Mid-term review of Capacity Building on Maintenance in Zanzibar Electricity Cooperation

NORCONSULT

Norad Collected Reviews 7/2017

www.norad.no
ISBN 978-82-8369-283-9
ISSN 1894-518X

Norad

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Final Report

19 May 2017

Assignment no.: 5170507 **Document no.:** 1 **Version:** 3
2017-05-19

Norconsult

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Version	Date	Description	Prepared by	Checked by	Approved by
3	2017-05-19	Final Report	FI, RT	RT	FI
2	2017-03-24	Draft final report	FI, RT	RT	FI
01	2017-02-23	Mid-Term Review ZECO, Draft Report	FI, RT	RT	FI

Executive Summary

This midterm-review of capacity building on maintenance in Zanzibar Electricity Corporation (ZECO) was conducted in January/February 2017. The purpose of this assignment is to assess the process and progress of the project in fulfilling its objectives. The Mid-Term Review will also be forward looking and provide recommendations for the remaining period of the project in order to achieve the set objectives in an efficient way. The review will assess key issues found to be pertinent to meet the planned results of the project.

Overall Performance Assessment

The key review findings indicate that ZECO has made significant progress in upgrading the transmission lines in Unguja and Pemba, and the procurement of the equipment and materials for the transmission lines have been below budget. The procurement and installation of transmission lines are delayed, and it is especially important to start the procurement of the transformers as soon as possible in order to secure the installation by the end of the programme.

Capacity building was one of the key objectives of the programme, and 22 technicians have undergone training with TANESCO and 7 managers have attended relevant courses in South Africa. The training has been successful, leading to increased knowledge and ability to handle their responsibilities. The Twinning arrangement has still not been organized and this should be a priority for the remainder of the programme. There is an urgent need for systemisation in preventive maintenance, which requires development and implementation of structured procedures and routines, and active practice of these procedures and routines supported by a suitable twinning or consultancy arrangement. The general impression is that the line upgrades are receiving too much focus at present, at the cost of capacity building within preventive maintenance.

The maintenance unit was originally set up as a separate project organization, but this approach was revised and updated during the inception phase to ensure better integration throughout the ZECO organisation. Presently, the maintenance functions are structured under the Project Coordinator, but the maintenance unit team members report directly to the ZECO management unit where they are located. While this enhances the maintenance work to be harmonized within the organization, it is important that during the remainder of the Project emphasis is placed on full integration and institutionalisation of the maintenance functions within the ZECO organisation, including assignment of a (preventive) maintenance budget.

The cooperation with other development partners is well organised and the communication is frequent and open. This ensures that no overlap of funding is taking place.

The EU is focusing their development support on renewable energy, and it is important that the electrification master plan updates are coordinated with these activities in order to ensure sufficient transmission capacity for the developments of future power generation.

The review team (RT) visited the site of the emergency power and back-up generators at Mtoni, which were financed by Norway during the power crisis in 2010. The units are still in a good condition, but are in urgent need of servicing. They have been operating only 250 hours on average since the installation in 2010, and are not used due to the high cost of diesel. Zanzibar does need back-up capacity on the island in case the supply from mainland is interrupted. Currently the hospitals and water supply have their own back-up generators. The RT recommends that a study is undertaken to properly evaluate the various options for the generators, with Zanzibar's energy situation/ambitions and policy guidelines in mind.

The financial sustainability of ZECO is still weak, but the 20% tariff increase last autumn improved the situation somewhat. Pre-paid meters are now being installed with financial support from Sweden, and this will improve the revenue collection. The regulator, ZURA, is still in its inception phase, and has still not started to regulate the electricity sector. To secure the financial viability of ZECO, a cost of service study should be undertaken to support the efforts of ZURA. ZURA was originally supported by MCC, but they pulled back their support to Zanzibar after the last election, and Sweden is now considering to reallocate some of their support to ZURA.

There is significant gender inequality in ZECO, which reflects the general gender inequality in the technical fields in Zanzibar. The technical assistant (TA) commissioned a consultant who developed a "Proposed Plan for the ZECO Gender Equality Strategy". This plan seems to be a well-developed tool which is supported by the ZECO management. We therefore recommend that the plan is implemented by ZECO and that the implementation is monitored by the TA.

Based on reviews by Norconsult / NCG (2009) and ILPI (2015) the RT concludes that the project phase i-iv project has had a significant impact on private sector development and job creation in both Pemba and Unguja. There was a significant growth in both the number of connected businesses and the power usage from 2009 to 2014 in Pemba, and the electrification had a significant effect on agricultural development since products can be stored properly for a longer period of time. Significant positive developments of tourism in Unguja took place after the new connection to mainland was finalised.

RECOMMENDATIONS / PRIORITIES FOR THE REMAINING PERIOD OF THE PROGRAMME

These high priority aspects are identified for the remaining period of the programme:

1. Expedite transformer procurement
2. Procure a suitable twinning partner
3. Revise and approve the EMP, adopt as the guide for maintenance planning and investment
4. Systemise maintenance planning (structured procedures and routines)
5. Establish an annual preventive maintenance budget, and allocate funds to it
6. Practice preventive maintenance planning (scheduling/budgeting of projects and activities)
7. Institutionalise the maintenance unit within ZECO
8. Undertake a study to decide on the fate of the Mtoni generators
9. Implement the "Proposed Plan for the ZECO Gender Equality Strategy"

Other recommendations include:

10. Continued capacity building
11. Focus on QoS indicators for improved maintenance focus
12. Promote commercial awareness around electricity access (for job creation and energy efficiency)
13. Actively participate in renewable energy initiatives
14. Transparent communication of KPIs

Perform a cost of service study for ZECO (not necessarily under this programme)

Contents

ACRONYMS USED IN THIS REPORT

APRs	Annual Progress Reports
DPs	Development Partners
DFID	Department for International Development of United Kingdom
EMP	Electrification Master Plan
EU	European Union
GIS	Geographical Information System
GoZ	Government of Zanzibar
HT	High Tension
ICTDSA	International Centre for Training and Development Southern Africa
IFRS	*International Financial Reporting Standards*
ILPI	International Law and Policy Institute
KPIs	Key Performance Indicators
kV	Kilo Volts
kVA	Kilo Volt Amperes
kWh	Kilo Watt Hours
LV	Low Voltage
MCC	Millennium Challenge Corporation
MFA	Ministry of Foreign Affairs (Norway)
MKUZA II	Second Zanzibar Strategy for Growth and Reduction of Poverty
MLHWE	Ministry of Lands, Housing, Water and Energy
MoF	Ministry of Finance
MSEK	Million Swedish Kroner
MV	Medium Voltage
MW	Mega Watts
MWh	Mega Watt Hours
MWp	Mega Watts Peak
NOK	Norwegian Kroner
NORAD	Norwegian Agency for Development Cooperation
PV	Photovoltaic
QoS	Quality of Service

REP	Rural Electrification Programme
RNE	Royal Norwegian Embassy of Tanzania
RT	Review Team
SIDA	Swedish International Development Agency
TA	Technical Assistant
TANESCO	Tanzania Electric Supply Company
ToR	Terms of Reference
TZS	Tanzania Shillings
WB	World Bank
ZECO	Zanzibar Electricity Corporation
ZURA	Zanzibar Utilities Regulator Authority

1 Introduction

Zanzibar Electricity Corporation (ZECO) is the utility owned by the Revolutionary Government of Zanzibar responsible for generation, transmission and distribution of electricity in the Island of Zanzibar.

Norway has supported Zanzibar in the implementation of phase one to four of an electricity transmission and distribution project on Zanzibar (Rural Electrification Project (REP)) as well as the Tanga-Pemba subsea cable project. Following these projects, Zanzibar requested in December 2011 for support to a capacity building project for ZECO with focus on maintenance, an electrification masterplan and a new electrification project. The Grant Agreement for the capacity building of ZECO was signed in December 2012 with a Norwegian contribution of up to NOK 82 000 000 to finance the project in the planned four-year period 2012 – 2016. Four senior staff from the Rural Electrification Project (Phase IV and IV Extension, Tanga - Pemba Submarine Project and the Emergency Generator of Mtoni) was allocated by ZECO to the newly established Maintenance Unit. Knut Riise who had been involved in the REP was appointed by ZECO as Project Manager for the Rural Electrification and Maintenance Project and had a contract directly with ZECO. An inception phase was initiated in the first half of 2013. However, key expected outputs were not as expected.

In January 2014, Norplan/Multiconsult was contracted as Technical Assistant (TA) to re-do the six-month inception phase and to do the electrification master plan. The contract was awarded through the Embassy's framework agreement with Norplan/Multiconsult. In January 2015, a second award letter was signed with Norplan/Multiconsult to provide technical assistance to the implementation of the project in the period 2015-2018.

Following initial delays and misunderstandings, the Grant Agreement was amended, restated in its entirety. The amended agreement, signed 17 March 2015, made necessary clarifications and extended the project period until 2018.

The challenging and unsustainable financial situation of ZECO and its inability to collect payments was supposed to be addressed in the second phase of SIDA's Financial Turnaround Project. This was highlighted in the Embassy's assessment of the sustainability of the project and the decision to enter into the Grant Agreement. However, the Swedish program has been delayed by several years compared to planned timeline and was launched November 2016.

The key outcomes as stated in the Grant Agreement are:

I. Improved access to reliable and affordable electricity supply

II. Improved quality of electricity supply

III. A competent maintenance unit performing preventive maintenance planning and work

The intended impact of the project is to contribute to improved economic and social development in a sustainable way in Zanzibar, through increased access to affordable, reliable and sustainable electricity services.

In 2010 Norway supported another project with ZECO, namely the "Emergency Power and Back-up Capacity Programme" (TAN-10/0005). The programme was successfully implemented and finalised, but some issues are still pending. According to the Grant Agreement Article III Clause 1, the generators shall be for the sole purpose of ZECO to supply in times of needed electricity to the main grid until the connection of the submarine cable to Unguja supported by the Millennium Challenge Account (MCA) was in place, commissioned in 2013. The Grant Agreement further states that once the submarine cable is in place the parties shall meet and prepare a plan in which the future usage of the procured generator sets will be described and agreed upon. This meeting is yet to take place, and ZECO's plans for the future use of the generators have not yet been communicated.

The purpose of this assignment is to assess the process and progress of the project in fulfilling its objectives. The Mid-Term Review will also be forward looking and provide recommendations for the remaining period of the project in order to achieve the set objectives in an efficient way. The review will assess key issues found to be pertinent to meet the planned results of the project.

