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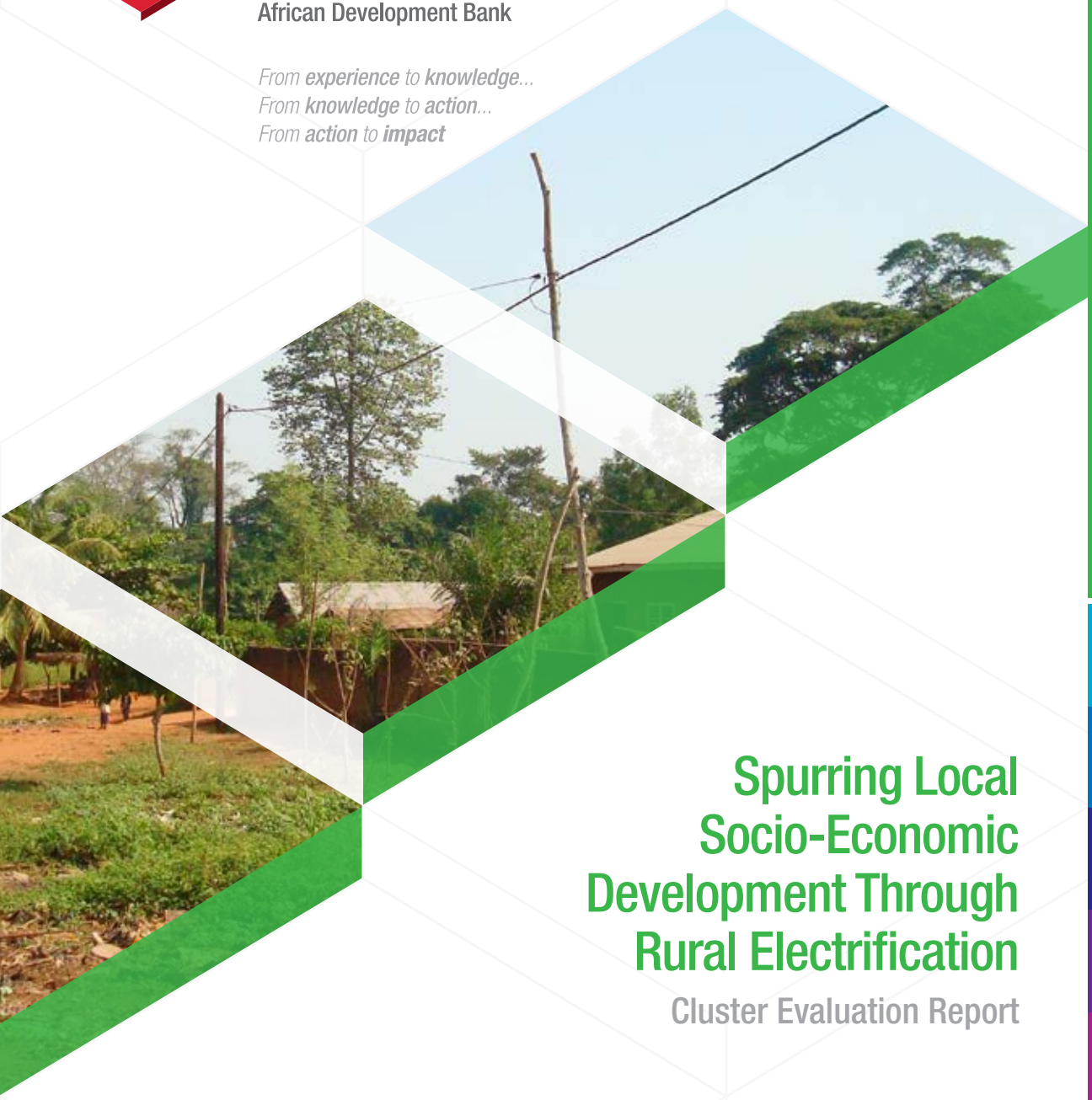

An IDEV **Project Cluster Evaluation**

Spurring Local Socio-Economic Development Through Rural Electrification

Cluster Evaluation Report

AFRICAN DEVELOPMENT BANK GROUP

March 2018

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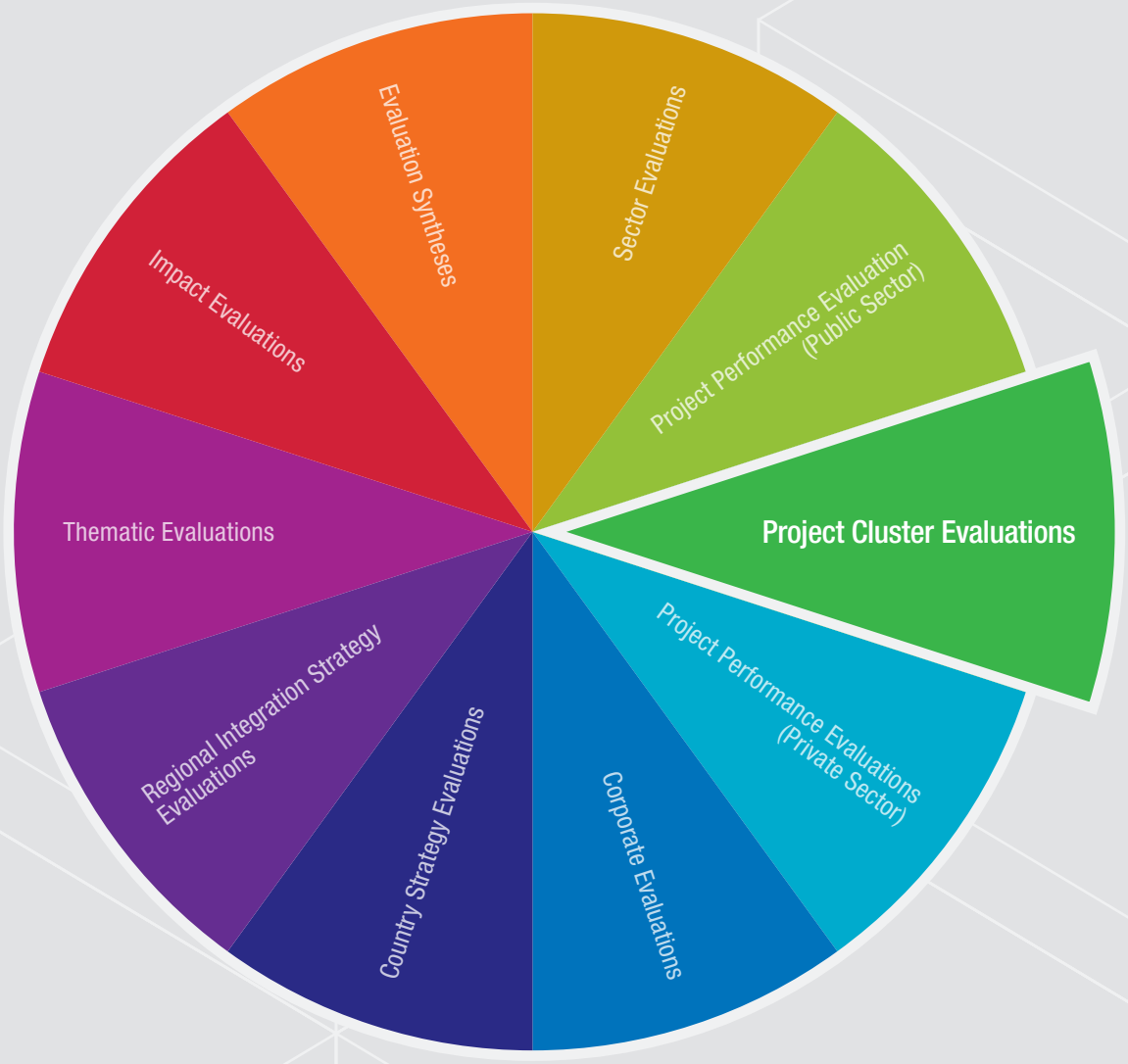

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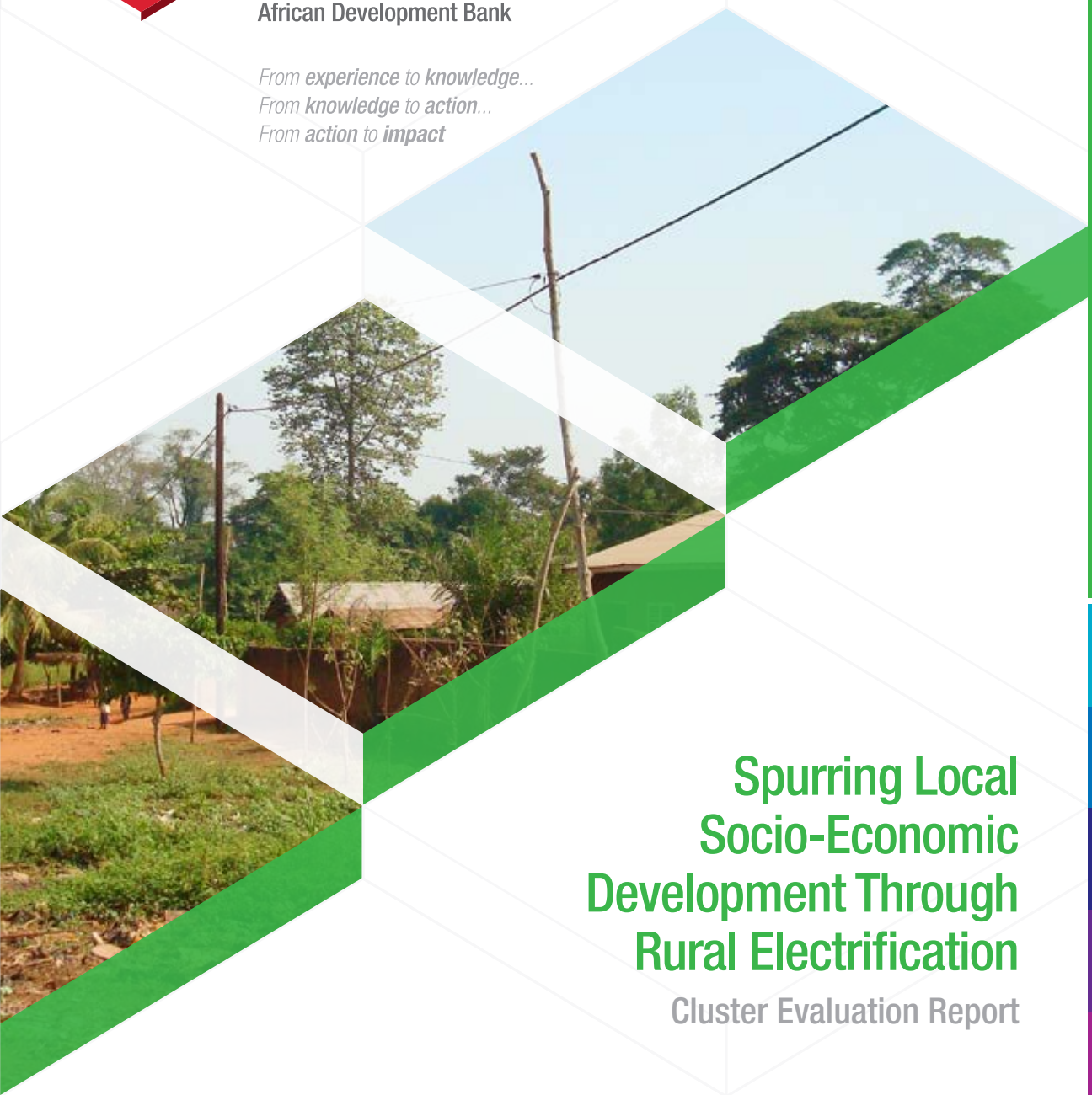

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Spurring Local Socio-Economic Development Through Rural Electrification

Cluster Evaluation Report

AFRICAN DEVELOPMENT BANK GROUP

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Spurring Local Socio-Economic Development Through Rural Electrification: Cluster Evaluation Report
IDEV Project Cluster Evaluation, March 2018

About the AfDB

The overarching objective of the African Development Bank Group is to spur sustainable economic development and social progress in its regional member countries (RMCs), thus contributing to poverty reduction. The Bank Group achieves this objective by mobilizing and allocating resources for investment in RMCs and providing policy advice and technical assistance to support development efforts.

