Impact assessment of Norwegian support to the energy and road sectors in Pemba (Zanzibar)

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Impact assessment of Norwegian support to the energy and road sectors in Pemba (Zanzibar)

Final report

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Evaluation report

Executive summary

This report presents the results of the evaluation of a bundle of projects aimed at strengthening the electricity and road transport infrastructures of the island of Pemba (Zanzibar). The projects consisted principally of the establishment of a submarine electrical cable between Pemba and mainland Tanzania, the electrification of villages and the rehabilitation of several roads in rural areas of the island. Their overall time span extended from 2004 to 2012, but they were mainly implemented in 2009-2010. The government of Norway provided the bulk of the funding for the projects (NOK 475 million out of a total cost of NOK 575 million), as well as technical assistance.

From the standpoint of impact evaluation, the projects are extremely heterogeneous: when the electrical cable started to operate in May 2010, its effects on the supply of electricity could be felt instantly across the island; by contrast, village electrification and road improvement take months or years to produce their full effects on power and transport supply, and these are at first local. In addition, the projects combine their effects. The economic consequences of the cable, for instance, are naturally larger in villages that are electrified and have access to good roads.

The approach adopted in this report aims to capture the sheer complexity of the impact that the projects have had on Pemba's society and economy. For this, particular attention has been paid to spelling out the theory of change associated to the projects, representing it in a formal way and using it as the logical backbone of the evaluation. The result is summarized by the causal graph of next page, which helps to describe the range of effects that the interventions have had, the channels through which these effects have taken place and the external factors that have influenced these channels. The causal graph of the theory of change was used to select the most appropriate set of indicators, to orient empirical investigations and to combine qualitative and quantitative information in a consistent and systematic manner.

As illustrated by the large share of favourable (green) outcomes on the graph, the projects have had a substantial positive impact on the welfare of the inhabitants of Pemba through various channels, in particular the improved mobility and better access to health facilities. The supply side of the Pemban economy has also greatly benefitted from access to reliable power and roads. In many traditional activities such as fishing and carpentry, production processes have been modernised. The projects have also triggered an unprecedented number of business and job creations. But the projects have had unintended negative impacts too, in the first place in terms of increased victims of road traffic accidents.

In contrast with these clear-cut indications, the report produces no substantial evidence on the effects of the interventions on incomes and on poverty reduction. Three reasons can explain this. First, very few economic data have been produced in recent years in Zanzibar, much less so at regional level. Second, some of the most important effects of the projects, in particular those related to better health, education and gender relations will only materialize in the longer term. Third and maybe most importantly, a large part of the potential benefits of the projects remains untapped mostly because of weak governance or inadequate accompanying measures.

While village electrification rates in Pemba are at the level of middle-income countries, household connection rates are low (even though they have improved in recent years), and even very low in rural areas. This is first and foremost due to the prohibitive costs of connection. The Zanzibar electricity company (ZECO) has increased its production margins thanks to the cable, but is affected by its heavy costs and by the fact that parts of the public administration do not pay their electricity bills. The report shows that through high connection fees and fairly high average prices of electricity, households are de facto forced to subsidise the electricity consumption of

these public entities. With persisting technical issues and the prospects of saturation of the cable in a decade from now, ZECO's financial difficulties bring the long-term sustainability of the electricity system into question.

Other major expectations that have not materialised so far include improved supply of piped water, due to inadequate pumping and storage capacities, better access of children to schools, for lack of transportation means, and innovative solutions to move out of poverty, because of insufficient knowledge (and sometimes capital) to start up a business and manage it.

In conclusion, the report suggests that Norway should aim at correcting such deficiencies through future interventions, rather than pushing further the financing of large infrastructures. Capacity building, spot improvements of water supply or public lighting, the promotion of effective policy measures for the transport of schoolchildren or accident prevention could go a long way in unleashing the potential gains from the electricity and road project.

The report also advocates for better anticipating on the complementarities and linkages that largely influence the outcome of interventions, such as the local synergies between electrification and better roads. The report makes a few practical proposals in this regard.

Last but not least, the report pinpoints the pervasiveness and harmfulness of the effects of weak governance, and pleads for an enhanced emphasis on the benefits of better institutions.

Causal graph summarising the findings of the impact assessment

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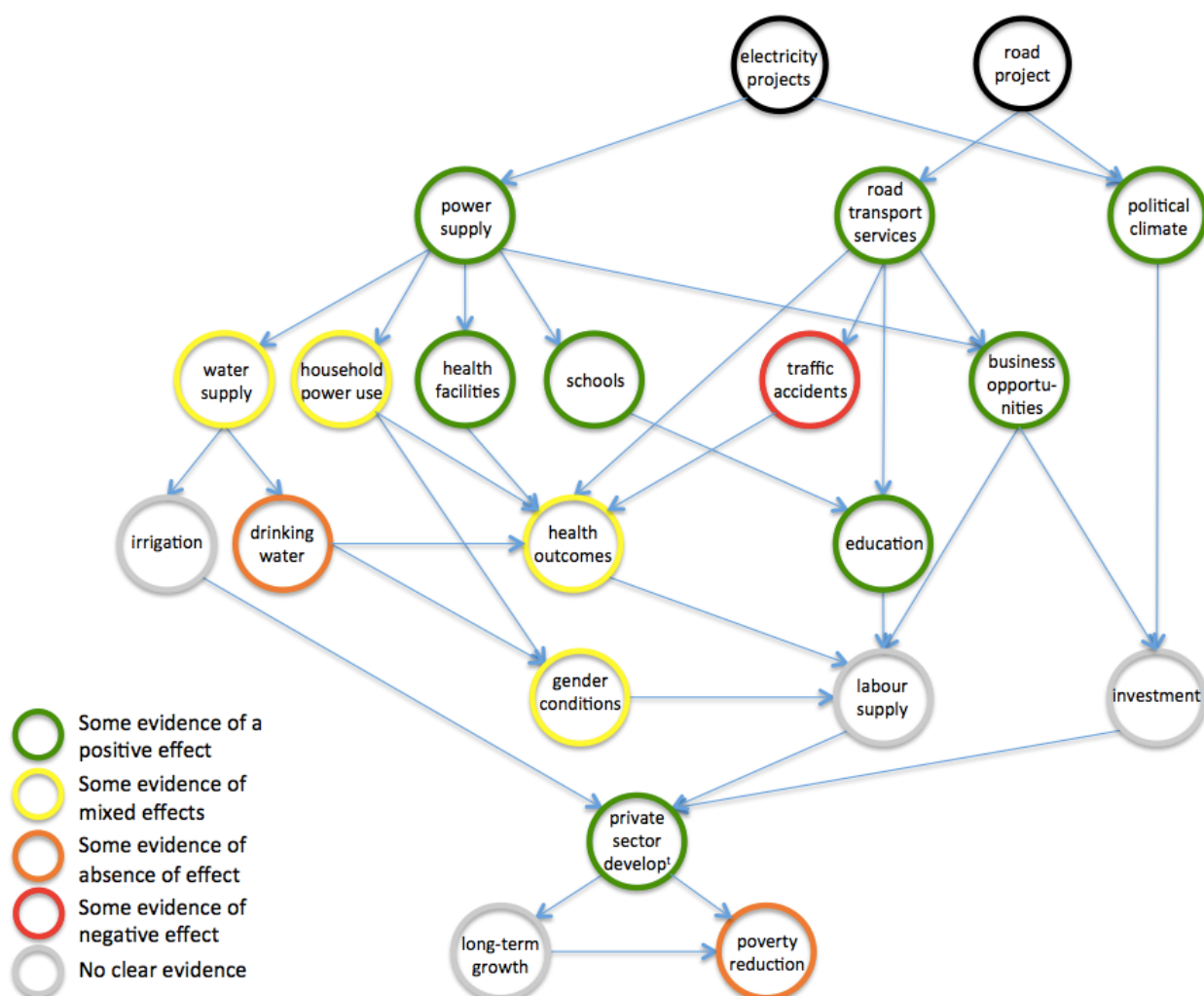
Acronyms, abbreviations, geographical locations and Kiswahili terms

ACLED: Armed Conflict Location and Event Data Project

Bn: Billions

CCM: Chama Cha Mapinduzi, "party of the Revolution", dominant ruling party in Tanzania since 1977

CUF: Civic United Front, traditional opposition party in Zanzibar, member of the GNU since 2010

Daladala: Public (but privately-owned) minibus

GNU: Government of National Union

Kaskazini Pemba: Northern Pemba

Kusini Pemba: Southern Pemba

Kaskazini Unguja: Northern Unguja

Kusini Unguja: Southern Unguja

Mijini Magharibi: Third region of Unguja consisting mainly of Zanzibar city

MoE: Ministry of Education and Vocational Training

MoH: Ministry of Health

MM: millions

NOK: Norwegian kroner

NORAD: Norwegian Agency for Development Cooperation

RFA: Road Fund Authority (Ministry of Finance)

TANESCO: Tanzania Electric Supply Company

TSH: Tanzanian shilling

USD: United States dollar

ZAWA: Zanzibar Water Authority

ZECO: Zanzibar Electricity Company

ZRF: Zanzibar Road Fund

ZRFB: Zanzibar Road Fund Board

1 Context, organization and limits of the evaluation

1.1 Context of the evaluation

This impact assessment study concerns a bundle of energy and transportation projects implemented in the island of Pemba between 2004 and 2012 thanks to Norwegian financial and technical support: a submarine electrical cable connecting for the first time Pemba to mainland Tanzania; the electrification of villages in rural areas; and the improvement of several feeder roads in the southern part of the island.

In 2009, NORAD commissioned the elaboration of a methodological framework for evaluating the joint impact of these projects, as well as a baseline study. The methodology that was elaborated, which we will designate as the baseline methodology, used data originating from a variety of sources, including public institutions, a medium-scale survey of the population of Pemba, interviews and focus-group discussions. This information was summarised by 41 primary and secondary indicators in order to evaluate the impact of the projects.[1] The second section of this report further discusses the approach. The baseline report considered that the projects would have produced their long-term effects within five years and therefore recommended to conduct the final impact assessment in 2014.[2]

In 2014, NORAD issued a call for proposals to assess the impact of the projects with the following requests:

. to review the methodology and the baseline data, with improvement suggestions if relevant;

. to conduct the end-line study and derive conclusions from its comparison with the baseline;

. to evaluate more broadly the long-term socio-economic impacts of the rural electrification project.

The International Law and Policy Institute (ILPI) was selected to conduct the evaluation at the end of October 2014, and submitted this final report in March 2015.

1.2 Overview of the projects

The subsea cable connects Pemba to Tanga on the mainland. The project started in 2009 and the cable was operational in May 2010, enabling the Zanzibar Electricity Company (ZECO) to buy electricity from its mainland counterpart the Tanzania Electric Supply Company (TANESCO) rather than to rely on out-dated, inadequate and ineffective diesel power generators as was the case previously. The Revolutionary Government of Zanzibar and the Government of the United Republic of Tanzania together contributed the equivalent of NOK 100 millions to the financing of the project, out of a total budget of NOK 400 millions.[3]

The rural electrification project was in fact the sequel of a programme funded by Norway in Zanzibar from 1985 to 1994, and then frozen until 2004 in reaction to the deterioration in the political environment. The programme placed particular emphasis on water pumping and

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[1] COWI (2009a), *Impact Assessment Baseline Study Pemba Island – Impact Evaluation Guide*.
[2] COWI (2009b), *Impact Assessment Study Pemba Island – Final Report, p.55*.
[3] Pöyry (2010), *End review of Tanga-Pemba Subsea Cable*.

distribution as critical channels for poverty reduction, especially in Pemba.[4] The project, which constituted the fourth phase of the programme, started in 2004, was extended in 2006 and completed in 2009.

The road improvement project concerned the rehabilitation of six feeder roads in the Chake and Mkoani districts in the southern part of the island. The roads were paved between 2009 and 2012 using a labour intensive and cost effective technology.[5] The project also included a component of capacity building for road maintenance at the Department of Roads of the Zanzibar Ministry of Communications and Transport (now the Zanzibar Roads Fund, ZRF), as well as the transfer of the equipment used for road rehabilitation to the Department upon completion of the work.

The following table presents an overview of the three projects. The third section of this report provides further details.

Table 1 – Overview of the three projects

Project	Implementation period	Description	Funding from Norway (NOK MM)
Rural electrification	2004-2009	Electrification of 159 villages in Unguja and Pemba[6]	102.7
Tanga-Pemba cable	2009	20 MW cable connecting Pemba to the mainland	300.0
Rural road improvement	2009-2012	44.8 kms of secondary economic roads and basic access roads; capacity building at ZRF	72.0

Sources: Norconsult and Nordic Consulting Group (2009), Pöyry (2010), Gicon AS (2012), op. cit.

1.3 The evaluation approach

The most critical aspect of the three projects, when considering the choice of an evaluation methodology, is certainly their heterogeneity.

The subsea electrical cable started operating literally overnight in May 2010, and its direct effects were presumably observed within a few months after its inauguration. The rural electrification project, by contrast, was implemented over 5 years and, as we explained, resumed a process that started almost 30 years ago. Its effects were already well underway at the time of the baseline. The road project, finally, combined a one-off investment component (the road rehabilitation works completed in 2012) and a capacity-building component implemented over a longer period (the enhancement of the road management capacity).

In addition, the effects of the establishment of the cable concern the whole of the island. The projects on road rehabilitation and electrification, by contrast, are local, but have possibly joined their effects with other interventions of the same type in other parts of the island. The Millennium development roads project in the Wete district is one important example of

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[4] Norconsult and Nordic Consulting Group (2009), *End-review of Phase IV and Extension of the Zanzibar Rural Electrification Project*, Final Report.

[5] GICON (2012), *Monitoring of the Pemba Rural Roads Project*, Report of the Final Mission.

[6] The project also financed renovation works at the Wesha power station in Pemba, a submarine cable to Tumbatu island and a preliminary study of the Tanga-Pemba cable. These components were not included in the present evaluation.

interventions that fall outside of the scope of this study, but whose effects might be difficult to distinguish from those of the projects reviewed here.

To complicate matters even further, the projects have strong synergies: the impact of the cable is somewhat reduced in a village that is not connected to the grid; and access to electricity does not create the same range of possibilities when people have to walk several kilometres to reach the first paved road.

Because of the diversity of time scales, geographical scopes, intervention logics and effects, the projects do not lend themselves to evaluation according to experimental methods - it is difficult to even imagine what the "treatment" and "control" groups would be in such a case. Although the baseline methodology does not elaborate an experimental approach, it strongly relies on an extensive survey of the inhabitants of Pemban villages, which might be faced with the same limitations. A more appropriate approach – the one chosen here – is to describe step by step the type of developments to which the projects have led, as well as the ones to which they could have led, and to compare these developments to the original aim of the projects.

The approach therefore places particular emphasis on the theory of change of the interventions, i.e. on the set of causal relationships that link the interventions to their possible outcomes, whether direct or indirect, intended or not. As exposed in the second section of this report, we use project-specific information as well as the broader literature to elaborate the theory of change associated with the projects; then we represent the theory with the help of a causal graph, and use it to select the impact indicators that help assess the outcomes of the interventions. The formal expression of a theory of change and its linkage with the assessment indicators are the main methodological contributions of this report, in particular in comparison to the baseline methodology.

Naturally, causal effects have to be assessed against a counterfactual, i.e. an account of the outcome that would have occurred had the intervention not taken place. Since, for the reasons we just mentioned, we do not have the possibility to rigorously define a counterfactual and formally establish causality, we use more loosely chosen reference points and try to account for the biases that they might introduce. For instance, when relevant, we use Unguja, Zanzibar's larger and richer island, as a basis of comparison for Pemba. Unguja, however, cannot be used as a reference to assess developments in Pemba without paying attention to two facts:

- first, Unguja had reliable electricity and a better road network than Pemba already in 2009
- second, there are numerous other factors of difference between the two islands.

Our focus, when comparing developments on the two islands, is thus to see if the projects have coincided with a catch-up of Pemba relative to Unguja. Of course, it cannot be excluded that a catch-up would have happened even in the absence of the projects. However, to the extent that we can relate it to causal channels that electricity and road transport interventions are known to activate, we have reasonable grounds for attributing it to the projects.

1.4 Organisation of the evaluation

The mix of quantitative and qualitative data collection tools and the broad range of sources proposed in the baseline methodology are well adapted to the approach we just described – and to the sheer complexity of the evaluation. We have therefore retained some elements of the baseline methodology, such as the survey design, in order to make the greatest possible use of the data that was collected in 2009. As the next chapter explains, we have systematically sought

to ensure that these empirical elements were integrated in the framework of the theory of change.

We started the evaluation process by collecting the rationale, expectations and risk factors associated with the projects at the time of their launch, replacing the set of indicators in that context and, if necessary, proposing additional indicators. For this, we reviewed the agreements, reports and other documents that were used to introduce and adopt the projects. We also interviewed some of the persons who were closely involved in the decision-making process concerning the design, adoption and implementation of the projects.

In the qualitative part of the assessment, we further investigated the causal relationships between the introduction of electrification and new roads and socio-economic outcomes. We focused to the extent possible on people's own experiences and narratives regarding the dynamics introduced by the projects at the level of households (micro), villages (meso) and the island (macro). We talked to people in different villages, whether electrified or not, observed and visited cooperatives, women's groups, fisheries and farmers, listened to people's own views and perceptions, and tried to grasp their priorities and strategies for fighting their ways out of poverty.

For this, we carried out a mix of qualitative methods in order to collect the multiple perspectives among the communities in Pemba and to understand the interplay between them: focus group interviews, participatory observation and significant change stories. We organized a series of focus groups discussions with female and male villagers in five villages in Pemba. These discussions were be supplemented by classic ethnographic fieldwork based on participant observation.

The qualitative approach was complemented by quantitative evaluation tools. We gathered data – whether pre-existing or not – from institutional sources such as the power utility ZECO and the Zanzibar Water Authority (ZAWA), the Office of the Chief Government Statistician and the ministries of Transport, Education, Health, and Agriculture. We also conducted a household survey based on a randomly-selected sample of Pembans. We replicated exactly the sample size and location choices of the baseline evaluation in order to make the results directly comparable. Both types of data – as well as qualitative observations and findings – were used to assess the various components of the theory of change.

1.5   Challenges and limits of the evaluation

The major challenge of the evaluation has been the availability and quality of data. Some of the most important national surveys have unfortunately not been completed for Zanzibar in recent years. The latest issues of the household budget survey (2012) and the employment and earnings survey (2013), which are the main sources of information on income and poverty, are limited to mainland Tanzania. National accounts, industrial production and national panel survey data are not available at regional level – i.e. figures relative to Pemba and Unguja are aggregated. The last demographic and health survey in Zanzibar goes back to 2010.

Public agencies such as ZECO, ZAWA and ZRF do not publish their accounts and some important data, such as detailed financial information or information on quality of infrastructure, do not appear to be available at regional level.

The second major challenge that we faced concerns time limitations. The overall time span of the evaluation – close to five months in all, but only about two months from the beginning of the assessment to the presentation of a first draft report – appears as insufficient in retrospect.

Given these constraints, the evaluation aimed first and foremost at building a consistent evaluation framework, feeding it with all relevant information that could be gathered and deriving robust conclusions from this setup. With additional data or time, more sophisticated statistical methods could have been used to test the structural assumptions of the theory of change. Some important issues that are not mentioned in this report (like corruption issues or the potential for alternative sources of electricity) or touched upon too briefly (such as the financial prospects of ZECO) could have been investigated more thoroughly. Aspects of the analysis could have been extended to the Unguja in order to have a better understanding of the power sector in Zanzibar. Such improvements are left for the future.

2 A theory of change for the projects

2.1 Why a theory of change?

A theory of change is a formal logical explanation of the effects that are expected from a given intervention. It is best expressed as a set of cause-and-effects relationships describing the major channels through which the intervention is expected to create change, from its outputs to its long-term outcomes, through a number of short- and medium-term outcomes and developments.[7]

For evaluation, the advantages of formally expressing the theory of change in terms of causal relationships are numerous:

- the results of the evaluation can be readily related to the initial interventions and their various effects, thereby directly leading to operational conclusions and recommendations;
- the action of outside (exogenous factors) can be identified and evaluated whenever relevant;
- the number of variables to control can be greatly reduced;
- quantitative and qualitative information of various sorts and from diverse sources can be integrated into a common framework of analysis.

The 2009 impact evaluation report and guide made a number of assumptions and methodological choices that can be seen as elements of a theory of change:

- The report distinguishes direct and indirect effects of interventions. The former essentially consist in direct job creations. The latter result from changes in the sustainable provision of energy and changes in the road transport system, specifically more reliable and affordable energy services, and cheaper, quicker, more reliable and more frequent transport services.
- These effects are expected to contribute to the ultimate objectives of the projects, namely economic development, social welfare and poverty reduction.
- The report pinpoints that "complementary investments and actions" are necessary for the indirect effects to take place.
- A set of 41 key impact and secondary indicators are associated with the projects' outputs, effects and objectives.
- Key impact and secondary indicators are organized according to five "potential areas of impact": project sustainability, economic dimension, social dimension, environmental dimension and rights-based development.

For several reasons, however, these elements fall short of providing a complete and consistent framework on which to found an evaluation strategy.

First, the potential outcomes of the interventions are defined in an overly restrictive and compartmentalised way. For instance, improvements in the provision of safe water, education and health services are considered only as secondary indicators in the social dimension, when economic theory has long considered them as critical determinants of long-term growth.

Second, the interventions are correctly identified as enablers, rather than sufficient causes, of two main drivers of further socio-economic change, i.e. reliable and affordable energy supply and

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[7] See, for instance, White, H. (2009), 'Theory-based impact evaluation: principles and practice', *Journal of Development Effectiveness*, 1(3), pp. 271-84.

improved transportation services. However, the report does not specify which "complementary investments and actions" are necessary to activate these drivers. While it briefly mentions a number of external factors that may influence impact (reduced tourism, political disturbances, the pricing of electricity from TANESCO, inadequate maintenance capacity)[8], it does not explain which developments would be affected by these, and how. A number of other factors come to mind, which should be taken into account, in areas such as:

- governance (the financial situation of ZECO and ZRF, sound project management)
- culture (readiness and capacity of households to adopt new equipment and technologies and modify traditional lifestyles, the influence of social norms such as the strong expectations of reciprocity – of food, money and goods – between relatives in Zanzibar)
- the financial capacity of households to get access to and use electricity
- political dynamics (particularly the 'Maridhiano' agreement and the formation of the Government of National Unity (GNU) in 2010 with the key objective of bringing the political and economic marginalization of Pemba to an end).

