruction following the country's recent period of conflict, political instability and food insecurity. This note discusses an innovative output-based aid (OBA) project in rural Mali, the first such project in the energy sector to support development of mini-grids on a large scale. The project complements an innovative hybrid-system model supported by the International Development Association (IDA) and Climate Investment Funds/Scaling Up Renewable Energy in Low Income Countries Program (SREP) to expand rural access to modern energy services and increase renewable generation.

Developmental Challenge/Sector Context

Mali is among the poorest countries in the world, with about half the population living below the poverty line of $1.25 per day. In 2012, a complex crisis began to unfold in Mali—conflict and insecurity in the north, institutional and political turmoil in the south, and drought-related food insecurity across the country—which eroded the base of the country's economy and society. However, in 2013 and 2014, there were positive developments. The liberation of the northern part of the country from Islamist militants by French, African and international forces, and the swift adoption by the Malian authorities of a transition roadmap to restore democracy and peace have allowed the international community to resume development assistance. Democratic presidential elections took place in the

summer of 2013 and parliamentary elections were held in December of that year. The Malian economy has proven resilient in the face of recent shocks and the return to growth that began in 2013 is forecast to continue.

The rural population in Mali remains dispersed, which means that the extension of the national electricity grid in a financially sustainable manner is a major challenge, requiring huge investments in transmission and distribution. The national network expansion has focused on the distribution network in peri-urban/recently urbanized areas, and on connecting isolated localities with relatively high levels of demand for the national grid, leaving out the majority of the Malian population. For rural electrification, a decentralized model managed by the Malian Agency for Development of Rural Electricity (AMADER) has been developed over the last decade. This bottom-up approach to electrification, currently implemented by more than 60 private operators—mainly diesel mini-grids and Solar Home Systems (SHSs)—has proven its viability. However, the price of diesel generation and high investment costs for mini-grid densification, expansion, and internal wiring have limited scale-up of access in rural areas. In this context, the IDA/SREP Rural Electrification Hybrid System Project is designed to allow operators to improve their efficiency by selecting the least cost off-grid access plan—mini-grid connection or SHSs—and there is an important OBA component to this project.

Project Design

In 2013, the Global Partnership on Output-Based Aid (GPOBA) approved a grant for $5 million to co-finance Mali's Rural Electrification Hybrid System Project, which provides incentives to private operators to increase access and make connection packages affordable to the rural poor. The OBA project targets 12,000 poor households (approximately 130,000 people) in rural, off-grid, remote areas that have been unable to get a mini-grid/SHS connection due to high investment cost and that currently rely on candles, batteries or kerosene. The project has two components—subsidies for investment in off-grid solutions, and the independent verification of outputs.

Under the first component, the project grant enables operators to implement the least-cost electrification option. The primary option is mini-grid densification and internal wiring, which is expected to enable access for 9,600 households. The total unit cost of a metered connection with no electric pole is $282; a subsidy of $227 is provided to make the connection package affordable to the poor. Metered connections requiring one pole cost $959 per unit and the subsidy per household is $844. Where the extension of a mini-grid is not economically justifiable, the grant supports the installation of SHSs (50–135 watt peak) and internal wiring for 2,400 households. The unit cost per SHS with wiring is $717 and the subsidy is $586. The internal wiring package includes, in all cases, three Compact Fluorescent Lamps (CFLs) to promote efficient use of electricity and reduce monthly bills.

The contribution of the private operators is recovered through cost-reflective tariffs approved by AMADER for mini-grids and fees-for-service for SHSs. (Operators contribute $40 and $100, respectively, for no-pole and one-pole connections, and $116 for a SHS.) The OBA subsidies would also ensure affordable tariff and fee-for-service levels for rural customers while providing an acceptable financial rate of return for the operators. The user contribution is determined by the households' willingness-to-pay. The willingness-to-pay of $15 per household connection and internal wiring is based on AMADER's prior experience and evaluation of the implementation of business plans for existing rural electrification projects.

The second component of the project provides technical assistance of $300,000 to AMADER for hiring independent verification agents (IVAs) to verify outputs and determine operator eligibility for reimbursement of OBA subsidies. Subsidies will be disbursed in phases. For mini-grids, 80 percent of the subsidy will be paid upon verification that new metered connection and internal wiring have been completed according to AMADER's minimum technical standards, with the remaining 20 percent paid once the connection has functioned for three months and at least 80 percent of beneficiaries are paying for electricity consumption. In the case of SHSs, the disbursement schedule will see 80 percent of the subsidy paid upon new SHS installment and internal wiring, and 20 percent paid when operating and maintenance services for SHSs have been provided for three months and at least 80 percent of consumers are paying the fee-for-service.