About Independent Development Evaluation (IDEV)

The mission of Independent Development Evaluation at the AfDB is to enhance the development effectiveness of the institution in its regional member countries through independent and instrumental evaluations and partnerships for sharing knowledge.

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Contents

Contents

List of figures

List of tables

List of boxes

Abbreviations and Acronyms

AfDB	African Development Bank
EIRR	Economic Internal Rate of Return
FIRR	Financial Internal Rate of Return
HH	Household
IDEV	Independent Development Evaluation
Kv	Kilo-Volt
KWh	Kilowatt Hour
PAD	Project Appraisal Document
PCR	Project Completion Report
PRA	Project Result Assessment
RE	Rural Electrification
UA	Unit of Account
USD	United States Dollar

Executive Summary

Introduction and Evaluation Purpose/ Scope

This document outlines the key findings of the synthesis of evaluations of completed rural electrification (RE) projects over the period 1999–2013. All of them on-grid, the projects under this review aimed to foster rural development and improve the living conditions of rural populations by supplying electric power to rural areas.

The purpose of this cluster evaluation is: i) to assess the relevance, effectiveness, efficiency, and sustainability of completed RE projects; and ii) to draw key lessons from what worked, and what did not work.

The evaluation can inform the design and implementation of future RE interventions under the African Development Bank's (AfDB's) New Deal on Energy for Africa.

Project cluster performance

Development outcomes

Overall performance

Only four of the seven projects in the cluster were rated satisfactory on development outcomes; the remaining three were unsatisfactory.

The project cluster was relevant and effective but delivered inefficiently with results that were unlikely to be sustained.

Project cluster objectives relevant, but weak in some design aspects

- The objectives of the cluster of seven RE projects (the project cluster) aligned well with the stated RE needs and priorities of the five countries.
- The project cluster's objectives are also aligned with AfDB priorities and strategies, which consider RE as critical to local area development.
- The project cluster's objectives are consistent with the broader need of rural households for electricity, but the projects fail to specify how poor rural households are to access and use the electricity effectively.
- The projects have clear objectives, with planned outputs relevant for RE. However, the project designs are weak.
- Although four of the five countries concerned have master plans, political interference meant that the selection of localities to electrify was not always based on sound technical and economic grounds.
- Finally, the project designs do not show flexibility in the types of phasing and metering system to use.

Achievement of objectives

- The projects provided the main physical outputs necessary for increasing access of the rural populations to electricity.

- With the exception of Tunisia, the remaining six projects failed to connect households to electricity in a timely manner owing in particular to:
  - The strategy prioritising geographical coverage that did not cater for low-income households;
  - Low incomes meant that some households could not afford the connection fees;
  - Limited capacity of the power utilities to meet increased demand for new electricity connections; and
  - Compliance with certain aspects of local content policies (mainly concerning the use of locally-manufactured input such as electric poles in Benin and meters in Ethiopia).

- Integrated approaches optimized the use of electricity as well as its impacts on rural business development and expansion, and standards of living.

- Notwithstanding the positive effects of the RE project cluster, the available electricity, was not used optimally (except in Tunisia) mainly because of the limited availability of complementary economic activities and limited capacity of households to pay the electricity tariffs.

Unsatisfactory project efficiency: Although viable economically, the projects suffered from limited financial viability and substantial implementation delays

- All the five projects which were rated on economic performance were satisfactory.

- Only two of the four projects rated on financial performance were satisfactory.

- All seven projects evaluated suffered substantial implementation delays which led to inefficiencies and cost overruns. The consequent project slippages were substantial.

- The key factors behind project implementation delays included slow loan ratification, procurement issues, poor performance of contractors, late preparation of tender documents after loan approval, and limited payments of government counterpart funds.

Unsatisfactory sustainability of project benefits

- The project facilities are technically, environmentally and socially viable, but the projects were weak in financial viability, institutional capacity, political and governance environment, ownership, and resilience to external factors.

- The power utilities related to the seven projects rely on government subsidies to continue to operate. This is mainly due to the issues of electricity tariffs and their affordability for rural electricity consumers, especially the poor; insufficient electricity production capacity; and high investment and operating costs.

- The resilience of the projects to exogenous factors was weak, especially in face of price fluctuations of imported fuel and electricity.

- Six of the seven projects, were challenged by weaknesses in planning, managing for results, and designing appropriate policies and regulations. Institutional sustainability was strong in Tunisia but weak in all the other countries.

Project M&E performance

Limited monitoring and evaluation (M&E) systems

- M&E systems were incorporated in project designs but not operationalized or used effectively.
- The quality of the M&E data was unsatisfactory.
- Although three of the five project completion reports (PCRs) were prepared on time, there was a substantial disconnect (33%) between the PCR ratings and those of IDEV's Project Evaluation Reports.

Key Issues & Lessons Learnt

Quality of project design

Lesson #1: Lack of critical risk analysis and adequate risk mitigation measures can contribute to substantial implementation delays and inefficiencies.

Quality project design requires, inter alia, adequate risk analysis and mitigation measures for fostering quality implementation. In this regard, the project designs addressed the risks relating to power generation during peak demand, the financial health of power utilities, and political control. However, they were silent on the following risks:

- Reliability of the supply and quality of locally-manufactured project inputs (for example the cases of electrical poles in Benin and electrical meters in Ethiopia).
- Capacity of the project implementation units to deal adequately with issues including the timely preparation of tender documents (in the Gambia and Tunisia, documents were prepared only after loan approval), different donor procurement rules and procedures (Benin, Ethiopia, the Gambia and Tunisia) and government procurement regulations (Ethiopia) in multi-donor financing arrangements (the Gambia).
- Capacity of the contractors to perform their contractual obligations (Benin, the Gambia, Ethiopia and Mozambique).
- Payment of national counterpart funds (Benin).
- Ratification of loans by legislatures.
- Power supply from imports (Benin). The risk of insufficient power supply from imports was inappropriately assessed at the appraisal stage of the Rural Electrification Project II. This assumption did not hold, as Togo was also experiencing electricity shortages and needed all the power it was generating.

Further, the mitigation measures were inadequate for addressing the identified risks.

Fostering rural economic development through RE

Lesson #2: Integration between RE and other rural development projects (irrigation, agriculture, water supply, health, education, microcredit, etc.) is critical to better outcomes.

- Integrating with other development initiatives can enhance the productivity of RE and of the downstream and upstream industries.

- The productive impact of RE was highest in Tunisia, where the Government integrated electrification in a holistic rural development plan.

Geographical coverage vs. universal access

Lesson #3: Focusing RE on geographical rather than household coverage can bring electricity closer to rural households but cannot ensure universal access unless issues of affordability to the rural poor are addressed.

In promoting universal access of electricity in rural areas, government electricity strategy matters. In their electrification policy statements and strategies, Governments apply two definitions of access to electricity; one based on"in-house access to modern forms of energy", and the other on geographical coverage. As a result, countries can opt to use either definition, or both strategies for RE.

Rural electrification in Tunisia focused on the rural household, but in Benin, Ethiopia, Gambia and Mozambique on geographical coverage. Tunisia succeeded in electrifying almost all its rural households whilst only a minority of rural households in the rest of the four countries had access to and use electricity.

Sustaining project benefits

Lesson #4: Appropriate tariffs and subsidies are critical to the financial viability of electricity utilities and to sustaining RE benefits.

- The main challenges to sustaining the benefits of RE projects are: i) household affordability, ii) electricity generation at times of peak demand, and iii) the financial health of the electricity utilities.

- Connection charges and power prices can prevent low-income rural households from connecting to the power grid and using electricity. To improve household access to electricity supply, subsidies and power price measures are necessary.

- Affordability challenges and operational issues remain factors that hindered or facilitated the result's achievement and sustainability.

  - On the *demand* side, most rural households are unable to pay the full cost of connection upfront;

  - On the *supply* side, the subsidization policy poses a problem for sustaining the rural electrification services, as the government subsidies and electricity tariffs are inadequate to pay for the required RE investments. To finance investments requires a system of tariffs and subsidies that ensures sustainable cost recovery.

- Meeting peak electricity demand was also a challenge.

- All the power utilities in the five countries depend on transfers from national budgets and on government control tariffs. This strategy was not effective, as the utilities regularly show net annual financial losses.

- In addition to imposing unsustainable investment programs on their utilities, Governments prevent them from rising tariffs even when investment and operating costs are rising.

Political support

Lesson #5: Strong political support, including an initial investment subsidy and adequate institutional framework, is necessary to sustain project results.

Political and governance failure are the root causes of financial weaknesses within power utilities.

- In all five countries, the electricity utility companies were government-owned. As a result, the issues of electricity supply and tariffs were highly politicized.
- Government's political goals may not match those of its power utility regarding the need of providing reliable and quality electricity services.
- The consequence is often insufficient tariff levels, restricted budgets, or even a power system in disrepair that cannot meet the electricity demand of connected customers.

The extent of these problems varies according to the political and governance environments. Tunisia, and to some extent Mozambique and Ethiopia, control tariffs while propping up their power utilities with huge subsidies. ■

Introduction

The Independent Development Evaluation (IDEV) of the African Development Bank Group (AfDB, or "Bank") recently introduced a cluster approach to project-level evaluation on the Bank's priority theme areas.

This evaluation assesses the results of the rural electrification (RE) projects, and why the expected results were achieved or not. It provides a synthesis of seven selected RE projects (projects group) which were approved in 1999–2006 and completed (with one exception) in 2005–2016. The key evaluation questions for each project-level evaluation focus on the extent to which the RE projects are relevant, effective, efficient, and to which their benefits are likely to be sustainable.

AfDB-Funded RE Projects

The energy sector has always been a high priority for the AfDB. It was identified as a priority in the i) 2007 High-Level Panel report on "Investing in Africa's Future"; ii) AfDB's Ten-Year Strategy; and iii) most recent AfDB five key priority areas (High 5s), which capture energy as 'light up and power' Africa'.

The AfDB approved 201 operations (amounting to UA 7 billion in net loans and grants) in 1999–2013. This total amount of net loans and grants to the energy sector represented 14% of the total net loans and grants approvals by the AfDB during that period. Twenty of the 201 AfDB-funded energy operations in 1999–2013 were for RE. These operations, representing total net loans and grants of UA 494 million, comprise 18 investment projects (UA 491 million) and two studies (UA 3 million) spread over the AfDB's six operational regions on the African continent; South, North, West, East, Central and Multinational (Annex 2, Table 1). Six of the 18 RE investment projects were completed; the remaining 12 were at varying stages of implementation[1].

The six completed projects, together with one project nearing completion[2], are the basis of the cluster evaluation. With a total net approval amount of UA 200 million, they are located in Benin (2), Ethiopia (2), the Gambia (1), Mozambique (1) and Tunisia (1).

RE projects aim at improving access to, and the use of, reliable electricity by rural populations and entities in order to enhance rural economic activities and living standards (see Annex 1; project logic). According to projects appraisal documents (PADs), these projects are based on the hypothesis that RE will stimulate economic development. Access to and use of reliable electricity by rural populations and entities are expected to create jobs, boost rural incomes and attract business activities. The resulting growth in trade, together with reductions in poverty and in the rural exodus, is expected to support long-term RE.

Evaluation Purpose and Scope

This cluster evaluation is conducted in order i) to provide AfDB Board and Management with credible and actionable evidence on the performance and development results of AfDB-funded RE projects, ii) to provide AfDB operational management, staff and other stakeholders with relevant lessons for informing the Bank's strategy, project design and implementation for RE; and iii) to support further development of the cluster approach and methodology.

