Ex post evaluation – South Africa

Sector: Solar energy (CRS code: 23230)
Project: Rural electrification I & II (BMZ No. 1999 66 656* & 2004 66 359*)
Implementing agency: Department of Energy (DoE)

Ex post evaluation report: 2018

		Phase I (Planned)	Phase II (Planned)	Phases I & II (Actual)
Investment costs (total)	EUR million	24.36	9.50	16.33
Counterpart contribution	EUR million	0.00	0.00	0.00
Funding	EUR million	24.36	9.50	16.33
Concessionaire	EUR million	8.51	0.00	3.51
of which BMZ budget funds	EUR million	15.85	9.50	12.82

*) Random sample 2018

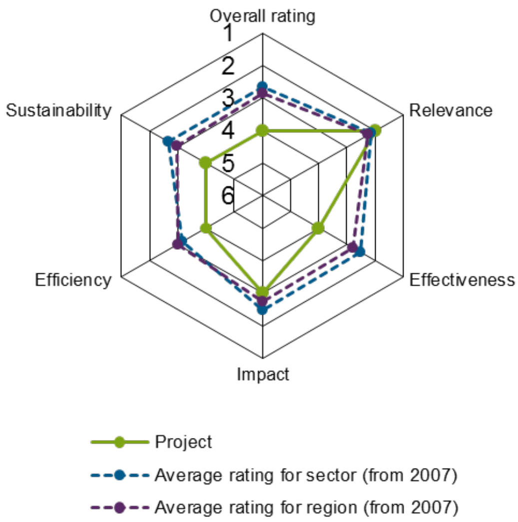
Summary: Both FC projects promoted the planned installation of up to 30,000 solar home systems (SHS) for households in remote rural areas in the Eastern Cape, which were not expected to be connected to the power grid in the foreseeable future at the time of the project appraisal. The SHS, which provide electricity for lighting and entertainment purposes, were installed and maintained by a private concessionaire, who in return received a monthly usage fee from the households. This is subsidised for disadvantaged households that fulfil certain criteria (so-called free basic electricity, FBE). In addition to an 80% investment cost subsidy for the SHS, FC funds were used to finance the services of a monitoring consultant and a transaction consultant to implement and award the concession, as well as consulting services to prepare a socio-economic study and implement awareness measures.

Objectives: The development objective (impact) of the project was to improve the living conditions of poorer population groups in remote rural areas by providing a secure basic energy supply of up to 200 Wh/d via SHS in return for an appropriate usage fee under a concession model (outcome).

Target group: Poor population groups in remote rural areas in the Eastern Cape (up to 30,000 households).

Overall rating: 4 (both phases)

Rationale: In order to supply remote rural areas in the Eastern Cape with electricity, the installation of SHS was the only option at the project appraisal. However, various developments have greatly weakened the effectiveness and efficiency of the project. The impact is limited to increased safety and possibly more time for pupils to do homework – there were no productive impacts, effects increasing income, or ones significantly improving quality of life. Even if the installed systems (provided they have not been dismantled) are still fully functional today, the project approach is not sustainable due to the loss of customers as a result of the expansion of the state grid and the shrinking market for the concessionaire. The link between the poverty component and economic feasibility for the concessionaire failed.



Highlights: The model, in which a private concessionaire makes an equity contribution and receives income from the maintenance services of the installed SHS, can support the expansion of renewable energies whilst simultaneously promoting the private sector. However, given the low output of SHS, which only provides a basic supply of electricity, there can be no high expectations of a significant improvement in the living conditions of the customers. Political and regulatory support as well as reliable payment practices from customers remain decisive for the model to be profitable.

Rating according to DAC criteria

Overall rating: 4 (all phases)

Given that Phase II complements Phase I financially and the project measures and regions are identical, the phases cannot be delimited from one another in terms of their effect and are therefore evaluated together – where possible, however, the phases have been rated separately according to DAC criteria.