Finally, the causal paths leading from the interventions to the outcomes are not specified, which affects the evaluation framework in two ways: first, it is not clear what mechanisms would lead to developments such as better nutrition, higher per capita expenditures or reduced illiteracy; second and conversely, the reasons why a particular development is observed (whether positive or negative) cannot not be established within the evaluation framework.

2.2 Prior knowledge about the projects and their intended effects

In order to reconstitute a theory of change *ex post*, it can be useful to go back to the objectives and expectations that first led to undertaking the projects. The agreements signed between the Norwegian Ministry of Foreign Affairs and the Revolutionary Government of Zanzibar concerning the subsea cable and the road rehabilitation projects provide a starting point for this. Each of the two agreements formulates a long-term overall goal, a purpose and main outputs for the project (see table 1).

Table 2 – Goal, purpose and outputs of the interventions

	Subsea cable project	Road rehabilitation project
Goal	Support economic development and improve social welfare by increasing access to affordable and sustainable energy	Contribute to poverty reduction through improved transport infrastructure on Pemba
Purpose	A least-cost reliable supply meeting the demand for electricity on Pemba over the coming 20-25 years	Contribute to improving the network of rural roads and enhancing the management capacity of the Department of Roads
Main outputs	Installation of subsea cable and supporting infrastructure	Rehabilitation of 45 kms of roads Implementation of new management systems and provision of funding and training for maintenance of rural roads

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[8] See COWI (2009b), op.cit., section 1.3.3.

These expectations have to be considered within the economic, social and political context of Pemba, Zanzibar and Tanzania.

Because of economic differences as well as historic reasons, relations between Pemba and Unguja, Zanzibar's larger and more developed island, have been and remain difficult. Pemba is traditionally a stronghold for the opposition party CUF. According to some of the decision-makers involved in the adoption of the projects, the betterment of the link between the two islands, as well as the one between Zanzibar and mainland Tanzania, was one of the main, if implicit, benefits that were expected at the time – particularly from the establishment of the electrical cable. Norway's role in supporting the electrification of Pemba and as a diplomatic sounding board during the establishment of the 'Maridhiano' reconciliation process in 2009 went hand in hand, so that the project served the dual goal of poverty alleviation and political stabilization.

Poverty and malnutrition are very real challenges in the rural areas of Pemba. Access to clean water is still an issue in many villages, and most people have little access to paid employment and instead engage in the informal economy, subsistence farming or fishing. Available resources are primary used for consumption or personal use, such as subsistence farming, reciprocal exchanges of foods and goods and spiritual offerings.

How would the interventions modify these conditions? The literature on the socio-economic effects of transport and energy infrastructure projects is immense, and we can only refer to a few contributions of particular relevance for our case.

Studies in social anthropology[9] show that the introduction of electricity may be instrumental in reorienting income-generating activities by generating surplus production, saving time and creating opportunities for new businesses or entrepreneurial activities. A review of rural electrification projects carried in different countries with the support of the World Bank suggests impacts on the quality of service in health facilities and schools, indoor air quality and health outcomes, household living conditions and business opportunities.[10] Better roads increase the mobility of people, goods and services and can increase or even create access to markets, hospitals, schools, employment opportunities and personal relationships. The level of provision of public services and the government's initiatives to match an increase in demand by improved capacities in hospitals, public health services or schools can thus be expected to have a significant influence on the final effects of the interventions in terms of the population's welfare, economic growth and poverty reduction.

In addition to a host of positive effects, the development of road transportation can also bring along accidents, dangerous driving behaviours and negative environmental impacts.

For the potential offered by better energy and transport services to be unleashed, certain individual and household decisions have to be taken which depend not only on economic incentives, but also on social norms and values. People's perceptions of poverty, wealth and quality of life and priorities in terms of investment of their time and monetary resources are critical in this regard. Principles of reciprocity, for instance, have to be suspended for formal economic activities to develop and generate income.

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[9] For instance Winther, T. (2006), *Social Impact Evaluation Study of the Rural Electrification Project in Zanzibar IV (2003-2006)*, Centre for Development and the Environment (SUM), University of Oslo; Winther, T. (2011), 'Electricity's effect on gender equality in rural Zanzibar, Tanzania'. Case study for Gender and Energy World Development Report Background Paper, ETC/ENERGIA in association with Nord/Sør-konsulentene.
[10] World Bank (2008), *The Welfare Impact of Rural Electrification: A Reassessment of the Costs and Benefits – An IEG Impact Evaluation*. Washington, DC: The World Bank.

A large number of factors – some of general relevance, others specific to the case of Pemba – can therefore be expected to influence the impact of the electricity and road projects. Among these, several deserve a particular mention for having been somewhat overlooked in the baseline methodology:

- Conditions of supply of water
- Nutrition (access to food and clean water)
- Health services and outcomes
- Household conditions (choices of investment, division of labour)
- Education services and outcomes
- Gender relations (inequalities in rights and access to decision making)
- Political conditions

2.3   Representing the theory of change as a causal graph

Our next step consists in identifying the mechanisms that are assumed to relate the projects, their ultimate objectives and the various factors that were just mentioned. An effective tool for representing such linkages is a graph where each node represents a factor or outcome of interest and each edge a direct causal relationship. Graph 1 below provides such a representation for our case, and we refer to it at every step of the following description of the theory of change.

Ignoring their short-term effects (which have dissipated by now), the interventions in the power and road sectors are expected to influence power supply and road transport services, as well as the political climate.

Power supply meets with demand in a number of areas: water supply, household power use, health services, schools, and new business opportunities. These, in turn, meet with final demand and determine outcomes in areas such as irrigated agriculture, household use of distributed water, gender conditions, health, education, investment and labour supply. The supply of road transport services influences health outcomes both directly (as people have easier access to health facilities) and through road traffic accidents. By changing the conditions of mobility, it also has an effect on educational outcomes and business opportunities. The use of power and water for domestic consumption is expected to influence health conditions by affecting respectively indoor pollution and the prevalence of water-borne diseases. Gender, health outcomes and education have an influence on labour supply which, together with investment and the development of irrigated agriculture, creates the conditions of private sector development. Finally, the latter impacts poverty both directly and by changing the economy's long-term growth potential.

The causal linkages depicted by the edges of graph 1 carry important structural assumptions. For instance, we have systematically considered supply – rather than demand – conditions as primary causes. The theory of change has to provide arguments in support of such assumptions. In this particular case, the prominent role of the supply side seems logical considering the prospects of bringing electricity and roads (and similarly water) to people which, to a large extent, have little prior experience of these goods at comparable scale and quality levels.

Graph 1 is therefore a visual representation of a causal model through which we express the theory of change of the interventions.[11] At this stage, the model is of course not specified in

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[11] For a thorough theoretical discussion and numerous examples of application of causal models and graphs, see Pearl, J. (2000), *Causality – Models, Reasoning and Inference*. Cambridge University Press, New York.

formal equations, nor validated empirically. As any model, it cannot claim to be exhaustive, but only to simplify reality in a relevant manner. Even as such, it might still overlook important aspects of the problem or be based on incorrect structural hypotheses. In a totally rigorous approach, each of its relations ought to be discussed in relation to the literature and, if need be, evaluated separately through standard econometric methods. Such a thorough evaluation approach is clearly beyond the scope of this study.

Graph 1 – Causal graph of a theory of change for the projects
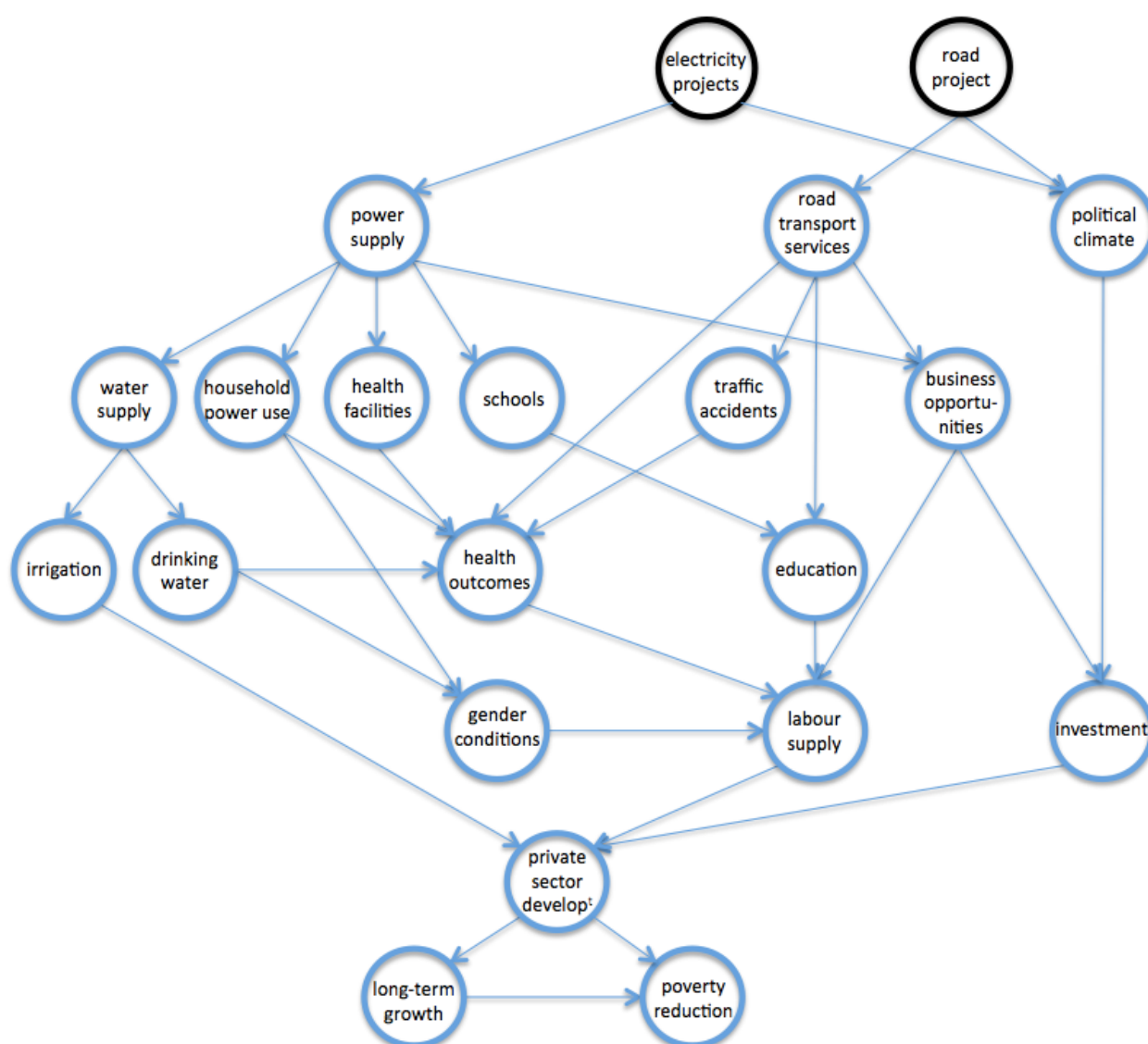
Still, this first step in the formal representation of the theory of change already entails important benefits, as we are now going to show: it enables us to connect the theory of change to the impact indicators and the evaluation method and ensure consistency; it helps to identify external factors that might affect each of the outcomes; and it provides a coherent storyline of the way in which the interventions combined with other factors to produce certain effects and not others.

2.4   The action of external factors

A number of external factors also exert causal influences upon the factors identified in the causal model, and can therefore either amplify or lessen the impact of projects. The causal model makes it possible to identify these factors in a systematic manner, to consistently analyse their impact and to distinguish it from the impact of the interventions. The following graphs describe the external factors that have been identified and assessed in this report.

Graph 2a – External determinants of power supply
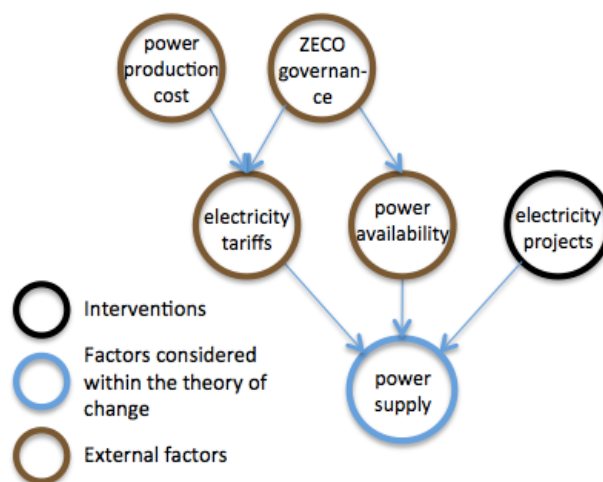
In graph 2a, "ZECO governance" covers ZECO's strategic decisions regarding pricing, investment and other expenditures, the institutional factors that affect these decisions (such as subsidies received from or cross-subsidisation imposed by the government) and other aspects of its governance. Decisions regarding grid maintenance and equipment expenditures influence system losses and power outages, while pricing decisions, together with production costs, determine the price of electricity for users (including connection costs). Power availability and prices, together with the projects, define the supply conditions.

Graph 2b – External determinants of road transport conditions
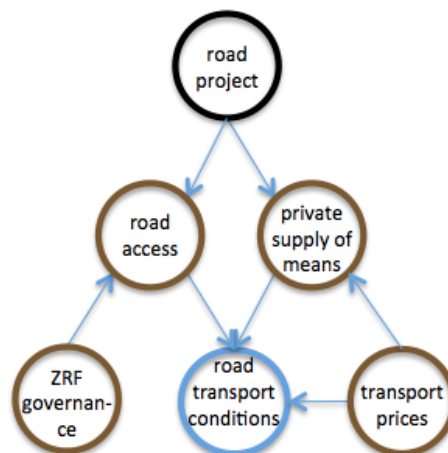
Graph 2b shows that analysing the influence of external factors might lead us to elaborate upon the mechanisms that we first used in order to describe the theory of change. In this particular

case, the effect of the road rehabilitation project on transport conditions is mediated by two distinct factors, namely the available means of transportation and the maintenance of the roads. Each of these is in turn impacted by other factors: the governance of ZRF and the prices of transportation, which also contribute to determining overall transport conditions.

Graphs 2c to 2g similarly describe the action of external factors at various nodes of the causal graph:

- the strategies of the two main parties regarding Maridhiano process and the GNU can potentially modify the political climate in Pemba (graph 2c);
- the availability of piped water, influenced by the governance of the water utility ZAWA, partly determines supply conditions (graph 2d);
- cultural factors contribute to household decisions regarding the use of electricity (graph 2e);
- public health policy acts on services provided in health facilities (graph 2f);
- and finally, private sector development depends on entrepreneurial capacities in addition to labour supply, investments and – in agriculture – irrigation (graph 2g).

Graph 2c – External determinants of the political climate
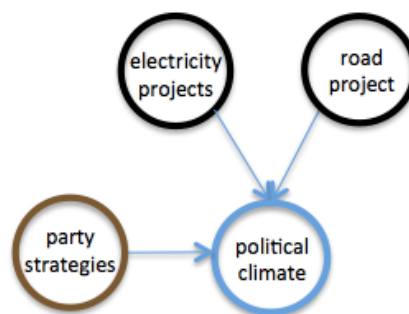
Graph 2d – External determinants of water supply
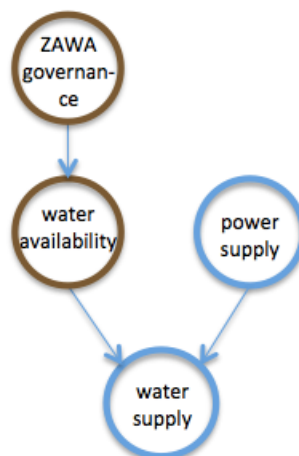
Graph 2e – External determinants of household power use
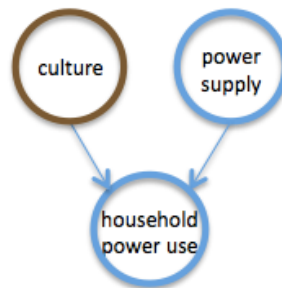
Graph 2f – External determinants of health facilities
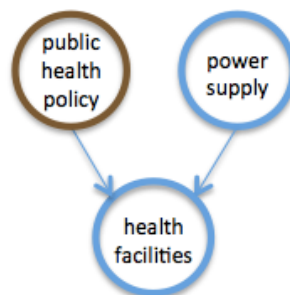
Graph 2g – External determinants of private sector development
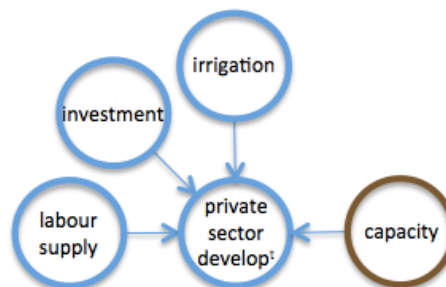
It needs to be emphasised again that the structure of the graph carries a number of structural hypotheses. For instance, we have presented supply in the electricity, transport and water sectors as a combination of quantities and prices, and assumed that both components are independent from demand factors. In addition to our previous argument regarding the dynamics of supply and demand, we can justify these choices by the fact that in all three sectors, prices are primarily determined by regulations and other aspects of governance, rather than market conditions. But such assumptions would necessitate a more thorough discussion than we can propose here because of time and space limitations.

2.5   Linking the theory of change to the evaluation method

It remains to relate our model of the theory of change to the empirical stage of the evaluation by choosing reliable indicators for each of the identified outcomes and factors.

When considered within the framework of a consistent causal account of the theory of change, some indicators of the baseline methodology appear as redundant (because the causal factor to

which they relate is already estimated by other, better indicators) or unreliable (because the causal chain leading to the factor that they are supposed to reflect is influenced by too many other factors). This is the case, for instance, for the range of available goods and their prices, which are influenced by a host of demand and supply factors other than electricity and road transport. In addition, private sector development, to which these indicators presumably relate, is already associated with more direct indicators such as the number of registered businesses. Conversely, some aspects of great relevance from a causal standpoint are not covered by any baseline indicator. This is the case, in particular, for supply-side factors in the water, health and education sectors.

The following table presents the list of indicators selected for the assessment. Each of the outcomes and contributing factors of the causal model is represented by one or more indicators, either already chosen in the baseline or not.

Table 3 – From the outcomes of the causal model to impact indicators

Outcome	Indicator	Baseline (Y/N)	Years	Source
Power supply	Power production	Y	2006-13	ZECO
Availability	Power outage occurrences	N	2013	
Electricity tariffs	Grid connection fee	Y	2009, 2014	
	Financial options for connection	N	2014	
	Electricity retail prices per tariff category	Y	1998-14	
Power production cost	Electricity production price	Y	2008	
	Fuel consumption	Y		
	System losses per year	Y	2008-13	
ZECO governance	Number of KWh invoiced per month	Y	2008-13	
	Amount invoiced and collected per month	N		
Road transport conditions	Time necessary to reach the nearest dispensary	Y	2009, 2014	Study
Road access	State of project roads and paved roads in general	N	2014	Study
Transport means	Prevalent mode of transport to basic facilities	Y	2009	Study
	Frequency of public transportation on weekdays	Y	2009	
Transport prices	Bus (daladala) prices for adults and children	N	2014	Study
ZRF governance	Annual % of the maintenance budget spent	Y	2007-12	ZRFB
	Length of maintained roads per category	Y	2009-12	
Traffic accidents	Number of people killed and injured in traffic accidents	Y	2009-13	Traffic police
Political climate	Number of political conflict events	N	1997-14	ACLED
Party strategies	Presence of individuals of Pemban origin in the Zanzibar government cabinet	N	2014	Study
Household power use	Source of energy for cooking	Y	2002, 2012	Census
	Source of energy for lighting	Y	2009,2014	Study

	Household power use in volume and in value	N	2008-2013	ZECO
Water supply	Proportion of people with access to piped water	Y	2002, 2012	Census
Water availability	Ratio between supply and estimated demand	N	2013	ZAWA
	Water shortages	N	2014	Study
ZAWA governance	Number of new boreholes drilled	N	2009-13	ZAWA
	Investment in pumping and storage facilities	N	2014	Study
Drinking water	Number of customers of water supplied in pumped schemes	Y	2010, 2014	ZAWA
Health services	Number of electrified health facilities	N	2014	Study
Health policy	Number of public health facilities	N	2014	MoH
Health outcomes	Number of in-patients in public hospitals	N	2008-13	MoH
	Death rates among public hospital in-patients	N	2008-14	
Schools	Number of electrified schools	N	2014	Study
Education	School and university attendance	Y	2009, 2014	Census
	Number of pupils admitted in standard 1 in public schools	N	2009-13	MoE
	Prevalent mode of transport to school	N	2014	Study
	Adult literacy rates	Y	2002, 2012	Census
Gender conditions	Time to collect firewood	Y	2009, 2013	Studies
	Time to collect drinking water	Y	2009, 2014	Studies
Business opportunities	Number of businesses billed for electricity	N	2008-12	ZECO
	Power use by businesses in volume and in value	N	2008-13	ZECO
Private sector development	Number of registered businesses	Y	2004, 2008, 2012	Census of establishts
	Number of employees in registered businesses			
	Availability of capital and capacity to start a business	N	2014	Study
	Number of new beds in hotels	N	2004-13	Tourism Commiss.
	Number of tourists	Y		
Poverty	Number of meals per day per household	Y	2009, 2014	Studies
	Frequency of consumption of certain food items (meat, fish, eggs, milk, beans)	Y		

3 Findings

In this section, we present the findings of the evaluation according to the main outcomes of our model of the theory of change. Whenever the evidence for different outcomes was closely related, these have been grouped, and the order of the sections follows the causal structure of the model: electricity supply; road transport conditions and accidents; political climate; household power use; water supply and use; health services and outcomes; schools and educational outcomes; gender conditions; business opportunities; private sector development; and finally, long-term growth and poverty reduction. Each section ends with a summary assessment of the impact of the project and of other factors of relevance. A table presents the values of the relevant indicators (listed in table 3) with an indication of how the team evaluates their change between the baseline year and the final year.

3.1 Electricity supply

The electrical cable started to operate in May 2010. The following month, 2.2 GWh of power were imported on Pemba, compared to 1.7 GWh produced one year earlier from diesel generators. All in all, the level of electricity supply on the island is currently more than 50% higher than at the end of the last decade, and growing steadily (see graph 3). The trend of growth in peak demand for electricity is estimated at about 9% a year in Pemba – about 2 percentage points more than the cable's end review report envisaged in 2011[12]. At this rate, the current capacity of the cable (20 MW) will be saturated in 2025.