2 Methodology

This midterm-review of capacity building on maintenance in Zanzibar Electricity Corporation (ZECO) was conducted in January/February 2017. The Review Team ("RT") consisted of three members, Frank Isachsen (team leader), Ralf Tobich and Ali Abdulrahman Abdullah.Methodology

The review was conducted partly as a desk study, and partly through meetings and interviews with stakeholders during a one-week mission to Zanzibar, Pemba and Dar es Salaam (23 – 27 January 2017), as well as subsequent correspondence and follow-up meetings to request additional information and clarify issues.

The desk study part entailed

- studying a variety of documents (agreements, reports, minutes of meetings) related to the Norwegian support program. These documents were provided to the RT by the Royal Norwegian Embassy ("RNE") in Dar es Salaam and Norad, as well as by ZECO and Multiconsult/Norplan
- Studying Zanzibar government policies and laws

Prior to the mission and in preparation for it, the RT held discussions with Norad and the technical advisor (TA) Multiconsult/Norplan in Oslo.

For the mission to Zanzibar, Pemba and Dar es Salaam, the RT pre-arranged meetings with stakeholders, counterparts, development partners and other players, and met with these stakeholders to garner relevant input for the purpose of the mid-term review. The list of parties consulted is included in the appendix. Start-up and wrap-up meetings, as well as one intermediate meeting, were held with RNE to receive input for and provide feedback on the mission.

The RT spent most of the time with ZECO, interviewing various directors, department heads, section leaders and field staff both in Unguja and Pemba, and inspecting documents and systems to verify information. In addition, the team met with representatives of the ministry responsible for energy; regulatory authorities for energy, environment and public finances; and the personnel from the TA. Ms. Kristin T. Wæringsaasen from NORAD participated in all meetings and site visit during the first two days of the field trip.

At each meeting, the team probed on the achievements of and challenges faced by ZECO in attaining the objectives relevant to the particular stakeholder and requested supporting documentation where relevant. Some follow-up meetings were necessary after the mission to clarify specific issues and verify information received. Where such follow-up meetings were not possible, the RT addressed the issues through email correspondence and telephone calls.

The RT found that stakeholders were generally very open to discuss matters related to the review and provide supporting documentation where this existed. ZECO management, and in particular the project focal person Ms Salma H. Mussa, was instrumental in facilitating individual meetings within the agency and following up on documentation requested by the RT.

3 Mid-term review of the Capacity and Maintenance Programme

This chapter summarises the RT's assessment of progress of the preventive maintenance program, as well as recommending possible improvements to be implemented for the remaining period of the programme.

3.1 ACHIEVEMENTS OF THE SUPPORT COMPARED TO THE PURPOSES AND OBJECTIVES

This is presented under section 3.3.

3.2 PROCESS AND ACTION TAKEN WHEN KEY OUTPUTS IN THE PROJECT WERE NOT AS EXPECTED IN 2013

Background

In 2010 Norplan was awarded a consultancy contract for developing a cooperation programme between Norad and ZECO. In 2012 Norplan prepared the ToR for the inception phase. At the beginning of the support programme in 2012, Mr Knut Riise was hired to make an inception report recommending how to implement the objectives of the support programme. The methodology presented in the final inception report in July 2013 did not meet the objectives of the programme, and RNE decided to re-do the inception phase in order to secure a successful implementation of the project. Norplan|Multiconsult, who also had prepared the ToR for the inception phase in 2012, were in January 2014 selected under their framework agreement with the RNE to:

- redo the inception phase
- make an Electrification Master Plan
- Provide Technical Assistance to ZECO for establishing the maintenance unit, develop baseline studies, assess maintenance tools and equipment needs and establish a work plan for the development of the ZECO maintenance unit

The total value of the contract was about NOK 4 million over 2 years.

In March 2015 Norplan-Multiconsult was awarded another contract under the framework agreement with RNE as technical assistant to the maintenance unit at ZECO for work under the programme in the period 2015-2018. This contract had a value of about NOK 6 million over 4 years.

The process, with comments from RNE, is summarized in the appendix in section 5.5.

Conclusion and recommendations:

The RT has not seen all relevant agreements in full version, only parts of the documents, and therefore finds it difficult to make clear conclusions and recommendation. While it seems rational that the repeat of the inception phase was awarded to Multiconsult (as there was urgency and Multiconsult was aware of the challenges in the Zanzibar energy sector and could therefore perform the work quickly), the RT believes it would have been prudent to invite tenders for the TA to oversee the implementation of the project, in view of the nature, size and duration of this project.

3.3 ASSESS TO WHAT EXTENT THE AGREED OUTPUTS AND OUTCOMES HAVE BEEN ACHIEVED AND REPORTED, OR ARE EXPECTED TO BE TO BE ACHIEVED

For this part the Review Team ("RT") has compared actual outputs/outcomes with agreed goals, assessed the extent of achievement, and made proposals on where the Project needs to focus going forward.

The amended and restated Agreement between MFA and GoZ, dated 17 March 2015 and replacing the original agreement of 12 December 2012, defines the desired impact as "*improved economic and social development in a sustainable way in Zanzibar, through increased access to affordable, reliable and sustainable electricity services".*

The key outcomes of the project are:

- Improved access to reliable and affordable electricity supply
- Improved quality of electricity supply
- A competent maintenance unit performing preventive maintenance planning and work.

Other agreed outcomes include:

- Further electrification on Zanzibar in accordance with a prioritised plan
- Connection of customers in a feasible manner
- Fostering economic development in intervention areas (job creation)
- Shift from high-cost and polluting energy forms (diesel, petrol, etc) to cheaper and more environmentally friendly energy forms
- A successful project implementation.

The RT has assessed the extent of achievement of the agreed outputs and outcomes on the basis of ZECO's annual progress reports ("APRs") that compare actual outputs to planned outputs, as defined in the work plans, and information provided by stakeholders during the mission.

a) First APR - October 2015 (for the period March to September 2015)

At the time of the 2015 APR, little progress towards the agreed outcomes could be reported, primarily because the procurement of materials was delayed by procedural and bureaucratic obstacles, and therefore no network rehabilitation/upgrade/extension work was possible. Capacity building of the maintenance unit, however, had commenced, with a number of training courses conducted (in office management, heavy vehicle use, stores and inventory management, GIS application, project management, asset management and maintenance, project financial management, tendering/procurement contract management). Also, line surveys/inspection of REP phases I, II and III and GIS data collection on Pemba had commenced, and a solar PV seminar was held, although these did not form part of the workplan.

Also, the goal hierarchy, KPIs and monitoring framework were established during this period.

b) Second APR - September 2016 (for the period September 2015 to February 2016)

This APR was approved on 26 May 2016, but the final updated report was only submitted on 13 September 2016. During the reporting period procurement of line materials and equipment had advanced, with seven tenders and two local purchase orders having been completed. 341km of line were surveyed and inspected, and 6 ZECO staff received training. Progress towards the twinning arrangements was made, with contact with the utility in Oman having been established.

Our assessment of progress towards achieving the agreed outcomes is summarised in the table below. The RT notes that

- The Annual Progress Reports do not follow the format as prescribed in Annex II of the Agreement, which makes it more difficult to evaluate actual progress towards achieving the agreed outcomes.
- The goal hierarchy lists 10 activities that are meant to result in 3 outcomes and 6 outputs (the monitoring framework only lists 5 outputs), to achieve the overall impact of improved economic and social conditions in Zanzibar. These outcomes and outputs are not directly aligned with the 8 agreed outcomes of the Agreement, which makes it more difficult to evaluate actual progress towards achieving the agreed outcomes.

The RT assessment follows the sequence of the Agreement and correlates the actual outcomes and outputs measured in the monitoring framework, with “OCI” referring to the outcome indicators and “OPI” to output indicators.

Agreed Outcome	Corresponding Outcome / Output Indicators as per Monitoring Framework	Actual Outcome	Extent of Achievement to Date	Focus Areas for the Remaining Term
1. Improved access to reliable and affordable electricity supply	• OCI 1.4: MWh sold to tariff groups Z1, Z2, Z3 and Z4 • OCI 2.1: % population connected to the grid • OCI 2.2: number of connected schools • OCI 2.3: number of connected medical facilities	• OCI 1.4 reveals a gradual increasing at an average 8.5% per year, which is an indication of improving access • OCI 2.1, 2.2 and 2.3 all indicate above target progress • Network extension and upgrading in accordance with a master plan (EMP) • Radial networks being enhanced by closing a ring in some parts of Zanzibar • Some improved access to reliable electricity as a result of ongoing rehabilitation, upgrade and extension of networks • Affordability guaranteed by life line tariffs that were implemented in 2016	• Ongoing • Access achievement largely on target, but hampered by delayed transformer procurement • Affordability goal fully achieved • Reliability improvements will only become effective once network rehabilitation and/or upgrades have been completed	• Continue with rehabilitation, upgrade and extension of networks • Expedite transformer procurement • Include number of new household connections provided as another OI to measure access progress

2. Improved quality of electricity supply	• OCI 1.1: Average duration of unplanned outages
	• OCI 1.2: Average number of unplanned outages per month
	• OCI 1.3: Number of voltage drops per month
		• OCI 1.1 shows slight improvement at 11kV, but deterioration at 33kV. The 33kV results are close to target though, while those for 11kV are far below target.
		• OCI 1.2 has gotten worse at 11kV, but showing a slight improvement at 33kV
		• OCI 1.3 has not been recorded
		• Steps taken towards establishing a preventive maintenance programme
		• Pole replacement and line restringing organised such that customer inconvenience is minimised
		  ○ Outage schedules communicated to affected communities
		  ○ Not every day
		  ○ Support from ZECO operations teams
			• Ongoing
			• Extent difficult to assess, estimated to be 30%
			• QoS improvements will only become effective once network rehabilitation and/or upgrades have been completed
				• More focus on effective maintenance planning
				• Continue with implementation of preventive maintenance program
				• Record the causes of outages to identify focus areas for maintenance

Agreed Outcome	Corresponding Outcome / Output Indicators as per Monitoring Framework	Actual Outcome	Extent of Achievement to Date	Focus Areas for the Remaining Term
3. A competent maintenance unit performing preventive maintenance planning and work	• OCI 3.2: ZECO participatiuon in renewables seminars • OPI 1.1: Twinning implementation • OPI 1.2: Maintenance routines and procedures • OPI 1.3: Training of staff • OPI 1.4: Training of female staff	• OCI 3.2: 21 ZECO staff have participated in one solar PV seminar. Another seminar where XZECo staff participated was held in January 2017 • OPI 1.1: No success so far with procuring a twinning partner • OPI 1.2 reveals no progress to date • OPI 1.3 shows good progress, albeit slightly behind target, with various training courses for administrative and technical staff, both abroad (South Africa) and local (in Arusha and on-the-job training with TANESCO) • OPI 1.4 is above target • Acting project coordinator in place since September 2015, who was formerly the head of maintenance in ZECO • Good cooperation between Project teams and ZECO operational teams, to expedite rehabilitation work (pole replacement and line restringing) and minimise outage times for customers in affected communities	• Largely on track with training • Twinning arrangement lagging far behind • Maintenance routines and procedures lagging far behind	• Urgently establish maintenance planning and management systems and procedures • Procure a twinning arrangement that focuses on mainteannce planning and establishing an effective preventive maintenance system • If no suitable twinning partner can be identified, then engage a dedicated technical assistant with expertise in maintenance planning and system implementation (for at least 6 months) • Continue with technical training of maintenance teams, on a rotational basis • Additional support/training for project coordinator required, to fully capacitate her to lead the maintenance function in ZECO