Ratings:

	Phase I	Phase II
Relevance	2	2
Effectiveness	4	4
Efficiency	4	4
Impact	3	3
Sustainability	4	4

General conditions and classification of the project

Under the South African Off-Grid Concession Programme introduced by the South African government in 1999, concessions were awarded to six companies following a bidding process. These concessions are long-term exclusive rights under which each concessionaire undertakes to use solar home systems (SHS) to electrify the areas allocated to it that have not yet been connected to the electricity grid. This concept – which remains innovative today – involved the concessionaire making a financial contribution to the investment costs, thus offering them an incentive for sustainable operation. At the same time, the concessionaires were granted access to state subsidies amounting to 80% of the SHS investment costs. In the case of the concessionaire KES, these costs were financed from FC grants. The remaining 20% of the costs was provided by the concessionaire itself, thereby financing the installation and development of the operating and maintenance infrastructure for the systems. The concessionaire receives income via payments from the households supplied with SHS, which pay a monthly fee set by the government of ZAR 118 (as of October 2018) to KES;[1] these payments are used by the company to finance the maintenance, repair and proportionate costs of the installation. Very poor households (around 90% of households in the Eastern Cape according to information from the municipalities and KES) – which are recorded in a municipal register – pay a reduced fee to KES of ZAR 61. 61 ZAR an KES. The remaining ZAR 57 is subsidised by the South African state under the “free basic electricity” (FBE) policy. The municipalities maintain a register of all households defined as poor, and receive the allocations from the central state level.

Relevance

Even after the end of apartheid, there remains a strong urban-rural divide and considerable regional differences in the supply of electricity in South Africa. While around 80% of the urban population was supplied with electricity at the time of the project appraisal (PA) in 2001, less than 50% of the rural population had access to electricity. Network expansion in off-grid rural areas is not always the most economically efficient way to broaden energy access. Vast distances to the existing grid, a small number of potential customers and their limited solvency (at the PA, over 95% of non-electrified households had an average monthly income[2] of less than ZAR 2,000 (around EUR 120)) as well as the low consumption rates of the predominantly private households often make connections to the electricity grid unprofitable. Off-grid systems in the form of SHS therefore offered the potential to supply the inhabitants of remote rural areas with electricity, especially in the project area of the Eastern Cape, where 84% of urban households – but just 32% of rural households – were connected to the grid at the PA. In Phase I, the state-owned electricity supplier Eskom estimated the potential at 27,000 SHS for households and 300 and 160 PV systems for

[1] The electricity offered via the central grid costs households 1.20 cents (ZAR) per kWh.

[2] The income in the project region consists of state allocations (social welfare, pensions and child benefit) as well as remittances from family members, and includes no income from employment.

schools and healthcare facilities respectively – depending on the speed at which the grid expansion was to proceed from state grants. In Phase II, Eskom's estimate was as high as 30,000 SHS.

At the time of the PA, non-electrified households covered their needs using traditional energy sources such as paraffin, candles, (car) batteries and firewood, which – taking into account the transport costs required for procurement – used up a significant portion of their monthly income (ZAR 60–300, at an average of ZAR 160 per month).[3] The costs were mainly associated with lighting and media use. Thus the installation of suitably designed SHS had the potential to reduce these costs. However, given that the charge for connecting/registering the SHS (a subsidised ZAR 100) had to be paid over and above the monthly subsidised maintenance cost of ZAR 57 (fee-for-service; even if the system does not work), the SHS does not always represent a viable financial alternative for the poorest of the poor due to their lack of liquidity.

The SHS ensured a basic supply of electricity (outcome), facilitating the connection of lamps, a radio and a black-and-white television as well as the charging of mobile phones. Effects[4] in the form of fundamentally improved living conditions for the predominantly poor households – in terms of health, education, security and (in the long run) improved income (impact) – could hardly be expected as the performance of the SHS was too low for this. The massive delays in implementation which had not been expected at the PA, the rapid decline in SHS prices, the strong continued development of technology and the availability of innovative payment systems meant that the design of the systems (capacity, accessories) was no longer aligned with demand or the state of technology.