Graph 3 – Power supply in Pemba
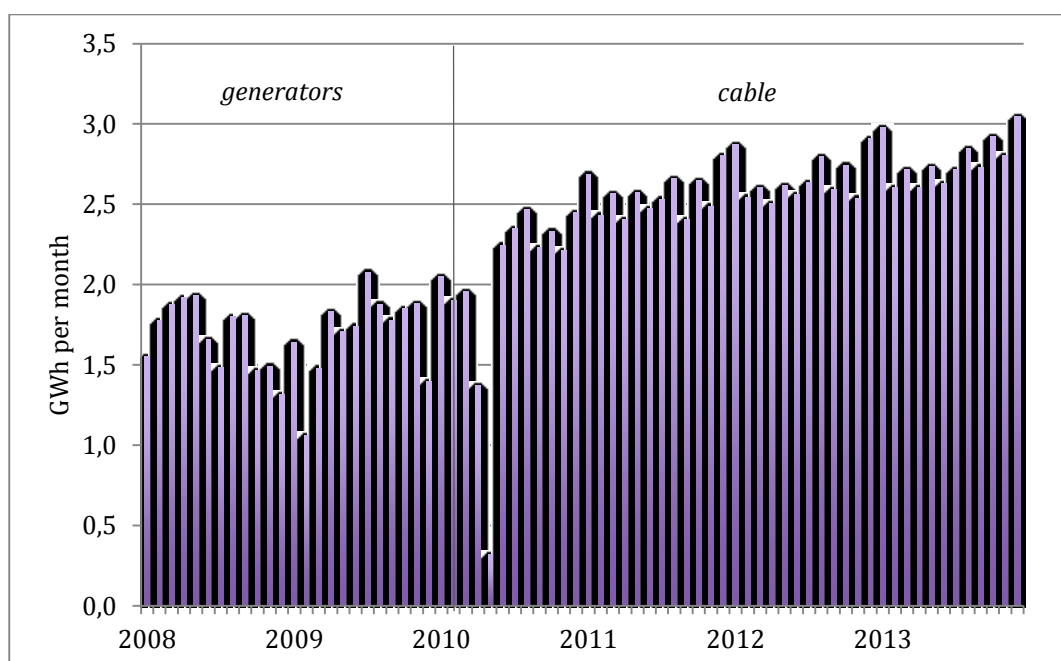
Source: ZECO

Electricity supply reaches 80% of villages on Pemba. Map 1 shows the extent of rural electrification since the end of the Phase IV project. ZECO's medium-term (5-year) goal is to connect all villages to the grid, and a new strategic plan is being prepared to this aim.

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[12] Pöyry (2011), op. cit., p.16.

Map 1 – Villages covered by the rural electrification programme since 2010*
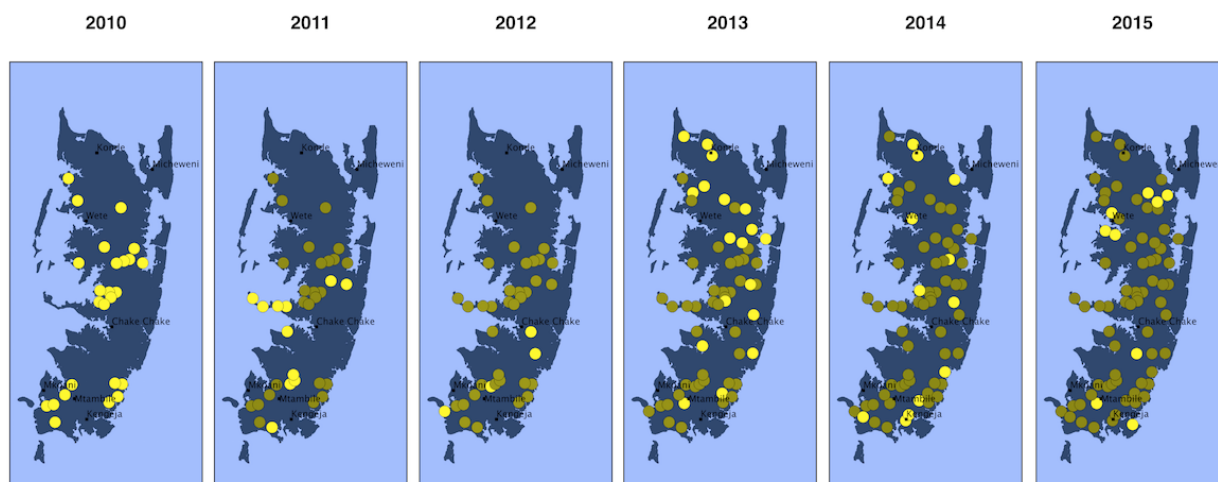
*Connected villages are represented by bright yellow dots the first year and darker dots the following years. Data for 2015 concerns villages planned for electrification.
Source: District commissions of Chake Chake, Mkoani, Micheweni and Wete

Electricity supply has certainly gained in thermal efficiency, as transmission through the cable entails smaller losses than generation with out-dated equipment. The start of the cable coincided with a drastic reduction in total system losses, from about 35% in 2008-2009 to 13% in 2011. Since, however, they have increased again and remain very high considering the relatively simple technical setup in Pemba (see graph 4). The review was not able to gather precise information on the sources of the losses; this is an issue left for further research.

Graph 4 – Percentage of total losses
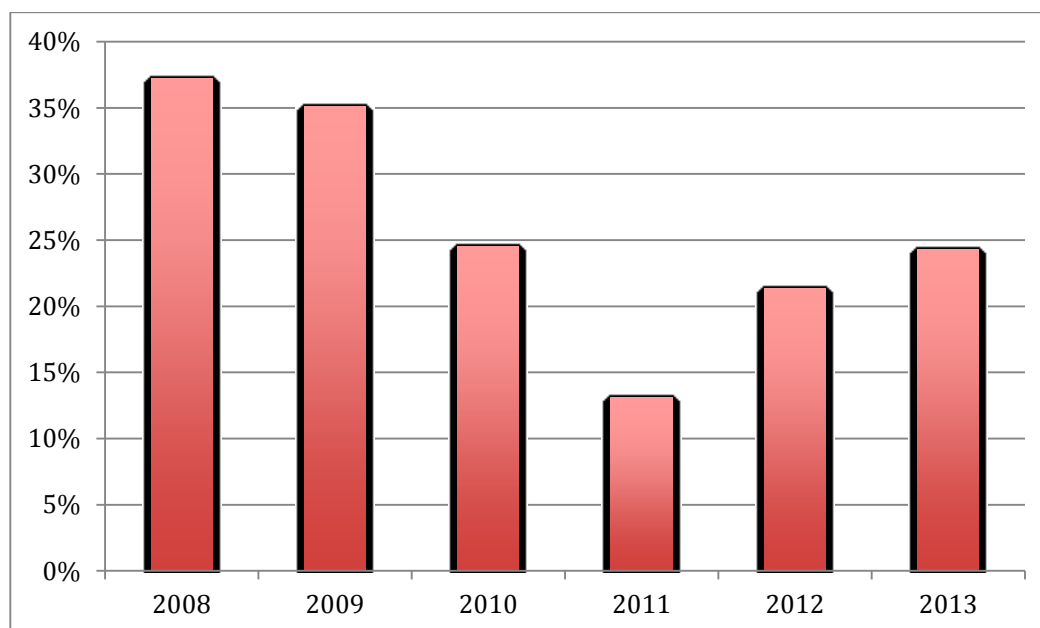
Source: ZECO

In 2009, the end review of the electrification project considered that "the supply situation in Pemba [was] grave, with extensive load-shedding and power cuts".[13] In comparison, the

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[13] Norconsult and Nordic Consulting Group (2009), op. cit., p. 7.

reliability of the cable is satisfactory, even though outages are common. Supply is directly affected by electricity shortages on the mainland, which are less severe in the Tanga region than in Dar Es Salaam. Since 2012, the Tanga line and the feeder lines on Pemba each experienced several long outages for load shedding per year, as well as several shorter unplanned outages (tripping) per week (see table 4). Outages are both more frequent and longer in the rain season.

Table 4 – Power outages

		2012 (April-December)		2013		2014	
		Total number	Average duration(min)	Total number	Average duration(min)	Total number	Average duration(min)
Tanga line	Planned	1	287,0	2	224,0	5	196,6
	Unplanned	91	11,4	77	9,3	58	16,9
33 kV line	Planned	5	211,2	3	181,7	20	32,4
	Unplanned	227	7,0	189	3,3	119	6,9
11 kV line	Planned	2	380,0	1	28,0	17	37,6
	Unplanned	104	11,5	95	7,0	72	21,0

Source: ZECO

Even though generation costs have dramatically fallen thanks to the cable, prices of electricity on Pemba are not particularly low (see graph 5). ZECO introduced a new tariff in June 2012, which consisted in particular in splitting non-commercial domestic uses into a lifeline, which is subsidized, and other uses that are charged at the same rate as commercial uses. The tariffs were raised again in November 2013. As a result, apart from the lifeline, households now face higher electricity tariffs than businesses (as in some high-income countries such as Norway).

Graph 5 – Electricity prices*
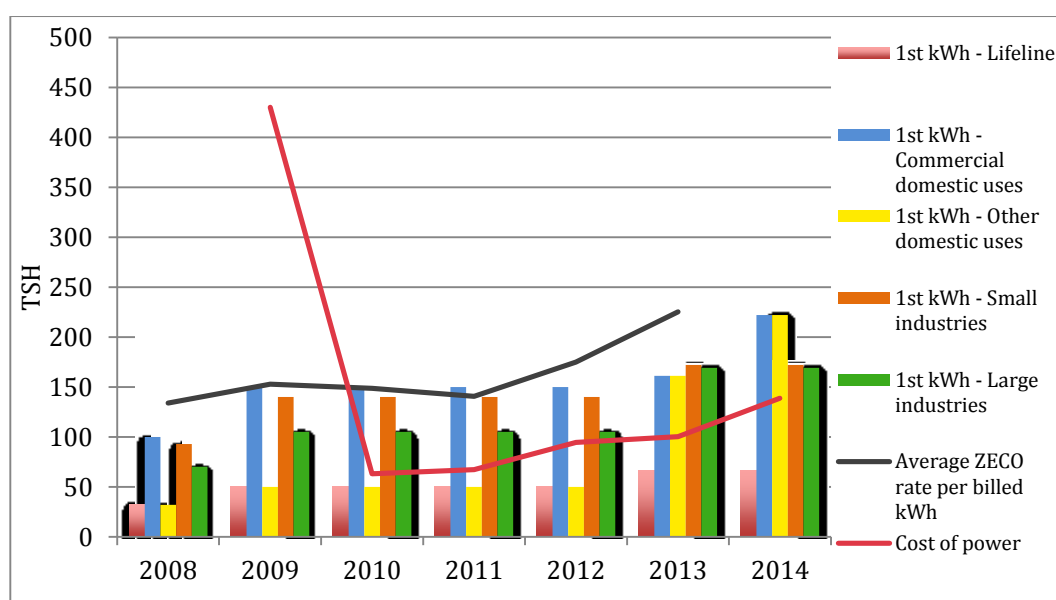
* 1st kWh tariffs on 1st January. The average rate is based on the billing of post-paid meters over the year for all categories of consumers. As tariffs per kWh increase with the volume, the average rate is higher than all tariffs for 1st kWh consumed. The cost of power consists of diesel costs in 2009, TANESCO tariffs subsequently, and does not integrate operation and maintenance costs. Source: ZECO.

The tariff changes of June 2012 and November 2013 disconnected ZECO's revenue from the volume of electricity that it sold. As shown in graph 6, the trend increase in ZECO's income (from both postpaid and prepaid meters) during the first years of operation of the cable was caused by the increase in the number of units of electricity that it billed. Since mid-2011, however, sold units have stagnated at best (due to the reduction in units used per meter, while the number of meters was increasing – see below), and the strong income gains are only due to a price effect.

Graph 6 – Electricity demand in value and in volume
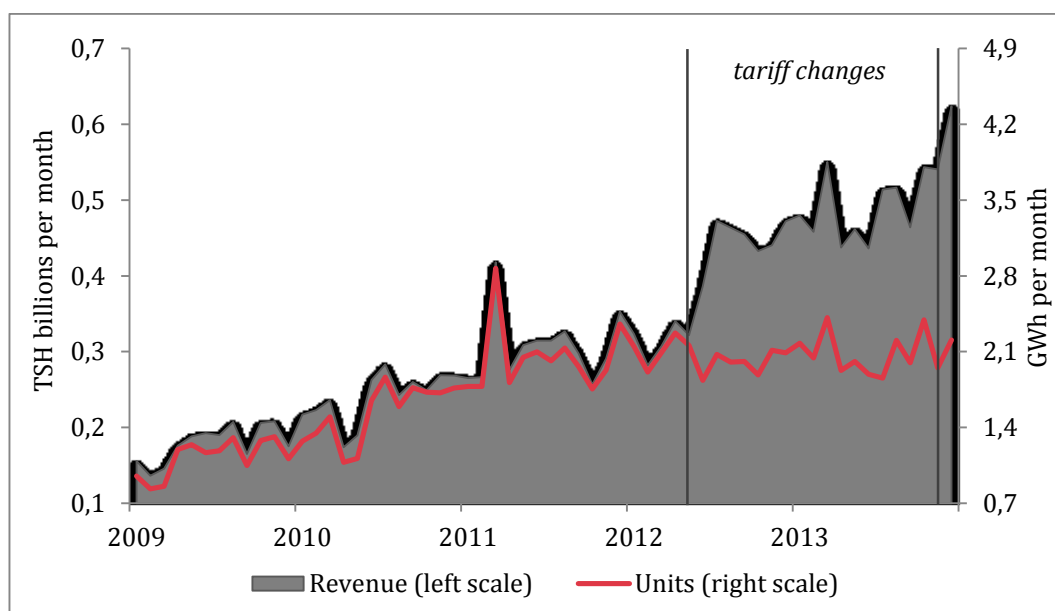
Source: ZECO

The cost of connection to the grid is very high by local standards – it amounts to TSH 450,000 (USD 268) for a direct connection, and TSH 1.5 million (USD 893) if it is necessary to add one pole. ZECO has introduced financial schemes to help individual households make the investment, by allowing them to pay half of it upfront and have the rest added to their monthly bills. Demand for the scheme appears to be low but, according to ZECO representatives, it is increasing (although figures were not provided to the evaluation team). ZECO has also provided free connections for public services, so that a majority of schools and dispensaries are connected. Usage is low in primary schools, slightly higher in secondary schools. According to ZECO, its fees only cover the cost of connection, but the review team has not been able to verify this statement. In any event, the public good nature of grid connections – in particular in relation to poverty alleviation – would justify these expenditures to be financed by a public subsidy.

The efficiency gains of the cable have thus fully been channelled towards ZECO's margins (difference between average electricity rate and generation cost), which have substantially increased since 2010. But the company still makes large losses: its 2013 sales in Pemba reached TSH 3.1 billion (USD 2 million), while its costs were at TSH 7.3 billion (USD 4.7 million).[14] ZECO's detailed cost structure, which was not provided to the review team, constitutes another topic for further investigation.

Together with the prospect of saturated capacities within a decade and the persistence of technical issues (notwithstanding the obvious improvement compared to the situation before 2010), ZECO's strained financial situation raises concerns with regard to the sustainability of

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[14] Source: ZECO.

supply.[15] ZECO already faces serious constraints in maintaining a recent grid infrastructure. In future years, it is difficult to imagine how the company will address increasing maintenance costs, let alone finance a major repair if necessary or build reserves to extend its capacity from 2025 onwards. This issue could not be fully investigated in this review for lack of access to detailed financial data, and certainly calls for further scrutiny.

ZECO's financial difficulties are partly due to poor revenue collection. According to its own estimates, about 20% of its income are not collected every year. Street lighting is not billed by ZECO; public administrations and State-owned companies typically have not paid for their usage until recently. The resulting loss of income amounted to TSH 1.1 billion (USD 0.7 million) in 2013 (see graph 7).

Graph 7 –ZECO's loss of income due to non-payment of power use
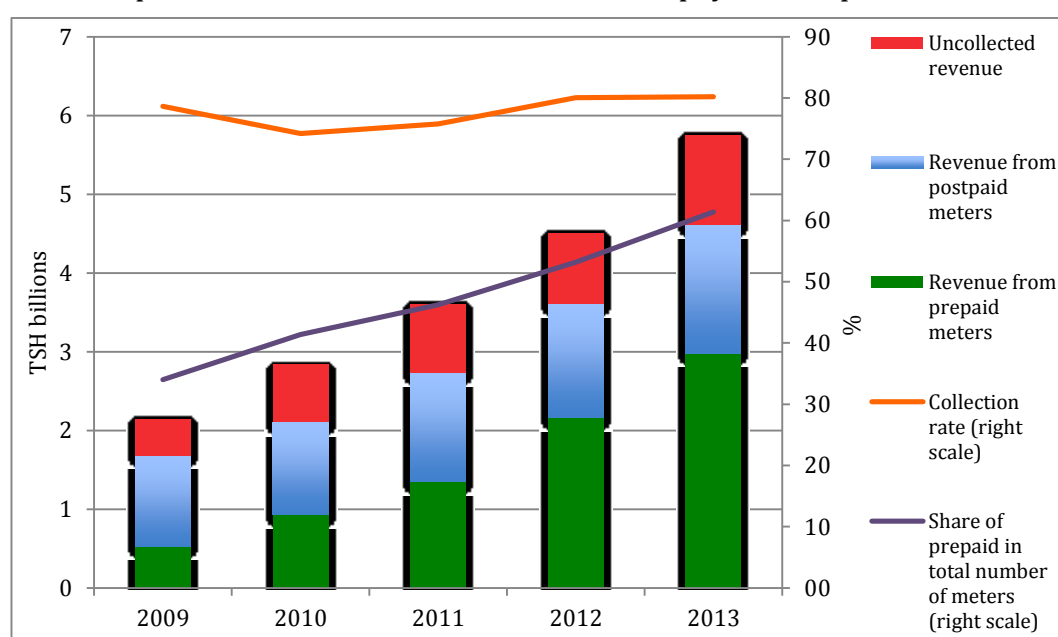
Source: ZECO, ILPI calculations

To date, this state of affairs has not been modified by ZECO's generalised use of prepaid meters. At the end of 2014, 14,600 customers, out of a total of 20,900 in Pemba, had to pay in advance for their consumption, a higher proportion than in Unguja. Prepaid meters have been installed in public administrations, primary schools and police offices. But still, the Zanzibar Water Authority (ZAWA), hospitals and military forces do not pay for their consumption. ZAWA, in particular, is the largest user of electricity on the island, with 15% of total usage. According to the local ZECO office, ZAWA owed ZECO TSH 6 billion (USD 3.6 million) in outstanding arrears at the end of 2014. Nevertheless, ZECO representatives declare that supply to ZAWA cannot be cut because it is a government-owned institution, and that they have no other recourse. In turn, ZAWA representatives declare that the regulated tariffs charged for water supply do not allow it to pay for its electricity bills, and it does not get direct support from the government in this regard.

In summary

Electricity supply through the Tanga-Pemba cable seems adequate and fairly reliable, but the overall supply conditions, including pricing and revenue collection, are not satisfactory. Recent

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[15] Of note, financial capacity is an area of cooperation between ZECO and the Swedish International Development Cooperation Agency (SIDA).

tariff changes have resulted in fairly high prices of electricity for the households, which also face very heavy connection fees. At the same time large customers from the public sector do not pay for their usage and have not been affected by ZECO's increased recourse to prepaid meters. Through ZECO's losses of income, both the utility and private users are *de facto* subsidizing the usage of electricity by public institutions in Pemba. ZECO's financial situation also raises concerns with regard to the longer-term sustainability of power supply on Pemba.

Table 5 – Indicators of electricity supply

Indicators	Baseline year and value	Final year and value	Evaluation
Power production	2009: 20.3 GWh	2013: 33.3 GWh	Positive
Power outage occurrences	Several hours a day on average	Several minutes a day on average	Positive
Minimum grid connection fee	2009: USD 130 (TSH 170 000)	2014: USD 270 (TSH 450 000)	Negative
Financial options for connection	None	Credit for up to 50% of fee	Positive

Electricity retail prices
  - domestic (<50 kWh) or lifeline
  - other non-commercial domestic
  - small industry
  - large industry
	2009:
	USD 0.04 (TSH 50)
	USD 0.04 (TSH 120)
	USD 0.11 (TSH 140)
	USD 0.08 (TSH 105)
		2014:
		USD 0.04 (TSH 66)
		USD 0.13 (TSH 222)
		USD 0.10 (TSH 172)
		USD 0.10 (TSH 160)
			Slightly negative

Electricity production price	2008: USD 0.33 (TSH 430)	2014: USD 0.08 (TSH 139)	Positive
Fuel consumption for generation	2008: 5.9 MM l	0	Positive
Total losses per year	2009: 35%	2013: 24%	Positive but high*

* As explained in the text, the rate of total losses remains abnormally high.

3.2   Road transport conditions and accidents

The five road sections rehabilitated under the project stretch over 44.8 kms in total, and significantly improve road accessibility in southern Pemba. Map 2 below shows that thanks to the roads, very few areas of the southern part of the main island are now more than 4 kilometres away from a paved road.

The roads were inaugurated in 2010 and 2011, and have already shown signs of wear due to problems of surfacing quality, so that patches are visible on some roads. The Zanzibar Roads Fund (ZRF) has planned and budgeted for the maintenance of the road between Matambile and Kangani in 2015. But the foundations of the new roads are deemed strong and the roads are supposed to need minimal maintenance during ten years after the surfacing material has been adjusted. According to ZRF representatives, missions have been sent from neighbouring countries to observes the construction techniques and learn about the stabilization and soil erosion control method, which has proved very efficient. ZRF now applies the same techniques on other Pemban roads.

Although many inhabitants complain about the size of the roads (which were conceived as secondary, narrow arteries from the start),[16] traffic has strongly increased. On all six roads public minibuses (called daladalas) to Chake and to Mkoani are operating at least at hourly frequency. Small shops and businesses have appeared on the sides of the roads.

Similar projects have taken place in other parts of the island, notably 35 kms of new roads financed by the Millenium Challenge Corporation (MCC) and, recently, 35 kms financed by the OPEC Fund for International Development (OFID).