4. Further electrification on Zanzibar in accordance with a prioritised plan	• OCI 2.1: % population connected to the grid
	• OCI 2.2: number of connected schools
	• OCI 2.3: number of connected medical facilities
		• Network extensions, upgrades and rehabilitation are underway on both Unguja and Pemba
		  ○ Guided by the EMP
		  ○ Implemented in accordance with annual work plans
		• OCI 2.1, 2.2 and 2.3 all indicate above target progress
			• Ongoing
			• EMP not yet adopted by ZECO
			• Electrification progress above EMP target
				• ZECO needs to iron out issues with the EMP so that it can be adopted as the guiding document
				• EMP Expedite transformer procurement
				• Continue to set realistic targets in the annual

Agreed Outcome	Corresponding Outcome / Output Indicators as per Monitoring Framework	Actual Outcome	Extent of Achievement to Date	Focus Areas for the Remaining Term
	• OCI 3.1: MWs of grid-connected renewables installed • OPI 4.1: EMP finalised • OPI 4.2: EMP adopted by ZECO • OPI 4.3: Investment inaccordance with EMP	• OCI 3.1 shows no progress • OPI 4.1 has been achieved • OPI 4.2 is shown as «agreed» in the APR, but the RT has found that it has not yet been approved by the board nor adopted as the guiding document • OPI 4.3 is on track		workplans, and implement accordingly • Measure the number of projects completed
5. Connection of customers in a feasible manner	• OCI 2.1: % population connected to the grid • OCI 2.2: number of connected schools • OCI 2.3: number of connected medical facilities	• OCI 2.1, 2.2 and 2.3 all indicate above target progress • Customer connections do not form part of this Project, but are implemented by ZECO once the networks have been extended • Network extension, however, alerts local communities to the prospect of being connected, and hopefully triggers applications to be submitted	• Ongoing • Above EMP target	• Effective coordination between Project Teams and ZECO will enhance the timely connection of new customers • Proactive engagement with local communities is recommended
6. Fostering economic development in intervention areas (job creation)	• No indicators	• Engagement of local communities/indivuduals for ○ bush clearing ○ collection, transport and delivery of replaced line materials to the ZECO depots • Access to electricity improves economic prospects in local communities ○ Lighting ○ Battery charging ○ Refrigeration ○ Electric appliances ○ Power tools	• Early stage • Ongoing • Evident wherever the Project reaches	• Consider awareness campaigns about benefits/uses, costs and dangers of electricity • Coordinate electrical appliance availability with local buisness people and traders • Consider bulk buying of good quality standard appliances, in order to enhance affordability • Consider a subsidised loan scheme for electric appliance
7. Shift from high-cost and polluting energy	• OCI 3.1: MWs of grid-connected renewables installed	• OCI 3.1 shows no progress • OPI 5.1 indicates progress under EU initiative	• Early stage • Ongoing	• ZECO/GoZ needs to take a decision about the existing generators, whether to retain

Agreed Outcome	Corresponding Outcome / Output Indicators as per Monitoring Framework	Actual Outcome	Extent of Achievement to Date	Focus Areas for the Remaining Term
forms (diesel, petrol, etc) to cheaper and more environmentally friendly energy forms	• OPI 5.1: FS for Unguja solar PV plant • OPI 5.2: Investment decision	• OPI 5.2 dependent on progress with EU initiative • With access to electricity there is bound to be a shift away from high-cost and polluting energy forms at a household level (candles, kerosene, batteries, wood, charcoal) • While the EMP contains high-level proposals for solar and wind generation facilities, the feasibility studies for and implementation of these are covered under separate initiatives, funded by the EU • Maintenance of the existing diesel generators is not included in the scope of this Project		these as an emergency backup (which will require a budget allocation) or to sell them off (which will release much-needed capital from a stranded asset) • Ongoing maintenance of the generator sets is essential, even though they are not presently in use, so as to avoid dilapidation of a relatively new and valuable asset
8. A successful project implementation	• OPI 2.1: Preventive maintenance equipment for Unguja • OPI 2.2: Preventive maintenance equipment for Pemba • OPI 2.3: Preventive maintenance budget • OPI 3.1: Corrective maintenance budget • OPI 3.2: Corrective maintenance equipment for Unguja • OPI 3.3: Corrective maintenance equipment for Pemba • OPI 3.4: Expanded storage facility	• OPI 2.1, 2.2 and 2.3 show no progress in the APRs, but the RT's mission has revealed that (most of?) the equipment has now been procured • OPI 3.1 is ongoing, with an annual budget • OPI 3.2 and 3.3 are slightly behind target, but ongoing • OPI 4.3 has been achieved • Capacity building of the maintenance unit appears to be on track • Network rehabilitation/upgrade/extension is underway, hampered by delays with transformer procurement • Preventive maintenance planning systems and procedures are not yet established • The role of preventive maintenance in ZECO, beyond this Project, requires clarification and an action plan with budget	• Early stage for preventive maintenance, with some delayed progress in the right direction • Ongoing	• Establish preventive maintenance planning systems and procedures as a matter of priority, so as to ensure a sustainable maintenance function in ZECO • Implement a maintenance budget, with allocations to support the Project • Continue with capacptiy building efforts (technical training, maintenance planning and management) • Prepare now for integrating network maintenance in ZECO's functional and organisational structures, beyond the horizon of the Project

Agreed Outcome	Corresponding Outcome / Output Indicators as per Monitoring Framework	Actual Outcome	Extent of Achievement to Date	Focus Areas for the Remaining Term
				○ Introduce a separate budget item for maintenance ○ Clarify the future organisational structure, and the role of preventive maintenance (part of operations, or a separate unti) • Introduce benchmarks and performance indicators for ZECO to publicise on a regular basis, to transparently demonstrate improvements in service delivery, eg ○ Frequency, duration and causes of outages ○ Number of new connections ○ Access levels

3.4 EFFICIENCY AND EFFECTIVENESS OF THE PROGRAMME

3.4.1 Efficiency of use of funds and resources

The total budget of the programme from the support agreement is shown in the table below:

Cost component	Maintenance	Electrification	Monitoring	Overall
Project management fees	3 300 000			3 300 000
Data collection /database equipment	100 000			100 000
Training courses at TANESCO	150 000			150 000
Tools, safety equipment	1 100 000			1 100 000
Line equipment	48 400 000	2 500 000		50 900 000
Transport and handling	1 800 000			1 800 000
Office and operational costs	4 500 000			4 500 000
Vehicles	2 000 000			2 000 000
Labour (hired)	7 200 000	30 000		7 230 000
Contingency (procurement)	4 840 000			4 840 000
Consultancy	1 350 000	1 500 000	1 250 000	4 100 000
Inception phase	1 980 000			1 980 000
Total (NOK)	**76 720 000**	**4 030 000**	**1 250 000**	**82 000 000**

As can be seen from the budget, the majority of the project is related to material costs and hiring labour for the upgrade of the transmission lines and other equipment costs, which account for about NOK 67.7 million, or 83% of the budget.

According to the last overview we have received from ZECO and the TA, the contract values of the contracts we have received overview over have been below budget (77% of budget). This shows that the money has been spent in an efficient way. In section 3.14 the RT team has investigated the price level of the contracts compared to international contracts

BUDGET VS ACTUAL FOR CBMP	Budget (NOK)	Contract value in NOK at exchange rate on date of payment	(Contract value in USD)	(Contract value in NOK)*	% of budget
DETAILS			USD/NOK	8.50	
WOODEN POLES	8 933 190	8 171 493	949 070	8 171 493	91 %
CONDUCTOR (ACSR AND ABC)	7 762 500	6 684 478	776 362	6 684 478	86 %
TOOLS AND SAFETY EQUIPMENT	1 978 230	Partly paid	88 325	750 765	38 %
CROSS ARMS AND INSULATORS	3 372 375	Partly paid	373 472	3 174 513	94 %
OFFICE FURNITURE	253 083	232 629		232 629	92 %
CRANE	1 020 000	1 033 076	118 608	1 033 076	101 %
DISTRIBUTION MANAGEMENT SOFTWARE LICENCE	62 000	67 503	7 750	67 503	109 %
STAY WIRE AND STAY ACCESSORIES	1 938 900	Partly paid	82 812	703 904	36 %
AERIAL BUNDLED CONDUCTOR AND ACCESSORIES	1 576 650	Partly paid	71 077	604 158	38 %
TOTAL	**26 896 928**		**2 467 477**	**21 422 518**	**80 %**
Training	873 992	812 172		812 172	93 %

** Contract value in NOK at time of payment for paid contracts and at USD/NOK 8.5 for unpaid contracts*

The cost of the training has been NOK 812 172. This involved 22 technicians receiving 2 weeks training with TANESCO and 7 managers receiving 2 weeks courses in South Africa. The average cost per training week per person including travels and accommodation is NOK 14 000, which we consider to be a reasonable expense.

3.4.2 Assess to what extent the training has been cost-efficient, value for money and sustainable, and identify areas where the training has benefitted ZECO as an organization

For this part the RT assessed ZECO's maintenance capacity, in how far training goals have been achieved, and training costs vs budget.