In South Africa, municipalities play an important role in access to electricity. They determine not only the distribution of subsidies for basic services (FBE as an "unconditional grant"), but also whether certain villages are ultimately supplied with SHS. No household can be allocated to the concessionaire(s) without the consent of the local authority. The involvement of the municipalities is therefore essential to achieving the objectives of the FC project. Although the concept was designed to include representatives from the municipalities in the preliminary information on the planning and implementation of the individual measures, other options such as bilateral agreements would have given this step greater emphasis and more of a binding nature, and would have served to further underscore the project's consistency with the Federal Government's development policy concept, in which municipal development plays a central role and was included as one of the priority sectors of German-South African DC at the time of the PA. Since no other donors were active in the field of rural electrification there was no coordination in this respect.

Electrification is of high socio-political significance in South Africa. The project formed part of the highly subsidised "South African Off-Grid Concession Program" and was embedded in the National Electrification Program (NEP, later INEP), which focused on the promotion of rural electrification from 2000, but did not follow the concession model. A master plan for off-grid electrification is still lacking, as is the legal and regulatory framework and coordination with Eskom and the relevant ministries (education, rural development and health ministries), all of which finance power supply lines to schools and health clinics in rural regions themselves.

Given that Eskom was responsible for grid-connected electrification and its implementation, the off-grid electrification by private concessionaires was a complementary and needs-based solution in remote areas far from the power grid, which had the potential – provided it was adapted to local conditions – to contribute to rural electrification using renewable energies and to promote regional and local (full-time) employment (technicians and other service staff employed by the concessionaire). The private sector is not squeezed out by this model, it is supported. The structure of the fee-for-service model anchored the sustainability of the approach in its design. However, the concession contract concluded between the concessionaire (KES) and the Ministry of Energy had one major design flaw: according to the regulations contained therein, given that Eskom was not a contractual partner, KES is unable to claim compensation from Eskom for any grid-connection costs incurred in the event of a necessary dismantling of the SHS when the grid is reached, nor can it claim for lost revenues. Other concessionaires used a tripartite contract (concessionaire, DoE, Eskom) to close this legal loophole.

---

[3] Of which on average ZAR 19/month for candles; ZAR 68/month for paraffin; ZAR 30/month for batteries and ZAR 135/month for gas, where applicable.

[4] Jimenez, R. (2017): Development Effects of Rural Electrification. Policy Brief, IDB-PB-261.

By opting for the concessionaire model and energy supply via the SHS, an innovative and adequate solution to the core problem was chosen. Accordingly, the relevance is still rated as good, although various aspects such as the necessary economic viability of the concessionaire – which is based on a sufficiently high number of installed SHS and reliable cash flows – were not properly analysed at the PA and were not embedded in the design.

Relevance rating: 2 (both phases)

Effectiveness

The programme objective was to provide, via a concessionaire, a secure basic energy supply of up to 200 Wh/d by means of an SHS at a fixed monthly usage fee for households as well as (in Phase II) for hospitals and schools, a fee that is acceptable to the target group.

Indicator	PA target value	Ex post evaluation
(1) One year after the programme implementation, at least 90% of the installed systems are in operation.	90% (target)	(Partially) achieved. All systems are functional and/or will be repaired shortly. However, only 74% of the planned systems were installed.
(2) The average annual power failures due to technical problems amount to <10 days/year.	<10 days (target)	Achieved. The repair time as at the EPE is 4 days.
The theft rate for PV systems is below 2%.	<2% (target)	(Partially) achieved. Only around 1% of the systems are affected by theft, but just under 5% are affected by vandalism.
(4) At least 90% of all customers pay their fees.	>90% (target)	Not achieved. Payment delays and defaults by users total >60%.
(5) No more than 10% of installed PV systems are removed within the first year.	<10% (target)	Achieved. 4% of the systems had to be dismantled and placed in temporary storage in the first year. There was/will be no implementation and further use of the dismantled SHS.
(6) The average energy consumption per household is no less than 4 kWh/month.	4 kWh (target)	Achieved.