Map 2 – The rehabilitation of rural road and its effects on accessibility
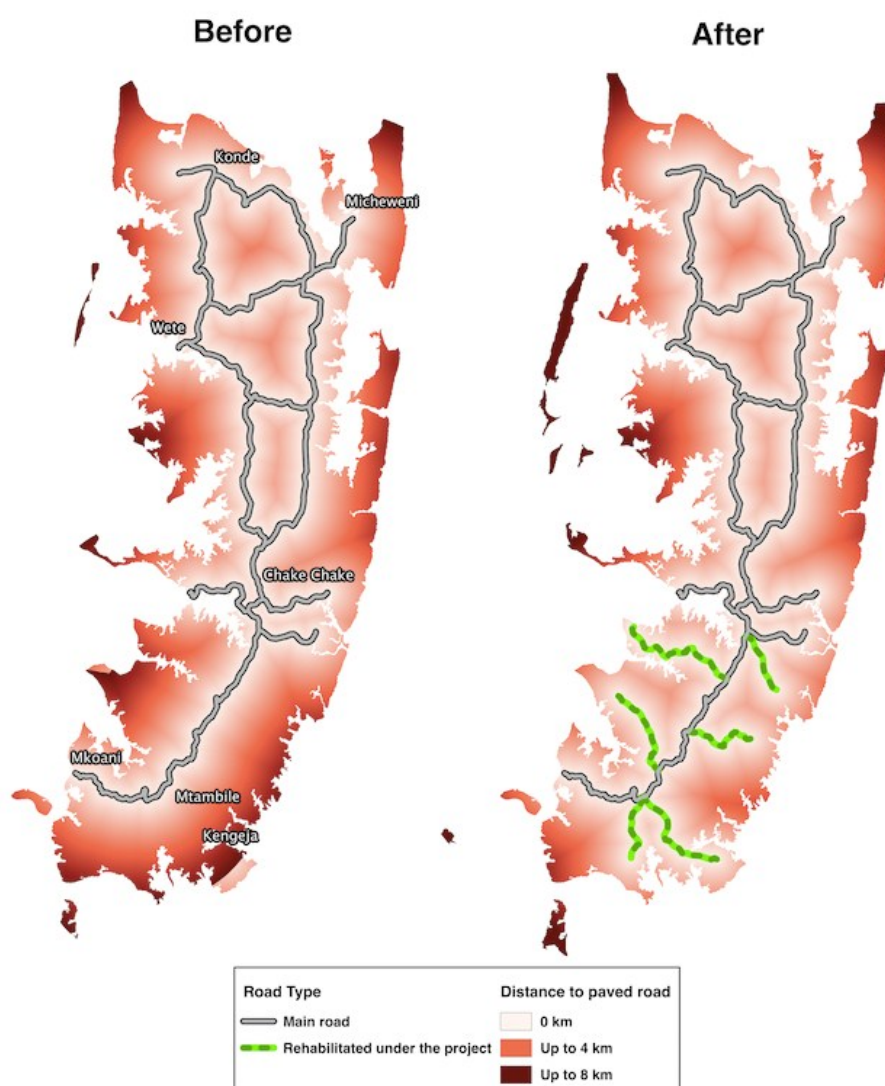
Source: ILPI

As a consequence, mobility on the island has significantly improved. The following graph compares the distribution of responses to the question "how much time does it take you to reach the nearest dispensary?" in the baseline and in the final evaluation surveys. It shows that the share of people who need more than an hour has decreased by 10 percentage points, and that the share of people who need between 10 and 30 minutes has increased by a similar margin.

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[16] Three are 3.5m wide and two 5.5m.

Graph 8 – Time necessary to reach the nearest dispensary
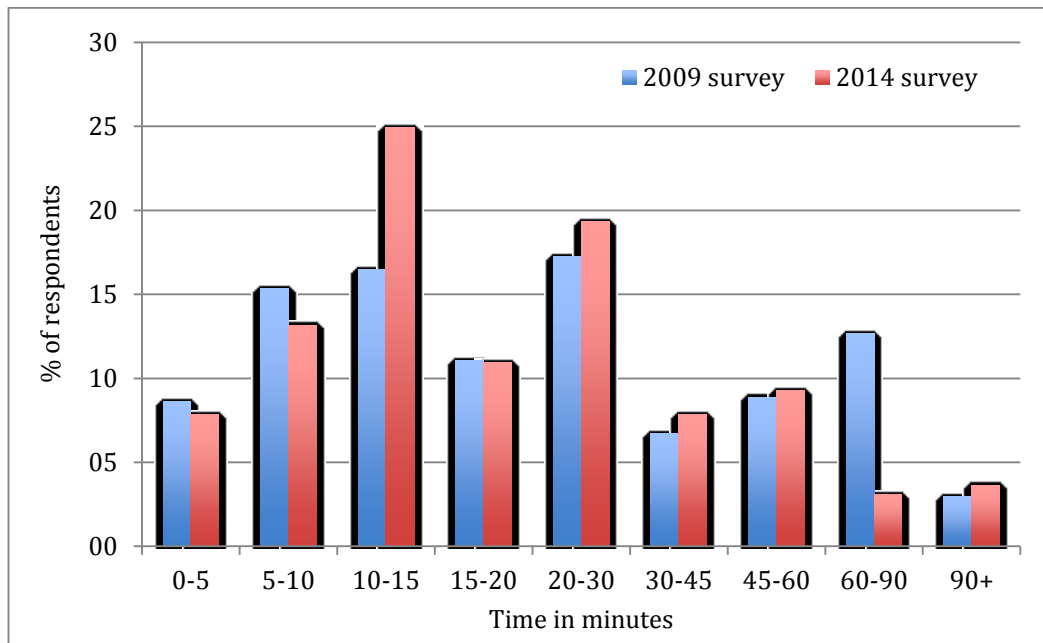
Sources: Baseline and final evaluation surveys

The ZRF receives its maintenance budget from the Road Fund Authority under the Ministry of Finance, to which it is linked through a performance agreement. The 2014/15 budget reaches 2.3 billion TSH (USD 1.4 million) for Pemba (TSH 6.1 billion / USD 3.6 million in total for Zanzibar), in substantial increase compared to 2011/12 (TSH 1.3 billion / USD 830 million for Pemba, TSH 5.5 billion / USD 3.5 million for Zanzibar). However, in 2011/12, the last exercise for which detailed data is available, only about half of the maintenance budget was actually spent.[17]

Picture 1 – The Chanjamjawiri-Tundauwa road

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[17] Zanzibar Road Fund Board, *Annual Report 2011/2012*. It is difficult to have a clear picture of the road maintenance budget as ZRF also receives funding from the RFA in case of emergency needs, and directly from the government for work on the main roads.

A noticeable feature of the new roads is the near absence of pavements, road signalling and speed bumps (see picture 1), which underlines the lack of attention to a negative if unintended outcome of increased mobility of the Pemban road network, namely the rise in traffic accidents. The number of victims of road accidents has increased almost threefold in just four years, in contrast to Unguja where the progression has been moderate (see graph 9). The divergence points towards a cause that is specific to Pemba, and the improvement in the quality of roads is the most obvious candidate.

Graph 9 – Victims of road accidents
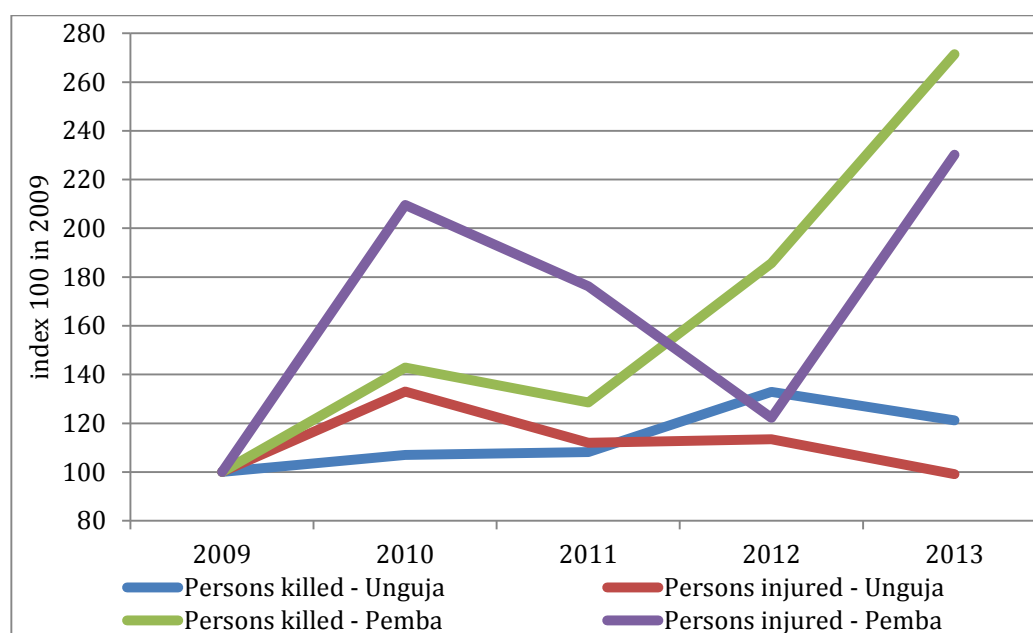
Source: Police headquarters, Zanzibar

In summary

Together with other similar interventions, the road rehabilitation project seems to have been successful in improving the mobility of Pembans, in particular in some of the remote rural areas of the island. It remains to be seen if the ZRF will have the capacity to preserve the quality of the roads as maintenance needs increase with time. Increased mobility on roads has also taken a toll in terms of accident risks.

Table 6 – Indicators of road transport conditions and accidents

Indicators	Baseline year and value	Final year and value	Evaluation
Time necessary to reach the nearest dispensary	2009: 36 minutes on average	2014: 30 minutes on average	Positive
State of project roads and paved roads in general	-	Good	Positive
Prevalent mode of transport to basic facilities	2009: on foot for short trips, daladala for long trips	2014: on foot for short trips, daladala for long trips	Unchanged
Frequency of public transportation on weekdays	2009: Hourly on main roads	2014: Hourly on main roads, in effect not available for children	Negative

		2014: USD 0,9 (TSH 1500) for long trip (Chake-Wete), children half-price	Unclear
Daladala prices for adults and children	-		
Annual % of the maintenance budget spent	2009/10: 89%	2011/12: 53%	Negative
Length of maintained roads per category	2009/10: Routine 351 km Spot improvemt 9 km Periodic 26 km 1 bridge, 3 culverts	2011/12: Routine 181 km Spot improvemt NA Periodic NA 13 culverts, 2 box culverts	Negative
Number of people killed/injured in traffic accidents	2009: 14/63	2013: 38/145	Negative

3.3 Political climate

In 2009, when the electrical cable project started, the connection of Pemba to Tanga had significant importance for the ruling party CCM in a number of ways. First, the connection to the mainland was symbolic in further cementing the Union between the mainland and Zanzibar, and more specifically Pemba – an stronghold of the opposition party CUF that had long advocated for more Zanzibari autonomy in regards to the Union. Second, the literal binding of Pemba to the mainland was significant to the inclusion of Pemba to the United Republic, because of the island's exclusion – whether perceived or real – from developmental programs for historic reasons going back to the 1964 Zanzibar revolution.

Pemban perceptions of inequality in terms of both opportunities and development were important to CCM as the Karume Presidency wound to a close. After the violent events in 2001 following Karume's election, where Pembans fled to neighbouring Kenya, Pemba was a virtual no-go zone for some of the CCM leadership. Both presidents Karume and Kikwete sought to find ways in which to bridge the deep political rifts and to restart the failed "Mwafaka" talks with the opposition. By initiating such a development project and including the opposition in some of the discussions, the undersea cable not only put in place the infrastructure to bring reliable electricity to Pemba, but also reinvigorated the stalled talks between CCM and CUF over broader political issues.

The leadership shown by President Karume, President Kikwete, Minister of Energy Mansour Hamid, and Maalim Seif Shariff Hamad (CUF leader), combined with proactive diplomatic engagement from the Royal Norwegian Embassy, made this infrastructure project also a contributor to the political reconciliation process between CCM and CUF. In early November 2009 an agreement (*Maridhiano* agreement) was reached between President Karume and Maalim Seif over the formation of a Government of National Unity (GNU), which was put up for referendum and adopted by a majority of two-thirds of Zanzibari voters in August 2010.

With CUF in the government and President Shein (CCM) being of Pemban origin, the Revolutionary government of Zanzibar (SMZ) increased its efforts to improve the inclusion of Pemba in development activities. The government's motivations were dual: to capitalize on the new infrastructure for development and, for the CCM component, to gain ground politically in an opposition stronghold. The Maridhiano power-sharing arrangement was successful in bringing

stability, peace and unity to the island - and it has reached its main objective of reconciling former opponents at the grassroots level.

Unfortunately, the political dynamics changed significantly in 2012 with the start of the Tanzanian constitutional review process. Thenceforth, politically motivated violence has been on the rise in the country, particularly in Unguja (see graph 10). So far, however, political peace has persisted on Pemba, which is in itself a positive development given the parallel records of violence in the two islands in the past.

It remains to be seen if current divisions over the constitutional review and the general elections in 2015 will engender similar political tensions in Zanzibar or if the improved political climate of recent years will persist.

In summary

The Tanga-Pemba cable seems to have positively contributed to the process of dialogue between political parties that led to the constitution of the GNU and had a positive impact on the political climate in Zanzibar – and particularly in Pemba. Unfortunately, other factors that are not specific to Zanzibar have since led to a severe deterioration of political conditions, and the future of the GNU and consensual politics in Tanzania appears highly uncertain at the beginning of 2015.

Graph 10 – Political conflict events registered in Tanzania[18]
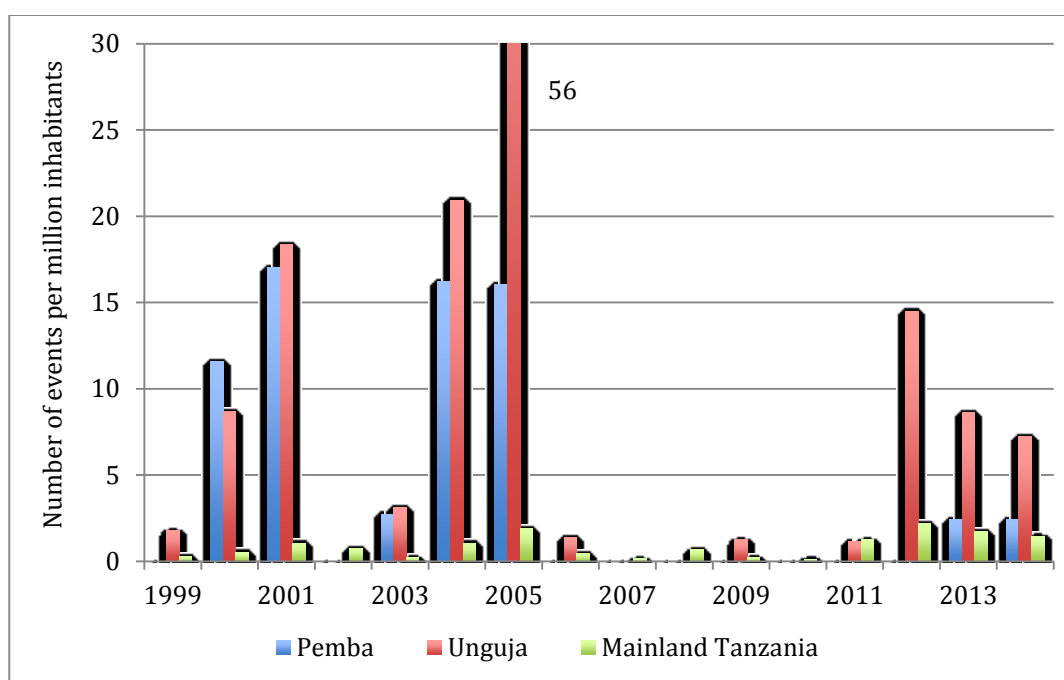
Source: ACLED

It has not been possible to collect data on capital expenditure specific to Pemba in order to check the effect of changes in political conditions on investment. However, the evidence on private sector development (reviewed in section 3.8.) seems to indicate that the availability of capital has remained inadequate in recent years.

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[18] Political violence is understood as the use of force by a group with a political purpose or motivation. The ACLED dataset records all forms of political conflict events within and across states. It defines an event as a single altercation where force is used by one or more groups for a political end, or as a non-violent activity that can potentially be a precursor or critical juncture of a violent conflict (demonstrations, etc.).

Table 7 – Indicators of political climate

Indicators	Baseline year and value	Final year and value	Evaluation
Number of political conflict events	2005-09: 6	2010-14: 2	Positive
Share of persons of Pemban origin in the Zanzibar government cabinet	2005-09: 7%	2010-14: 23%	Positive

3.4 Household power use

In parallel to the growth in power supply, the number of connections has steadily increased on the island since 2009 (see table 8). Although this is a positive development, the rate of connection is still low: a little less than 30% of households are presently connected to the grid, and their share is significantly lower in rural areas. Furthermore, the number of new connections appears limited when compared to Unguja. Far from receding, the gap between the two islands in terms of actual access to electricity has even increased since 2009.

Table 8 – Connections to the electrical grid in Pemba*

	2009	2010	2011	2012	2013	2014
New connections	2,252	1,275	642	1,183	2,048	2,665
Total connections	14,866	15,941	17,492	18,916	20,964	23,451
Connection rate	20.6	21.8	23.5	25.0	26.2	29.1

* The total number of connections is usually not equal to the sum of the previous year's total connections and the current year's new connections. It is also larger than the number of meters (20,910 at the end of 2014), which indicates an average waiting time of about 1 year to obtain a meter. The connection rate is the share of households that are connected to the grid. Our estimate includes connections of businesses and public bodies, and therefore overstates the actual rate. The annual number of households is estimated based on the population and average size of households in Pemba in 2002 and 2012.
    Sources: ZECO, National Bureau of Statistics of Tanzania, ILPI calculations

As previously stated, the most prominent cause of the narrowness of ZECO's customer base in Pemba seems to be the cost of connection to the grid. In our survey, 60% of the people who are not connected to the grid declared that the reason was that the connection was too expensive.[19] In rural areas, where distances between houses are typically larger than in towns, connection costs frequently reach TSH 1.5 million (USD 900), an amount that exceeds the average annual income of a Pemban (the GDP per capita in the whole of Zanzibar reached TSH 1.1 million / USD 700 in 2013). The access to electricity is thus in itself a considerable investment.

For those who can afford the connection cost, the increases in ZECO's tariffs in 2012 and 2013 are certainly discouraging consumption, in particular by inducing strong threshold effects as the price shifts from one tariff category to the next. Once corrected for inflation, the relative price of electricity has increased by 66% between 2011 and 2014 when measured by the average cost of a kWh, and by 365% for the 1st kWh in non-lifeline non-commercial uses (see graph 11). It needs to be emphasised that the latter category represented 75% of household consumption of electricity in 2012, so that the choice to align its tariff on commercial – rather than lifeline – was in itself responsible for most of the increase in the average price of electricity.

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[19] This is far from being specific to Pemba, as explained in the World Bank study on rural electrification: "In most countries, (...) the connection charge is a hurdle that prevents the poor from connecting to the grid, even though the benefits they would derive—and so their willingness to pay —would exceed the cost of supply." (World Bank, 2008, op. cit. p. xv)

Graph 11 – Relative prices of electricity

tariffs corrected for inflation, 2014 TSH

Legend:
- First kWh, lifeline
- First kWh, other domestic
- Average rate, prepaid meters
- First kWh, domestic commercial
- Average rate, post-paid meters
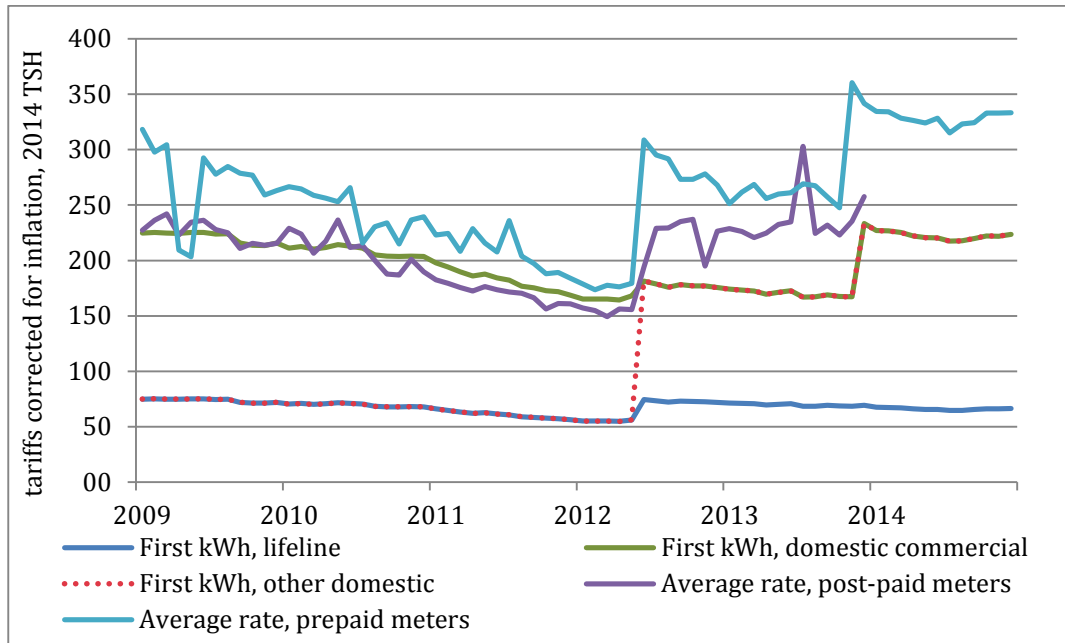
Sources: ZECO and Office of Chief Government Statistician, Zanzibar

Such an increase in prices could only lead to a reduction in demand: the average electricity usage of a Pemban household equipped with a postpaid meter decreased by 25% between May and June 2012, when the tariff change occurred, and has not recovered it previous levels since (see graph 12). Data on household consumption in 2014 were not available at the time of the writing of this report, but data for all categories of customers equipped with prepaid meters shows that the price increase of November 2013 has had a similar effect: average use decreased by 40% between October and November 2013 and remained low throughout 2014 compared to 2013.