The formal training that has so far been provided as part of this Project is summarised in the following two tables:

a) Technical training for maintenance teams

TRAINING PERIOD	TRAINING COURSE	Unguja		Pemba		
		Male	Female	Male	Female	TOTAL
06-17 Sept 2015	Planning and Design		1		1	**2**
06-17 Sept 2015	Surveying (HT power lines)	1	1	2		**4**
14-25 March 2016	• Construction & maintenance of LV and MV lines • General safety in the workplace	4		4		**8**
28 Mar–08 Apr 2016	• Construction & maintenance of LV and MV lines • General safety in the workplace	4		4		**8**
	TOTAL:	**9**	**2**	**10**	**1**	**22**

The RT was informed that 2 employees who have been on training are now retiring, which raises the question why they were selected for the training course in the first place. No additional training is planned for 2017 under this Project, according to the project coordinator, but ZECO has an ongoing technician/artisan training arrangement with TANESCO for 3 months per year, outside the scope of this Project. It is the RT's opinion that the technical training for the maintenance unit should continue annually, until all members have been exposed to it, and to upskill staff for enhanced competence.

b) Management training with ICTDSA in South Africa

TRAINING PERIOD	TRAINING COURSE	Unguja		Pemba		
		Male	Female	Male	Female	TOTAL
16-27 March 2015	GIS application in power line network	1		1		**2**
06-17 April 2015	Assistance maintenance procedures and management		1	1		**2**
20 April-01 May 2015	Mastering project management for donor-funded projects	1				**1**
20 April-01 May 2015	Financial management for project accountants		1			**1**
20 April-01 May 2015	Tendering and procurement contract management	1				**1**
	TOTAL:	**3**	**2**	**2**	**-**	**7**

While this training appears to be relevant for the maintenance unit, and employees have found it to be beneficial, the RT recommends that some follow-up training is arranged, particularly focused on maintenance planning systems and procedures.

c) Twinning

The Project has envisaged twinning as a means of enhancing capacity building in ZECO. While repeated efforts have been made to procure a suitable twinning partner to date, this has not been successful.

Conclusion:

The key benefit of training lies in a more competent maintenance unit that understands the requirements of preventive maintenance and is ultimately empowered to follow a structured maintenance schedule, in accordance with an established system based on standard procedures. Other benefits of capacity building and training include

- For ZECO: commitment and loyalty to the organisation, higher work efficiency
- For the maintenance unit: motivation and pride
- For customers: Improved reliability and quality of electricity supply

Recommendation:

In identifying a suitable twinning partner, the RT recommends that electricity distribution entities focused on rural networks (eg the regional electricity distributors in Namibia) are targeted in particular, instead of larger utilities. As an alternative to twinning, a 6-month technical assistance arrangement with an individual expert in maintenance planning and systems could be considered.

3.4.3 Assess programme design, participation of relevant stakeholders, and project organization, monitoring and reporting

For this part the RT assessed the programme concept and organization in view of present status, stakeholder involvement, monitoring and reporting, and expenditure vs budget.

The RT's key observations are as follows:

a) Programme concept and organisation in view of present status

The combination of capacity building and establishing preventive maintenance capability in ZECO has made good progress, but is not yet at the desired level. Pole replacement and line restringing appear to be handled efficiently and competently by the crews, and outages schedules are coordinated so as to cause minimal inconvenience to customers and communities.

There is good cooperation between the maintenance unit and ZECO operations to expedite network rehabilitation, and some non-core activities are outsourced to local community members which frees up time for the maintenance unit and provides temporary employment for those community members.

While these aspects are indicative that the programme concept and organisation are working in the right direction – this is corroborated by anecdotal evidence gleaned during the various interviews conducted by the RT – the RT strongly recommends to place more emphasis in the next period on establishing an effective preventive maintenance planning system and standard procedures that enable measurement of KPIs. This may best be achieved through engagement of a suitable twinning partner or specialist consultant with experience in this area. Targeted further training/capacity building is also recommended.

Another aspect that requires attention is the effective integration of the maintenance unit and functionality into the functional/organisational structure of ZECO. While this Project provides a

focussed platform for capacity building in maintenance, it is important that ZECO considers now already how this unit/function is integrated into its structures so as to ensure continuity and sustainability.

b) Stakeholder involvement

ZECO: While there is good cooperation between the maintenance unit and ZECO operations to expedite network rehabilitation, as mentioned above, it is the RT's impression that ZECO views the project as only a project that is limited in time and budget, without much consideration being given to how the maintenance function may effectively be integrated in ZECO's future setup. The RT recommends that ZECO registers maintenance as a separate item in the annual budget and starts now already to make financial provision for this function so as to supplement the Project funds, which would improve maintenance efforts. Deciding on the role of maintenance in the future organisational structure will provide confidence in ZECO's ability to meet its goals in terms of reliability and quality of supply, while at the same time quelling uncertainty about employees' jobs.

ZURA: With the regulator not being fully functional yet in the electricity sector, there is little scope at this stage for effective interaction with and guidance to ZECO in terms of regulation, licensing and tariffs. A positive aspect is that the acting director for electricity regulation is on secondment from ZECO and thus has a thorough understanding of the issues that confront the utility.

The RT recommends that a cost-of-service study is commissioned, to inform the determination of cost-reflective electricity tariffs and the need for subsidies. Such a study would also need to establish what TANESCO should be charging for power supplied to ZECO, which has been a contentious matter that requires resolution.

Ministry of Lands, Water, Energy and Environment (MLWEE): While there is no direct involvement by the Ministry in the Project, the MLWEE is coordinating and monitoring all energy projects, and the Principal Secretary chairs the Annual Review Meetings for this Project. The Ministry's planning officer has commented that this Project is one of the most efficient ones with strong commitment from the sponsor (Norway) and the beneficiary (ZECO). He felt that the Ministry should also show its commitment to the Project through a budget allocation (eg to cover administrative lines). The RT agrees with this sentiment and recommends that such a government budget allocation should address affordability issues by way of subsidies (eg of the lifeline tariff or customer connection costs).

Ministry of Finance (MoF): This Ministry's involvement with the Project is through keeping track of fund flows and donor coordination. Present donors include Norway, Sweden, EU, World Bank, Japan and Netherlands, with the African Development Bank also coming on board soon. A further aspect of the MoF's involvement in electricity supply is through its Infrastructure Fund which supports the electricity connection to Fundo Island from Pemba.

The MoF's head of resource mobilisation and monitoring reported good cooperation with Norway and is not aware of any issues with this Project. MoF is participating in quarterly donor coordination meetings (only one so far) and has noted some overlaps in donor activity as well as a lack of transparency (donors not willing to share information). She also commented that ZECO's financial situation is improving, and that the MoF needs to raise awareness in government that the consequence of non-payment for electricity (by government departments) is that tariffs will need to rise to cover costs.

SIDA: SIDA is funding a 47 MSEK programme that commenced in November 2016, with the following components:

- Capacity building in the Department of Energy and ZECO
- Review of the Zanzibar energy policy and strategy
- Establish financial systems in ZECO

- Replacement of post-paid meters by pre-paid meters and smart meters
- Fault detection on cables
- SIDA might be able to take over parts of the support MCC was supposed to give to ZURA.

These initiatives complement the Norwegian Project, which appears to be working fine from SIDA's perspective. Emphasis needs to be placed on empowering ZECO and changing the working culture to that of a business, rather than a service provider. This requires emphasis on revenue collection, which has been a challenge, especially from government departments that have accumulated a significant backlog that would

European Union: The EU is funding a €3 million renewable energy programme that includes wind and solar measurement and data collection, a feasibility study into solar and wind power generation in Zanzibar, and technical assistance to develop a strategy and action plan for renewable energy and energy efficiency. This programme needs to be coordinated with the EMP, but existing conflicts between the respective technical advisors (as highlighted by the RNE and EU) are hampering this and threatening to become counter-productive to the overall effort of improving energy supply in Zanzibar. Better coordination is required.

c) Monitoring and reporting

The RT noted that the APRs do not follow the prescribed reporting structure as per Agreement, which complicates the assessment process. Going forward, the RT recommends that key indicators (eg duration, frequency and causes of outages) are monitored and reported on, for transparent measurement of real progress towards better reliability and quality of electricity supply in Zanzibar.

3.4.4 Recommend on how to improve efficiency and effectiveness, and how to convert outcomes into realistic measurable savings/increased income for ZECO

Based on the progress assessments of 4.1-4.3 above and 4.5 below, the RT recommends the following for the remaining term of the Project:

a) Improving efficiency / effectiveness

With the procurement of materials and equipment almost completed, and network rehabilitation/upgrading/expansion well underway, the key focus for the remaining term of the Project should be on maintenance planning and systemisation.

Specific recommendations are summarised in the table below:

	Recommendation	Envisaged Consequences
1	Implementation of an effective maintenance planning system	• Structured maintenance planning and budgeting • Clear responsibilities and priorities • Effective maintenance activities
2	Formally establish preventive maintenance function in ZECO	• Integrates the Project in ZECO planning • Fosters recognition of the importance of maintenance for ZECO's performance • Provides trigger to start budgeting for maintenance • Enhances sustainability of maintenance capacity
3	Bi-annual reporting on Project progress, instead of only once a year	• Timely progress assessment • Enables adjustment
4	Agree on, monitor and transparently report on key performance indicators (eg duration,	• Better focus on what really matters

	Recommendation	Envisaged Consequences
	frequency and causes of outages, new connections), by project and island (and for ZECO as a whole)	• Puts emphasis on planning and operational decisions • Enhances accountability • Regular and transparent external communication
5	Focus on priority workstreams by outsourcing non-core functions like bush-clearing, collection and delivery of replaced line materials	• Faster progress • Job creation for local communities
6	Continue cooperation with ZECO operations in rolling out the network rehabilitation programme	• Faster progress • Fewer power interruptions • Integration of Project activities within ZECO operational routines
7	Consider incentivising maintenance crews through agreed benefits for reaching defined targets	• Higher motivation of crews, focus on getting the job done • Faster progress • Fewer power interruptions • Requires tighter quality control
8	Transparently communicate project goals and progress to affected communities	• Requires good planning • Better cooperation with communities • Motivates crews to work according to an agreed programme, as the community can hold them to account • A pro-active and transparent approach is likely to raise community appreciation

b) *Converting outcomes to savings / increased income*

Better preventive maintenance should automatically result in savings and/or increased income for ZECO, in that the need for corrective maintenance is minimised and fewer outages enable more continuous electricity consumption. Preventive maintenance follows a predictable schedule that can be budgeted for, while corrective maintenance is disruptive of normal operations and often involves expenses (and at times very costly emergency measures) that have not been budgeted for. An unreliable electricity supply system also means that revenue generation is curtailed while costs are high, which puts strain on the financial viability of the utility.

The key goal in this regard for the remaining term of the Project should therefore be to fully establish and integrate the preventive maintenance function in ZECO's operations, supported by a practical maintenance planning system and organisation, and competent and efficient maintenance crews. Some of the specific recommendation made in the previous section also apply here (particularly 1 and 2). A heightened focus on key performance indicators will go a long way towards streamlining maintenance and other operations, and thereby improve the overall performance of ZECO.

However, while better maintenance has the potential for increasing revenue, the issue of non-payment by government institutions needs to be addressed as well. This is partly a political matter, and will need to be dealt with at government level.