Indicator 1: By the time of the final review, a total of 22,057 SHS (36% with a 65Wp and 64% with a 95Wp capacity) had been installed (output), a significant proportion of which were installed in Phase II: from July 2013 to the end of 2015 the number of SHS rose from 8,128 to a total of 22,057 (still just 74% of the originally planned 30,000 SHS) – all those still installed were in operation. FC financing was reduced in 2015 (see Efficiency), and as a result, subsequent installations can no longer be attributed to the project.

Indicator 2: The households visited during the EPE expressed their satisfaction with the reliability of the concessionaire KES in the event of failures. KES has its own service teams that carry out continual maintenance work. In addition, subcontractors are commissioned to relieve peak workloads. When all project locations are considered, the average annual outage is just a few days; this is because the technicians are well organised and deployed quickly, while the systems are serviced on site at least once a year.

Indicator 3: Information campaigns were run to increase awareness among the target group and to limit theft and vandalism. Nevertheless, interviews showed that some customers had higher expectations for the performance of SHS (e.g. cooking and the ability to connect refrigerators) and that many saw SHS as only a temporary solution until the power grid reached them ("the real energy"). Adjusting the mounting of the SHS curbed the rates of theft and vandalism. Overall, the rates of theft and vandalism are low compared to other subsidised electrification projects in schools and hospitals. It is plausible to assume that this has been aided by the counterpart contribution for the installation and the cost contribution for maintenance.

Indicator 4: At the time of the EPE, it is estimated that more than 60% of households are behind or not paying their already heavily FBE-subsidised usage fees, and that this figure will continue to rise. Despite the implementation of awareness-raising measures and the application of a pre-paid system, the willingness to pay remains unsatisfactory.

Indicator 5: Some of the systems (3,533 systems; 4%) had to be dismantled by 2015 because (i) users were unexpectedly connected to the grid (65% of cases)[5], (ii) users did not pay their bills (25%) or (iii) there was theft or damage (10%). Installation figures in the Phase I project areas (Tsomo, EC135 and Mt Fletcher, EC141) were well below expectations. Both potential and existing customers were lost due to interim connections to the power grid. At the time of the EPE, KES had 12,709 active customers in the project areas who had an SHS – however, not all were necessarily paying for it.

Indicator 6: The average monthly energy consumption is above the target of at least 4 kWh/month defined at the PA. At the time of the EPE, consumption is 9 kWh/month.

Several factors were responsible for the lack of target achievement: (a) the poor communication between stakeholders, and in connection with this (b) the unforeseen expansion of the state electricity grid into the concessionaire's territory; (c) the significant delays in the allocation of concession areas due to the lack of planning; (d) the expectations of consumers which remained unsatisfied by the design of the SHS (here the targeting of the information campaign consultant was not specific enough and the approaches not sufficiently innovative), which had a negative impact on (e) the willingness of the users to pay (this was further weakened by the FBE available from 2003 and other programmes run by the DoE itself, which provided SHS completely free of charge); (f) the slow processing of applications for SHS as a result of the slow allocation of concession areas; and (g) the fact that grants for the concessionaire were often not available on time, making it necessary for the concessionaire to make payment several months in advance, with the result that the installations were halted[6]. PV systems for hospitals and schools were never installed as the DoE and other ministries ultimately installed these themselves.

To avoid duplication, the lack of expansion of concession areas and the high payment defaults are only assessed under the criterion of sustainability. The South African goal of electrifying 300,000 households via SHS has not yet been achieved, despite several extensions. The FC project was likewise unable to make any significant contribution here.

Effectiveness rating: 4 (both phases)

Efficiency

At the time of the final review, the total costs amounted to EUR 16.33 million, compared to the planned EUR 33.9 million; this was attributable to fewer outputs than planned as well as currency fluctuations. From this amount, EUR 2.76 million related to consulting services, EUR 12.57 million to the installation of SHS and EUR 1 million to other costs of the concessionaire. EUR 12.8 million was financed from FC funds and EUR 3.5 million by the concessionaire. The disbursement rate of just 51% can hardly be considered satisfactory. The reasons for this include, on the one hand, the strong devaluation of the South Af-

---

[5] The reason for the unexpected network expansion in the concession area was a lack of and/or insufficient demarcation agreements with Eskom, which is responsible for network expansion. In the course of the project implementation, overall responsibility for grid-connected and decentralised energy supply was transferred to the Department of Energy (DoE), which is responsible both for financing rural electrification and concluding demarcation agreements.