Implementation and Financial Arrangements

The grant will be managed by AMADER, which is responsible for selecting private operators to implement the project. Selection is based on established criteria, which includes the following: potential demand and prospect for economic growth at the proposed sites; demonstrated source of up-front capital; proven past performance; technical, economic and financial viability of the sub-project; clearly defined outputs; and balanced geographical representation. The selection process places particular emphasis on the pre-financing capacity of potential operators, as operators will be required to fund the off-grid connections and internal wiring before receiving subsidies. Sources of pre-financing include revenues from energy and other activities, and commercial loans.

It is expected that the project subsidy will contribute to an acceptable rate of return for participating private operators. In cases of full payment of the subsidy, the rate

of return for new connections to mini-grids and SHSs has been estimated at 12.7 percent and 18.5 percent respectively. The relatively lower rate of return for mini-grids would be acceptable to operators in light of the wider support to their operations through hybridization under the Rural Electrification Hybrid System Project. The OBA subsidies would therefore make new connections financially viable for operators, while the bulk of the economic benefits (and the subsidy) go to the poor households that are connected.

Aside from selecting operators and overseeing the payment of subsidies following output verification, AMADER will also be responsible for outreach and promotion of the program, hiring and supervising IVAs, overseeing project implementation to ensure quality and timely progress, and implementing the monitoring and evaluation arrangements.

Lessons Learned and Reflected in the Project Design

This project builds on experience gained in previous World Bank-supported projects in Mali, especially the Household Energy and Universal Access Project (HEURA), concluded in 2012. Lessons from HEURA were incorporated in the project design. Additional lessons have been learned since the project's inception.

1. **Shifting performance risks to operators can increase access.** Under the HEURA project, private operators benefited from AMADER's subsidy (70–80% of total project cost) for generation, transmission, distribution and mini-grid access. However, although significant progress was achieved with regard to generation, access targets sometimes remained unmet. The GPOBA grant will encourage improved performance among private operators regarding access, as the subsidy is disbursed only after the connections and internal wiring are completed and verified. With regard to SHSs, the fee-for-service model, which has been piloted successfully by some operators in Mali, is expected to ensure appropriate incentives for operators to provide high-quality equipment and continuous maintenance services.
2. **Countries or regions in conflict-affected or fragile situations tend to undergo many institutional changes and a loss of institutional capacity; it is therefore crucial that implementation support and capacity building are included in project design.** Due to job insecurity during the conflict in Mali, essential executive and specialized staff left AMADER, which delayed project implementation. In order to avoid similar setbacks, strong support, supervision and guidance for both implementing agencies and service providers is required, particularly with regard to OBA mechanisms, technical capacity, procurement, safeguards, monitoring and evaluation.
3. **In remote areas, there are challenges to consistent and clear communication. However, in order that program requirements and responsibilities are clear to all parties, it is critical that the implementing agency maintain an ongoing dialogue with service providers, and that service providers communicate effectively with residents receiving services.** This is particularly important as residents or providers may not be accustomed in the way responsibilities are distributed within the project. In this project, for instance, internal wiring—usually the responsibility of the households—is included as part of the connection package supplied by the service providers. Open discussions between AMADER and service providers concerning the level of demand for new connections and the ability of poor households to pay for consumption have also been important, and AMADER has encouraged operators to pursue their own market due diligence. Moreover, the project technical design for the SHS component has been slightly adjusted (from the original 50 Wp to the range 50–135 Wp) based on market demand, while the subsidy level remained constant.

Conclusion/Sustainability

An off-grid approach driven by the private sector will continue to be a central part of Mali's rural electrification strategy, as the national grid expansion is unlikely to connect large numbers of dispersed, low income populations. An integrated strategy needs to include investments in increased access, renewable energy, and energy efficiency; effective public-private partnerships; and capacity building of stakeholders. The strengthening of AMADER's oversight of private operators' performance will help increase and diffuse local technical expertise. Hybridization of systems is crucial, as this reduces the volatility of operating costs for rural providers and contributes to more regular cash-flows, creating incentives for investment in access expansion through off-grid solutions, while facilitating access to credit for operators. This OBA project, especially when linked with clean energy activities supported by IDA and SREP and working closely with local partners, is expected to support a sustainable increase in access for the poor.

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