Recommendation:

Effective regulation of electricity supply in Zanzibar, once ZURA is fully capacitated and functioning, will contribute to ensuring ZECO's sustainability. Transparency in the cost breakdown structure of electricity supply will provide insight into the cost drivers and enable measures to keep tariffs affordable and cost-

reflective, as well as offer motivation for government subsidies where these are required (eg to support the lifeline tariff for low-income customers, connection costs, or rural electrification in general). The RT therefore recommends that a cost-of-service study is commissioned.

3.4.5 Assess project relevance in light of actual/planned tariff level and collection rates

The project is highly relevant for reducing the cost of service of electricity from ZECO through better preventive maintenance, thereby contributing to reducing ZECO's operating losses. Sweden's aid programme is focusing on installing pre-paid meters and this should, combined with the efforts of the Norwegian programme improve the collection rates substantially. ZECO has challenges when it comes to collecting revenues from the government sector entities in Zanzibar. In an attempt to improve this, even some of the government institutions, including the Ministry of Finance had to install pre-paid meters. Large users like the hospitals and water supply cannot not have pre-paid meters due to safety issues, and the collection rates from these entities remain low. The same goes for revenue collections from the police and military.

The regulator, ZURA, is in the process of setting up regulations for the electricity sector, but they informed the RT that no cost of service study has been performed.

The GM of ZECO informed the RT that there is an dispute over the tariff level that ZECO should pay to TANESCO, and ZECO has an outstanding debt to TANESCO of TZS 62 billion (about NOK 227 million). On the other hand, ZECO has substantial receivables not paid from the government institutions (TZS 14 billion only from the water supply institution).

Conclusion and recommendation:

The project is highly relevant with respect to keeping long term operating costs down. However, the RT recommends that Norway or another donor finances a cost-of-service study for the electricity sector in Zanzibar as this will be an important pre-requisite to ensure sustainable electricity tariffs. It is also of high importance to improve the collection rate from the government institutions, and this needs to be handled at ministerial level.

3.5 ASSESS TO WHAT EXTENT THE PROFESSIONAL LEVEL AND KNOWLEDGE OF THE STAFF AT ZECO HAS BEEN INCREASED AS INTENDED, COMMENT ON THE RELEVANCE AND EASINESS OF MONITORING OF THE INDICATOR SET

a) Maintenance staff capacity assessment

The present maintenance unit comprises of two crews of 8 technicians and one foreman each, one based in Unguja and the other in Pemba. The unit is headed by an acting project coordinator – the original project coordinator has taken up political duties – and supported by a project finance head, a procurement head, a storekeeper and an assistant storekeeper.

Most maintenance unit staff have undergone training since the inception of the Project, and the general consensus seems to be that this has enhanced the unit's capabilities and motivation, which in turn has had a positive effect on Project implementation.

The RT has held discussions with various maintenance staff, both at management and execution level, and has witnessed field work by the crews on both islands. The impression was that the maintenance unit is fully occupied at present and under pressure to deliver – at least since the line materials have arrived – with the rehabilitation, upgrading and extension of networks. It was evident that the field teams are well organised and largely competent in the execution of their duties, which corroborates anecdotal accounts of technical training having improved the crews' motivation and skills. At management level, however, there appears to be need for additional training and support, particularly in maintenance planning and systemisation,

but also in human resource management. These areas should receive special focus during the remainder of the Project term, while technical training of new staff and upskilling of existing staff may not be neglected either and should form part of the ongoing capacity building initiative.

Concerns have been raised about a shortage of staff to deal with the workload, particularly on Pemba where 75% of the Project work is apparently located. On Unguja this shortage is being dealt with by having ZECO operations teams assisting whenever possible, but Pemba does not benefit from a similar assistance. While the staff shortage assertion may be true under present circumstances, it is the RT's opinion that this situation is temporary and should not be resolved by employing additional personnel on a permanent basis, as they may become redundant when the present projects have been completed. Rather, existing ZECO staff, or interns and temporary workers, should be engaged where possible, as is already the case in Unguja. Outsourcing of non-core activities is also an effective means of utilising trained staff where their skills are most effectively deployed.

The following table summarises the capacity gaps identified and documented in the 2015 APR, and the RT's assessment of progress in addressing these.

2015 Capacity Gap	Achievement to Date
Lack of project management skills	Only 1 staff member has had the benefit of a project management course in South Africa. The RT has not been able to assess if this was sufficient and what the further project management needs of the maintenance unit are.
Lack of procurement skills	A procurement head has been appointed and has been on a training course in South Africa. This capacity gap has been adequately addressed.
Lack of professional engineers	There are 3 professional engineers in the maintenance unit, which should be adequate for this purpose.
Inadequately trained technical staff (technicians)	22 staff have been on technical training in Arusha and/or on-the-job with TANESCO. The general consensus is that the maintenance crews are adequately trained now, meaning that this capacity gap has been adequately addressed for now.
Lack of preventive maintenance on the system and associated equipment	This area has not been adequately addressed and requires particular focus going forward, as structured maintenance planning is not yet in place. A maintenance management and planning system with structured procedures and routines needs to be implemented.
Lack of proper working tools including vehicles and cranes	The RT understands that the tools and equipment/vehicles required to undertake preventive maintenance have been procured. This capacity gap has thus been adequately addressed.

b) *Training investments*

The past training programs are summarised in the following table:

TECHNICAL TRAINING COURSES	MANAGEMENT TRAINING COURSES
Planning and Design	GIS application in power line network
Surveying (HT power lines)	Assistance maintenance procedures and management
Construction & maintenance of LV and MV lines	Mastering project management for donor-funded projects
General safety in the workplace	Financial management for project accountants
	Tendering and procurement contract management

Judging by the maintenance crews' competent execution of power line rehabilitation and general safety awareness, the relevant technical training has been effective and a worth-while investment. On the management and administrative side, it appears that the financial management and procurement training courses have been effective.

The lack of a structured maintenance management system with planning guidelines and maintenance procedures, despite the above training courses, suggests that additional training and support are required in this area. This is a critical aspect of establishing an effective maintenance function in ZECO, and will require an additional budget under the Project.

The RT was not able to verify the line surveying, GIS and project management competence of the maintenance unit, but understands from anecdotal accounts that these skills do exist.

c) Indicators

The monitoring framework includes 5 indicators that specifically measure maintenance unit competence. These are as follows ("OCI" refers to the outcome indicators and "OPI" to output indicators):

- OCI 3.2: ZECO participation in renewables seminars
- OPI 1.1: Twinning implementation
- OPI 1.2: Maintenance routines and procedures
- OPI 1.3: Training of staff
- OPI 1.4: Training of female staff

While the indicators are easy to measure and report on, it is important that the annual targets are clearly defined, preferably by breaking them down into smaller and more specific components. This is particularly important for OPI 1.2, which requires heightened focus in the coming year if the Project is to achieve a meaningful outcome overall.

3.6 RELATION TO OTHER DEVELOPMENT PARTNERS' SUPPORT

Currently there are only two other development partners (DPs) supporting ZECO, Sweden (Sida) and the European Union. The developments partners have close relationships and are communicating informally on a weekly basis, but also have frequent formal coordination meetings. Multiconsult is TA both for the Swedish and Norwegian support.

The focus of the Swedish support is:

- Capacity building in the Ministry of Energy (related to energy policy)
- Capacity building ZECO: Financial assistance
- Pre paid meters and fault identification of the lines

After the Millennium Challenge Corporation (MCC) withdrew from Zanzibar after the last election, the support to ZURA, the regulatory institution in Zanzibar was cut off. ZURA is in the start-up phase for electricity regulations, and need more financial support to be able to establish these services. SIDA might be able to take over the support MCC was supposed to give, but this has not been decided yet.

The focus of the EU support is the development of wind and solar, both supporting feasibility studies and measurements. They are also looking at the regulatory environment, including evaluating fee-in tariffs or other financial support for renewables. The Multiconsult pre-feasibility study for a 5 MW solar plant was shared with the EU. Both the RNE and the EU have expressed concern over existing conflicts between the TAs of their respective programmes, which are threatening to become counter-productive to the overall effort of improving energy supply in Zanzibar, and particularly the acceptance and implementation of the EMP. The RT's discussions with the EU's TA have corroborated such conflicts.

Conclusion:

There is a very good climate of cooperation between the development partners, securing that potential overlaps are avoided. There is currently no overlap between the Norwegian support and the support from Sweden and EU. The efforts of Sweden strengthen ZECO financially, partly through their financial assistance and partly through increasing revenue collection by installing pre-paid meters. The efforts of EU will over time lead to increased generation of renewable energy in Zanzibar, and this will increase the availability of power and reduce the dependency on mainland Tanzania for electricity supply. The programs of Sweden and EU will lead to even better results of Norway's efforts to enhance the distribution of power in Zanzibar.

Recommendation:

RNE should continue the close cooperation with ZECO and the development partners, and make sure that new potential DPs are included in the cooperation. During our mission, we were informed that both Netherlands and the African Development Bank are considering supporting the electricity sector in Zanzibar.

The existing conflict between the TAs of RNE and the EU needs to be resolved so as not to negatively affect the various initiatives.

3.7 ASSESS RELEVANCE TO NATIONAL DEVELOPMENT PLANS AND POLICIES

Growth of the economy in Zanzibar depends on the availability, reliability and reasonable cost/affordability of electricity and other energy sources.

The RT has assessed the relevance of the Project in relation to Zanzibar's key policy documents and development plans and has found that it is generally supportive of the various policy objectives and goals.

a) Vision 2020 (2000)

This development plan "*aspires to improving the standard of living of the people of Zanzibar. The vision points to promotion of locally affordable economic and social infrastructure such as electric energy, transport, communication facilities, banking facilities and other social services as key policies to reach the overall objective of eradicating absolute poverty in the society*."

Energy-related policy objectives include:

i. Establishing an independent power supply system to reduce dependency on imported energy and the pressure on demand for forest resources.
ii. Developing and promoting energy supply and management systems that will ensure reliable energy for all purposes at a reasonable cost.
iii. Encouraging Research and Development on non-wood energy sources (such as solar, wind power and biogas) and on energy efficient domestic alternative sources of energy.
iv. Promoting an efficient use of energy, ensuring conservation of renewable and non-renewable energy sources and the protection of environment; and
v. Promotion of petroleum exploration activities.