[6] These reasons were also cited by failed concessionaires as obstacles to achieving the objectives.

rican rand against the euro[7], as well as developments which necessitated adjustments, ultimately bringing about delays – for example, the implementation period was extended from 60 to 169 months (the projects ended in 2016 instead of 2007 as planned) – and affecting the installation dynamics along with the production and allocation efficiency:

(i) Following the PA, the concession grantor changed from Eskom to the DoE, which was initially unable to carry out this task in terms of expertise and personnel, and thus slowed down the project implementation.

(ii) There was no legal basis for the concessionaire model, so each year only a few areas were allocated for subsidised installations.

(iii) Although the detailed planning for the installations was adjusted to some extent between 2003 and the first installation in 2008, it was ultimately no longer in line with current technical requirements.

(vi) The executing agency changed the project area and decided that PV systems and electric equipment for schools and health centres were no longer part of FC financing. The FC funds could not be disbursed by the end of the project period and had to be returned.

(v) Only after the adoption of the national electrification plan in 2013 was the programme refocused from a geographical and technical perspective.[8] Since the RR2 batteries used in the SHS in Phase I saw a significant 50% drop in performance after one year, at the end of Phase II around 100 SHS were equipped with newer, higher-quality tubular batteries with a service life of 5–7 years on a pilot basis. However, this could not be verified at the EPE. Households throughout the country continue to use slightly modified car batteries. LED lamps have been replaced by higher quality LED lights which offer better performance, a longer service life and improved light yield. The cost per installed SHS was ZAR 4,956–6,370 (approximately EUR 290–375 (Oct. 2018)) per 65Wp system (installed between 2008 and 2013) and ZAR 8,900 (approximately EUR 525) per 95Wp system (installed between 2013 and 2015) and is considered reasonable. After implementing the adjustments in Phase II, it was possible to intensify the project and increase the number of installations. As a result, the three years from 2013–2015 saw the installation of just as many SHS as in the previous 11 years. The installation performance in 2015 is also a special case though, stemming from the announcement in this year that the programme was to be terminated; this led to an increase in the number of active installation teams and to installation work being carried out even at weekends. The production efficiency of Phase II is accordingly rated higher.

(vi) Some of the households which were – or which were planned to be – electrified with SHS were connected to Eskom's extended grid earlier than anticipated, despite the fact that both grid and off-grid electrification in rural areas fell under the responsibility of the same executing agency (DoE).

From a cost-benefit perspective, the SHS installations were a practical approach for the electrification of rural areas at the time of the PA. Nevertheless, the allocation efficiency remains weak as the SHS have a lower output compared to an electricity grid connection, and accordingly there is little potential for developmental impact. Since SHS customers will always compare themselves against grid customers, complete satisfaction is impossible. At the time of the PA, the installation of mini-grids was not yet possible for technical reasons, nor was it an efficient alternative given the large distances between huts in rural areas. For the above mentioned reasons, the efficiency of the project is assessed as unsatisfactory overall.

Efficiency rating: 4 (both phases)

Impact

The development objective (impact) of the project was to improve the living conditions of poorer population groups in remote rural areas by providing a cost-efficient energy supply through the use of renewable energies. No development objective indicators were defined at the PA, and so indicators (improvement in health, education, income and quality of life) were added within the framework of the EPE, which were described in both qualitative and quantitative terms by the field mission as well as by evaluating various

[7] The rand has lost half its value against the EUR since 2004 (PA Phase II): while the exchange rate in September 2004 was 8 ZAR/EUR, it had dropped to 16 ZAR/EUR at the time of the last SHS installations in December 2015.