Graph 12 – Average use of electricity by meter

kWh per meter per month

tariff changes

Legend:
- Postpaid meters - Households
- Prepaid meters - All customers
- Moving average (3 months)
- Moving average (3 months)
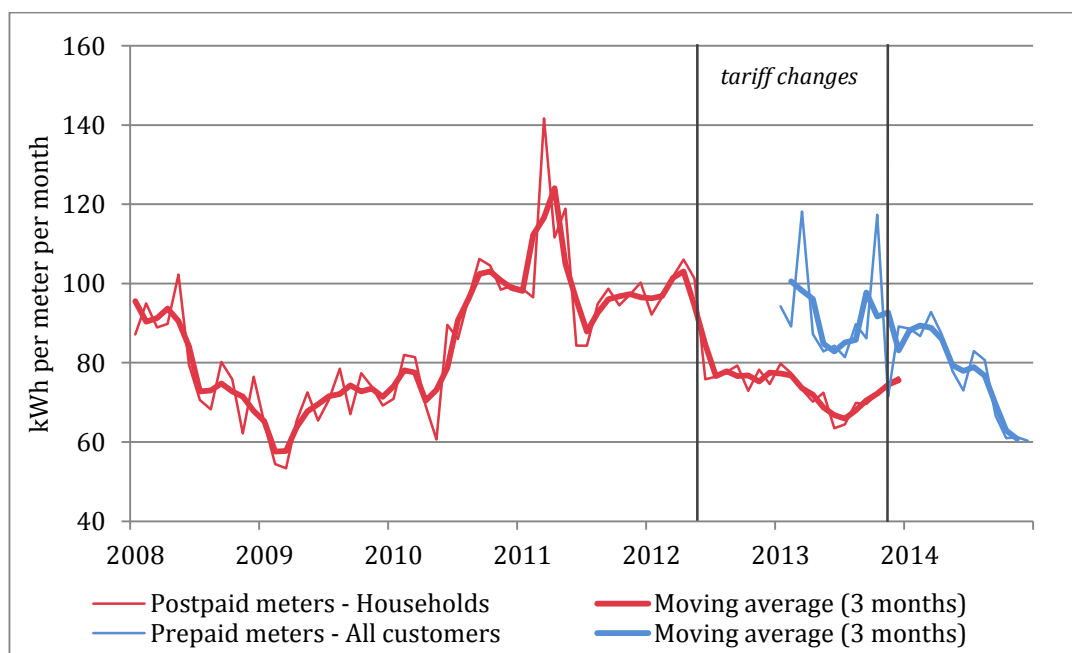
Sources: ZECO and Office of Chief Government Statistician, Zanzibar

All in all, the average consumption of a household equipped with a postpaid meter decreased by 17% between 2011 and 2013 at the same time as its electricity bill increased by 27%.

With the strong increase in the price of electricity beyond lifeline uses and in the absence of strong initiatives on the productive use of electricity, demand has been orientated towards light items, such as lighting and television, away from household appliances and equipment that could save time or be used as a means of income generation. In our survey, electricity from the grid is the main source of energy for lighting for 41% of respondents, but only 4% use it as their main source for cooking. We also noted that usage of fridges and freezers remains very limited. This, in turn, limits the longer-term economic impact of electricity consumption. On a per capita basis, imported power is still only a fraction of its level in Unguja (2.7 GWh per month on average in Jan-Sept 2013 in Pemba against 25 GWh in Unguja, while the population ratio is close to 1:2.5).

In summary

Access to electricity has already modified living conditions for many Pemban households, and opened new opportunities for women. These positive impacts are, however, proportional to the rate of penetration of electrical power in Pemban homes, which remains low and has dramatically fallen in the past two years in terms of average volumes used, in response to ZECO's pricing policy choices.

Table 9 – Indicators of household power use

Indicators	Baseline year and value	Final year and value	Evaluation
Source of energy for cooking	2009: Firewood 80% Charcoal 18% Electricity 1%	2014: Firewood 48% Charcoal 47% Electricity 4%	No significant change
Source of energy for lighting	2014: Paraffin 66% Electricity 34%	2014: Paraffin 53% Electricity 41%	Positive
Average household power use in volume and in value (postpaid meters)*	2009: 812 kWh / USD 76 (TSH 99 thousand)	2013: 864 kWh / USD 103 (TSH 160 thousand)	Negative

 * Breakdown of use by user category was not available for prepaid meters.

3.5   Water supply and use

Access to safe drinking water has for a long time been a crucial public health challenges in Zanzibar, both in Unguja and Pemba, but the situation has improved thanks to the reliable provision of electricity. According to the 2012 census, the vast majority of Pembans had access to protected sources of water, principally piped water in their dwellings (22%) or their land plots (13%), or public tap (37%). The number of houses connected to the ZAWA water system gradually approaches 40,000, out of a total of 76,000 households (see graph 13).

Still, 24% of people in Northern Pemba and 16% in Southern Pemba had unprotected wells as their main source of drinking water in 2012, and these averages masked wide disparities between towns and rural areas, where the use of open wells is much more widespread.

The introduction of electricity has brought positive health effects in terms of providing cleaner water and reducing women's physical burden, as also found in rural Unguja.[20] One of the villages visited in this assessment was connected neither to the electrical grid, nor to proper roads. Its access to clean water was also worse than other villages. The village had frequent cholera outbreaks during rainy seasons. Findings from Unguja show that improved water supplies in general have reduced the incidents of diarrhoea in rural areas. As water has become accessible within houses, people – typically women – have also saved time in one of their traditional tasks, which has been to fetch water.

Graph 13 – Number of ZAWA customers
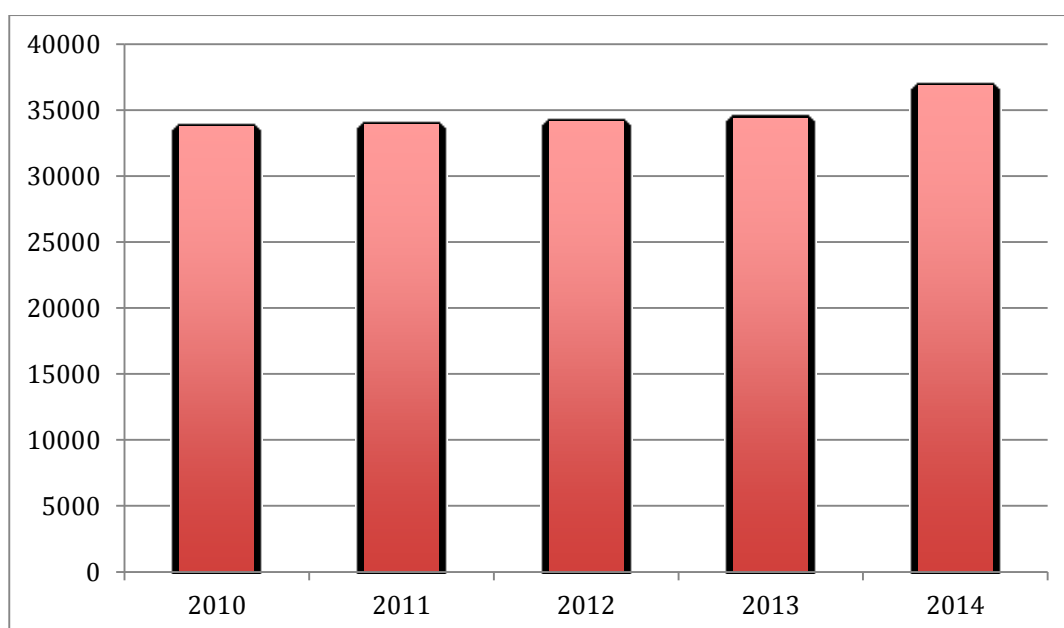
Source: ZAWA

However, one of the important findings of our field visits was the unreliability of piped water, which is only available two or three days a week in many locations, and even only a few hours a week in some. In all of the villages we visited, water was actually provided less than half of the time. The situation was particularly difficult in urban areas where rates of connection to ZAWA water distribution are high, especially in hilly regions. As the following table shows, water supply has not been able to match the increase in demand, and is largely inadequate.

Table 10 – Supply and demand of distributed water (2013)

	Volume of distributed water (in millions of m³)	Estimated demand for distributed water (in millions of m³)	Supply deficit (in %)
Unguja	24.5	37.6	34.8
Pemba	12.2	16.4	25.6

Source: ZAWA

In some villages, in addition, people seemed suspicious about the quality of tap water and declared they did not use it for drinking or cooking. In Tumbenikani, inhabitants explained that

[20] Winther (2011), op. cit.

the location chosen by ZAWA to dig a well for tap water was bad, and that the quality of water on the traditional (unprotected) wells was much better. This might be related to ZAWA's recent effort to increase the number of wells (see table 11). According to the ZAWA representatives on the island, however, the only problem is a high content of iron that can colour the water in some locations, with no adverse health effects. They assure that ZAWA's water systematically fulfils Tanzanian sanitary standards, even though it cannot reach WHO standards because the process of aeration needed to remove iron is too costly.

Table 11 – Number of new boreholes drilled

	2009	2010	2011	2012	2013
Pemba	3	2	0	3	25
Unguja	6	4	9	10	47

Source: ZAWA

The management of ZAWA considers that the supply deficit does not result from a lack of quantity or quality of water, but rather from insufficient distribution capacities – in terms of both water pumping and storage. With the support of the African Development Bank (AfDB), it has invested in new storage facilities. In Chake Chake, the storage capacity is being extended from 500,000 to 3 million litres (see picture 2). In Vitongoji, a tower of 300,000 litres has been built for the rural area.

Picture 2 – ZAWA's new water storage project in Chake Chake

In summary

Better supply of electricity has improved the access of Pembans to clean water – admittedly more so in towns than in rural areas. The gains have been slow to materialise, essentially because of ZAWA's inadequate capacity for water pumping and storage. Recently, the utility has made investments to address the problem with the help of the AfDB, and this is leading to a substantial increase in storage capacity. It would be desirable to monitor the development of water supply in a more proactive manner in the future.

Table 12 – Indicators of water supply and use

Indicators	Baseline year and value	Final year and value	Evaluation
% of people having access to piped water	2002: 40%	2012: 74%	Positive
Ratio between supply and estimated demand	-	2013: 74%	Negative
Water shortages	-	Several days per week on average	Negative
Number of new boreholes drilled	2009-10: 5	2012-13: 28	Positive
Investment in pumping and storage facilities	-	Major expansion projects	Positive
Number of customers of water supplied in pumped schemes	2010: 33,780	2014: 36,890	Positive

3.6 Health services and outcomes

Health services have been and remain inadequate in Pemba when compared to Unguja. The number of dispensaries has substantially decreased since 2009 (see table 13), and while in the 2009 baseline survey, 83% of respondents declared they went to the dispensary on foot, the proportion has fallen to 65% in our survey. Admittedly, the reduction in the number of health facilities does not in itself imply a worsening in the quality of service, in particular if resources are better used.

The health centres visited during our fieldwork have been improved thanks to electrification. Although only two of the five villages visited (Tumbenikani and Chachani) had health care centres, both of these had been electrified recently (as one of the very few electrified public buildings or services). The electrified health centres were equipped with refrigerators for storing medicine and light that provided better conditions for examining patients.

The most significant improvement in health care was however due to the road project. New and proper roads that connect the villages to the nearby hospitals were looked upon as a major positive impact in people's health, in particular for pregnant women. Previously, when the villages were not connected to proper roads, women were often unable to reach the hospitals and proper medical treatment. Others had to go to the hospital by "ox transport" on bumpy roads.

The villagers also highlighted the importance of electrification of the hospitals. Before the sea cable, when hospitals were equipped with generators, patients had to pay for the fuel, in particular when giving birth. Nowadays, women perceive giving birth as less risky thanks to increased light, and also as less expensive. They declare that their health during pregnancy and childbirth has improved.

Table 13 – Number of public health facilities

Number of facilities	Public - primary			Public - secondary	Public - tertiary		Private	
	PHCU	PHCU+	PHCC	District hosp.	Special	Referral	Hospital	Dispensary
Unguja								
2008	71	17	2	0	2	1	3	54
2009	42	13	2	0	2	1	3	54
2010	54	22	2	1	2	1	3	53
2011	69	23	2	0	2	1	3	44
2012	69	23	2	0	2	1	3	44
2013	58	21	2	0	2	1	4	62
Pemba								
2008	45	9	2	3	0	1	0	10
2009	55	18	1	3	0	0	0	10
2010	44	13	1	2	0	0	0	9
2011	45	10	2	3	0	0	0	9
2012	45	11	2	3	0	0	0	9
2013	47	10	2	3	0	1	0	8

Source: Ministry of Health

In support of these observations, statistics from the Ministry of Health show that the number of in-patients in public hospitals in Pemba has significantly increased since 2008, even though the number of facilities was stagnating (see graph 14).

Graph 14 – Number of in-patients in public hospitals
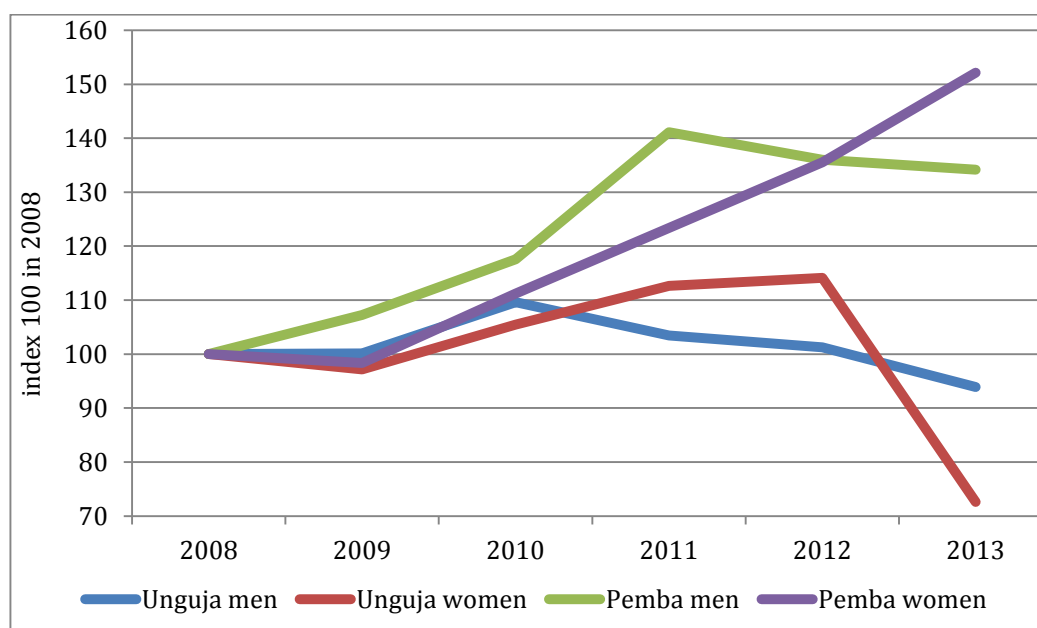
Source: Ministry of Health

This development can be contrasted with the situation in Unguja, where admissions in public hospitals have first increased more slowly, and then fallen. The fact that women in particular have been admitted much more frequently (+52%) in Pemban hospitals seems to validate the hypothesis according to which better transport conditions have improved access to health facilities.

At the same time, death rates among in-patients in public hospitals have strongly decreased for men, and moderately increased for women (see graph 15). Death rates have evolved in parallel in Pemban and Ungujan hospitals, but while they are lower in Pemba, the differences have tended to widen for both sexes.

Graph 15 – Death rates among public hospital in-patients
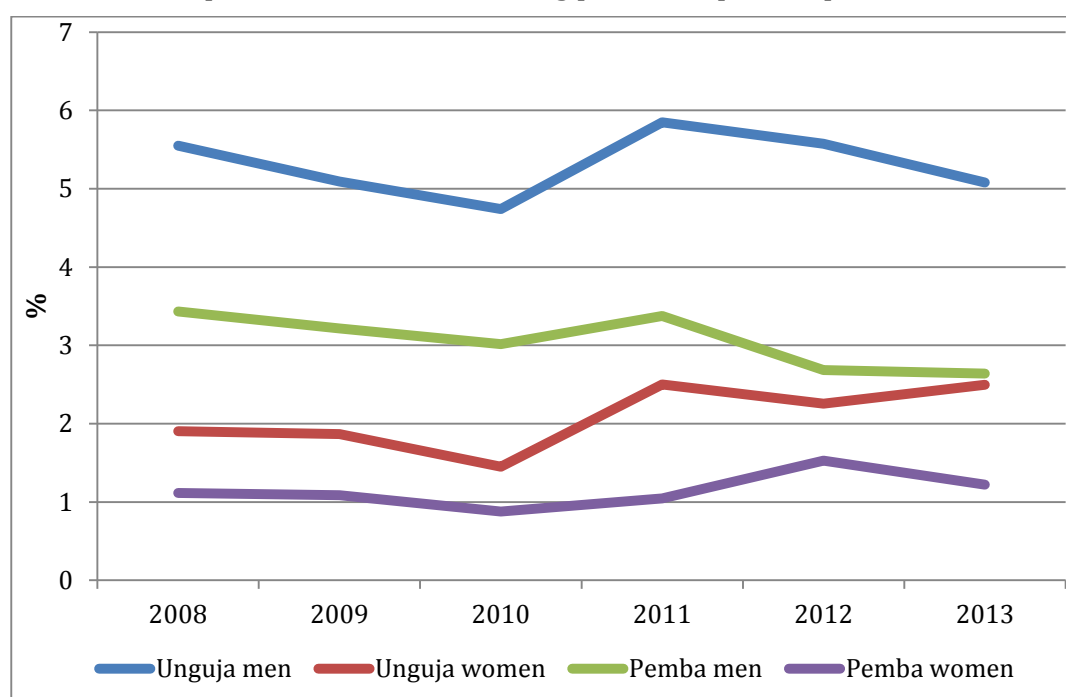
Source: Ministry of Health

This improvement relative to Unguja seems to indicate either that Pembans access hospitals earlier, improving their chances of survival, or that Pemban hospitals have improved the quality of their medical services (at least in relative terms). Either of these developments could again be at least partly attributed to better transport and electricity infrastructures.

In summary

Improvements in electricity supply and road transport have had a sizeable effect on the access to health facilities, and possibly also on the quality and affordability of health services. This has resulted in better health outcomes for Pemban women and men.

Table 14 – Indicators of health facilities and outcomes

Indicators	Baseline year and value	Final year and value	Evaluation
Share of electrified health facilities	-	2014: Apparently high even in rural areas	Positive

Number of public health facilities	2009: 77	2014: 63	Not conclusive
Death rates among public hospital in-patients	2009: women 1,1% men 3,2%	2014: women 1,2% men 2,6%	Positive relative to Unguja
Number of in-patients in public hospitals	2009: 18784	2013: 27335	Positive

3.7   Schools and educational outcomes

Children's rates of school enrolment are high in Pemba, typically close to or even above 100% of the normal age group for lower classes. The number of pupils has increased fast in recent years, in stark contrast with the stagnation observed in Unguja (see table 15).

Table 15 – Number of pupils admitted in Standard 1 in public schools

	2009	2010	2011	2012	2013
Unguja	20 571	20 133	18 877	20 554	21 660
Pemba	10 899	12 850	12 269	13 591	14 043

Source: Ministry of Education and Vocational Training

Among the villages that we visited, 3 out of 5 had their own school, one of which had even been financed and built by the villagers themselves. All of the schools had installed electricity and this seemed to have a positive impact on the access to education, as well as on actual attendance at school. Lights enable school classes also after sunset. Some of the villages, with dense population, had therefore increased school classes by introducing night classes after the introduction of lights. Night classes are common prior to important exams. Other villages had also created night classes for illiterate adults.

Such observations tend to indicate that electricity is in part responsible for higher school admissions. The evidence is much less compelling for roads.

Children in general do not seem to directly benefit from new roads. The "daladala" minibuses, which are the only public means of transportation, often refuse to take them as passengers, because children pay half price and thus decrease the bus' potential income. As a consequence, many children have to walk long distances to schools and in their cases, new roads, with higher and faster traffic, often make the trip more dangerous.

Some parents tend to keep their youngest children at home, instead of sending them to school. In one village, a mother explained to us: "We are afraid for the children, because the drivers drive very fast. We tell the children to not go to the road". Her husband continued: " We have also tried to talk with the communication network officer in order to build a speed bump, but it has not yet happened. They have not yet responded to our request, although we asked in 2010".

The improvement in school attendance at young ages is still too recent to have a measurable impact on general illiteracy statistics. In that area, Pemba has experienced strong improvements in recent years, particularly among women (see table 16). Still, literacy rates remain largely below the levels observed in Unguja.

Table 16 – Adult literacy rates (in %)

	2002			2012		
	Men	Women	Total	Men	Women	Total
Mainland Tanzania	77,5	62,1	69,4	83,2	73,1	77,9
Zanzibar	78,6	64,4	71,1	88,3	80,7	84,2
Kaskazini Unguja	66,2	48,2	56,6	84,2	75,5	79,7
Kusini Unguja	83,7	71,8	77,7	92,2	85,1	88,5
Mijini Magharibi	90,7	81,1	85,7	95,6	90,9	93,1
Kaskazini Pemba	62,8	43,0	52,2	74,6	61,6	67,6
Kusini Pemba	66,9	53,4	59,6	79,5	68,1	73,3

Source: National Bureau of Statistics of Tanzania, *Literacy and education monograph*, 2014.

In summary

While electricity seems to have contributed to higher school enrolment and attendance, the evidence is more mixed regarding the effects of road improvement. In the absence of appropriate means of transport, children have not benefitted from new roads, while some have been affected by the associated hazards. All in all, educational outcomes have gradually improved in Pemba, but the specific impact of the projects might take longer to materialise in general statistics.

Table 17 – Indicators of schools and educational outcomes

Indicators	Baseline year and value	Final year and value	Evaluation
Share of electrified schools	-	2014: Apparently high even in rural areas	Positive
Number of pupils admitted in standard 1 in public schools	2009: 10899	2014: 14043	Positive relative to Unguja
Prevalent mode of transport to school	-	2014: on foot	Unchanged
Adult literacy rates	2002: Male 65%, Female 49%	2012: Male 77%, Female 65%	Positive

3.8   Gender conditions

Pemba is a gender-segregated society. Women and men live separate lives and the segregation is occupationally, spatially and socially reflected. Men have, by culture, structure and tradition, always participated in the formal economic sector and have thus had the role of income generators and business owners. Women, by contrast, perform jobs that are time consuming, unpaid and related to the household. In addition to their work in the fields, they are responsible for childcare, preparing food, fetching water and collecting firewood.[21] Several studies have also highlighted the differences between Zanzibari men and women concerning spare time. For

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[21] Olsen, E. F. (2014), 'Women in politics. A case study on women's engagement in the reconciliation and constitution review processes in Zanzibar', ILPI report for the Norwegian Embassy in Tanzania.

instance, it has been observed that men in Zanzibar spent almost two hours socializing each day, compared to barely more than one hour for women.[22]

Electricity has the potential to change this situation – and has already done so to some extent. Electrical appliances and improved access to water have increased women's spare time, which in turn is spent on entrepreneurial activities. Women's position as entrepreneurs is quite new and can be directly related to access to electricity. A woman who participates in a cooperative in Mjibini, southern Pemba, told us during the field visit: "Previously, before electricity, we had to walk several kilometres daily to fetch water. Now that the water situation has improved, we have freed time for other activities".

Picture 3 – A Pemban entrepreneur

However, the potential of electricity to modify household living conditions and correct gender imbalances is still largely untapped in Pemba. For instance, the gains in time to collect water since 2009 do not seem substantial according to our survey, which might reflect the consequences of piped water shortages (see graph 16).