The first four of these objectives are addressed by the Project. Objective ii in particular is of key relevance, as the Project strives to improve reliability, quality and affordability of electricity

supply. The other three objectives are primarily addressed through the EMP which deals with energy independence and alternative energy sources.

b) *Energy Policy (2009)*

The relevant objectives of the *Energy Policy* are

i. transition from unsustainable wood-fuel use to modern energy sources,
ii. reliable, affordable and independent power supply,
iii. increased use of indigenous energy sources, and
iv. increased energy efficiency,

all of which are addressed by the Project to a greater of lesser extent. The reliability aspect of Objective ii), as well as Objective iv), are directly addressed by improving preventive maintenance and building capacity in ZECO, while increasing access to electricity - which the EMP is meant to address - will ease the burden on forest resources (90% of final energy consumption is ascribed to biomass , including wood-fuel, charcoal and agricultural residues). The EMP also partlyy addresses Energy Policy issue 11 (Energy and the Zanzibar Strategy for Growth and Reduction of Poverty), and makes high-level recommendations regarding independent power supply and increased use of indigenous energy resources, which are more directly addressed through other interventions (ref EU project).

Energy Policy issue 16 deals with subsidies to enable the poor to use modern energy, which is addressed by the life-line tariff promoted by the Project.

Devising a practical and cost-effective solution to dealing with the stranded Mtoni diesel generators as a possible backup facility when supply from the mainland is interrupted addresses another relevant Energy Policy issue, namely that of supply security.

Energy Policy issue 21 (Development of Human Resources for Administration, Service and Maintenance in the Energy Sector) is at the heart of the Project and directly addressed through the various capacity building and training activities.

Cross-cutting Energy Policy issues such as environmental sustainability and gender equality/equity are also addressed by the Project.

Other policies that are supported by the Project include Zanzibar's *Environment Policy* and *Agricultural Sector Policy,* both of which highlight the unsustainable demand for wood-fuel that is diminishing the forest resources and causing environmental damage, and the Zanzibar *Investment Policy* which is one of the macro policy instruments guiding the need for attracting investment.

c) *MKUZA II - Second Zanzibar Strategy for growth and Reduction of Poverty (2010)*

This strategy document acknowledges the importance of access to electricity for attracting investors, as well as the fact that Zanzibar is dependent on the power supply from the mainland.

One of the operational targets of the MKUZA II is to ensure energy security by 2015, with the following associated activities:

i. Conduct feasibility studies and implement the recommendations for future energy demands and alternative sources of energy, including wind and thermal energy, sea wave, solar energy and natural gas.
ii. Purchase and maintain standby generators both in Unguja and Pemba.
iii. Expand storage capacity for strategic fuel reserves.

iv. Conduct study to ensure petroleum and natural gas security for Zanzibar and implementation of recommendations.
v. Lay down electric submarine cable from Dar to Unguja.
vi. Create awareness of the efficient use of energy.
vii. Expand and maintain the present electricity infrastructure in Zanzibar.
viii. Ensure financial sustainability of ZECO.
ix. Build the human resource capacity of the energy sector.
x. Facilitate household energy installations.

Some of these have already been achieved, while others are ongoing. This Project has strong relevance for activities vii and ix, but also for i, vi, viii and x.

3.8 LESSONS LEARNED FROM THE RURAL ELECTRIFICATION PROGRAMME

The Norconsult and NCG end review of the rural electrification programme dated April 2009 highlighted the following lessons learnt from the programme:

- The core areas were focused to the degree that the training and capacity building objectives were not sufficiently prioritized. Here the activities were limited to the immediate needs of the project. A better focus could have been achieved by organizing the training as a separate component, with a designated officer responsible within REP, and/or by engaging external expertise.

Lessons learnt	How have the lessons learnt influenced the Maintenance programme
The core areas were focused to the degree that the training and capacity building objectives were not sufficiently prioritized. Here the activities were limited to the immediate needs of the project. A better focus could have been achieved by organizing the training as a separate component, with a designated officer responsible within REP, and/or by engaging external expertise	It is the RT's impression that focus on the construction of the transmission lines and other technical installations have been too high in the Maintenance project, at the cost of the Twinning arrangement receiving too little attention.
Good results in cost control were achieved through an extensive use of international tendering.	International tendering has been successfully implemented in the Maintenance programme, resulting in cost below budget.
The deficient technical capacity for maintenance operations and planning within ZECO is also alarming and should be addressed in future cooperation schemes.	This is the main focus in the new programme, but in the RT's view, too little attention has been put on the Twinning and training in preventive maintenance planning.
Capacity building for ZECO regarding management and finance is now addressed under other initiatives, but the technical fields are still not fully covered. Initiatives to deal with the extensive technical losses could contribute to raise revenues and increase the capacity of energy supply.	This is partly covered under the Norwegian support programme, and partly under the Swedish support programme, where pre-paid meters are being installed to ensure better revenue collection.
ZECO is in particular need of capacity building for maintenance, including training in technical skills, planning procedures, routines and work manuals. There is also a need for specialization in network planning	This is the focus are of the current programme, and there are significant improvements in technical skills and routines, but still more improvements in planning is required.

Lessons learnt	How have the lessons learnt influenced the Maintenance programme
Initiatives should also be launched to strengthen ZECO's statistical services and the production of statistics from its consumer database in particular.	This has partly been implemented in the monitoring framework which was developed under the current programme.

The ILPI report summarized the following recommendations for future support projects:

Lessons learnt/recommendations	How have the lessons learnt influenced the Maintenance programme
Projects should be designed from the onset with a view to their larger consequences, prerequisites and complementarities.	The project has designed targets for operational performance and capacity building. The targets are measurable and easy to control
This entails in particular additional work on the field to adjust the parameters of the intervention to the real-world situation at hand.	
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.	
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.	

Conclusion and recommendation:

It is the RT's view that most of the recommendations have been taken into consideration. The RT strongly recommends that the training and/or Twinning arrangement with focus on capacity building on long term preventive maintenance planning is prioritized in the remaining period of the programme.

3.9 Role of the Technical Assistant

The overall objective of the project is improved economic and social development in a sustainable way in Zanzibar, through increased access to affordable, reliable and sustainable electricity services. The ToR for the Technical Assistant lists several tasks to be performed by the TA. These, as well as their current status, are presented in the table below:

Task	Achievement
Present a summary report of the inception phase recommendations, as a supplement to the original Project Document.	A summary report of the inception phase recommendations was presented in May 2015.
Finalize the the Goal Hierarchy and the corresponding Key Performance Indicators for project progress monitoring and reporting. The	Goal Hierarchy was developed and has been reported in progress report. Also reporting on a number of KPIs in the progress reports.

Task	Achievement
Goal Hierachy will also supplement the original Project Document and be finalized with technical input from Norad	
Present a comprehensive strategy for capacity building, based on the baseline study and capacity building and training plan. The strategy shall recommend capacity building interventions in consideration of the role and cost effectiveness and sustainability of all options available, including the Chief Technical Adviser, the Twinning arrangement, as well as different short and longer-term training options. The strategy shall also include a plan to measure the effect of these interventions.	The comprehensive strategy for capacity building was never developed. Considering that the Twinning arrangement is still not in place and there is still no plan for the future preventive maintenance, it seems that not making this strategy in the early stage of the project was a mistake.
Finalize the TOR for the Twinning utility, looking into opportunities to also incorporate aspects of the coming SIDA and MCC TA support, and issue a call for service/tender. It is an aim to complete this process and that the Twinning utility will be selected within the third quarter of 2015.	ToR was finalized and several utilities contacted for Twinning arrangement, but still not successful. Need to expedite this as the Twinning arrangement may improve the understanding of need for planning and budgeting preventive maintenance.
Closely follow and ensure value for money in the ongoing procurement of materials and equipment for the rehabilitation works.	The TA has been actively involved in the procurement processes being instrumental in preparing tender documents, and has also been an advisor in the tender evaluations. Only two tenders remain under the programme, and the tender documents for these tenders have already been finalized.
Assist in the further development of an asset inventory and ensure that the equipment procured is duly registered.	The asset inventory lists have been integrated with the SAP reporting system and is mostly operative, but still some categorization work remains.
Procurement of computer network for the offices	Completed
Procurement of tools and safety equipment	Completed
Procurement of vehicles (truck)	Completed
Selection of training programmes and staff training	Completed
Feasibility study for a 5 MW solar plant on Unguja, including a high level business and financing plan	Study completed and shared with the EU and EU's consultants.
Review of the EMP and preparation of an investment plan	The EMP has been revised, but minor changes remain, including the upgrade of the network in Stonetown.
TA shall assist with the rehabilitation work	Chilima is both giving valuable assistance to the management of the maintenance project and to the crews in the field. Always tries to bring at least one of the engineers for training in addition to instructing the technicians at site.

Conclusion and recommendation:

The technical assistant has completed a number of the tasks in the ToR. Most importantly, all the tenders (with the exception of two) have been completed with success, at or below budget. Due to complications relating to tax exemptions, one of the tenders was delayed, but the problems were solved, and the tax exemption does not pose a threat to the last two tenders. As described in section 3.4.2, linesmen and members of the administration have undergone successful training with TANESCO and in South Africa, clearly improving both the knowledge and motivation of the participants. The inventories have been registered and integrated in the SAP accounting system, but some detailing remains to be completed.

The Twinning arrangement has still not materialised and a plan for how to implement a preventive maintenance unit after the end of the project remains. *It is the RT's opinion that the TA should have much more focus on the long-term capacity building in the remaining period of the programme.* A twinning arrangement or another training arrangement for planning preventive maintenance should be on top of the agenda. The TA should also assist ZECO management in developing a plan and budget for preventive maintenance at least a year before the end of the project. If ZECO supports a separate preventive maintenance budget, and plans for integrating the maintenance unit into their operation department, it is more likely that the organization will be able to handle the preventive maintenance in a professional and responsible manner after the end of the support programme. The RT understand that the local presence of the TA has been gradually reduced during the programme, and that this is according to plan and budget since the intention is that the Maintenance Unit will take larger responsibility as their competence increases. The RT is of the opinion that the Maintenance Unit still has not reached a satisfactory level of understanding of how to plan the preventive maintenance in ZECO, and that in addition to the Twinning arrangement, more support from the TA is needed. The RT therefore recommends that *the savings on procurement of materials is reallocated to supporting more presence of the TA in Zanzibar, with focus on assisting ZECO to develop their preventive maintenance policies and procedures.*

3.10 Assess to what extent the Electrification Master Plan (EMP) targets have been met, the process and involvement of ZECO in developing the plan and the relevance of the EMP for the future development of electrification on Zanzibar beyond this project

The 2014 EMP proposes various network upgrades, refurbishments and expansions over the period 2015 to 2030, based on a demand forecast that predicts a doubling of consumption over the next 11 years, and a doubling of peak demand over the next 14 years. Two sensitivity analyses regarding alternative demand scenarios are presented, showing the effects of a lower number of connections due to solar home system uptake and reduced consumption as a result of better energy efficiency.