[8] Geographical refocus on Alfred Nzo District Municipality (DC44) which, at that time, had 100,000 households without electricity.

studies and examinations. Surveys[9] on the effects of access to a modern energy supply offer the following results, which have been confirmed by non-representative surveys conducted as part of the EPE mission:

- **Health and safety (Indicator 1)**: Users (82%) were particularly satisfied with the reduced risk of fire and other household accidents associated with power supplies which use traditional energy sources. Children no longer have to play and read by candlelight in the evenings. Despite the SHS installations, however, many households still use paraffin and wood because SHS were not designed for cooking. Candles are also used as an alternative to SHS when the SHS is unavailable or is no longer available due to the charge status. As a result, just 5% of the households surveyed by the MC stated that the health of their families had improved. However, 89% of those surveyed felt safe with the outdoor lighting that was now available.

- **Education (Indicator 2)**: Children in households with access to electricity generally receive a better education than children from households without access to electricity. The PwC survey, for example, found that 56% of children in areas with SHS received a secondary school qualification, compared to just 44% in non-electrified areas. Of course, this is not just attributable to the availability of electricity, it may also be due to other factors. 70% of children in households which have lighting in the evenings have enough time to do their homework. In non-electrified areas, this is true for just 30% of children. However, it cannot be ruled out that this may simply be due to the postponement of homework until the evening. As shown in Fig. 1, electricity in the evenings is used mainly for lighting purposes. Many households in the Eastern Cape (EC) province do not have a television set to distract children from doing their homework because they cannot afford the device or the licence (ZAR 289) needed to use it.

- **Income (Indicator 3)[10]**: A study on the impact of electrification on employment[11] provides evidence that access to a modern energy supply increases employment and shows that women, in particular, have more time for housework as they spend less time gathering wood[12] and have more light in the evenings. However, given that SHS in the EC are not designed for cooking and thus firewood must continue to be collected, these assumptions are not fully applicable for the FC project. Moreover, there are virtually no differences between electrified and non-electrified households in terms of actual increases in income (PwC 2013). Only 6% of households stated that they were generating additional income. This can be attributed to the local setting: rural areas lack a business culture and are home to only a small number of micro and small enterprises. Most households survive on state aid (child benefit and pensions). If households report an increase in income, this is usually nominal and not real. The project made a small contribution to job creation thanks to the production and installation of SHS and the establishment of a service and distribution infrastructure. The provision of a basic electricity supply cannot be expected to offer a way out of poverty.

- **Quality of life (Indicator 4)**: All households stated that SHS had made some change to their lives. They had light, a radio connection, were able to charge mobile phones directly in their homes and saved on travel and charging costs. Access to communication and information about world events was improved and households were able to begin playing a greater role in global development. Since SHS are not designed for cooking and refrigeration, everyday life was not improved in this respect.

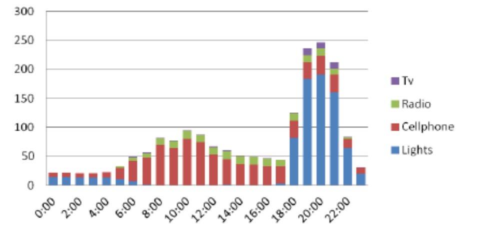


Fig 1: The electricity generated by SHS is mainly used for charging mobile phones during the day and for lighting in the evenings.

The installation of PV systems in schools and healthcare facilities could well have had a positive impact on the education and health status of the population, but this was not financed by FC. The "improving the living conditions of poorer population groups" objective was there-

[9] PwC (2013): Socio-economic Impact Assessment of Rural Electrification und Monitoring Consultant (2013)

[10] The indicator focuses not on the income savings that stem from eliminating the costs of traditional energy sources (see Relevance), but instead on the additional income generated, which indicates increased employment.

[11] Dinkelman, T. (2011): The Effects of Rural Electrification on Employment: New Evidence from South Africa. Princeton University.