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[22] Winther (2011), op. cit.

Graph 16 – Time necessary to collect water
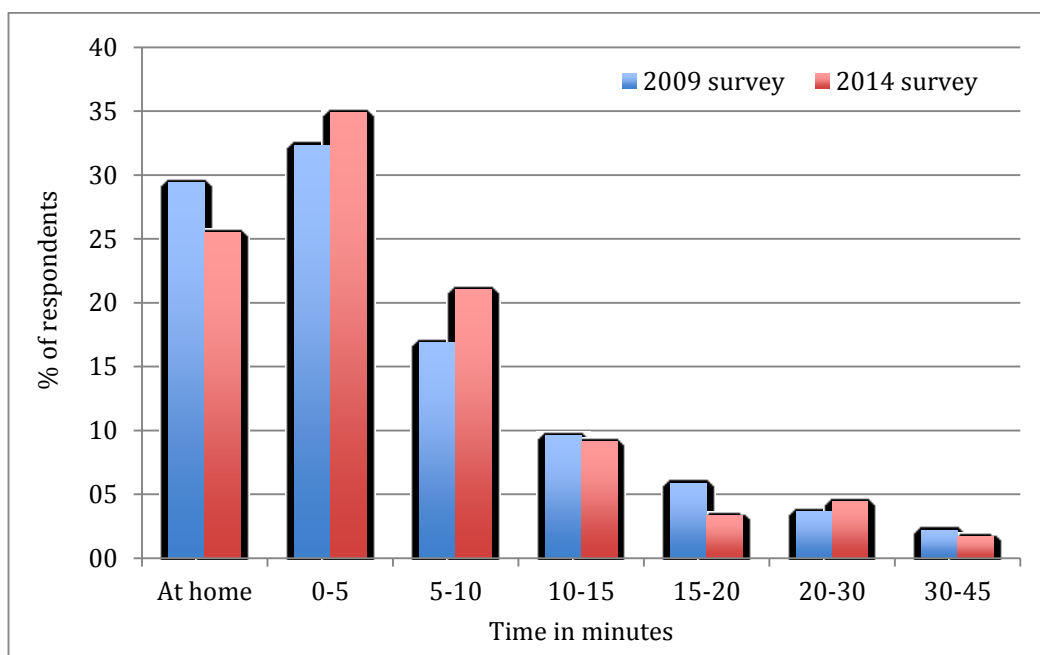
Sources: Baseline and final evaluation surveys

Time spent at collecting firewood has even seriously increased, probably as a consequence of a depletion of environmental resources jointly with the low use of electricity for cooking (see graph 17).

Graph 17 – Time necessary to collect firewood (% of respondents, time in min)
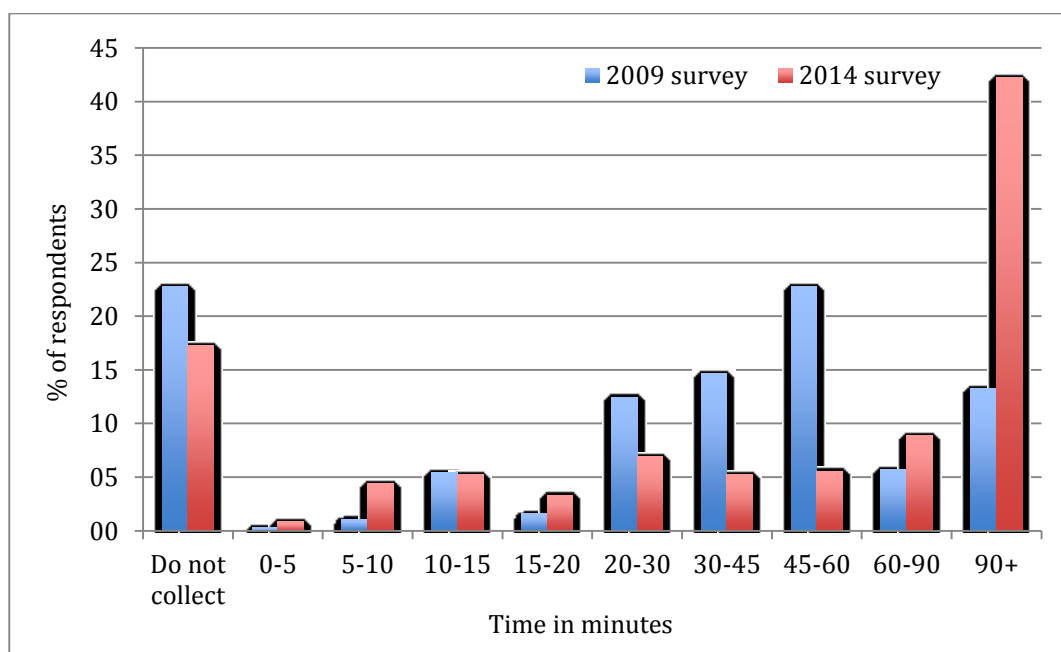
Sources: Baseline and final evaluation surveys

Inadequate public lightning is also particularly detrimental for gender equality. Both women and men claim that women fear darkness, because the fear of theft and spirits arises after sunset. In addition, women are not supposed to walk alone in public areas, and in particular not after darkness. Better public lightning would then improve women's mobility and freedom. However,

public lightning is at present only available in towns and on main roads, and has not reached any of the villages we visited. On the contrary, in the village of Msingini, inhabitants complained that previously enjoyed public lightning now had disappeared.

In summary

Gender relations and the role of women in daily life have started to shift as a consequence of increased use of electricity, but these changes are still limited since many of the traditional constraints on the activity of women remain unaffected.

Table 18 – Indicators of gender conditions

Indicators	Baseline year and value	Final year and value	Evaluation
Time to collect firewood	2009: 46 minutes on average	2014: 68 minutes on average	No change attributable to projects
Time to collect drinking water	2009: 8,5 minutes on average	2014: 8,0 minutes on average	No significant change

3.9 Business opportunities

The number of businesses connected to the electrical grid gives an indication of the impact of the cable project on private sector development. After falling to a very low point in 2009, the number of businesses having a postpaid meter has increased threefold since (see graph 18).

Graph 18 – Number of businesses billed for electricity (postpaid meters)
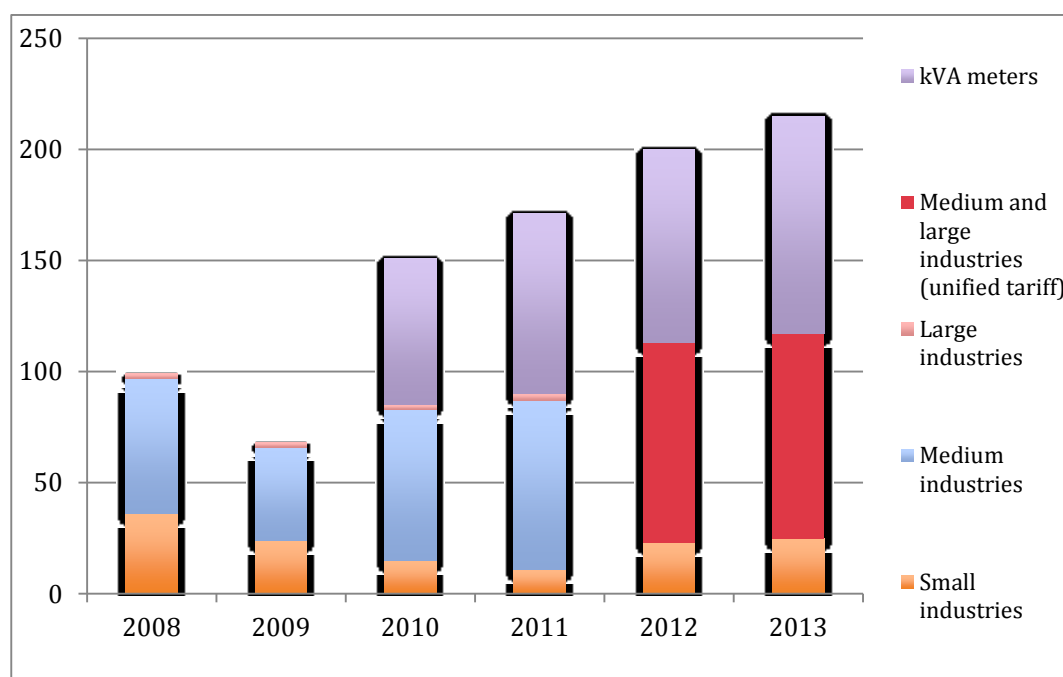
Source: ZECO

At the same time, as shown in graphs 19 and 20, the power use of businesses (particularly smaller businesses) has increased both in value and in volume. The contrast with the reduction in households' consumption in volume can be due to a host of factors (as reflected in the model of the theory of change), among which the evolution in electricity prices is noticeable: by contrast to

domestic use tariffs, electricity rates for businesses have remained roughly constant in real terms (i.e. once corrected for inflation) in recent years.

Graph 19 – Average power consumption by small industries (postpaid meters)*
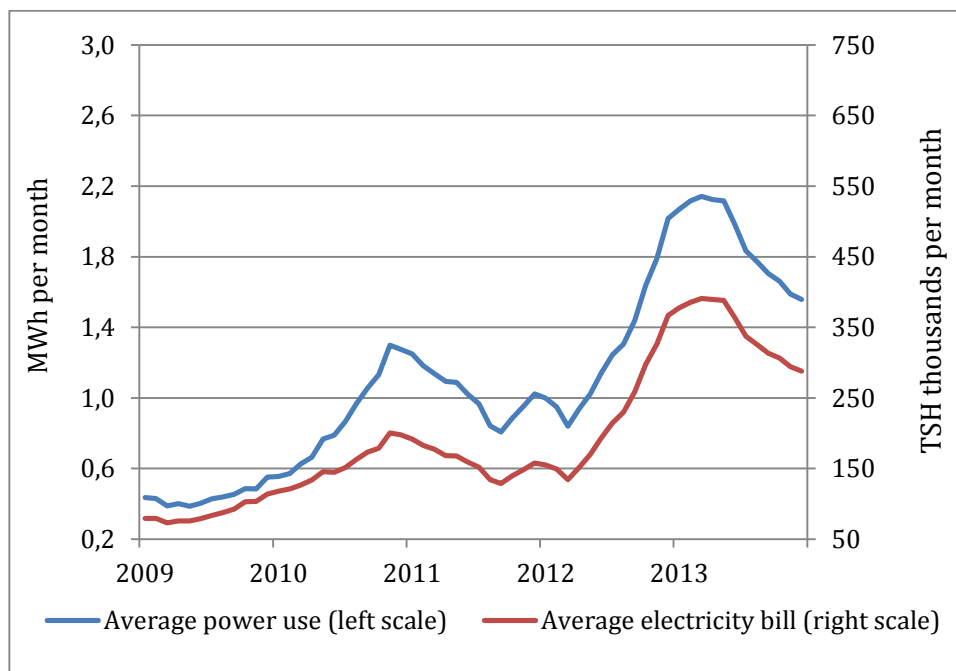
* Both series are in moving average over nine months in order to smooth short-term fluctuations that can be caused by reporting errors.
Source: ZECO

Graph 20 – Average power consumption by medium and large industries (postpaid meters)*
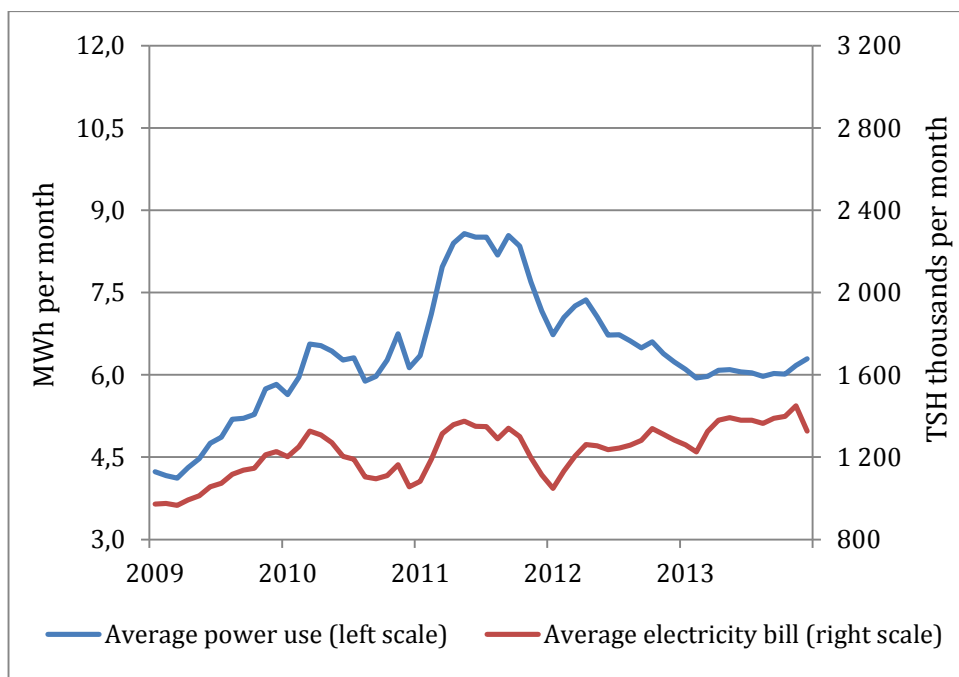
* Both series are in moving average over nine months in order to smooth short-term fluctuations that can be caused by reporting errors.
Source: ZECO

The increase in demand from businesses can be partly due to an external cause: in 2011, as part of the Maridhiano agreement, the GNU tripled the price offered to Pemban farmers for cloves, which substantially improved their financial situation and their investment capacity. But the magnitude and the persistence of the growth in demand points towards causes that are directly related to the projects: first, the access of existing businesses to electricity, presumably with positive effects on their productivity and profitability; second, the emergence of new activities intrinsically related to electrical power, which broadens the range of goods and services produced and consumed on the island and creates new sources of income generation.

The difference between the two latter alternatives often seems to coincide with that between men and women. As stated earlier, apart from a few cooperatives, existing businesses visited during the evaluation mission were almost exclusively owned and run by men. Men have thus prioritized the improvement of their previous businesses, such as carpentries and shops. Many seem to have invested in fridges and freezers to store fresh products like fish, vegetables and fruits. By contrast, electricity has freed up women from some of their traditional activities and opened new opportunities to their initiatives. Their innovate businesses consist mainly of production of juice, frozen juice, ice cubes and ice creams. These businesses often remain within the informal sector, as their products are mainly sold to friends, family and neighbours.

In summary

As measured by the number of companies buying electricity, the volume of power that they use and the amount that they pay for it, the projects have triggered deep transformations in the supply side of the Pemban economy.

Table 19 – Indicators of business opportunities

Indicators	Baseline year and value	Final year and value	Evaluation
Number of businesses billed for electricity	2009: 68	2014: 117[23]	Positive
Average power use by small businesses in volume and in value (postpaid meters)	2009: 4.7 MWh / USD 727 (TSH 0.9 MM)	2013: 23.1 MWh / USD 2,739 (TSH 4.2 MM)	Positive

3.10 Private sector development

Agriculture

Zanzibar's agriculture sector is traditionally dominated by small-scale subsistence farming, with low productivity of land, labour and other inputs. Agriculture and fishing are the main economic activity for men in rural Pemba, in particular clove production. For women, seaweed farming is the most important income-generating activity. Clove trees are owned by individual households and are sold at a fixed price set by the government monopoly, which is also by law the exporter and final benefiter from the sale of the cloves. Seaweed farming however is a completely liberalized part of the private sector, and trading is dominated by non-Pemban owned companies. The seaweed is exported internationally and is nowadays becoming the island's second most important product. Fish are mainly sold on village markets, however more wealthy villages seem to be able to sell their fish directly on the fish markets in the towns.

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[23] Not including businesses owning a kVA meter (in total, 98 kVA were installed on the island at the end of 2013).

Subsistence farming is important in order to secure the necessary levels of nutrition. Surplus production, if any, is often used for sale and income generation within the village. Some female cooperatives in the agricultural sector also manage to sell their products at a larger scale, by reaching the urban markets in Pemba.

To date, agriculture (including fishing) is one of the economic sectors that have been most impacted by the projects. Villagers told us that before the stabilisation in power supply, they had to sell their products within 24 hours after harvest. This was risky business; in particular in villages without proper roads, as a sudden rain could cut the access to the markets and severely affect the potential income from the harvest. With the possibility to invest in fridges and freezers, it has become easier to prevent such losses. Electricity has thus – among those who can afford it – both increased incomes and decreased risk related to their primary activities.

New roads have also enabled businesses from town or abroad to bring trucks and vehicles to collect seaweed, fish and other agricultural products from the villages and bring them in large quantities to the urban markets or ports. The seaweed and fish are mostly bought from local cooperatives and fishermen, while agricultural products seem to be cultivated by the businesses themselves, on borrowed land next to the villages. The villagers we met perceive themselves as the weak side in the bargain with outside businesses, and claim that although the businesses represent an attractive opportunity, they also tend to push down the prices of the commodities and to deteriorate working conditions.

Data on agricultural production shows large increases in recent years for the most important products for Pemba (see table 20). The recent hike in the production of cloves might be partly circumstantial and partly related to the government's specific actions that we already mentioned. The development seems more significant for sea products. Fish production, in particular, has increased substantially and faster than in Unguja, particularly in the Northern districts. This indicates that a factor specific to Pemba must be at work, and both electricity and roads are likely candidates for the reasons exposed above.

Table 20 – Annual output in selected agricultural products (in tons)

Product	Area	2009	2010	2011	2012	2013
Cloves	Zanzibar	3,536	2,129	3,743	1,755	5,733
Clove stems	Zanzibar	445	280	468	328	493
Seaweed	Zanzibar	10,248	11,937	13,193	15,087	11,044
Fish catches	Unguja total	16,466	16,652	18,960	19,212	19,445
	Pemba total	8,931	9,041	9,799	10,199	11,267
	Wete	2,169	1,973	2,467	2,302	2,807
	Micheweni	1,969	2,201	22	2,619	2,754
	Chakechake	1,372	1,489	1,681	1,806	2,016
	Mkoani	3,421	3,378	3,451	3,471	3,690

Sources: Ministry of Agriculture and Natural Resources, Ministry of Livestock and Fisheries

Commerce

New businesses are still at a low scale and the variety of products that they provide is rather limited, but exceptions exist (see picture 4). In cases where they remain confined within the

village, the markets for their products are exceedingly small. In this regard, the effects of electrification and road rehabilitation exhibit interesting synergies: roads expand the market for businesses created thanks to electricity; by contrast, in villages that are still isolated because of bad roads, new businesses do not seem to have significant prospects of development.

Picture 4 – A satellite-TV cinema in the village of Msingini

The Zanzibar Strategy for Growth and Reduction of Poverty summarizes the obstacles to efficiency of private businesses in the case of seaweed farming – but the same arguments apply to other sectors:

> "Nevertheless the development of seaweed farming and its contribution to the livelihoods of those who engage in it could be effectively sustained through improving the quality of produce, provision of varieties with higher market potentials, promoting investments in secondary and tertiary processing of seaweed, and improving farmers' skills in farming and post-harvest handling techniques."[24]

Pembans explicitly ask for more information and training on how to benefit economically from electricity and access to new areas through new roads and how to manage and operate a business. Mjimbini, one of the villages we visited during the fieldwork, had received a greenhouse

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[24] The Revolutionary Government of Zanzibar (2010), *Zanzibar Strategy for Growth and Reduction of Poverty 2010-2015 (MKUZA II).*

from the government in order to scale up its production of vegetables. One of the women in the cooperative working with the greenhouse told us: "It's a great greenhouse, but no one knows how to use it. The government representatives came and installed it. When they left, we had no idea how to use it. So now we try, experience and learn which vegetables to use and how to use it. But we really don't know anything about it. We need capacity building". A fellow male villager agreed. He was a clove farmer and sold his cloves within the limits set by the government. He saw the potential of using or sells cloves in other ways, but admitted: "I have so many cloves, but I don't know how to make money on them".

Cooperatives are a case in point. Villagers apply to the local government (through the village chief) to create a cooperative. When the group is formally established, the governmental offices are responsible for visiting the group and holding a start-up seminar, where men and women are trained on how to create a cooperative and share income. Ideally, the group shall also receive an initial funding for start-up investments and other capacity building courses, but the groups visited during this fieldwork had neither received funding nor further training. The cooperatives were essentially operating on their own means, creating their own saving groups and trying to cope with all matters related to their business as well as they could.

The lack of capacity goes hand in hand with the scarcity of start-up capital. Another female villager from Mjimbini explains: "We need loans in order to develop our businesses. We might have the money to buy a fertilizer, but then we need further cash to invest in more products, so that we can increase our production".

Tourism

Indeed, in capital-intensive sectors such as tourism, recent years have seen very little improvement of capacities (see table 21), notwithstanding the presence of electricity and better roads and the many opportunities offered by Pemba's geography, which have attracted an ever-increasing number of tourists. Far from receding, the gap with Unguja in terms of development of tourism infrastructures has even dramatically widened.

Table 21 – Number of new beds registered in hotels and guesthouses

	District	2009	2010	2011	2012	2013
UNGUJA	Mjini	134	101	162	140	271
	Magharibi	18	24	128	16	31
	Kaskazini "A"	724	115	296	86	427
	Kaskazini "B"	20	182	36	30	0
	Kati	398	108	49	20	363
	Kusini	80	205	280	61	320
	Total	1374	735	951	353	1412
PEMBA	Wete	0	0	0	0	0
	Micheweni	6	0	0	0	0
	Chake	45	0	5	0	42
	Mkoani	0	12	8	0	14
	Total	51	12	13	0	56

Source: Zanzibar Commission for Tourism

In summary

Access to reliable electrical supply has led to both improvement of production processes in existing businesses (fishing, farming, carpentry) and to the emergence of new activities (commerce of fresh drinks and ice creams), especially when combined with increased mobility.

The possibility to better store, preserve and transport farming and fishing products seems to have triggered both an increase in production and deeper transformations of the agricultural sector in Pemba. The number of businesses registered in Pemba and their staff numbers massively increased in the years 2008-2012 (see table 22), and the difference both with the preceding period and with Unguja leaves little doubt as to the joint influence of the electricity and road projects.

Table 22 – Number of establishments and employees

		2004	2008	2012	2004-08 change	2008-12 change
Number of establishments	Unguja	11,579	13,380	16,419	15,6	22,7
	Pemba	3,613	4,038	6,936	11,8	71,8
Number of employees	Unguja	53,809	70,303	84,340	30,7	20,0
	Pemba	13,717	16,470	40,991	20,1	148,9

Source: Office of Chief Government Statistician of Zanzibar, *Census of Establishments 2012 – Statistical Report.*

Individuals and businesses are however facing serious constraints in developing their activity, particularly in capital-intensive sectors and in poorer areas: the lack of investments for the former, and cost of access to electricity and inadequate of knowledge and capacity for the latter.