Various supply options are considered at high level, including import from TANESCO, running the high-speed diesel gensets at Mtoni, developing a 10MW wind farm, and building a 5MWp solar PV plant.

a) EMP targets and progress

The EMP targets are summarised in this section.

The EMP highlights the poor condition of poles and conductors in sections of the network and recommends that 1,487 individual poles are replaced, 52km of 33kV line is reconstructed and 95km of 11kV line is reconstructed. As the EMP does not contain an overview of the recommendations, the RT has tried to summarise these in the following table:

	UNGUJA		PEMBA	
	33kV grid	11kV grid	33kV grid	11kV grid
Replace rotten poles	450	-	1,037	-
Reconstruct line sections	Kivunge-Nungwi 17.5km	Welezo-Bambi 50km	Pandani-Masipa 1.4km	Entire 11kV network
	Kitogani-Paje 11.6km	Mwanyanya-Dole 20km	Amani Road-Ole 1.4km	
	Dunga-Ufufuma 8km	Mtoni-Mpendae 25km	Pujini-Kichaka 11.6km	
TOTAL Line Length	37.1km	95km	14.4km	??
Overloaded transformers to be upgraded	1 x 50kVA	1 x 50kVA 2 x 100kVA 1 x 200kVA 1 x 250kVA	1 x 50kVA	1 x 15kVA 1 x 50kVA

Regarding reliability and quality of supply, the EMP lists the recorded number of circuit breaker trips (in 2013) and calculates the number of outages from these, based on the assumption that an outage is made up of 5 trip on average. Earth faults are by far the most common reason for trips and outages. The average outage duration is also recorded. These statistics, which are summarised in the table below, demonstrate significant room for improvement.

	UNGUJA		PEMBA	
	33kV grid	11kV grid	33kV grid	11kV grid
Number of trips	1,006 (avg 80/mo)	84 (avg 7/mo)	233 (avg 19/mo)	122 (avg 10/mo)
Average number of outages	201	17	47	24
Total outage duration (minutes)	14,530 (avg 20 hrs/mo)	4,233 (avg 6 hrs/mo)	1,585 (avg 2 hrs/mo)	2,037 (avg 3 hrs/mo)
Average outage duration (minutes)	76	252	38	85

The envisaged sequence of proposed projects and investment requirements is summarised in Table 39 of the EMP:

Table 39 EMP investment requirements to achieve 95% access and increased energy independence, 2015-2030

	Project number	Project name	Capital Expenditure (million TZS)									Total (million TZS)	Total (million USD)
			2014	2015	2016	2017	2018	2019	2020	2021-2025	2026-2030		
Maintenance	A-1	Replacement of single rotten poles Unguja		77	77	76						153	0,1
	A-2	Replacement of single rotten poles in Pemba		180	180	180						540	0,3
	A-3	Reconstruction Kiwunge - Nungwi		394	393							787	0,5
	A-4	Reconstruction Kitogani – Paje		255	256							511	0,3
	A-5	Reconstruction Dunga-Ufufuma		128	128							256	0,2
	A-6	Reconstruction Pandan-Masipa			67							67	0,0
	A-7	Reconstruction Anani Road – Ole		67								67	0,0
	A-8	Reconstruction Pujini – Kichaka		265	266							531	0,3
	A-9	Reconstruction of 11 kV Ubago – Bambi village				690	690					1 380	0,8
	A-10	Reconstruction of 11 kV Mwanyanya - Dole				285	286					571	0,3
	A-11	Reconstruction of 11 kV Mwanyanya - Mton				363	363					726	0,4
	A-12	Reconstruction of the 11kV grid on Pemba (alternative B)		2 247	2 247	2 247						6 741	4,1
	A-13	Reinforcement of 11 kV Mpendae feeder out from Mtoni		TBD								TBD	TBD
	A-14	Corridor vegetation clearing		650	650	650	650	650	650	3 250	3 250	10 400	6,3
	A-15	Tibirinzi substation / switching station		TBD								TBD	TBD
	A-16	Installation of manually- and/or remote operated load breakers		TBD								TBD	TBD
	Sub-total		0	4 263	4 264	4 491	1 989	650	650	3 250	3 250	22 731	13,8
Grid build-out	B-1	33 kV line Pongwe – Kiwengwa (5.9km)							265			265	0,2
	B-2	5MVAr capacitor bank in Kivungve secondary substation including circuit breaker bay					348	348				695	0,4
	B-3	33 kV line Charawe – Chwaka (3km)					80	85				165	0,1
	B-4	Reinforcement of 33 kV line Mtoni - Kivunge area (21km)								5 789		5 789	3,5
	B-5	33 kV line Matemwe – Nungwi (10km)								2 647		2 647	1,6
		MV-HV Unspecified								10 000	20 000	30 000	18,2
	Sub-total		0	0	0	0	428	433	265	18 436	20 000	39 561	23,9
LV	LV	Investment in LV grid and new connections		8 278	14 532	15 592	19 015	20 466	22 029	144 004	262 926	**506 842**	306,8
	LV	Payment for connection			-2 483	-11 405	-15 062	-17 304	-19 741	-13 217	-86 402	**-165 614**	-100,3
	Sub-total		0	8 278	12 049	4 187	3 953	3 163	2 289	130 787	176 524	341 228	207
Supply	Supply 0 (pilot)	5MW solar power Unguja		13 200								13 200	8,0
	Supply 1	45MW solar power Unguja				118 800						118 800	71,9
	Supply 2	80MW wind power on Unguja						256 000				256 000	155,0
	Supply 3	10MW solar power on Pemba								26 400		26 400	16,0
	Supply 4	10MW wind power on Pemba				32 000						32 000	19,4
	Supply 4	SHS							660	1 320	1 320	3 300	2,0
	Sub-total		0	13 200	0	150 800	0	256 000	660	27 720	1 320	449 700	272
Total	**GRAND TOTAL (million TZS)**		**0**	**25 741**	**16 313**	**159 478**	**6 370**	**260 245**	**3 864**	**180 193**	**201 094**	**853 220**	
	GRAND TOTAL (million USD)		**0,0**	**15,6**	**9,9**	**96,5**	**3,9**	**157,5**	**2,3**	**109,1**	**121,7**	**516,5**	

The 'A' projects relate to maintenance and are those (to be) executed by the Norwegian-funded intervention. Progress with these projects is indirectly reported in the APRs, via the Project outcomes and outputs of the monitoring framework. While the implementation of these projects is underway, it is evident that the programme is behind schedule, which is largely the result of a protracted procurement process for the materials. Most of the materials have arrived during 2016 and the first few projects are in the process of being executed, with ZECO operations teams assisting where possible (Unguja only) to catch up on the delay.

b) ZECO's role in developing the EMP

In the EMP introduction it is stated that the master plan "is prepared by the Zanzibar Electricity Corporation (ZECO), with assistance from the consulting company Multiconsult | Norplan of Norway". The RT was not able to obtain details of and confirm ZECO's role and involvement in developing the EMP, however, except for anecdotal evidence that key ZECO staff members were consulted during its development. The final EMP was to be approved by the ZECO board and become the guiding document for capital project budgeting and implementation, but this board approval has not yet been granted, more than 2 years after its finalisation, which is indicative of ZECO not having taken ownership of the master plan, possibly as a result of failure to obtain the utility's buy-in at the right level from the onset and due to lack of involvement of senior management in its conceptualisation and development. This is corroborated by ZECO's intention to review and change certain parts of the EMP – in particular the inclusion of distribution planning for Stone Town (which was previously catered for under the MCC project) and elaboration of generation planning – before presenting it to the politicians, which is scheduled to happen in time for the 2017/2018 budget, ie by June 2017, according to ZECO's General Manager.

In addition, ZECO's General Manager stated during discussions with the RT that the EMP is not being used by ZECO as a guide for planning and scheduling projects, which casts its relevance and expediency into question.

Despite the EMP not having been formally approved, and ZECO 'not using' it for scheduling projects, the implementation of its priority distribution maintenance projects – with which there does not seem to be any controversy - has commenced via this capacity building Project.

c) Relevance of the EMP for Zanzibar beyond this Project

The above EMP investment schedule provides for completion of most of the maintenance projects by the end of 2018, which is also the end of this Project. However, implementation is behind schedule as a result of delays with the procurement of materials and equipment, which is likely to also delay the completion of these projects. The EMP is therefore still relevant for a while after the end of this Project.

With the EMP being reviewed and updated in 2017, including the preparation of an investment plan according to the 2016 APR, a new implementation plan and schedule will emerge that will define more realistic dates for the maintenance projects. Further, the possibility exists that new maintenance projects and priorities are identified as more detailed analysis and strategic planning is undertaken.

Conclusion and recommendation:

The fact that the EMP in its original form has not been approved by the ZECO board, and ZECO not appearing to take active guidance from it, are cause for concern about its relevance. However, ZECO's intention to review and change the master plan indicates that the utility is taking ownership.

The RT recommends that the EMP update process is expedited and possibly enhanced through an independent review that is cognisant of the overall policy objectives of improving energy supply in Zanzibar, including a more in-depth evaluation of generation options.

3.11 CROSS-CUTTING ISSUES

3.11.1 Gender

In 2016 the TA commissioned the consultant Aggripina Adolph Mosha to assist ZECO in making a gender assessment of ZECO and developing an Institutional Gender Equality Strategy for greater inclusion of female employees within the organization. This work was funded under the support programme from Norway.

The main conclusions of the gender assessment were:

"Women in ZECO work in all departments and sections, and they are fewer in numbers relative to men, with the exception of the finance department, where women were 38 (53%) out of total 72 staff. The Technical/Operations department had the least number of women 23 (8.2%) compared to men 258 (91.8%). Data from the HR-Department showed the Institution had 4 female and 14 male registered engineers out of them 5 male engineers were at Executive Management positions and none of the female engineers was at that level. With technical qualifications were 7 females and 42 males. It was said to be rare for the female technicians and engineers to go for field activities as they were rarely assigned to do so. Most of them were bound to routine desk work. Though the women engineers expressed the desire and competence for field work, their male colleagues were of different opinion. Culture, traditions and family expectations from a woman came out strongly as silent inhibiting factors in hiring females at technical and engineering fields. Maternity leaves were also perceived as loss of human power to the Company."

The assessment further concluded:

"It is evident from the findings that, the gender inequality in the technical and engineering positions in ZECO is not unique but a phenomenon from household and community levels where norms, shape desires, attitudes and actions of boys and girls to fit into masculinity and femininity images that are constructed and prescribed by their communities and create gender stereotypes. It is also a trend in relevant learning institutions and professional associations."