[12] An average of 1.05 hours per day is spent collecting wood in South Africa (IEG Impact Evaluation (2008): The Welfare Impact of Rural Electrification: A Reassessment of the Costs and Benefits. Washington, USA).

fore only partially achieved. The scientific literature[13] also provides evidence of the limited impact of SHS in terms of socio-economic development. The project did, however, have an impact on another level: it allowed private suppliers to enter the otherwise monopolistic electricity market more easily.

Impact rating: 3 (all phases)

Sustainability

“The key elements of a sustainable rural PV market include customer satisfaction, affordability, dealer profitability, and effective supply and service chains” (Martinot, 2001). The long-term success of SHS projects depends on financial aspects – both for the concessionaire and for the households – as well as on technical and logistical factors and measures to increase acceptance. The project was unable to meet all of these requirements. Given the high fixed costs of the sophisticated service infrastructure, in combination with revenue from sales which remained below expectations due to the sluggish allocation of concession areas by KES, the difficulties outlined above and the expansion of the network led to cash flow problems which could only be overcome by the company’s strong shareholders (EDF and TOTAL) supporting the commitment. Today, KES is one of just three active concessionaires and is reportedly (only just) making a small profit. The other concessionaires no longer exist. KES secures its revenues through diversification, by expanding its product range and by distributing gas and D-light systems (small solar panels) on a commercial basis.

On the one hand, the introduction of FBE had a positive effect on the financial sustainability of the concessionary model, as revenues became more predictable and the concessionaire was no longer dependent on the logistical nightmare that was the time-consuming collection of minimum fees. On the other hand, however, it became dependent on FBE payments, which vary from year to year. At the same time, FBE had a negative impact on the payment practices of customers in relation to the remaining counterpart contribution. These payment practices deteriorated further following the introduction of fully-subsidised state SHS programmes – some of which were implemented in the concession areas. The concessionaire model is thus threatened not only by the expansion of the state network into the areas designated exclusively for the concessionaire, but also by state-owned SHS programmes. In view of the ever-shrinking market, this business model cannot be regarded as sustainable in the long term.

The sustainability of the technology must also be viewed in a critical light: the type of battery used is not optimal for SHS. Its service life is too short and it offers a low performance capacity. This is considered acceptable in view of the cost-benefit ratio, but excludes the nationwide, additional use of other devices (refrigerators, colour televisions), which has a negative effect on user satisfaction. The batteries are produced locally and options for recycling are well defined and reliably used. Operation and maintenance are currently well organised and are carried out in a competent manner. Employee motivation appears to be high, as does SHS performance given the limitations discussed. It remains unclear who ultimately owns the SHS – subsidised by FC or the state – and who will maintain them in the future (at present, the DoE has only extended the concessionaire’s maintenance contracts to cover the next three years).

Sustainability rating: 4

---

[13] Systematic Review by Lemaire, X. (2018): Solar home systems and solar lanterns in rural areas of the Global South: What impact?. lin: https://doi.org/10.1002/wene.301 (3.9.2018).