Table 23 – Indicators of private sector development

Indicators	Baseline year and value	Final year and value	Evaluation
Number of registered businesses	2008: 4,038	2012: 6,936	Positive
Number of employees of registered businesses	2008: 16,470	2012: 40,991	Positive
Availability of capital and capacity to start a business	-	inadequate	Negative
Number of new beds in hotels	2009: 51	2013: 56	No significant change
Number of tourist arrivals	2010: 14,893	2013: 26,791	Positive

3.11 Long-term growth and poverty reduction

Regional breakdowns of income and poverty statistics for recent years are extremely difficult to come by in Zanzibar and, paradoxically, it is in this area that it proved most difficult to assess the effect of the projects. From the available data – and pending further investigation – it however does not seem that the effect on poverty has been significant.

From 2002 to 2012, the population of Pemba has grown by 1.2 on average per year, against 3.7% for Unguja and 2.7% for the mainland.[25] This shows that Unguja has continued to act as an economic pole of attraction for inhabitants of Pemba and the mainland alike.

Despite the strong improvement discussed above, the share of formal employment in total employment remains very low in Pemba, just under 18% in 2012. This compares to a share of

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[25] 2012 Census.

30% in Unguja. Official jobs remain primarily concentrated in governmental positions or in shops and hotels in town or tourist areas. The economic benefits of the project, which appear substantial, might however remain concentrated in a few sectors of the economy.

Finally, nutrition is a reliable indicator of poverty in Pemba's economy, which, as stated earlier, is still largely based on subsistence farming. In this regard, the results of our survey are rather discomforting: the share of people who eat only one meal per day seems to have increased significantly since 2009, when the baseline survey was conducted. The frequency of consumption of food items such as meat, fish, eggs or dairy products has stagnated at best.

Graph 21 – Number of daily meals of households
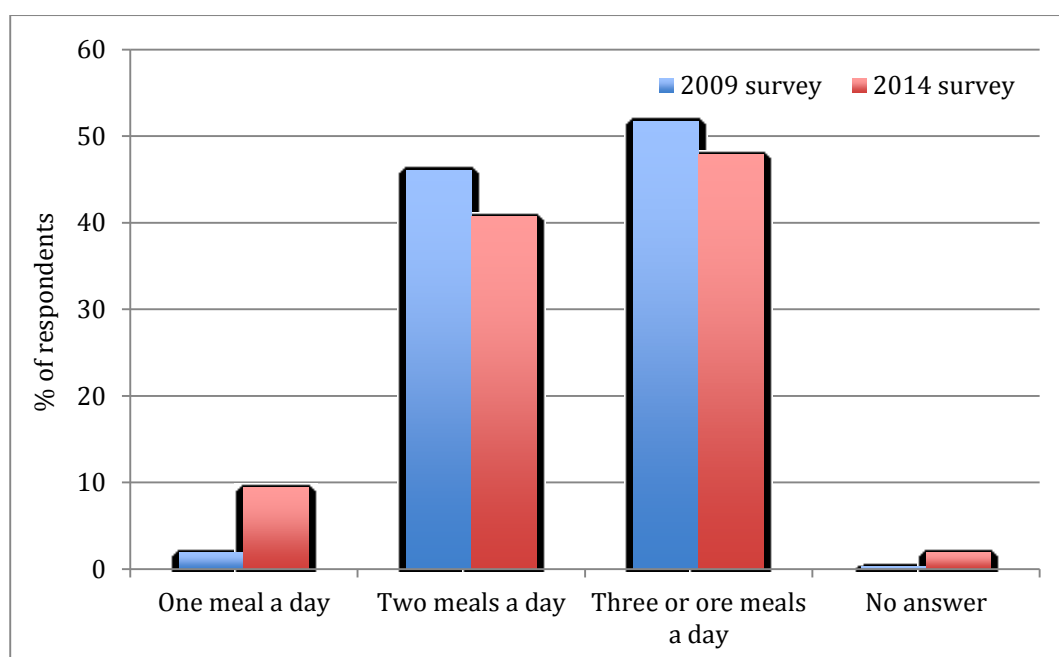
Sources: Baseline and final evaluation surveys

In summary

In spite of its sizeable economic benefits, the projects do not seem to have had a significant impact on poverty reduction until now. But the data on regional distribution of income and poverty is scarce and further investigations would be necessary.

Table 24 – Indicators of long-term growth and poverty reduction

Indicators	Baseline year and value	Final year and value	Evaluation
Number of meals per day per household	2009: 1 meal 2% 2 meals 46% 3 meals 52%	2014: 1 meal 9% 2 meals 41% 3 meals 48%	Slightly negative
Frequency of consumption of certain food items (meat, fish, eggs, milk) per week	2009: meat 0.4 fish 5.1 eggs 0.4 milk 2.4	2014: meat 0.5 fish 4.8 eggs 0.7 milk 1.6	Not significant

4 Conclusions and recommendations

4.1 Summary assessment

When confronting the theory of change exposed in the second section with the findings of this evaluation, it seems fair to say that the reviewed projects have had substantial positive effects for the welfare of Pembans (see graph 22). Among these, the most important are probably the improved access to public services such as water, health facilities and, to a lesser extent, schools, and the creation of opportunities for existing and new businesses. Almost 3,000 businesses and 25,000 jobs in the formal sector have been created in Pemba between 2008 and 2012, and the projects appear to be responsible for a significant share of these. But there is more: in the words of rural people on the island, being "developed" *means* having access to quality water, health services, food and work. As one villager told us: "It is about going from one point to another. Before we did not have roads, but now we have cars. Before we used water from the borehole, but now we have tap water in the house". When their initial cost (NOK 475 million) is compared with these achievements, the projects appear as a reasonably efficient use of aid policy resources.

Graph 22 – Reporting the evidence on the causal graph of the theory of change
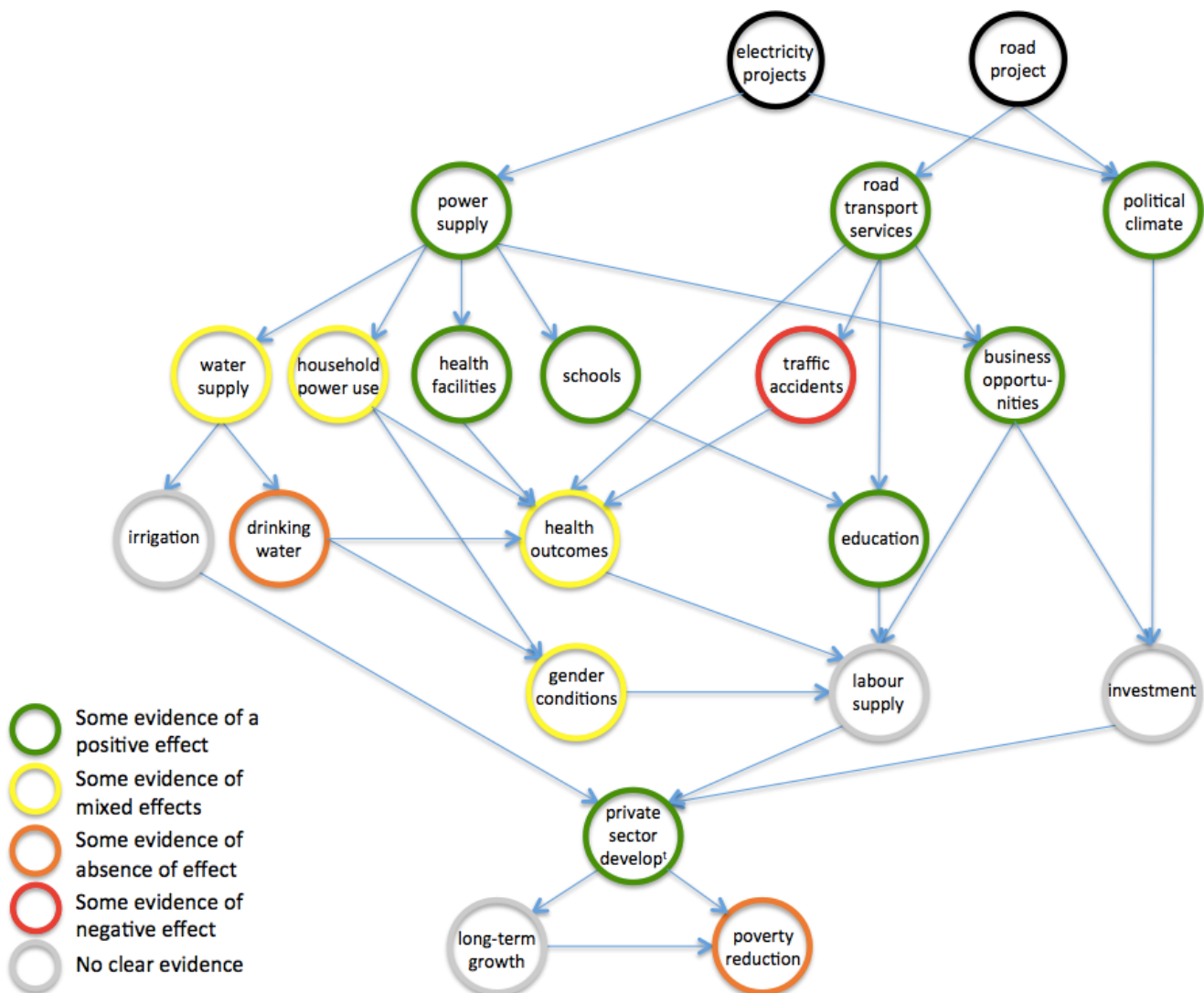
If the positive outcome of the projects is not measurable in terms of aggregate income, that is probably due in the first place to the absence of appropriate data. It is highly likely that strong increases in the number of businesses and in formal employment have had a positive impact on household income and consumption. The latter, however, does not seem to have trickled down in terms of poverty reduction, probably because it has so far been concentrated in towns and among the relatively affluent.

In addition, some of the most fundamental economic benefits expected from the projects, those related to better health, education and gender equality, as well as the knock-on effects of productivity growth, will only materialise in the longer term. In the five-year time span of this evaluation, they might still be too limited and volatile to be tangible at first sight.

Our causal analysis also shows that some positive outcomes expected from the projects, particularly in rural areas and among the poor, have not taken place, or only to a limited extent. A large part of the potential opened by the projects in terms of access to electricity, clean water and, to a lesser extent, education facilities in rural areas remains untapped. This is not due to the projects themselves, but to the negative contribution of a number of exogenous factors among which the foremost is the supply of public utilities – in quantity, quality or price.

The tariff policy of the Zanzibar Electricity Company – in particular the extremely high connection cost – *de facto* excludes a large majority of the rural population from the electricity market. In a village such as Tumvenikani, electricity does not seem to have changed anything to people's lives, even though the few who have it (10 out of 180 households), seem to share its benefits, for instance by charging the cell phones of neighbours and friends. The rate of penetration of electricity in the life of the village is too low for new activities to develop. In addition, recent increases in electricity prices limit the use of machinery and equipment, which would be instrumental in the adoption of more efficient and innovative production processes. Finally, street lighting is virtually absent from rural areas, which is particularly detrimental to women.

In the same vein, while access to clean water was one of the main benefits expected from enhanced power supply, the Zanzibar Water Authority has been unable to respond to the increase is demand because of inadequate water pumping and storage capacity. The problem has started to be addressed only recently with the support of the African Development Bank.

While ZECO has strongly increased its margins since the cable started operating, its financial situation remains plagued by high costs and poor revenue collection, particularly from public institutions. Already faced with significant technical issues when Pemba's power infrastructure is recent and underutilised, ZECO is likely to undergo serious difficulties as maintenance costs increase in the coming years. Furthermore, it is difficult to imagine how the utility could constitute reserves in order to address a major failure of the cable, or invest in additional capacities when the cable nears saturation, in a decade from now under current trends. All these factors raise concerns over the long-term sustainability of the current system.

Timely access to consistent data was a major challenge for this study, and explains a number of limitations in the assessment. It would have been necessary to further investigate the governance, capacity and financial position of ZECO, ZRF and ZAWA. The

terms of reference also called for an assessment of the power sector in Unguja, although it had not been considered in the baseline study. Unfortunately, it was only possible to refer to Unguja as a point of reference for the developments in Pemba, and a more in-depth analysis had to be left for the future.

4.2   Lessons learned

The foremost policy-relevant conclusion of this assessment is the pervasiveness of the effects of inadequate institutional arrangements and the need to prioritise sound policy design and implementation.

The constraints imposed by public utilities on the development of the island are not rooted in economic factors, but rather in weak governance. Public sector entities did not pay their electricity bills until recently, and some like ZAWA and the military forces still do not. ZECO's tariff policy aims at compensating for these losses with little attention to the long-term consequences of some of its choices for the access of less affluent households to electricity. ZAWA, for its part, declares that its regulated tariffs are below its production costs and that its losses are not covered by government subsidies, so that it is not in a position to pay for its power consumption. On-going capacity-building activities in ZECO and other parts of the public sector can of course have a positive impact in this regard, but the broader governance context (transparency of public finance and procurement mechanisms, attention to incentives for private actors, etc.) also needs to be scrutinised.

There has also been a lack of complementary actions to reap the full benefits of the projects and minimize negative side effects:

- to provide appropriate transportation means to schoolchildren and enable them to benefit from new roads;
- to help the water utility anticipate the surge in demand and make all necessary investments;
- to prevent the rise in road accident risks, particularly for vulnerable populations;
- to build capacities on how to use electricity and transportation to develop new means of income generation and improve livelihoods;
- to provide capital to emerging businesses.

Such linkages and complementarities should be foreseen and integrated at an early stage in project design.

A related criticism can be addressed to the projects with regard to their lack of consideration of the standpoint and interest of their end-users. In some cases, increased involvement of end-beneficiaries would have helped to trigger the type of actions that have been deficient, as for the integration of speed bumps and traffic signs in the new roads in the vicinity of villages and schools or the emphasis on the importance of grid connection fees, water shortages or transportation means for schoolchildren. In other cases, it would have appeared that the projects had strong synergies, and that the benefits of connection to the electricity grid are substantially lowered when it is not combined with access to proper roads.

With regard to the impact assessment itself, it appears that despite its richness in terms of indicators, the baseline evaluation had a number of weaknesses. It did not make it possible to identify the causes of positive as well as negative outcomes within a single logical framework, nor did it provide a consistent storyline for the assessment. It placed a strong

emphasis on a survey of a representative sample of the rural population, which has clear limitations when it comes to providing reliable conclusions in the case of a complex intervention like the one considered here. At the same time, it could probably have gone further in developing channels and tools of data collection from institutional sources, particularly from the utilities ZECO, ZAWA and ZRF that have a key influence on the outcomes of the projects. While some of the information gathered through the baseline study was definitely useful for this assessment, part of it also proved irrelevant; some important aspects were simply not covered by the baseline impact indicators.

These weaknesses all relate to the lack of proper attention to and formal integration of the theory of change of the projects.

4.3   Suggestions for future interventions
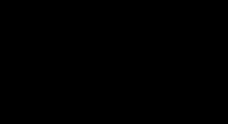
This leads directly to a set of suggestions aimed at consolidating what has already been achieved by the projects and better exploiting the important potential that they have induced.

Suggestions for Norwegian aid policy

1. Future interventions in the electricity and road transport sectors should aim at correcting the deficiencies that have prevented Zanzibaris from reaping the full benefits of past interventions. If the analysis in this report is correct, such actions could be considerably more efficient than the continuation of large infrastructure projects.
2. In particular, the focus should be placed on targeted support to those segments of the population that have not experienced the benefits of better access to electricity and roads, for instance through: improvement of water pumping capacities in areas experiencing severe shortages; public lighting in villages; outreach activities on the productive use of electricity, in particular capacity building in business creation and management; road signalling and accident prevention; transport of schoolchildren.
3. If poverty reduction is indeed an important goal for electricity projects, the subsidisation of connections should be considered.
4. Synergies between infrastructures, specifically here between roads and electrification, should be better exploited with a dynamic approach to market creation, market access and market development.
5. Further research should be conducted on the long-term sustainability of the power system and possible options for extending power generation capacities.
6. Additional emphasis should be placed on the benefits of good governance at all levels of government.

Suggestion for intervention design and evaluation

1. Projects should be designed from the onset with a view to their larger consequences, prerequisites and complementarities.
2. This entails in particular additional work on the field to adjust the parameters of the intervention to the real-world situation at hand.
3. Impact assessments should be designed from the beginning with careful attention to the specifics of the intervention and its expected outcomes. They should include

in particular an analysis of enabling factors, complementary actions and responsibilities for these, and risk factors.

4. Formal representations of the theory of change of an intervention can be useful instruments for examining its possible consequences, prerequisites and complementarities and for shedding light on any unsupported or hidden assumption. Methodological work in this area could be a profitable investment in terms of improved project design.

Annex 1 – Terms of reference

Background

Norwegian energy assistance has a long history of electricity cooperation with Zanzibar. Norway has supported:
1. A rural electrification project on Zanzibar in four phases,
2. Infrastructure development on the Island Pemba (one of the two main islands of Zanzibar) through
    i. Installation of a subsea cable from Tanzania mainland to Pemba (Tanga-Pemba Subsea Cable). Norway supported the subsea cable with MNOK 300 for the preparation phase (starting in 1991) and implementation phase. The inauguration of the cable took place in June 2010.
    ii. Development of capacity for road maintenance and rehabilitation of six roads in southern Pemba. Norway supported the development of capacity for road maintenance and rehabilitation of six roads in southern Pemba with MNOK 72 between 2009 and 2011.

In 2009 Norad commissioned COWI to:
- establish a methodology for collecting baseline and end-line data before and after project implementation for the two infrastructure projects mentioned above,
- collect the baseline data according to proposed methodology, and
- develop a baseline with the aim to assess and document the results, changes and impacts (intended and un-intended) caused by the two infrastructure projects

COWI's final report (November 2009) including the "Impact Evaluation Guide" forms the main basis of this assignment.

In addition, the scope should include a broader evaluation of the long-term socio-economic impacts of the large rural electrification program in Zanzibar supported by Norway. This will provide a more complete and nuanced picture of the development in all of Zanzibar. The consultant should therefore supplement the COWI impact evaluation guide to incorporate this.

Relevant documents for this assignment include:

- Impact Assessment Study Pemba Island 2009 and its annexes
- End-review of the subsea cable project commissioned by Norad in 2011 (carried out by Econ Pöyry)
- Final Monitoring Report Mission of Pemba Rural Roads in 2012
- End-review of Phase IV and Extension of the Zanzibar Rural Electrification Project, commissioned by Norad in 2009 (carried out by NCG/Norconsult)
- Census data 2012 from www.nbs.go.tz
- Social Impact Evaluation Study of the Rural Electrification Project in Zanzibar Phase IV (2003-2006), Dr. Tanja Winther

Purpose of this assignment

The overall purpose of this assignment is two-fold.

Firstly, the assignment is to document the socio-economic impacts of the two infrastructure projects supported by Norway by performing an end-line impact assessment study.

Secondly, the assignment should evaluate more broadly the long-term socio-economic impact of the rural electrification project on Zanzibar, which Norway has supported in four phases. The aim should be to provide a more complete picture of the impact of Norway's support to the energy sector in Zanzibar.

Scope of work

1. Assess the methodology of the "Impact Evaluation Guide" and suggest improvements
2. Assess the quality of data in the Baseline Study and perform data quality assurance (random samples)
3. Complete the end-line study according to "the Impact Evaluation Guide" as far as this is practical and relevant as agreed by the Client
4. Analyse the results of the end-line study by comparison to the baseline study and document results, changes and impacts (intended and unintended) by the two infrastructure projects
5. Analyse and comment on the role of the Rural Electrification Project with regards to socio-economic impacts
6. Describe to what extent the mapped socio-economic changes can be traced to the mentioned Norwegian support
7. Reflect on the overall sustainability of the power sector, e.g. capacity and financial resources to carry out overall maintenance, planning and reinvestments
8. Describe lessons learned
9. Describe suggested follow-up by Norway, if any

Presentation of proposals

The bid should include comments to the draft ToR as well as a proposed methodology for solving the assignment within the proposed budget and timeline (final report 31 January 2015). This can include proposals regarding scope, data, travel and analysis.
The Consultant awarded the contract is then invited to discuss the proposal and revision of the ToR with Norad in a "kick-off" meeting after entering into a final agreement.

Deliverables/Schedule

Report	Deadline
Closing date for submission of tenders	19 October 2014
Kick-off meeting	6 November 2014 (tentative)
Draft end-line report	21 January 2015
Comments from Norad and others	2 February 2015
Final end-line report	9 February January 2015

Annex 2 – Survey questionnaire

Q1- Q19 to be filled by the enumerator

Q1   Name of the village/town

Q2   District

     1 = Michaweni

     2 = Wete

     3 = Chake Chake

     4 = Mkoani

Q3   Type of area

     1 = Rural

     2 = Urban

Q4   Distance to district town

     1 = 0-5 km

     2 = 5-10 km

     3 = 10-15 km

     4 = 15-20 km

     5 = 20-25 km

     6 = more than 25 km

Q5   Distance to main road in km

     1 = 0-5 km

     2 = 5-10 km

     3 = 10-15 km

     4 = 15-20 km

     5 = 20-25 km

     6 = more than 25 km

Q6   Distance to feeder road (road which comes from the main road) in km

     1 = 0-5 km

     2 = 5-10 km

     3 = 10-15 km

     4 = 15-20 km

     5 = 20-25 km

     6 = more than 25 km

Q7   Distance to rural road (road without asphalt) in km

     1 = 0-5 km

     2 = 5-10 km

     3 = 10-15 km

     4 = 15-20 km

     5 = 20-25 km

     6 = more than 25 km

Q9   Prior to knocking and entering the household, from in front of the door, are you able to see any of the following?

     1 = Yes

2 = No

_1 Primary school

_2 Health clinic

_3 Police station

_4 Political party branch

_5 Public well/borehole

_6 Sheha's office

_7 Tarmac road

_8 Dirt road

Q10 Area Accessibility

1 = Yes

2 = No

_1 Does the village have access to Electricity?

_2 Is the village located along a rehabilitated road?

Q12 Housing type

1 = Single family house

2 = multi-family house

3 = multi-family, multi-unit structure

4 = servants quarters

5 = Garage

6 = Hut

7 = Other

Q13 Please record what material the dwelling is primarily made of

1 = cement or rocks/coral

2 = Timber and dirt

3 = cured bricks

4 = uncured bricks

5 = Salugi

6 = Tin

7 = Other

Q14 Please record what material the roof of the dwelling is primarily made of

1 = Mabati

2 = Vigae

3 = leaves

4 = Dirt and leaves

5 = Cement

6 = Other

Q15 Does the house appear to have an electricity connection?