The evaluation covers a cluster of seven of the 18 AfDB-funded RE investment projects in five

countries (Benin, Ethiopia, the Gambia, Mozambique and Tunisia). The projects were approved in 1999–2006 and completed (with one exception) in 2005–2016. These RE projects comprise six completed projects and one project which was near completion at the time of the review (see Annex 2, Table 2). The evaluation focuses on the project relevance, effectiveness, efficiency, and sustainability.

Evaluation Approach, Methods and Limitations

The project-level evaluation used a theory-based approach[3]. As the projects' theories of change were not explicit at the points of appraisal and implementation, the evaluation team constructed a Rural Electrification Intervention Project Logical Model which indicates the intervention activities, outcomes, and associated assumptions for the cluster of seven projects (Annex 1). This provided the basis for assessing results at both individual project level and project cluster level, where findings from individual projects were categorized and synthesised.

In order to generate useful lessons for the future, the key evaluation synthesis questions focused on the extent of the project cluster results and the factors which facilitated or limited their achievement. The evaluation used a common data collection protocol to collect both quantitative and qualitative data on the performance of each project. The data was generated from multiple sources and collection methods including: 1) desk review of relevant AfDB documents and literature; 2) interviews with key stakeholders (both inside and outside the Bank); 3) field visits of purposively-selected project sites; and, 4) a survey of 500 purposively-selected households per project (including beneficiaries and non-beneficiaries). Each category of data was analysed using mainly descriptive statistics. Comparative analysis was also done at indicator levels using baselines, targets and actual results. With some of the data sources and methods, evidence triangulation was done.

The RE cluster evaluation is limited mainly by:

i. The purposive nature of the sample of seven projects. This limitation was mitigated, however, by the reasonable sample size (39% and 53% in terms of number and net amount, respectively) of the total AfDB project investment in RE in 1999–2013.

ii. The shortcomings associated with the field visits, stakeholder interviews, and beneficiary survey, especially in terms of insufficient coverage (of project sites and beneficiaries) and survey responses. The triangulation process reduced the impact of these limitations.

iii. Lack of granular data on certain national outcome indicators to which the RE projects were expected to contribute. This was a challenge in assessing the effectiveness of the project cluster, but the use of the program theory-based approach was helpful in mitigating this limitation. ■

Project Cluster Performance

Development Outcomes Performance

Overall performance. The development outcomes of four out of the seven projects were rated satisfactory; three were deemed unsatisfactory (Annex 3, Table 4). As the following figure shows, the performance of the project cluster was satisfactory in terms of relevance and effectiveness but unsatisfactory in terms of efficiency and sustainability. The project cluster was relevant and effective but delivered results inefficiently that were unlikely to be sustained.

Relevance

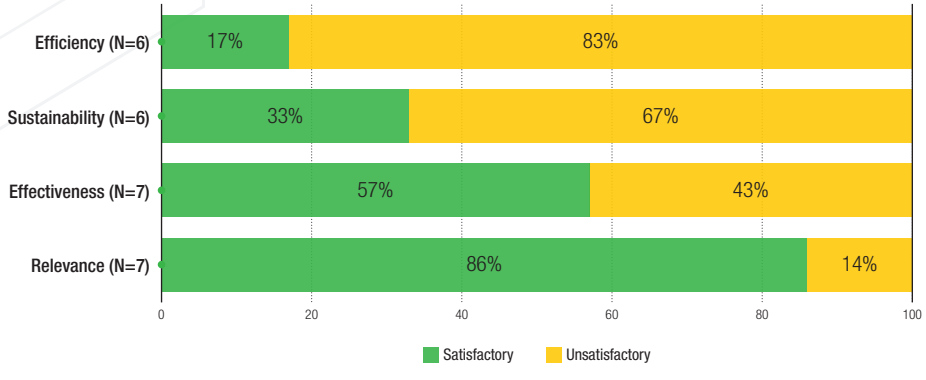
Cluster objectives relevant, but weak in some design aspects.

The objectives of the seven RE projects (the project cluster) are aligned well with the stated RE needs and priorities of the five project countries (Benin, Ethiopia, the Gambia, Mozambique and Tunisia). The projects' objectives of improving access to, and use of, reliable quality electricity among rural communities are consistent with the critical development constraints and needs set out in the national development strategies or plans in each of the countries concerned. RE remains a high policy priority in all the project countries. Ethiopia and Tunisia, for example, explicitly identify RE in their laws or policies as a priority for development (Box 1).

The supply of electricity to rural communities addresses the energy and energy-related constraints and needs of the rural population and entities for improving rural social facilities, economic activities and living conditions.

The project cluster's objectives also align with AfDB priorities and strategies which consider RE as critical to rural area development. These projects aim not only to provide reliable electricity for the rural population, but also to help promote the growth potential of complementary development activities. The AfDB's 1999–2013 country strategy papers (CSPs) for Benin, Ethiopia, the Gambia, Mozambique and Tunisia explicitly address RE constraints in each country. The projects' objectives are also in line with those of the non-energy sectors within the CSPs, and

Figure 1: Performance rating of RE project cluster by criterion



Source: IDEV's Project Results Assessment (PRAs)

Box 1: Rural electrification as a government priority

Tunisia launched a large program of RE in the mid-1970s, when approximately half the country's population lived in rural areas and only about 30,000 households, representing 6% of rural households, were electrified. RE became the third pillar in an integrated rural development drive that also emphasized basic education and improved health services. RE therefore became a top priority in social and economic development plans of the Government of Tunisia (GOT). The Electricity VI project was included in the country's Ninth (1997–2001) and Tenth (2002–2006) national development plans. With the achievement of 100% RE, the GOT's priorities switched to power system reinforcement in rural areas in order to meet growing demand.

In 1994, the Government of Ethiopia (GOE) issued a formal energy sector policy which encouraged access to electricity in all parts of the country, including rural areas, in support of the Agriculture Development Led Industrialization (ADLI) strategy. This in turn was the cornerstone of the GOE's Interim Poverty Reduction Strategy Paper (PRSP, 2000/01–2002/03). The two projects were components of the five-year private sector development programme formulated to support the ADLI strategy.

with the strategies of other development partners. This coherence of project objectives, coupled with the wide geographical spread of the RE projects, facilitates the development of complementary activities. Cases in points are projects funded by other donors and focused on the development of small and medium enterprises (SMEs) in rural areas. Such projects can increase rural demand for new power facilities and customer connections, boosting electricity use.

The projects are consistent with the broader need for electricity, but fail to specify how poor rural households are to access and use the electricity effectively. The project outputs meet a real need for electricity of the rural population able to pay for connection and electricity, but not those who cannot pay. Further, the projects favour a geographical coverage approach with no specific targeting of poor households. This biases access to electricity towards those who can afford to pay, illustrating the fact that specific needs of beneficiaries, especially the poorest, were not taken into account appropriately in project design.

While the project designs have clear objectives, with planned outputs relevant for RE, they have the following weaknesses:

- The causal links between project outputs and some of the expected medium- and long-term outcomes (e.g. improved rural economic growth and living standards; improved school performance; improved business environment),
- Risk analysis and mitigation,
- Monitoring and evaluation system (especially in providing indicators and their levels), and
- In assessing the appropriateness of certain technological inputs.

The project interventions are likely to be linked only indirectly to some of the expected outcomes, such as rural economic growth and living standards, as these outcomes are distant and beyond the sphere of control and influence of project interventions. Moreover, the feasibility of achieving some the expected outcomes within the planned timeframe is questionable, and the risk analysis and mitigation measures are limited in scope.

The project designs include risks relating to power generation during peak demand, the financial health of power utilities, and political control, but they are silent on risks concerning the reliability of the supply and quality of locally-manufactured project inputs (for example the cases of the electrical poles in Benin and meters in Ethiopia) or the incompatibility of donor procurement procedures in multi-donor financing arrangement (as in the case of the Gambia). Furthermore, the mitigation measures are inadequate for addressing the identified risks.

Despite the existence of master plans in four of the five countries, political interference meant that the choice of localities to electrify was not always sound. A holistic electricity master plan for power is a point of entry for effective and efficient rural coverage. A holistic plan will ensure that adequate power generation is available at the lowest cost possible, and that the transmission system and distribution network are of sufficient capacity to deliver electricity services of acceptable quality that meet the demand arising from RE. Such a holistic analysis would be required to consider various RE solutions – on-grid, off-grid, and standalone home systems.

However, in selecting localities to electrify, the Bank sometimes considered Government-submitted documents which had no credible and holistic analyses of proposed localities or the priorities and programming of RE projects. In such cases, the choice of locality was guided by political interests (Benin and Ethiopia, where four out of the seven cluster projects are located). This reflects the pressure from rural populations to access electricity at lower or zero cost. Such politically-motivated choices of localities challenge the effectiveness and sustainability of the project benefits.

The project designs are not flexible on the phasing and metering systems to use. Irrespective of the context, the project designs (except in Tunisia) rely on single- or triple-phasing power connections rather than a mix of the two that could be more appropriate technically and economically. Although prepaid metering is effective for improving the collection rate of electricity bills, the project designs, with the exception of the Gambia's, do not consider this option. The designs of six of the seven projects use the post-paid metering system.

Effectiveness

Substantial achievement of project objectives. *The projects enhanced not only household use of reliable electricity; but also rural economic activities.*

The projects provided the main physical outputs necessary for boosting the access of rural populations to electricity. Six of the seven completed RE projects achieved and sometimes exceeded (Tunisia and Mozambique) their main expected outputs (Annex 2, Table 3). The seventh project (Ethiopia II) was likely to deliver almost all its planned outputs. The main project outputs include power stations (diesel generation), distribution substations, transmission and distribution networks, transformers, and streets lights and connections). The projects delivered fewer high-voltage lines than planned, mainly because of cost escalation (Benin, Ethiopia, and the Gambia). Generation capacity was consequently scaled down, notwithstanding a rise in the number of low-voltage lines.

Five of the seven projects achieved or exceeded (with substantial delays) their targets of connecting households to electricity; the remaining two projects made only modest progress towards their objectives (Annex 2, Table 4). Six of the seven projects failed to connect households in a timely manner for the following main reasons:

- The strategy of geographical coverage did not cater for the income-poor households.
- Low incomes meant that some householders could not afford the connection fees (Annex 2, Table 6). Except in Tunisia, where government provided subsidies, those who could not pay the fees were excluded access to the electricity.
- Limited capacity of the power utilities to meet higher demand for new electricity connections (lack of connection equipment such as meters, insulars, etc.). The power utilities in all five countries except Tunisia have long waiting lists of potential users, some of whom have already paid for the connections.
- Compliance with certain aspects of local content policies mostly concerning the use of locally-manufactured inputs like electric poles in Benin and meters in Ethiopia. In the

absence of local manufacturing of electric poles in Benin, no local poles were available for use. In the Ethiopia Rural Electrification Project II, delivery of the meters had to wait for the meter factory to be established and come into operation. As a result, only 6,200 (3%) of the expected 184,000 meters were installed by 2015. The situation was exacerbated by shortages of inputs (including meters and insulars) necessary to connect households effectively to electricity.

In spite of the positive effects of the RE project cluster, the available electricity was not used optimally. When they do have access to electricity, households and other entities use it for lighting and to power commercial and social activities. According to the beneficiary surveys, consumers took advantage of electricity to increase their productivity and/or scale up their commercial activities. There can be no doubt that the supply of electricity from the project cluster generated positive economic and social effects beyond the mere connection to power. However, in Benin, Ethiopia, the Gambia and Mozambique, notwithstanding the positive effects of the RE project cluster, the available electricity was not used optimally. This was due mainly to limited availability of complementary economic activities and the inability of many households to pay the electricity tariffs.

Six projects were implemented without any direct link to other development and/economic initiatives, thereby limiting the benefits of RE. The benefits of RE were more pronounced in Tunisia, where the Government integrated RE with other development initiatives within its integrated rural development strategy. This approach optimised electricity use, rural business development and expansion, and increased standards of living.