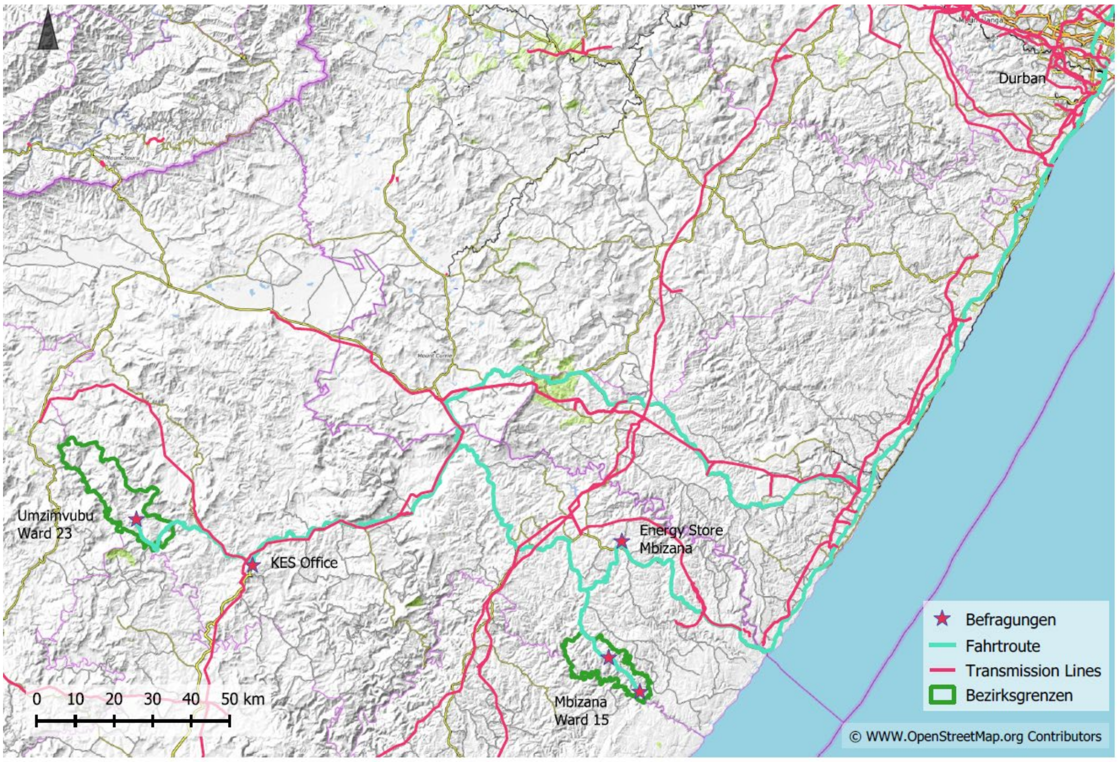


Fig. 1: The map shows the distance between the project areas visited during the evaluation mission and the existing power grid (Source: own research using OpenStreetMap).

Notes on the methods used to evaluate project success (project rating)

Projects are evaluated on a six-point scale, the criteria being **relevance, effectiveness, efficiency** and **overarching developmental impact**. The ratings are also used to arrive at a **final assessment** of a project's overall developmental efficacy. The scale is as follows:

Level 1	Very good result that clearly exceeds expectations
Level 2	Good result, fully in line with expectations and without any significant shortcomings
Level 3	Satisfactory result – project falls short of expectations but the positive results dominate
Level 4	Unsatisfactory result – significantly below expectations, with negative results dominating despite discernible positive results
Level 5	Clearly inadequate result – despite some positive partial results, the negative results clearly dominate
Level 6	The project has no impact or the situation has actually deteriorated

Rating levels 1-3 denote a positive assessment or successful project while rating levels 4-6 denote a negative assessment.

Sustainability is evaluated according to the following four-point scale:

Sustainability level 1 (very good sustainability): The developmental efficacy of the project (positive to date) is very likely to continue undiminished or even increase.

Sustainability level 2 (good sustainability): The developmental efficacy of the project (positive to date) is very likely to decline only minimally but remain positive overall. (This is what can normally be expected).

Sustainability level 3 (satisfactory sustainability): The developmental efficacy of the project (positive to date) is very likely to decline significantly but remain positive overall. This rating is also assigned if the sustainability of a project is considered inadequate up to the time of the ex post evaluation but is very likely to evolve positively so that the project will ultimately achieve positive developmental efficacy.

Sustainability level 4 (inadequate sustainability): The developmental efficacy of the project is inadequate up to the time of the ex post evaluation and is very unlikely to improve. This rating is also assigned if the sustainability that has been positively evaluated to date is very likely to deteriorate severely and no longer meet the level 3 criteria.

The **overall rating** on the six-point scale is compiled from a weighting of all five individual criteria as appropriate to the project in question. Rating levels 1-3 of the overall rating denote a "successful" project while rating levels 4-6 denote an "unsuccessful" project. It should be noted that a project can generally be considered developmentally “successful” only if the achievement of the project objective (“effectiveness”), the impact on the overall objective (“overarching developmental impact”) and the sustainability are rated at least “satisfactory” (level 3).