1 = Yes

2 = No

Q16 Estimated wealth of the household

1 = Rich

2 = Moderately rich

3 = Poor

4 = Very poor

Q17 Knock to enter the dwelling and please indicate whether or not someone was present in the home

1 = a person was present

61

2 = no person was present

Q18 The floor of the house is made of

1 = Earth / cowdung

2 = Concrete, cement

3 = Tiles

4 = Other

Q20- Q90 to ask the respondent

Q20 When you close the door of the home at night, how many individuals are there who sleep in your home?

Q21 How many adults of 18 years and older are living in this household?

Q22 How many children of less than 18 years are living in this household?

Q23 Is the respondent female or male?

1 = Female

2 = Male

Q24 What is your relationship to the head of the household?

1 = Household head

2 = Spouse of household head

3 = Child of household head

4 = Child of spouse of household head

5 = Grandchild of household head

6 = Parent of household head or spouse

7 = Another family relationship

8 = Worker

9 = Other non-family

_other …

Q25 What is your age?

Q26 Are you married?

1 = Single

2 = Married, one spouse

3 = Married, multiple spouses

4 = Amechika

5 = Separated from partner

6 = Widow

7 = Unmarried with live-in partner

Q27 What is the highest class in school you attended?

1 = Never attended school

2 = Did not graduate primary education

3 = Graduated primary education

4 = Did not graduate secondary education

5 = Graduated secondary education

6 = Diploma

7 = Undergraduate

8 = Postgraduate

9 = Doctorate

Q28 What is your main type of activity? **(MORE THAN ONE ANSWER IS POSSIBLE)**

1 = Farming / livestock keeping

2 = Fishing

3 = Mining

4 = Tourism

5 = Paid government employee

6 = Paid private company employee

7 = Paid NGO / religious organization employee

8 = Self-employed

9 = Works at home

10 = Is looking for work

11 = Student

12 = Disabled

13 = Unemployed

14 = Retired

15 = Other

_other …

Q29   What is the main type of activity of your partner? **(MORE THAN ONE ANSWER POSSIBLE)**

1 = Farming / livestock keeping

2 = Fishing

3 = Mining

4 = Tourism

5 = Paid government employee

6 = Paid private company employee

7 = Paid NGO / religious organization employee

8 = Self-employed

9 = Works at home

10 = Student

11 = Disabled

12 = Unemployed

13 = Retired

14 = Other

_other …

Q30   What is the highest class in school your partner attended?

1 = Never attended school

2 = Did not graduate primary education

3 = Graduated primary education

4 = Did not graduate secondary education

5 = Graduated secondary education

6 = Diploma

7 = Undergraduate

8 = Postgraduate

9 = Doctorate

Q32   Now we'd like to ask about different possessions it is possible are in your household. We would like to know for each item if there is one (or more) in your household.

0 = Not selected

1 = Selected

_1   Radio

_2	Landline phone
_3	Fridge
_4	Sewing machine
_5	Television
_6	Chairs
_7	Couch
_8	Computer
_9	Generator
_10	Passports
_11	Electric Stove
_12	Gas Stove
_13	Motorcycle
_14	Car
_15	Bicycle
_16	2 pairs clothes for each person in household
_17	1 Pair of shoes for each person in household
_18	None

Q34 Who owns the house/building?

1 = They own the house

2 = They are tenants

3 = Employer provided for free

4 = Employer provided at a charge

5 = Other ownership

Q35 Is the building connected to the national electricity grid?

1 = Yes

2 = No

Q36 What is the main source of drinking water of your household?

1 = Aqueduct in building

2 = Canal in local area

3 = Community supply

4 = Water well

5 = Pond

6 = River/lake

7 = Rainwater

8 = Water vehicle

9 = Wheelbarrow

10 = Bottled water

11 = Other

Q37 Is the house connected to ZAWA piped water?

1 = Yes

2 = No

Q38 Where does the majority of water for general use (drinking and other uses) in the house come from?

1 = Aqueduct in building

2 = Canal in local area

3 = Community supply

4 = Water well

5 = Pond

6 = River/lake

7 = Rainwater

8 = Water vehicle

9 = Wheelbarrow

10 = Bottled water

11 = Other

Q39   What is the approximate time taken to collect drinking water for your household consumption? **(ONE WAY TRIP IN MINUTES)**

1 = 1- 5 minutes

2 = 5-10 minutes

3 = 10-15 minutes

4 = 15-20 minutes

5 = more than 20 minutes

6 = 0 minutes, water comes directly to home

Q40   How many round trips do you make each day to collect drinking water?

1-7 = 1-7

8 = more than 7

9 = 0, water comes directly to home

Q41   Do you pay for water?

1 = Yes

2 = No

Q42   How much do you pay for water?

1 = 1-5,000 Tsh

2 = 5,000-10,000 Tsh

3 = 10,000-15,000 Tsh

4 = 15,000-20,000 Tsh

5 = more than 20,000 Tsh, specify

_other   …

Q43   Who normally collects water?

1 = Mostly boys

2 = Mostly girls

3 = Equally boys and girls

4 = Mostly men

5 = Mostly women

6 = Equally men and women

7 = Other

_other   …

Q44   Do you have an electricity connection?

1 = Yes

2 = No

Q45   Why don't you have access to electricity?

1 = Village has no access

2 = Connection is too expensive

3 = Connection takes too much work or too much trouble

4 = Electricity does not provide much benefits compared to other, cheaper sources

5 = Other

_other   …

Q46 How much was your last electricity bill?

1 = 0-1000 Tsh

2 = 1000-2000 Tsh

3 = 2000-3000 Tsh

4 = 3000-4000 Tsh

5 = 5000-5000 Tsh

6 = 5000-10000 Tsh

7 = 10000-15000 Tsh

8 = 15000-20000 Tsh

9 = other

_other ...

Q47 How much time did the bill cover?

1 = A few days

2 = A week

3 = Two weeks

4 = Three weeks

5 = A month

6 = More than a month

7 = Other

_other ...

Q48 How many hours of low voltage did you experience last month?

1 = 1-5 hrs

2 = 5-10 hrs

3 = 10-15 hrs

4 = 1-2 days

5 = 2-4 days

6 = 5-7 days

7 = None

8 = I do not know

_1 Hours each day

_2 Hours each week

_3 Hours each month

Q49 Since which year have you been connected to the electricity grid?

Q50 What advantages do you think electricity has brought to your life?

0 = Not selected

1 = Selected

_1 provide light during the night

_2 employment opportunities and business opportunities

_3 ability to cool things with refrigerators

_4 availability of water

_5 the ability to recycle products

_6 to charge phone and using electronic devices such as radios , televisions , fans , etc ...

_7 other

_other ...

Q51 And what disadvantages?

0 = Not selected

1 = Selected

    _1   Deaths

    _2   To get hurt by electricity

    _3   To break things of value

    _4   Large electric bill

    _5   Hurts family budget

    _6   The health effects (i.e. microwave)

    _7   Other

    _other …

Q52   On the whole, would you say that access to electricity has been positive for your life?

    1 = Yes

    2 = No

Q53   What advantages do you think electricity has brought to society?

    0 = Not selected

    1 = Selected

    _1   brightness in the night for safety and for people to make their activities

    _2   improved economy and business

    _3   availability of water is improved

    _4   The ability of communities to recycle their products

    _5   To preserve food

    _6   Access to information and communication i.e.

    _7   Strengthening education (reading)

    _8   Improvement of the environment

    _9   Other

    _other …

Q54   And what disadvantages?

    0 = Not selected

    1 = Selected

    _1   Fire accidents

    _2   Disaster

    _3   Damage to the environment (industrial areas)

    _4   Loss of ethics and traditions because of watching TV

    _5   Lowering the level of education (children using more time on TV-shows, internet, etc.)

    _6   Small payments from the government or labor (inadequate compensation)

    _10   Other

    _other …

Q55   On the whole, would you say that access to electricity has been positive for society?

    1 = Yes

    2 = No

Q56   What is the main type of energy you use for lighting?

    1 = Solar

    2 = Gas (biogas)

    3 = Electricity from the grid

    4 = Generator

    5 = Paraffin

    6 = Candles

    7 = Firewood

    8 = Other, specify

_other ...

Q57 What is the main type of energy you use for cooking?

1 = Solar

2 = Gas (biogas)

3 = Gas (industrial)

4 = Electricity from the grid

5 = Generator

6 = Paraffin

7 = Coal

8 = Wood charcoal

9 = Other, specify

_other ...

Q58 How much time do you use to reach the area to collect firewood?

1 = Don't use

2 = 5-10 min

3 = 10-15 min

4 = 15-20 min

5 = 20-25 min

6 = 25-30 min

7 = 30-45 min

8 = 1-1.5 hrs

9 = 1.5-2 hrs

10 = more than 2 hrs

Q59 How many liters of paraffin do you buy each week?

1 = Don't use

2-7 = 1-6 liters

8 = More than 6 liters

Q60 Do you have a generator?

1 = Yes

2 = No

Q61 What fuel does your generator use?

1 = Diesel

2 = Petrol

3 = Other

Q62 How many liters of each fuel type do you buy each week?

1 = 1-2 liters

2 = 2-4 liters

3 = 4-6 liters

4 = 6-8 liters

5 = 8-10 liters

6 = 10-15 liters

7 = 15-20 liters

8 = more than 20 liters

_1   Diesel

_2   Petrol

_3   Other fuel

Q63 Which type of cooling equipment does your household have?

1 = None
2 = Fan
3 = Air conditioning
4 = Air conditioning and fan
5 = Other, specify
_other   …

Q64   What is the main mode of transport you use to go to the nearest district town?
1 = On foot
2 = Own bicycle
3 = Hired bicycle
4 = Own motorcycle
5 = Hired motorcycle
6 = Own car
7 = Hired car
8 = Own lorry
9 = Hired lorry
10 = Daladala bus
11 = Other, specify
_other   …

Q65   How much time does it take to reach it?
1 = 0-5 minutes
2 = 5-10 minutes
3 = 10-15 minutes
4 = 15-20 minutes
5 = 20-30 minutes
6 = 30-45 minutes
7 = 45 minutes-1 hour
8 = 1-1.5 hours
9 = more than 1.5 hours
_other   …

Q66   How much does it costs to go one way only?
1 = 100-500 tsh
2 = 500-1000 tsh
3 = 1000-1500 tsh
4 = 1500-2000 tsh
5 = 2000-5000 tsh
6 = more than 5,000 tsh
7 = 0
_other   …

Q67   What is the nearest health clinic and what is the main mode of transport you use to go there?
1 = On foot
2 = Own bicycle
3 = Hired bicycle
4 = Own motorcycle
5 = Hired motorcycle
6 = Own car
7 = Hired car

69

8 = Own lorry

9 = Hired lorry

10 = Dalada Bus

11 = Other, specify

_other   ...

Q68   How much time does it take to reach it?

1 = 0-5 minutes

2 = 5-10 minutes

3 = 10-15 minutes

4 = 15-20 minutes

5 = 20-30 minutes

6 = 30-45 minutes

7 = 45 minutes-1 hour

8 = 1-1.5 hours

9 = more than 1.5 hours

_other   ...

Q69   How much does it costs to go one way only?

1 = 100- 500 tsh

2 = 500-1000 tsh

3 = 1000-1500 tsh

4 = 1500-2000 tsh

5 = 2000-5000 tsh

6 = more than 5,000 tsh

7 = 0

_other   ...

Q70   What is the nearest market and what is the main mode of transport you use to go there?

1 = On foot

2 = Own bicycle

3 = Hired bicycle

4 = Own motorcycle

5 = Hired motorcycle

6 = Own car

7 = Hired car

8 = Own lorry

9 = Hired lorry

10 = Dalada Bus

11 = Other, specify

_other   ...

Q71   How much time does it take to reach it?

1 = 0-5 minutes

2 = 5-10 minutes

3 = 10-15 minutes

4 = 15-20 minutes

5 = 20-30 minutes

6 = 30-45 minutes

7 = 45 minutes-1 hour

8 = 1-1.5 hours

9 = more than 1.5 hours

_other   ...

Q72 How much does it costs to go one way only?

1 = 100- 500 tsh

2 = 500-1000 tsh

3 = 1000-1500 tsh

4 = 1500-2000 tsh

5 = 2000-5000 tsh

6 = more than 5,000 tsh

7 = 0

_other   ...

Q73 What is the nearest secondary school and what is the main mode of transport you use to go there?

1 = On foot

2 = Own bicycle

3 = Hired bicycle

4 = Own motorcycle

5 = Hired motorcycle

6 = Own car

7 = Hired car

8 = Own lorry

9 = Hired lorry

10 = Bus

11 = Other, specify

_other   ...

Q74 How much time does it take to reach it?

1 = 0-5 minutes

2 = 5-10 minutes

3 = 10-15 minutes

4 = 15-20 minutes

5 = 20-30 minutes

6 = 30-45 minutes

7 = 45 minutes-1 hour

8 = 1-1.5 hours

9 = more than 1.5 hours

_other   ...

Q75 How much does it costs to go one way only?

1 = 100- 500 tsh

2 = 500-1000 tsh

3 = 1000-1500 tsh

4 = 1500-2000 tsh

5 = 2000-5000 tsh

6 = more than 5,000 tsh

7 = 0

_other   ...

Q77 Now I would like to ask you a few questions about the economy. How do you view current state of the following?

1 = Very bad

2 = Bad

3 = Average

4 = Good

5 = Very good

_1   National Economy

_2   Personal economic state

Q78   In general, how do you see your economic situation now compared to fellow Zanzibaris?

      1 = Worse than other Zanzibaris

      2 = Bad

      3 = Exactly the same

      4 = Good

      5 = Better than other Zanzibaris

Q79   How is your personal economic situation today compared to 12 months ago?

      1 = Worse today

      2 = Bad

      3 = Exactly the same

      4 = Good

      5 = Better today

      6 = Don't know

Q80   How do you think your personal situation will be in the next 12 months compared to today?

      1 = Worse than today

      2 = Bad

      3 = Exactly the same

      4 = Good

      5 = Better than today

      6 = Don't know

Q81   Who has the final decision on how to spend the money you earn?

      1 = Yourself

      2 = Head of household

      3 = You and your partner together

      4 = Other

Q82   Who has the final decision on how to spend the money your partner earns?

      1 = Yourself

      2 = Head of household

      3 = You and your partner together

      4 = Other

      5 = Your partner

Q83   How is the national economy today compared to 12 months ago?

      1 = Worse now

      2 = Bad

      3 = Exactly the same

      4 = Somewhat good

      5 = Good

      6 = Much better

      7 = Don't know

Q84   Please compare your own household with other households in your community?

      1 = Worse now

2 = Bad

3 = Exactly the same

4 = Somewhat good

5 = Good

6 = Much better

7 = Don't know

Q86 How many times in the past month have you or anyone in your family had to cope with the following?

1 = Not at all

2 = Once or twice

3 = Several times

4 = Often

5 = Always

  _1 Lack of adequate food

  _2 Lack of clean drinking water

  _3 Lack of medicine

  _4 Lacking sufficient kerosene

  _5 Lack of income

  _6 Receive financial assistance from someone outside your family

  _7 You received material assistance from someone outside your family (like food or kerosene)

  _8 You provided financial support to someone outside your family

  _9 You provided material assistance to someone outside your family (like food or kerosene)

Q87 How many meals does your household usually have per day?

1 = Less than one meal per day

2 = One meal per day

3 = Two meals a day

4 = Three meals a day

5 = More than three meals per day

6 = No answer

Q88 In the past 30 days has your household ever had fewer meals than this usual number?

1 = Yes

2 = No

Q89 If yes, how many days?

1 = 1-3 days

2 = 4-5 days

3 = 6-8 days

4 = 9-10 days

5 = more than 10 days

Q90 In the past week how many days did the household consume the following?

  _1 Meat

  _2 Fish

  _3 Eggs

  _4 Milk/dairy products

  _5 Beans/vegetables

Annex 3 – Focus-group discussion forms

I. UNELECTRIFIED VILLAGES

Information about the Village:

Name of the village:

Name of the district

Date:

Number of women present:

Number of men present:

Introduction to the participants:

Main areas to be discussed: Perceptions of poverty and wealth; What it takes to improve wealth; In what regard electricity and access to proper roads improve people's wealth

The presence of electricity in the village & access to new roads

1. Tell us *how you would have wanted electricity to be present* in the village?

-   Public spheres (village square, fish marked, school, health care center, water pumps? Are there road lights?)

-   How big part of the village population do you believe would have been connected to the grid?

2. Has the *road* that connects this village to the rest of Pemba been improved the last years? (If yes- please also ask questions: 9-18)

-   If so, in what ways have the improved *road benefited this village*?

3. *Who do you believe* would benefit mostly if the village was electrified? (Make sure that you discuss this issue both at a household and a community level)?

4. How do you think electricity would have contributed to *improve people's lives in this village*?

Changes related to the implementation of electricity/new roads

Most significant change

5. Let's say the village was connected to the electricity grid next year. This would probably lead to many changes, big and small. *What do you think would have been the most important positive change that would occur* if electricity were introduced to the village?

6. *Why would this change be important?*

7. *Who would have benefited from this change?*

If improved roads:

8. Looking back, what *changes* have taken place in this village – or in your life - after the roads were improved?

Most significant change

9. There have been many changes, big and small. Now, if you can choose only 1, *what change do you feel is really the most important positive changes of them all*?

10. *What difference* has this change made? And for whom?

11. *Why* is this difference important?

12. What does it take to involve a larger part of the village into this positive change?

Negative changes/impact

13. What are the main problems that have arisen after the improved roads to this village?

14. What is the biggest problem of them all?

15. *Why* is this a problem?

16. *Who* is affected by this problem?

17. *How* can this problem be solved?

Steps towards poverty reduction

18. What is, in your view, good quality of life?

19. Is *maendelo* (modernization/development) important, and if so, why?

20. In what ways can electricity contribute to *maendeleo* in your lives?

21. And what about proper roads are that relevant for *maendeleo* too?

22. Do you think electricity would have played a role in improving your economy? How? Why?

23. What are the main obstacles for improving wealth in your community today?

24. If you were the president of Tanzania; what would be your main priority in order to fight poverty in Pemba today?

II. ELECTRIFIED VILLAGES

Information about the Village:

Name of the village:

Name of the district

Date:

Number of women present:

Number of men present:

Introduction to the participants:

Main areas to be discussed: Perceptions of poverty and wealth; What it take to improve wealth; In what regard electricity and access to proper roads improve people's wealth

The presence of electricity in the village & access to new roads

1. When did this village receive electricity?

2. Tell us how electricity is present in the village today?

- Public spheres (village square, fish marked, school, health care center, water pumps? Are there road lights?)

- How big part of the village population do you believe have connected to the grid?

3. Has the *road* that connects this village to the rest of Pemba been improved the last years? (If yes- please also ask questions: 12-14)

- If so, when?

- in what ways has the improved *road benefited this village*?

4. *Who do you believe* has benefited mostly from the electricity in your village? (Make sure that you discuss this issue both at a household and a community level)?

5. In what ways has electricity contributed to *improve people's lives in this village*?

Changes related to the implementation of electricity/new roads

6. Looking back, what *changes* have taken place after electricity was introduced?

- At home?

- In the village?

Most significant change

7. There have been many changes, big and small. Now, if you can choose only 1, *what change do you feel is really the most important positive changes of them all*?

8. *What difference* has this change made? And for whom?

9. *Why* is this difference important?

10. What does it take to involve a larger part of the village into this positive change?

If improved roads:

11. Looking back, what *changes* have taken place in this village – or in your life - after the roads were improved?
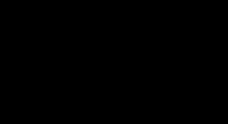
Most significant change

12. What is the most important change?
Why is it important?

13. What is the main problem that has arisen after the improved roads to this village?

Negative changes/impact

14. What are the main problems that have arisen after the introduction of electricity to this village?

15. There may have been many problems, big and small. Now, if you can choose only 1, *what problem do you feel is really the most important of them all*?

16. *Why* is this a problem?

17. *Who* is affected by this problem?

18. *How* can this problem be solved?

Steps towards poverty reduction

19. What is, in your view, good quality of life?

20. Is *maendelo* (modernization/development) important, and if so, why?

21. In what ways can electricity contribute to *maendeleo* in your lives?

22. And what about proper roads, is that relevant for maendealeo?

23. Do you think the improved infrastructure in this village presence of electricity in any ways have played a role in improving your economy? How? Why?

24. How could the economic improvement due to electricity be even better?

25. What are the main obstacles for improving wealth in your community today?

26. If you were the president of Tanzania; what would be your main priority in order to fight poverty in Pemba today?

Annex 4 – List of surveyed villages

Northern Pemba

Micheweni district

1. Majenzi
2. Tumbe Nyikani
3. Baharein
4. Kisiwani Mianzini
5. Tondooni makangale
6. Bule-Chimba

Wete district

7. Mjini Wete
8. Kiungoni
9. Mjini Ole
10. Mgogoni/Kisiwani
11. Mitanbuuni-Mtambwe
12. Mzambarauni

Chake district

13. Chake Chake
14. Vitongoji
15. Pujini
16. Kuungeni
17. Tundauwa
18. Kichuwani/kwale
19. Mgogoni
20. Kilindi/Tumbi
21. Kibaridi

Mkoani district

22. Mkoani - Ng'ombeni
23. Mtadoda
24. Mwambe (Muambe)
25. Michenzani
26. Wambaa
27. Kigope
28. Jambangome

Annex 5 – List of interviews

Mr. Othman JUMA
Acting director, Pemba branch, Zanzibar Water Authority

Mr. Jon LOMØY
Director, OECD Development Cooperation Directorate
Former Ambassador of Norway in Tanzania

Mr. Salim M. SALEH
Manager, Pemba branch, Zanzibar Electricity Company

Mrs. Inger Anette SANDVAND
Advisor, Section for Renewable Energy, Norad
Former Counsellor, Royal Embassy of Norway in Tanzania

Mr. Ørnulf STRØM
Leader, Section for Renewable Energy, Norad
Former Counsellor, Royal Embassy of Norway in Tanzania

Mr. Haroub MASOUD
Head, Pemba branch, Office of Chief Government Statistician Zanzibar

Mr. Khamis MASOUD
Manager, Pemba branch, Zanzibar Roads Fund

Mrs. Mwanamtiti RAMADHANI
Acting Manager, Zanzibar Roads Fund

Mr. Shomari Omar SHOMARI
Executive Director, Zanzibar Roads Fund

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