In addition, the income-poor households continue to depend on traditional sources of light such as the kerosene lamp and have low levels of electricity use. The household surveys reveal that respondents in Benin, Ethiopia and the Gambia still rely heavily on energy sources such as kerosene and candles for some of their lighting needs and that electricity has not replaced fuelwood and charcoal for cooking. In Benin, for instance, project post-evaluation reveals that the main factors limiting the use of electricity by connected customers are: i) a lack of financial resources and limited access to credit; ii) difficulties encountered by *Société Béninoise d'Energie Electrique (SBEE)* in supplying beneficiaries with 10A meters, which can operate some machines since the 5A meters available are inappropriate; and, iii) a lack of awareness and knowledge of electricity and its benefits. All these factors dampened investment in electrical equipment.

Efficiency

Unsatisfactory project efficiency. *The projects evaluated were inefficient. Although viable economically[4], the projects suffered from limited financial viability and substantial implementation delays. All the five projects which were rated on economic performance were satisfactory, but only two of the four projects rated on financial performance were satisfactory. All seven projects evaluated were characterized by substantial delays in implementation which caused inefficiencies and cost overruns. The key factors behind the delays included slow loan ratification, procurement procedure issues, poor performance of contractors, late preparation of tender documents after loan approval, and limited payments of government counterpart funds.*

Substantial implementation delays. None of the seven RE projects adhered to either their implementation schedule or their cost plan. They suffered substantial time overruns. None of the seven projects adhered to its original closing date or implementation period. Every project experienced significant delays from signature to completion (Table 1 below; Annex 3[5]). As the table shows, the average project implementation period (from start-

up to completion) was 77 months (6 years and 5 months), which equates to an average delay of 25 months relative to the planned duration at appraisal. The implementation duration ranged from a minimum of 51 months (4 years and 3 months) in Tunisia to 129 months (10 years and 9 months) in Mozambique. Three of the seven projects experienced more than one year of delays from the date the loan became effective to first disbursement.

Substantial implementation slippages. All the evaluated projects, excluding that in Tunisia, experienced substantial levels of slippages (or time overruns)[6]. The slippages at start-up ranged from 160% (Benin RE II) to 725% (Gambia RE III). The time overrun at completion date ranged from 33% (Tunisia RE VI) to 178% (Mozambique RE III).

Slow and late loan disbursements. The average disbursement period of the seven RE projects was 78 months (84 if weighted by net amount) compared to the target of 57 months on average. The projects loans took 47-127 months to disburse fully. Four of the seven projects (57%) had not even achieved 25% of disbursement after four years. Ethiopia RE II and Mozambique suffered the greatest delays in disbursement. (See Figure 1 and Annex 3, Table 5). Figure 2 shows variable disbursement profiles which deviate from the planned patterns.

Cost overruns and underruns. Three of the six completed RE projects experienced cost overruns; while three were associated with cost underruns (see Table 2). Three of the six completed projects experienced a cost variation of +/- 10% of the original estimates. The Ethiopia RE I cost about 26% less than planned. However, the extent to which projects were completed within the cost estimated at appraisal could not be assessed easily as some planned elements of projects were revised during implementation. As a result, cost savings or underruns could be attributable to a project being scaled down.

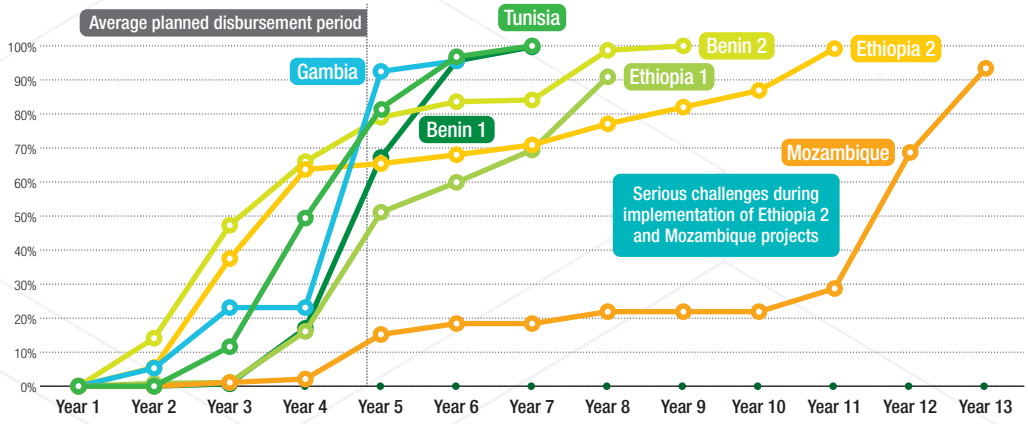
Table 1: Project time performance

	Project's duration							
	Signature to completion			Start-up to completion*			Effective to first disb. [M]	First disb. to last disb. [M]
	Planned [M]	Actual [M]	Variation	Planned [M]	Actual [M]	Variation		
Benin – Electrification of 17 Rural Centres	51	75	24	45	55	10	13	47
Benin – Second Rural Electrification Project	60	107	47	52	84	32	4	82
Ethiopia – Rural Electrification Project I	55	87	32	51	51	0	7	74
Ethiopia – Rural Electrification Project II	79	119	40	79	100	21	7	105
Gambia – Rural Electrification Project III	38	83	45	38	51	13	5	59
Mozambique – Rural Electrification Project III**	49	140	91	45	126	81	13	127
Tunisia – Rural Electrification VI	54	72	18	54	72	18	13	51
Average	**55**	**98**	**+ 43**	**52**	**77**	**+25**	**9**	**78**
Weighted average by net amount	**65**	**101**	**+36**	**63**	**83**	**+20**	**9**	**84**

* Start-up Date: Date of awarding of the consulting services for supervision.
** PCR mission conducted from 20 March 2014 to 05 April 2014. However, while the draft PCR was found, the final report was not disclosed.

Figure 2: Disbursement profile by project (compared to approval amount)

Low disbursement rate (less than 25%) after four years of project implementation for Benin 1, Gambia, Ethiopia 1 and Mozambique



Source: Cluster Evaluation Team

Table 2: Cost variations [+/-] and %

Country	Total cost				Achievement of outputs	
	Estimated UA mn	Actual UA mn	Variation UA mn	Variation %	%	Comments
Benin – Electrification of 17 Rural Centres	6.49	7.30	0.81	12%	131%	Unforeseen technical modifications to the scope of work: Increased number of rural centres electrified and the number of new street lights more than double that envisaged.
Benin – Second Rural Electrification Project	15.88	17.67	1.79	11%	122%	Increased number of rural centres electrified while the wood pole processing plant envisaged never materialized.
Ethiopia – Rural Electrification Project I	43.33	31.94	-11.39	-26%	93%	Saving due to: i) volumes of medium-voltage lines and distribution transformer stations reduced ii) bidders from emerging markets offered much lower prices for substation and distribution works than bidders from developed countries.
Ethiopia – Rural Electrification Project II	114.31				69%	Over-estimation of the length of 132 kV and lower metal prices leading to lower prices for power system equipment. Reduction of the number of districts to electrify. But only 6,200 of the planned 184,200 new meters have been installed.
Gambia – Rural Electrification Project III	14.86	13.98	-0.88	-6%	99%	Once it was realized that the project would go over budget due to delays in implementation, the project was scaled down excessively in the area of generation capacity.
Mozambique – Rural Electrification Project III	19.36	20.90	1.54	8%	173%	Local financing overran budget by almost 200%. This can be attributed to delays, caused essentially by non-performance by the contractor initially engaged for the project. Increased number of new connections and number of localities electrified.
Tunisia – Rural Electrification VI	64.57	62.58	-1.99	-3%	135%	Incentives for outsourcing to private firms for works and services introduced competition between suppliers which lowered prices.
Average	**39.83**	**38.38**	**1.69**	**-0.01%**	**117%**	

Viable economic performance. Five of the seven projects with re-estimated economic internal rate of return (EIRR) have EIRRs in excess of their respective opportunity costs of capital (Table 3). No post-project EIRR was estimated for two of the projects (Mozambique and Ethiopia II) owing to data limitations.

Weak financial performance. The projects' financial viability, from the perspective of the public utilities, is rated unsatisfactory due mainly to low revenue generation relative to high investment and operating costs. Two of the four projects with re-estimated financial internal rate of return (FIRR) have positive FIRRs that are higher than their respective costs of capital, while the FIRRs of the other two projects are negative (Table 4). The positive and negative FIRRs are indicative of positive and negative net financial benefits respectively. The FIRRs of the remaining projects could not be re-estimated because of data limitations.

The cost of generating, transmitting and distributing rural electricity was high among the seven projects but tariffs were kept artificially low under policies designed to ensure that the rural households could afford them. The revenues of the power utilities were also challenged by power shortages, which meant that revenue from electricity sales was insufficient to cover the cost of supply in most of the RE projects. Unless tariffs are raised, sustained government subsidies will be needed in all five countries if the power utilities are to secure financial viability.

Table 3: Economic Internal Rate of Return ex-ante and ex-post

Project	Ex ante EIRR (%)	PCR or [Ex post EIRR] (%)	Variation	Opportunity Cost of Capital
Benin – Project for the Electrification of 17 Rural Centres	10.0	19.0 [25.9]	+	12%
Benin – Second Rural Electrification Project	19.4	15.3	-	12%
Ethiopia – Rural Electrification Project I	17.0	31.7	++	12%
Ethiopia – Rural Electrification Project II	13.8	n.a.		10%
Gambia – Rural Electrification Project III	15.4	13.0	-	12%
Mozambique – Rural Electrification Project III	13.7	n.a.		12%
Tunisia – Rural Electrification VI	9.4	12.4	+	10%

Table 4: Financial Internal Rate of Return ex-ante and ex-post

Project	Ex ante FIRR (%)	PCR [ex post FIRR] (%)	Weighted Cost of Capital (WACC)
Benin – Project for the Electrification of 17 Rural Centres	2.1	15 % [negative at ex-post]	
Benin – Second Rural Electrification Project	4.3	n.a.	
Ethiopia – Rural Electrification Project I	5.7	7.4%	3.0%
Ethiopia – Rural Electrification Project II	10.7	Ongoing	3.6%
Gambia – Rural Electrification Project III	2.8	5%	2.1%
Mozambique – Rural Electrification Project III	7.8	n.a.	
Tunisia – Rural Electrification VI	negative	Negative	

Sustainability

Unsatisfactory sustainability of RE project benefits. *The sustainability of project benefits is rated unsatisfactory. Although the projects are technically, environmentally, and socially viable, the projects are weak in financial viability, institutional sustainability and strengthening of capacities, political and governance environment, ownership and sustainability of partnerships, and resilience to external factors. Only two of the seven projects (those in Mozambique and Tunisia) have benefits that are likely to be sustained. Apart from their technical soundness, these projects also show economic and financial viability, strong ownership, and sustainable partnerships.*

Weak financial viability of the power utilities. The power utilities involved in the seven RE projects rely on government subsidies to operate – mainly because of the issues of appropriateness of electricity tariffs, affordability for the poor, insufficient electricity production capacity, and high investment and operating costs. The power utilities were under-resourced, while at the same time obliged to comply with government policy on rural electricity tariffs. While such tariffs were good at enhancing the access of rural consumer to affordable electricity, they have negative impact on financial viability, maintenance, and vital new investments on generation capacity, transmission lines and distribution networks. In short, the low tariffs common among the project countries were responsible in part for the periodic shortages of electricity supply relative to demand in four of the project countries. Tunisia was the least affected by power shortages, as electricity demand exceeded generation capacity only during the hottest days of the year.

The persistent lack of capacity relative to demand affected rural electricity consumers more than urban ones. Rural areas were usually cut off first to protect urban customers. Unlike rural consumers, urban consumers can usually afford to pay full tariffs for electricity.

Furthermore, the infrastructure for supporting very small amounts of electricity consumption in rural areas was often not financially viable. Lowering capital costs could help make RE electrification infrastructure investments financially viable. For example, it was common to make grid extensions by prolonging three-phase high-voltage lines to step-down low-voltage transformers, but this practice was much more expensive than using a single-phase line. Although a single-phase line might not have been the most appropriate design, its use could at least have been considered case by case. Decentralized power systems, though technically problematic, could also have been considered in the design of the RE projects.

Resilience to external factors. The resilience of the projects with unlikely unsustainable benefits was especially weak with regard to the price fluctuations of fuel and electricity imports.

Weak capacity for institutional sustainability. Weak capacity for planning, management for results, and policy-/regulation-setting challenged six of the seven projects. In the case of Tunisia, institutional sustainability is strong as the roles of the key project stakeholders were very well defined and coordinated. Moreover, the utility provider in Tunisia operated a vocational training centre for the ongoing training of its technicians and managers in various aspects of the electricity supply business. For the other countries, institutional sustainability constraints included staff shortages and capacity weakness (Mozambique, Ethiopia), and limited institutional capacity to provide electricity services (Benin) or reliable and useful monitoring, learning, and evaluation information (all countries).

Project Monitoring and Evaluation

Limited monitoring and evaluation (M&E) systems.

M&E systems were incorporated in project designs but not operationalized and used effectively. Three of the projects did not generate sufficient data for their financial viability to be assessed. Some of the M&E data were not reliable and credible. Specific operational data was not available for any of the projects. Utilities do not keep separate data for individual areas/ projects within countries; and the absence of data makes performance monitoring for single projects challenging. In addition, the objectively-verifiable indicators for the key project outcomes (Annex 2, Table 8) are either inadequate or not provided.

Three of the five project completion reports (PCRs) were prepared on time (Annex 3, Table 3), there was a substantial disconnect between the PCR ratings and those of the IDEV project evaluation reports. On average, the PCR ratings for the development outcomes of the seven projects were 33% higher than IDEV's. ■

Key Issues and Lessons Learnt

Quality of Project Design

Lesson #1: Lack of critical risk analysis and adequate risk mitigation measures can contribute to substantial project implementation delays and inefficiencies.

Quality project design requires, *inter alia,* adequate risk analysis and mitigation measures for quality implementation. In this regard, the project designs addressed the risks relating to power generation during peak demand, the financial health of power utilities, and political control. However, they were silent on the following risks:

- Reliability of the supply and quality of locally-manufactured project inputs (for example the cases of electrical poles in Benin and the electrical meters in Ethiopia).
- Capacity of the project implementation units to deal adequately with issues including the timely preparation of tender documents (documents were prepared after loan approval in the Gambia and Tunisia); different donor procurement rules and procedures (Benin, Ethiopia, the Gambia and Tunisia); and government procurement regulations (Ethiopia) in multi-donor financing arrangements (the Gambia). In Ethiopia, procurements exceeding $1.25 million require approval from the Board of the Universal Electricity Access Project, while those over $10 million require approval from the President. In the Gambia, about two thirds of the delay in project implementation was due to non-conformity of the tenders with the requirements of the Islamic Development Bank (IDB). As a result, the package financed by IDB had to be re-tendered.
- Capacity of the contractors to perform their contractual obligations (Benin, the Gambia, Ethiopia and Mozambique).
- Payment of national counterpart funds (Benin).
- Ratification of loans by legislatures.
- Power supply from imports (Benin). The risk of insufficient power supply from imports was mis-assessed at the appraisal stage of the RE Project II. It was assumed that ample supply would be available via the North Benin – North Togo interconnection. This assumption did not hold, as Togo was also experiencing electricity shortages and needed all the power it was generating.

Further, the mitigation measures were inadequate for addressing the identified risks.

The failure of the seven RE projects evaluated to cover risks and incorporate risk mitigation measures in the designs contributed to implementation delays and cost variations.

Fostering Rural Economic Development Through Electrification

Lesson #2: Integration between RE and other rural development projects (irrigation, agriculture, water supply, health, education, microcredit, etc.) is critical for better outcomes.

Good integration with other development initiatives can enhance the productivity of RE and of downstream and upstream industries. The availability of electricity in rural areas was an

opportunity, taken up by some entities, to enhance their existing commercial activities or start new businesses. This was revealed by the beneficiary surveys in the seven RE projects evaluated. The productive impact of RE was highest in Tunisia, where the Government integrated electrification in a holistic rural development plan.

Geographical Coverage vs. Universal Access

Lesson #3: Focusing RE on geographical rather than household coverage can bring electricity closer to rural households but cannot ensure universal access unless issues of affordability for the rural poor are addressed.

In promoting universal access of electricity in rural areas, government electricity strategy matters. In their electrification policy statements and strategies, Governments apply two definitions of access to electricity. As a result, countries can opt to use either definition, or both for RE[7]. Rural electrification in Tunisia focused on the rural household, but in Benin, Ethiopia, Gambia and Mozambique on geographical coverage.

- The most common interpretation, including that of the UN's Sustainable Energy for All Initiative's goal of achieving universal access goal by 2035, which defines access as "in-house access to modern forms of energy". It calculates the electrification rate as *"the number of households (HHs) connected to the grid or to a decentralised electricity generating system divided by the total number of HHs in a project area, region or country."*

- In contrast, governments of countries at an early stage of RE prefer to use a definition based on geographical coverage (Box 2), defining the access rate as *"the percentage of the rural/urban/national population living in an electrified area, including HHs that live near the distribution grid but are not connected to it"*. In the Project Appraisal Documents (PADs), this is the case for Benin's "policy objective of a 51% rural electrification rate by 2006" and the Ethiopian "rural access target of 50% by the year 2013".

This reflects a belief in some countries that the productive and economic benefits of RE investments are best served by maximising the number of electrified rural communities with limited financial means rather than by maximising the number of electrified HHs.

The motive of governments may also be due partly to political convenience. In implementing the government's geographical access policy in Ethiopia, the power utility focused on extending the grid to previously non-electrified regions instead of increasing the number of connected households in proximity to existing grids. This RE policy also made it possible to extend the scope of the two RE projects to more localities than originally envisaged, though with fewer customer connections to the grid.

Box 2: Defining geographic access

Ethiopia promoted a definition of energy access that focuses on the community or village level and aims to spur rural economic development by supporting high-impact socioeconomic activities which can justify the economic supply of energy. These include mechanized agriculture, schools and hospitals, and small businesses. Once electricity access is provided at village level, it is the responsibility of households to choose whether to connect or not. Access is therefore defined not by the number of household connections but as giving households the ability to connect if they choose.

Source: ECA (2014), Energy Access and Security in Eastern Africa: Status and Enhancement Pathways by the Economic Commission for Africa

As a result, the electrification rates and quantitative policy goals quoted in the PADs cannot be compared directly. At the time of AfDB's project approval, Tunisia quoted in the PAD an RE rate of 80%. Each of the other four countries had, at project approval, a national electrification rate of below 20% and a rural rate of below 5%. By 2010, due to urbanisation, all five countries had lifted their respective national electrification rates considerably (Annex 2, Table 7).

Sustaining Project Benefits

Lesson #4: Appropriate tariffs and subsidies are critical to the financial viability of electricity utilities and to sustaining RE benefits.

The main challenges to sustaining the benefits of RE projects are i) household affordability, ii) electricity generation at times of peak demand, and iii) the financial health of the electricity utilities.

Household affordability. Connection charges and power prices can prevent low-income rural households from connecting to the power grid and using electricity. To improve household access to electricity supply, subsidies and pricing measures (consumption based tariff bonds) are necessary. This requires setting appropriate tariffs and subsidies in order to ensure that households connect while encouraging the service provider to supply electricity. The affordability challenges apply on both the supply and the demand sides:

- **On the demand side, most rural households are unable to pay the full cost of connection upfront.** The typical minimum cost of connecting to the electricity grid is US$67, which the majority of rural households cannot afford. Neither can they afford to pay more than US$5–10 per month for electricity consumption.

Instruments used to address this challenge in the five countries are: i) on-bill financing of the connection charge over a number of months rather than as a one-off upfront fee, ii) subsidized connection charges, and iii) a two-step tariff schedule with a below-cost 'lifeline' tariff for a monthly consumption of 20–200 Kilowatt hours (KWh) (depending on the country) and a higher tariff for consumption above that level (Table 6 in Annex 2 lists the charges by country for connection to the grid). Tunisia and Ethiopia introduced a program allowing rural consumers to pay the connection charge in instalments over a number of years after a small upfront payment. In Ethiopia, the power utility charges a monthly payment over two years while its Tunisian counterpart levies a bimonthly payment over six years. Other strategies, including the reduction of the individual connection cost during project start-up (Benin) were developed to boost rural connection. This strategy was implemented in Benin within a short timeframe which did not allow many people to benefit. All countries, except Tunisia, subsidized the connection fee.

- **On the supply side, the subsidization policy poses a challenge for sustaining the rural electrification services mainly because of the inadequacies of the subsidies, and the revenue from the rural electricity consumers. To finance RE investments requires a system of tariffs and subsidies that ensures sustainable cost recovery.** The resources to cover the financial losses made in rural areas can come from two sources: i) cross-subsidy through above-cost-of-supply tariffs charged to commercial consumers and households with high levels of power consumption, and ii) transfers from the state budget, including donor money allocated to RE. Due to the low levels of power consumption nationally, the capacity for cross-subsidy of the customer base in African countries is

limited. The little capacity, which exist for urban-to-rural transfers, is undermined by the lifeline tariff scheme, which subsidises urban as well as rural consumers and extends up to surprisingly high levels of consumption (e.g. 200 KWh per month) in several African countries.

Whereas a high upfront connection payment represents a serious barrier to household access, there is much less expert agreement on the need for lifeline tariffs from an access point of view. Another way to cover financial losses made in rural areas is to consider robust business models such as Public Private Partnership (PPP) or stand-alone Independent Power Producer (IPP). In these cases, instead of imposing a fixed retail tariff per KWh, private developers are allowed to operate business models which ensure reasonable recovery of their investment either through fee-for-service or power-based tariffs.

Generating capacity to meet peak demand. Meeting peak electricity demand was also a challenge. None of the evaluated projects provided enough generating capacity to address this. Benin's attempts to import power were unsuccessful, as neighbouring countries also face power shortages.

Power utilities' financial health and ability to sustain financial losses from RE. All the power utilities in the five countries depend on transfers from the national budgets, and on tariffs subject to government controls. This strategy was not effective, however, as the utilities regularly post annual losses. The annual government transfers, where they were regular in the case of Tunisia, could be substantial. The state budget transfers to the power utility in Tunisia during the last 10 years covered up to half the annual cost of power supply. In the other four countries, state budget transfers to power utilities were irregular. Coupled with government controls on tariffs, this fact reduced the capacity of the utilities to deliver quality services and undertake necessary investments. For example, power utilities in Benin and Ethiopia lacked sufficient connection and distribution equipment, and were therefore not able to respond to the demand of customers who had paid connection fees.

Furthermore, being owned and controlled by the national governments means that all utilities are subject to political pressures which usually have debilitating effects. In addition to imposing unsustainable investment programs, Governments prevent their utilities from raising tariffs regardless of their rising investment and operating costs. For example, Ethiopia has seen no tariff increases since 2003; the tariff remained in the range of $0.02 to $0.04 per KWh.

Political Support

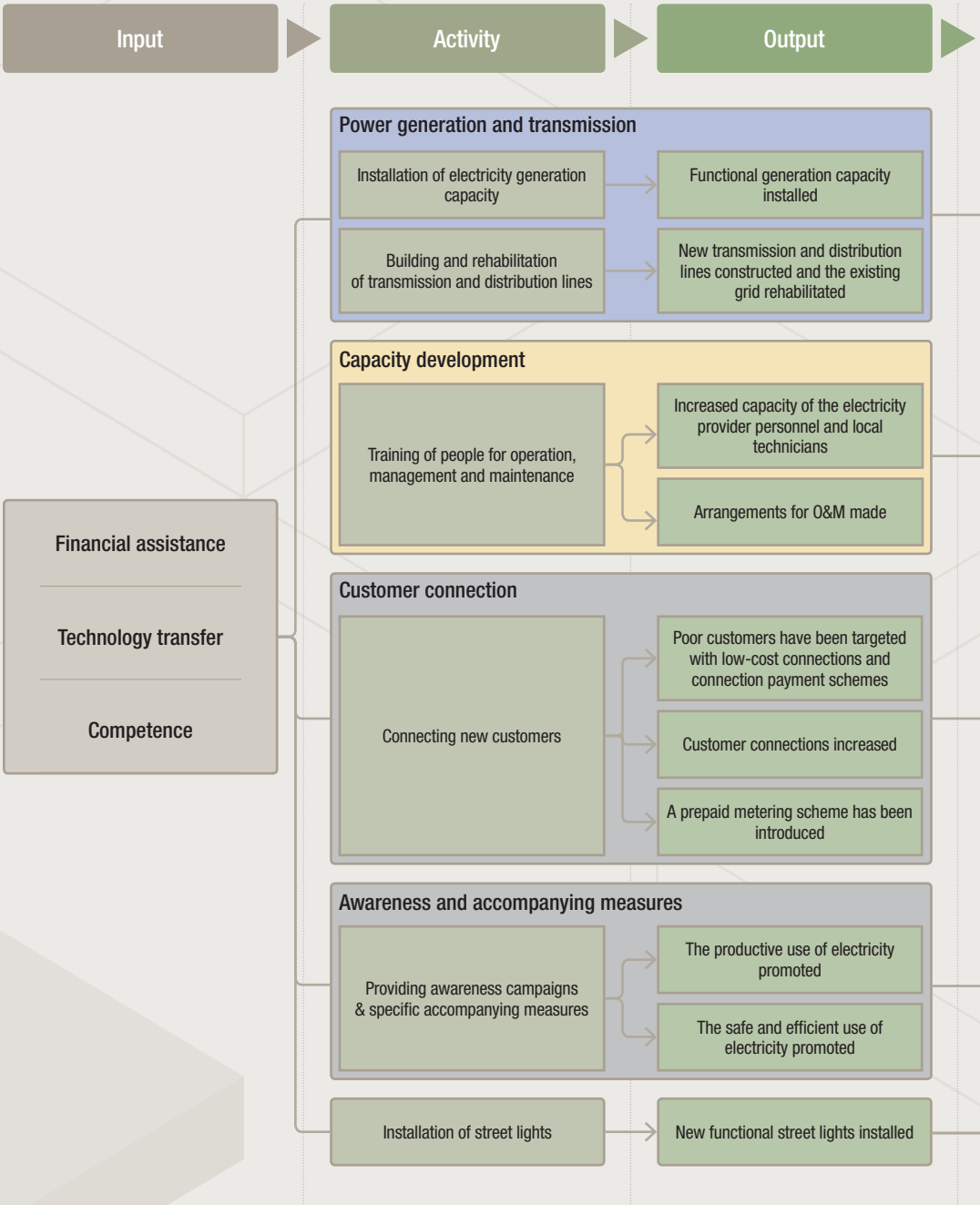
Lesson #5: Strong political support, including an initial investment subsidy and adequate institutional framework, is necessary to sustain project results.

Political and governance failures are the root causes of financial weaknesses within power utilities. In all five countries, the electricity utility companies were government-owned. As a result, electricity supply and electricity tariffs were highly politicized. A government's political goals may not match the utility's goals of providing reliable and quality electricity services. Governments which become actively involved in the affairs of an electricity utility tend to shift its focus towards electricity expansion and goals of social equity. Often, the result is insufficient tariff levels, restricted budgets and, eventually, a power system in disrepair that cannot meet the electricity demand of connected customers.

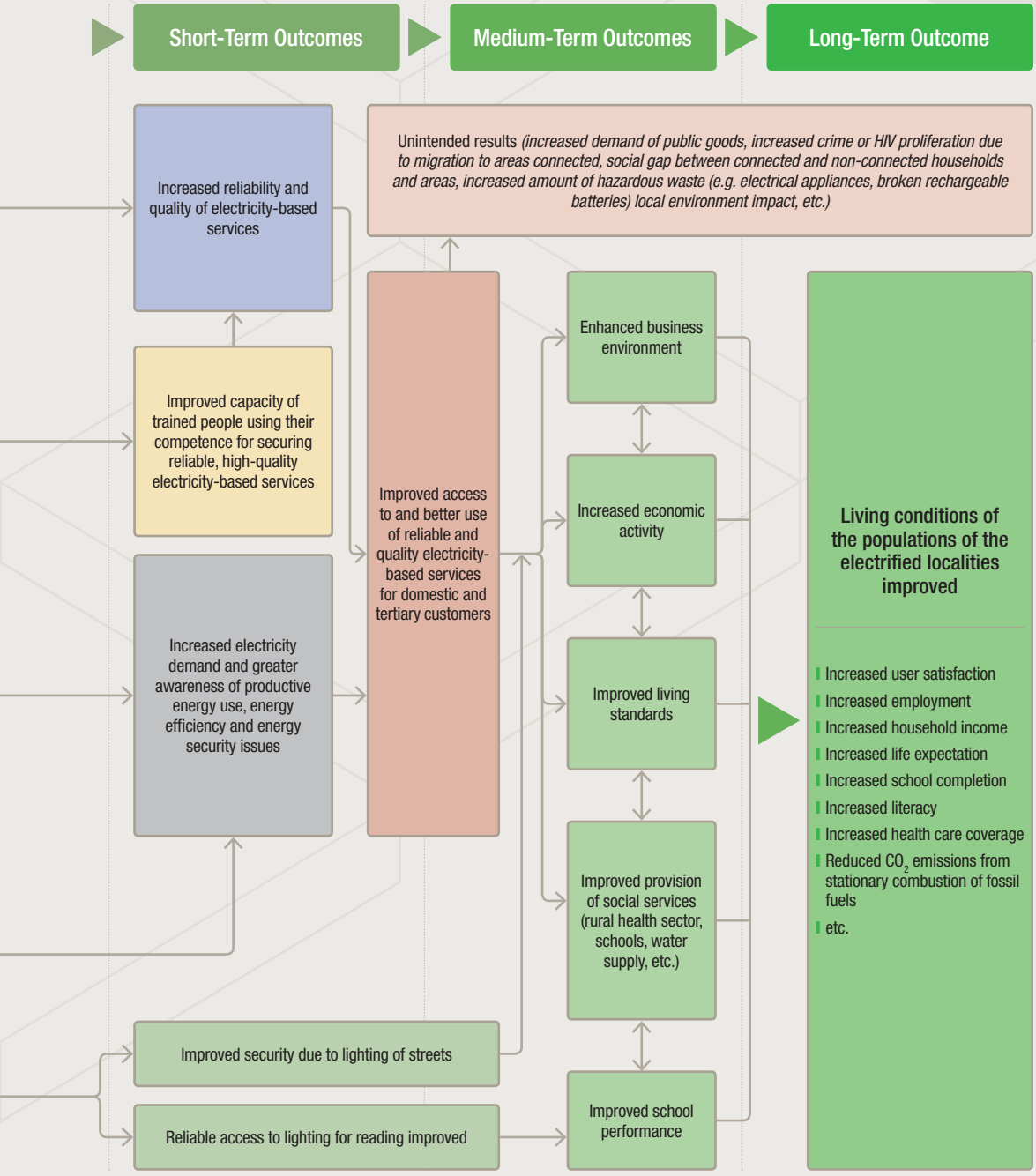
The extent to which this happens varies according to the political and governance environments. Countries including Tunisia, and to some extent Mozambique and Ethiopia, prop up their power utilities through huge subsidies while controlling tariffs. ■

Annexes

Annex 1 — RE intervention logical model



Assumptions: i) sufficient electricity generation/import, ii) power utility financially healthy, iii) optimal use of the electricity provided, iv) capacity of households to pay for electricity, etc.


Short-Term Outcomes
Medium-Term Outcomes
Long-Term Outcome
Unintended results (increased demand of public goods, increased crime or HIV proliferation due to migration to areas connected, social gap between connected and non-connected households and areas, increased amount of hazardous waste (e.g. electrical appliances, broken rechargeable batteries) local environment impact, etc.)
Increased reliability and quality of electricity-based services
Improved capacity of trained people using their competence for securing reliable, high-quality electricity-based services
Increased electricity demand and greater awareness of productive energy use, energy efficiency and energy security issues
Improved access to and better use of reliable and quality electricity-based services for domestic and tertiary customers
Improved security due to lighting of streets
Reliable access to lighting for reading improved
Enhanced business environment
Increased economic activity
Improved living standards
Improved provision of social services (rural health sector, schools, water supply, etc.)
Improved school performance
Living conditions of the populations of the electrified localities improved
Increased user satisfaction
Increased employment
Increased household income
Increased life expectation
Increased school completion
Increased literacy
Increased health care coverage
Reduced CO_2 emissions from stationary combustion of fossil fuels
etc.

Annex 2 — Main tables

Table 1: List of AfDB RE projects and operations approved, 1999–2013

# Project	# Operation	Project name	Type	Project code	
1	1	Electrification of 17 rural centers	Project	P-BJ-FA0-001	
2	2	Second Rural Electrification Project	Project	P-BJ-FA0-002	
3	3	Rural Electrification Study	Study	P-BF-FA0-002	
4	4	Rural Electrification Project	Project	P-CG-FA0-001	
5	5	Periurban Rural Electrification project	Project	P-CD-FA0-003	
	6	Peri-urban Rural Electrification project	Project	P-CD-FA0-003	
6	7	Rural Electrification Project	Project	P-ET-FA0-004	
7	8	Rural Electrification Project II	Project	P-ET-FA0-006	
8	9	Rural Electrification Project	Project	P-GM-FA0-001	
9	10	Rural Electrification Project	Project	P-GN-F00-004	
10	11	Rural Electrification project	Project	P-LS-F00-001	
	12	Rural Electrification project	Project	P-LS-F00-001	
11	13	CLSG- Rural Electrification -LIBERIA	Project	P-Z1-F00-057	
12	14	Int. wind turbine, hydro and RE project	Project	P-MA-FA0-003	
13	15	Rural Electrification Project (ELECT III)	Project	P-MZ-FA0-004	
14	16	CLSG - Rural Electrification	Project	P-Z1-F00-056	
15	17	CLSG- Rural Electrification LIBERIA	Project	P-Z1-F00-057	
16	18	CLSG- Rural Electrification SIERRA LEONE	Project	P-Z1-F00-058	
17	19	CLSG- Rural Electrification GUINEA	Project	P-Z1-F00-059	
18	20	Rural Electrification Project	Project	P-SN-FA0-002	
19	21	Rural Electrification Study	Study	P-TZ-FA0-005	
20	22	Rural Electrification Project VI	Project	P-TN-FAC-001	
TOTAL					

* As at end of 2014

	Country	Region	Status*	Approval date	Loans and grants net approvals (UA M)
	Benin	West	COMPLETED	28/06/2000	4.80
	Benin	West	COMPLETED	29/10/2003	12.32
	Burkina Faso	West	COMPLETED	17/04/2002	0.85
	Congo CG	Centre	ONGOING	06/12/2012	10.00
	Dem Rep Congo	Centre	ONGOING	15/12/2010	9.69
	Dem Rep Congo	**Centre**	**ONGOING**	**15/12/2010**	60.00
	Ethiopia	East	ONGOING	17/12/2001	34.23
	Ethiopia	East	ONGOING	20/12/2006	87.2
	Gambia	West	COMPLETED	14/12/2000	2.84
	Guinea	West	ONGOING	21/01/2011	14.96
	Lesotho	South	ONGOING	04/02/2009	8.75
	Lesotho	South	ONGOING	04/02/2009	2.10
	Liberia	West	APPROVED	06/11/2013	17.96
	Morocco	North	ONGOING	13/06/2012	118.58
	Mozambique	South	COMPLETED	03/09/2001	10.38
	Multinational	Multinational	ONGOING	06/11/2013	6.11
	Multinational	Multinational	APPROVED	06/11/2013	17.95
	Multinational	Multinational	APPROVED	06/11/2013	4.88
	Multinational	Multinational	APROVED	06/11/2013	10.28
	Senegal	West	ONGOING	13/10/2004	9.58
	Tanzania	East	COMPLETED	28/06/2001	1.87
	Tunisia	North	COMPLETED	09/06/1999	48.32
					493.65

Table 2: List of projects evaluated*

#	Country	Project name	Period (App.–Comp.)	Net amount (Million UC)	Total cost** (Million UC)	Region
1	Benin	Electrification of 17 Rural Centres	2000–2005	4.80	7.30	West
2	Benin	Rural Electrification Project II	2003–2011	12.32	17.67	West
3	Ethiopia	Rural Electrification Project I	2001–2009	34.23	32.97	East
4	Ethiopia	Rural Electrification Project II	2006–ongoing	87.20	114.31	East
5	Gambia	Rural Electrification Project	2000–2007	2.84	13.99	West
6	Mozambique	Rural Electrification Project III	2001–2013	10.38	16.62	South
7	Tunisia	Rural Electrification Project VI	1999–2005	48.32	62.58	North
TOTAL				**200.09**	**258.14**	

* As at end 2014
** At completion

Table 3: Main outputs of the evaluated rural electrification projects

	Expected outputs	Actual outputs	Execution rate
Power station number	6	6	100%
Power station capacity (MW)	6200	4250	69%
Number of 30/11 kV Substation	1		0%
Number of 132/66/33 kV Substation	18	18	100%
Number of 11kV/400 V Substation rehabilitated	7	7	100%
Number of 33/0.4 kV transformers	2124	1664	78%
Number of low-voltage transformer stations	145	211	146%
Length of 11 kV line rehabilitated (km)	7,5	7,5	100%
Length of 0.4 kV line (km)	4800	6755	141%
Length of 20 kV line (km)	163	352	216%
Length of 30 kV line (km)	227	202	89%
Length of 33 kV line (km)	7543.5	6310	84%
Length of 132 kV line (km)	280	256	91%
Length of LV line (km)	2341	2435.5	104%
Length of mixed-voltage lines (km)	270	209	77%
Number of street lights	4180	16.000	383%

Table 4: New connections per project

Project	Completion year	Expected new connections at completion	Actual new connections (year*)
Benin – Electrification of 17 Rural Centers	2005	7,000	7,000 (2009)
Benin – Second Rural Electrification Project	2011	20,667	16,000
Ethiopia – Rural Electrification Project I	2009	40,093	42,093 (2015)
Ethiopia – Rural Electrification Project II	2016	184,200	6,200 (2015)
Gambia – Rural Electrification Project III	2007	6,715	7,000 (2008)
Mozambique – Rural Electrification Project III	2013	7,053	9,982
Tunisia – Rural Electrification VI	2005	45,320	52,730
TOTAL		**311,048**	**141,005**

* If different to completion year

Table 5: Project investment per connected customer in USD (exchange rate with UA at project appraisal)

Country	Project investment	Number of realised connections	Investment per connection
Benin – Electrification of 17 Rural Centers	USD10.1 m (1999)	7,000	USD 1,439
Benin – Second Rural Electrification Project	USD25.7 m (2003)	16,000	USD 1,604
Ethiopia – Rural Electrification Project I	USD39.9m (2001)	42,093	USD 948
Ethiopia – Rural Electrification Project II	USD162 m (2006)	6,200 (180,000 planned)	USD 26,129
Gambia – Rural Electrification Project III	USD17.9 m (2000)	7,000	USD 2,557
Mozambique – Rural Electrification Project III	USD24.1 m (2001)	9.982	USD 2,417
Tunisia – Rural Electrification VI	USD132.8 m (1998)	52,730	USD 2,519
TOTAL		**311,048**	**141,005**

Table 6: Connection charge for grid electrification

Country	Minimum connection charge for grid electrification (USD)	Connection charge as % of monthly income	Average weighted tariff (USD per KWh)
Benin*	150	44.9	0.12
Ethiopia*	75	50.4	0.06
Gambia**	153	52.7	0.24
Mozambique***	146	47.1	0.07
Tunisia*	67	3.7	0.08

* Source: World Bank, 2013, Connection Charges and Electricity Access in Sub-Saharan Africa
** National Energy Policy - The Gambia 2014-2018 – Draft Final Report submitted by SAHEL GROUP, April 2014
*** GTZ, 2010, Energy Usage and Socio-economic Conditions in Mozambique.

Table 7: Electrification rates in the countries of the projects evaluated

Country	National	Rural	Urban
Benin	28%	7%	57%
Ethiopia	23%	11%	85%
Gambia	36%	2%	60%
Tunisia	**99.9%**	**99%**	**100%**
Mozambique	15%	2%	36%

Source: IEA, World Energy Outlook 2012

Table 8: Sector goals and OVIs by project

Country	Project name	Sector goals	Objectively Verifiable Indicators (OVI)
Benin	Electrification of 17 Rural Centers	Improvement in the living conditions of the rural population and of the electrification rate of the country	▪ Improve the lifestyle of rural populations; ▪ Promote rural development activities; ▪ Improve productivity and incomes of rural population.
Benin	Rural Electrification Project II	Increase in access rate of the rural population to electric power so as to improve their living conditions	▪ Achieve a national electrification rate of 29% in 2008
Ethiopia	Rural Electrification Project I	Extend the national electricity grid to rural areas in order to promote socioeconomic development	▪ 36 areas electrified by September 2005; ▪ 40,093 consumers given access to electricity by September 2005
Ethiopia	Rural Electrification Project II	Extend electricity supply to the rural areas in the programme area and connect new households and commercial consumers to the national grid	▪ Power transmission capacity increased by 25 Megavolt Amps ▪ Number of consumers increased from 1.1 million to 1.3 million; ▪ Electricity access from 17% in 2006 to 20% in 2011; ▪ About 1.9 million people (including 960,000 women) given access to electricity.
Gambia	Rural Electrification Project	Promote economic growth and improve the quality of life of the people	▪ A minimum annual increase of 5% in electricity consumption in the country; ▪ A reduction of population under absolute poverty by 10% at end of the project's life in 2023.
Mozambique	Rural Electrification Project III	Provide the various economic sectors adequate energy, at minimum cost and in a sustainable manner so as to reduce poverty and enhance economic growth	▪ Annual wood-fuel yield kept at or above the per capita consumption (336,000 tonnes of oil equivalent per annum; ▪ Access to electricity above the existing level (7%).
Tunisia	Rural Electrification Project VI	Improve the living conditions of the population and economic and social development of rural areas	▪ Electrify about 1,000 rural communities by connecting approximately 45,000 subscribers and 320 low-voltage pumping stations, thus increasing the rate of rural electrification in the country from 87% in 1999 to 90% at the end of the project; ▪ Income growth in the rural population.

Annex 3 — Performance tables

Table 1: Time variations in months and % overrun [+/-]

Commitment date (signature date)							
Project	Approval date	Planned signature date	Actual signature date	Estimated time [M]	Actual time [M]	Delay [M]	Variation [+/-] in %
	a	b	c	d=b-a	e=c-a	f=e-d	h=f/d*100
Benin – Electrification of 17 Rural Centers	28/06/2000	01/07/2000	26/07/2000	0	0	0	
Benin – Second Rural Electrification Project	29/10/2003	31/12/2003	12/01/2004	2	2	0	0
Ethiopia – Rural Electrification Project I	17/12/2001	31/05/2002	14/03/2002	5	2	-3	-60
Ethiopia – Rural Electrification Project II	20/12/2006	31/05/2007	12/01/2007	5	0	-5	-100
Gambia – Rural Electrification Project III	14/12/2000	30/04/2001	19/01/2001	4	1	-3	-75
Mozambique – Rural Electrification Project III	03/09/2001	30/11/2001	06/11/2001	2	2	0	0
Tunisia – Rural Electrification VI	09/06/1999	11/06/1999	11/06/1999	0	0	0	
Effective entry into force dates							
Project	Approval date	Planned effective date	Actual effective date	Estimated time [M]	Actual time [M]	Delay [M]	Variation [+/-] in %
	a	b	c	d=b-a	e=c-a	f=e-d	h=f/d*100
Benin – Electrification of 17 Rural Centers	28/06/2000	01/12/2000	14/08/2001	5	13	8	160
Benin – Second Rural Electrification Project	29/10/2003	29/03/2004	08/12/2004	5	13	8	160
Ethiopia – Rural Electrification Project I	17/12/2001	30/06/2002	12/12/2002	6	11	5	83
Ethiopia – Rural Electrification Project II	20/12/2006	31/05/2007	02/11/2007	5	10	5	100
Gambia – Rural Electrification Project III	14/12/2000	30/04/2001	14/09/2001	4	9	5	125
Mozambique – Rural Electrification Project III	03/09/2001	31/01/2002	28/03/2002	4	6	2	50
Tunisia – Rural Electrification VI	09/06/1999	28/12/1999	29/12/1999	6	6	0	0
Start-up dates*							
Project	Approval date	Planned start-up date	Actual start-up date	Estimated time [M]	Actual time [M]	Delay [M]	Variation [+/-] in %
	a	b	c	d=b-a	e=c-a	f=e-d	h=f/d*100
Benin – Electrification of 17 Rural Centers	28/06/2000	31/01/2001	18/03/2002	7	20	13	186
Benin – Second Rural Electrification Project	29/10/2003	31/08/2004	31/12/2005	10	26	16	160

Ethiopia – Rural Electrification Project I	17/12/2001	30/09/2002	30/03/2005	9	39	30	333
Ethiopia – Rural Electrification Project II	20/12/2006	31/05/2007	31/08/2008	5	20	15	300
Gambia – Rural Electrification Project III	14/12/2000	30/04/2001	30/09/2003	4	33	29	725
Mozambique – Rural Electrification Project III	03/09/2001	31/03/2002	31/01/2003	6	16	10	167
Tunisia – Rural Electrification VI	09/06/1999	30/06/1999	30/06/1999	0	0	0	

First disbursement dates

Project	Approval date	Planned first disb. date	Actual first disb. date	Estimated time [M]	Actual time [M]	Delay [M]	Variation [+/-] in %
	a	b	c	d=b-a	e=c-a	f=e-d	h=f/d*100
Benin – Electrification of 17 Rural Centers	28/06/2000	31/08/2001	09/10/2002	14	27	13	93
Benin – Second Rural Electrification Project	29/10/2003	01/05/2004	18/04/2005	6	17	11	183
Ethiopia – Rural Electrification Project I	17/12/2001		21/07/2003		19		
Ethiopia – Rural Electrification Project II	20/12/2006		23/06/2008		18		
Gambia – Rural Electrification Project III	14/12/2000	28/02/2002	14/02/2002	14	14	0	0
Mozambique – Rural Electrification Project III	03/09/2001	01/03/2002	01/05/2003	5	19	14	280
Tunisia – Rural Electrification VI	09/06/1999	01/01/2000	26/02/2001	6	20	14	233

Last disbursement dates

Project	Approval date	Planned final disb. date	Actual final disb. date	Estimated time [M]	Actual time [M]	Delay [M]	Variation [+/-] in %
	a	b	c	d=b-a	e=c-a	f=e-d	h=f/d*100
Benin – Electrification of 17 Rural Centers	28/06/2000	31/12/2004	27/09/2006	54	74	20	37
Benin – Second Rural Electrification Project	29/10/2003	31/12/2008	28/02/2012	62	99	37	60
Ethiopia – Rural Electrification Project I	17/12/2001	31/12/2006	14/10/2009	60	93	33	55
Ethiopia – Rural Electrification Project II	20/12/2006	31/08/2015	18/04/2017	104	123	19	18
Gambia – Rural Electrification Project III	14/12/2000	28/02/2002	19/01/2007	14	73	59	421
Mozambique – Rural Electrification Project III	03/09/2001	31/12/2005	16/12/2013	51	147	96	188
Tunisia – Rural Electrification VI	09/06/1999	31/12/2003	02/06/2005	54	71	17	31

Completion dates							
Project	Approval date	Planned completion date	Actual completion date	Estimated time [M]	Actual time [M]	Delay [M]	Variation [+/-] in %
	a	b	c	d=b-a	e=c-a	f=e-d	h=f/d*100
Benin – Electrification of 17 Rural Centers	28/06/2000	31/10/2004	31/10/2006	52	76	24	46
Benin – Second Rural Electrification Project	29/10/2003	31/12/2008	31/12/2012	62	110	48	77
Ethiopia – Rural Electrification Project I	17/12/2001	31/12/2006	30/06/2009	60	90	30	50
Ethiopia – Rural Electrification Project II	20/12/2006	31/12/2013	31/12/2016	84	120	36	43
Gambia – Rural Electrification Project III	14/12/2000	30/06/2004	31/12/2007	42	84	42	100
Mozambique – Rural Electrification Project III	03/09/2001	31/12/2005	31/07/2013	51	142	91	178
Tunisia – Rural Electrification VI	09/06/1999	31/12/2003	30/06/2005	54	72	18	33

* Start-up date: Date of awarding consulting services for supervision

Table 2: Timeline

Actual project timelines (in months)					
Project	Net amount	Approval to signature [M]	Signature to effective [M]	Effective to first disbursement [M]	First disbursement to completion [M]
Benin – Electrification of 17 Rural Centers	4.8	0	12	13	48
Benin – Second Rural Electrification Project	12.32	2	10	4	92
Ethiopia – Rural Electrification Project I	34.23	2	8	7	71
Ethiopia – Rural Electrification Project II	87.2	0	9	7	102
Gambia – Rural Electrification Project III	2.84	1	7	5	70
Mozambique – Rural Electrification Project III	10.38	2	4	13	122
Tunisia – Rural Electrification VI	48.32	0	6	13	52
TOTAL	200.09				
Average time (M)		1	8	9	80
Average time weighted by net amount (M)		**1**	**8**	**9**	**83**

Planned times to completion (in months)					
Project	Net amount	Planned time to completion			
		Approval to completion [M]	Signature to completion [M]	Effective to completion [M]	Start-up to completion [M]
Benin – Electrification of 17 Rural Centers	4.8	52	51	46	45
Benin – Second Rural Electrification Project	12.32	62	60	57	52
Ethiopia – Rural Electrification Project I	34.23	60	55	54	51
Ethiopia – Rural Electrification Project II	87.2	83	79	79	79
Gambia – Rural Electrification Project III	2.84	42	38	38	38

Mozambique – Rural Electrification Project III	10.38	51	49	47	45
Tunisia – Rural Electrification VI	48.32	54	54	48	54
TOTAL	200.09				
Average time (M)		58	55	53	52
Average time weighted by net amount (M)		**68**	**65**	**63**	**63**

Actual times to completion (in months)

Project	Net amount	Actual time to completion			
		Approval to completion [M]	Signature to completion [M]	Effective to completion [M]	Start-up to completion [M]
Benin – Electrification of 17 Rural Centers	4.8	76	75	62	55
Benin – Second Rural Electrification Project	12.32	110	107	96	84
Ethiopia – Rural Electrification Project I	34.23	90	87	78	51
Ethiopia – Rural Electrification Project II	87.2	120	119	109	100
Gambia – Rural Electrification Project III	2.84	84	83	75	51
Mozambique – Rural Electrification Project III	10.38	142	140	136	126
Tunisia – Rural Electrification VI	48.32	72	72	66	72
TOTAL	200.09				
Average time (M)		99	98	89	77
Average time weighted by net amount (M)		**102**	**101**	**92**	**83**

Delays to completion (in months)

Project	Net amount	Delays to completion			
		Approval to completion [M]	Signature to completion [M]	Effective to completion [M]	Start-up to completion [M]
Benin – Electrification of 17 Rural Centers	4.8	24	24	16	10
Benin – Second Rural Electrification Project	12.32	48	47	39	32
Ethiopia – Rural Electrification Project I	34.23	30	32	24	0
Ethiopia – Rural Electrification Project II	87.2	37	40	30	21
Gambia – Rural Electrification Project III	2.84	42	45	37	13
Mozambique – Rural Electrification Project III	10.38	91	91	89	81
Tunisia – Rural Electrification VI	48.32	18	18	18	18
TOTAL	200.09				
Average time (M)		41	42	36	25
Average time weighted by net amount (M)		**34**	**36**	**29**	**20**

Table 3: Delays in the preparation of PCR

Project	PCR due date	Actual PCR date	Time [M]
Benin – Electrification of 17 Rural Centers	08/12/2005	07/09/2006	8
Benin – Second Rural Electrification Project	01/05/2011	25/11/2011	6
Ethiopia – Rural Electrification Project I	30/06/2009	30/11/2009	5
Ethiopia – Rural Electrification Project II	28/03/2017	17/08/2017	4
Gambia – Rural Electrification Project III	31/03/2007	30/09/2009	29
Mozambique – Rural Electrification Project III*	30/01/2014	-	-
Tunisia – Rural Electrification VI	30/12/2005	16/08/2006	7

* PCR mission carried out 20 March 2014–05 April 2014. However, the final PCR draft was not sent for posting.

Table 4: Project cluster ratings

	Rating						
	Benin 1	Benin 2	Ethiopia 1	Ethiopia 2	Gambia	Mozambique	Tunisia
Relevance (N=7)	3	3	3	3	3	2	3
Effectiveness (N=7)	3	2	3	2	2	3	3
Efficiency (N=6)	2	2	2	2		2	3
Sustainability (N=6)	2	2	2		2	3	3
Development outcome	2.50	2.3	2.5	2.3	2.3	2.5	3.0
(average of the 4 main criteria)	S	US	S	US	US	S	S

Table 5: Rating disconnect

Rating disconnect						
	Effectiveness			Development Outcomes (DO)		
Project	PCR	PRA	Disconnect	PCR	PRA	Disconnect
Benin – Electrification of 17 Rural Centers	4	3	-1	3	3	0
Benin – Second Rural Electrification Project	3	2	-1	3	2	-1
Ethiopia – Rural Electrification Project I	3	3	0	3	3	0
Ethiopia – Rural Electrification Project II						
Gambia – Rural Electrification Project III	3	2	-1	3	2	-1
Mozambique – Rural Electrification Project III	3	3	0	3	3	0
Tunisia – Rural Electrification VI	3	3	0	3	3	0

	PCR	PRA	Difference between PCR and PRA rating
Percent of RE projects rated satisfactory and over for Effectiveness (N=6)	100%	67%	-33%
Percent of RE projects rated satisfactory and over for Development Outcomes (N=6)	100%	67%	-33%

Table 6: Disbursement profiles

Disbursement ratio (compared to open undisbursed balance) – By project and year						
Project	**Net approval**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	
Benin – Electrification of 17 Rural Centers	4.8	0%	0%	1%	16%	
Benin – Second Rural Electrification Project	12.32	0%	14%	39%	35%	
Ethiopia – Rural Electrification Project I	34.23	0%	1%	0%	15%	
Ethiopia – Rural Electrification Project II	87.2	0%	5%	34%	42%	
Gambia – Rural Electrification Project III	2.84	0%	5%	19%	0%	
Mozambique – Rural Electrification Project III	10.38	0%	0%	1%	1%	
Tunisia – Rural Electrification VI	48.32	0%	0%	12%	43%	
Total	**200.09**					
Average		**0%**	**4%**	**15%**	**22%**	
Weighted average by net amount		**0%**	**3%**	**20%**	**34%**	

Cumulative disbursement ratio (compared to approval amount) – By project and year						
Project	**Net approval**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	
Benin – Electrification of 17 Rural Centers	4.8	0.0%	0.0%	0.7%	17.0%	
Benin – Second Rural Electrification Project	12.32	0.0%	14.1%	47.3%	66.0%	
Ethiopia – Rural Electrification Project I	34.23	0.0%	0.8%	1.1%	16.1%	
Ethiopia – Rural Electrification Project II	87.2	0.0%	5.5%	37.5%	63.7%	
Gambia – Rural Electrification Project III	2.84	0.0%	5.3%	23.1%	23.1%	
Mozambique – Rural Electrification Project III	10.38	0.0%	0.0%	1.1%	2.1%	
Tunisia – Rural Electrification VI	48.32	0.0%	0.0%	11.6%	49.4%	
Total	**200.09**					
Average		**0%**	**4%**	**17%**	**34%**	
Weighted average by net amount		**0%**	**3%**	**23%**	**47%**	

	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13
	61%	86%	93%						
	38%	22%	3%	92%	100%				
	42%	18%	24%	70%					
	5%	8%	9%	21%	21%	27%	94%		
	90%	42%							
	13%	4%	0%	4%	0%	0%	9%	56%	79%
	64%	83%	100%						
	45%	**37%**	**38%**	**47%**	**40%**	**14%**	**51%**	**56%**	**79%**
	30%	**31%**	**35%**	**38%**	**28%**	**24%**	**85%**	**56%**	**79%**

	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13
	67.2%	95.6%	99.7%						
	79.0%	83.6%	84.1%	98.7%	100.0%				
	51.1%	59.9%	69.4%	90.9%					
	65.4%	68.0%	70.9%	77.1%	82.0%	86.9%	99.2%		
	92.5%	95.6%							
	15.2%	18.4%	18.4%	21.9%	21.9%	21.9%	28.7%	68.7%	93.4%
	81.7%	96.8%	100.0%						
	65%	**74%**	**74%**	**72%**	**68%**	**54%**	**64%**	**69%**	**93%**
	66%	**73%**	**77%**	**78%**	**78%**	**80%**	**92%**	**69%**	**93%**

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Endnotes

1 As at end of 2014; the design stage of the cluster evaluation

2 In the process of completion at the time of this cluster evaluation

3 Theory-based approaches to evaluation use an explicit theory of change as an analytical tool to draw conclusions about whether, how and why an intervention contributed to observed results. A theory of change explains how, and why an intervention is expected to produce the targeted results. (https://www.canada.ca/en/treasury-board-secretariat/services/audit-evaluation/centre-excellence-evaluation/theory-based-approaches-evaluation-concepts-practices.html

4 Financial and economic analyses have similar features. Both estimate the net-benefits of a project investment based on the difference between the with-project and the without-project situations. The basic difference between them is that the financial analysis compares benefits and costs to the enterprise, while the economic analysis compares the benefits and costs to the whole economy.

5 The signature date was used (rather than the approval date) as the reference date for estimating the implementation delays. Using the approval date as reference point, the estimated implementation dates would have been higher.

6 The baseline for estimating time overrun was the actual approval date.

7 Which of the two electrification strategies in fact maximizes the economic advantage of rural investments is an open question; little if any economic literature exists on this topic.

IDEV

Independent Development Evaluation
African Development Bank

An IDEV **Project Cluster Evaluation**

About this evaluation

This evaluation provides the key findings of the synthesis of seven rural electrification projects financed by the African Development Bank Group in Benin, Ethiopia, The Gambia, Mozambique and Tunisia. It assesses the results of the projects, and why the expected results were achieved or not. The seven projects, approved during the period 1999 to 2006 and completed (excepted one) in 2005–2016, amount to 200 million UA in net loans and grants. These projects aim at improving access to, and use of, reliable electricity by rural populations and entities in order to enhance rural economic and living standards.

The evaluation used a common data collection protocol to gather quantitative and qualitative data on the performance of each project. Several sources and methods of data collection were used, including 1) a desk review of relevant AfDB documentation and literature; 2) interviews with key stakeholders (internal and external to AfDB); 3) field visits to the sites of deliberately selected projects; and, 4) a survey of 500 households per project, purposely selected (including beneficiaries and non-beneficiaries).

This project cluster evaluation is a learning product, focusing on findings and lessons. As such, it does not contain recommendations. Rather than AfDB Management preparing a formal Management Response, a knowledge sharing and capitalization workshop was held with the relevant operations departments of the Bank.

IDEV

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