"Despite of the gender diversity in employment within the ZECO; representation of women is very low and the lowest in the technical/operations department. Similarly at the executive management and decision making level, women are marginally represented.

Apparently, gender equality/equity was not vividly considered in the recruitment, training or internships. However, desire to increase the number of women employees in all sectors was expressed by the management team leader, who was acting in the position of ZECO Manager. The challenge mentioned was, women applicants for jobs were few and in many cases they did not have the desired qualifications. ZECO should be proactive in reaching out to qualified women and encourage them to apply for jobs and positions of company decision making."

During our meetings in Zanzibar and Dar Es Salaam it also became evident that becoming a qualified engineer requires participation in seminars and forums in addition to the formal education, and participation in such seminars is also required to keep the engineer title. It is often difficult for women to get the opportunity to participate at these events in order to keep their qualifications because it is not usual for women to insist on such participation.

In her report, the consultant developed a "Proposed Plan for the ZECO Gender Equality Strategy 2016-2021". This plan contains objectives, strategies, detailed actions, performance indicators for the activities, responsible personnel and deadlines. The plan has received support from ZECO management.

Conclusion and recommendation:

There is significant gender inequality in ZECO, which reflects the general gender inequality in the technical fields in Zanzibar. The Proposed Plan for the ZECO Gender Equality Strategy seems to be a well-developed tool which is supported by the ZECO management. We therefore recommend that the plan is implemented by ZECO and that the implementation is monitored by the TA.

3.11.2 Environment

The environmental impact of the project has been minimal since ZECO has chosen to follow the original line routes when upgrading the lines. The main challenge seems to be waste treatment. During our site visit to Mtoni where the diesel generators are located, it became evident that there are no policies on treatment of waste and oil. We were informed that when the generators need servicing (they have not been serviced yet), the oil would most likely be spilled in the ground at site.

The waste from the upgrading and replacement of power lines is being collected and stored in the storage facilities waiting for waste management policies to be finalised. The waste at the storage facilities do not pose any immediate threat to the environment.

We were told that a waste management policy is being developed, but were given no deadline for this activity.

Conclusion and recommendation:

The waste management policy should be finalised and operationally implemented as soon as possible in order to prevent damages to the environment. The generators at Mtoni should be serviced as soon as possible, and it is important that responsible disposal of oil and contaminated parts/consumables is part of the ToR for the servicing of the generators. ZECO should report on these improvements in their progress reports to RNE.

3.11.3 Corruption

The maintenance team, who were inexperienced with procurement processes, handled the first tenders. The team faced some challenges and the processes did not comply with all national procurement regulations. Although no signs of corruption were discovered in these tenders, complying with regulations is vital for preventing corruption. The procurement practise has been changed, and the tender board of ZECO now handles all tenders. The tender board includes professional procurement staff, and the current procurement staff is therefore more competent than the maintenance unit. The new practise secures that the procurement process complies with all rules and regulations.

Conclusion:

There are only two tenders left in the programme, and the tender process is now handled in a professional way by the tender board. The tender board complies with rules and regulations, and has additional support from the TA. The RT team therefore views the procurement risk to be low and under control.

3.11.4 Climate Change

The impacts of the programme on climate change are twofold:

1. The pre-feasibility study of a solar plant will, if the project is implemented, lead to reductions in CO_2 emissions since thermal power plants generate a significant part of the power from the mainland.
2. The improved condition and upgrading of the transmission lines and substations will reduce power losses, thereby reducing the total electricity generation required for delivering the same amount of power to the end users.

Conclusion:

The reduction in CO_2 emissions from these impacts are not quantified, but the project obviously contributes to reducing CO_2 emissions. ZECO should aim at quantifying the CO_2 impact of the reduced transmission system losses and report this in their progress reports to RNE.

3.11.5 Human Rights

The most relevant Human Rights issues related to electrification projects are gender equality, the right for employment, the right for education and health services. Gender equality has been discussed earlier in this chapter, and the job creation results of electrification are dealt with in section 3.16. When it comes to education and health services, the programme will provide more stable electricity supply to schools and hospitals/health centres, which again allows them to provide better services to the public.

In 2015 the UN established 17 sustainable development goals. The UN describes the rationale for the goals in the following manner:

“This Agenda is a plan of action for people, planet and prosperity. It also seeks to strengthen universal peace in larger freedom. We recognise that eradicating poverty in all its forms and dimensions, including extreme poverty, is the greatest global challenge and an indispensable requirement for sustainable development. All countries and all stakeholders, acting in collaborative partnership, will implement this plan. We are resolved to free the human race from the tyranny of poverty and want and to heal and secure our planet. We are determined to take the bold and transformative steps which are urgently needed to shift the world onto a sustainable and resilient path. As we embark on this collective journey, we pledge that no one will be left behind. The 17 Sustainable Development Goals and 169 targets which we are announcing today demonstrate the scale and ambition of this new universal Agenda. They seek to build on the Millennium Development Goals and complete what these did not achieve. They seek to realize the human rights of all and to achieve gender equality and the empowerment of all women and girls. They are integrated and indivisible and balance the three dimensions of sustainable development: the economic, social and environmental.”

Human rights is the central part of what the UN want to achieve with the programme, and development goal number 7 reads:

“Ensure access to affordable, reliable, sustainable and modern energy for all”

Conclusion:

The UN recognizes access to electricity as a goal in itself to achieve human rights. Measuring the connection rates and electricity access and improvement in the reliability should be performed. In this project ZECO has already included measures of system reliability and stability in their monitoring framework and this is included in the annual progress reports. The RT team believes this is sufficient reporting for this project. For other electrification projects, focus should also be put on measuring new connections and improved availability of power for schools, hospitals and water supply as they all provide essential services covering basic human rights.

3.12 MAJOR RISK FACTORS

The Amended Agreement identified a number of major risk factors (internal and external) for the project. Below is the RT's assessment of the current status of these risk factors:

3.12.1 A poor financial situation in ZECO due to poor revenue collection

ZECO still has a rather weak financial situation, but are showing several major improvements. The total technical and commercial electricity losses were 30% 5 years ago, but were in 2016 reduce to 23%, and the target for 2017 is 22%. Technical losses constitute 8-9%, and about 14-15% are commercial losses. ZECO's target for 2020 is 18%, which is the current level in Kenya. ZECO is currently installing pre-paid meters for all customers except larger commercial customers, and this will further reduce the commercial losses. SIDA has committed to support further installation of pre-paid meters, and the RT team therefore considers the goal of total losses of 18% by 2020 to realistic.

In the autumn 2016 ZECO got approved a 20% tariff increase, while a similar increase on the mainland was not approved by the government. The fortunate result for ZECO is that their revenues increased by 20%, while their cost of power did not increase.

3.12.2 Blackouts due to power crisis or breakdown or grid

Since the back-up generators at Mtoni are not sufficiently maintained and therefore not ready for operation, a breakdown of electricity supply from the mainland or malfunctioning of the sea cable would lead to power supply interruptions. The generators have not been serviced because ZECO considers the fuel cost too high, and there is no diesel in the storage facilities. Since no other power generation facilities have been established in Zanzibar, this leaves the power supply in Zanzibar vulnerable if there are interruptions in supply from mainland.

Recommendation:

ZECO should develop a plan for how to handle potential power interruptions.

3.12.3 Lack of mandate, ownership, coordination or commitment within the organisation

The maintenance unit is operating well, but it is a separate organization within ZECO, with its own budgets, mandate and management. The unit has support and commitment from the General Manager of ZECO, but it is treated as a separate unit and not part of ZECO operations.

Recommendation: For the unit to be operative at the time when the Norwegian support ends, it is vital that the unit gradually will be integrated into ZECO operations department, with its own work plan and budget. If this is not achieved by the end of the support period, it is the RT's view that the knowledge and focus on the preventive maintenance will be significantly reduced.

3.12.4 Challenges of procurement, including corruption

The maintenance team, who were unexperienced with procurement processes, handled the first tenders. The team faced some challenges and the processes did not comply with all national procurement regulations. Although no signs of corruption were discovered in these tenders, complying with regulations is vital for preventing corruption. The procurement practise has been changed, and the tender board of ZECO now handles all tenders. The tender board includes professional procurement staff, and the current procurement staff is therefore more competent than the maintenance unit. The new practise secures that the procurement process complies with all rules and regulations.

Conclusion:

There are only two tenders left in the programme, and the tender process is now handled in a professional way by the tender board. The tender board complies with rules and regulations, and has additional support from the TA. The RT team therefore views the procurement risk to be low and under control.

3.12.5 Political risk

The political risk increased after the last election, as some of the other development partners (MCC and WB) pulled out their support to the Zanzibar electricity sector.

3.12.6 Risk of theft and vandalism

The equipment of the project and also the waste material from the lines that are being repaired are stored safely in the warehouses of ZECO, and the materials are registered in the SAP system. The risk of theft and vandalism seems very limited.

3.12.7 Risk of delays

There have been some delays in a few of the procurement processes, and therefore there are some delays in the project. The delays are not material, and do not represent a large risk to the project.

3.12.8 Risk of donors duplicating roles

As presented in section 3.6, the cooperation and coordination between the development partners is very close, with regular formal meetings, as well as weekly informal contact. In addition, Multiconsult is the TA of both the Swedish and Norwegian support, and therefore has a good overview of both programmes.

Conclusion and recommendation:

The RT considers the risk of duplicating donors' roles to be very low since there are currently only three donors with a close communication and cooperation between them. We would recommend that new donors entering the electricity sector in Zanzibar (currently the Netherlands and the African Development Bank are considering their support) are included in this cooperation.

3.12.9 Fiduciary risk

The procurement of materials and equipment has on average been below budget and only two tenders remain. The RT therefore considers the fiduciary risk for the remainder of the project to be low.

3.13 Follow up of the recommendations provided by the Auditor

The RT has reviewed the audit report by KPMG dated 29. February 2016, and the ZECO management response to the report. The RT also had a meeting with Ms. Riziki Faki Hamad, Capacity Building and Maintenance Project Finance Head to clarify the progress of the outstanding issues from the audit report.

All recommended improvements mentioned in the previous year audit were addressed in the management response, and all recommendations have either been implemented or were to a large extent implemented by the response letter from the management was written. The only outstanding issues were:

1. Project financial accounting should be performed in the SAP accounting system of ZECO, and not in Excel
   This has now been rectified, and was demonstrated to the RT by Ms Hamad
2. Withholding tax was not deducted in one instance
   This was one mistake made by an unexperienced deputy accountant. This is now under control.
3. Whistleblowing procedures and anti-corruption manuals are not in place
   Was partially implemented by September 2016.
4. Update of accounting policies to comply with IFRS standards and reconciliation of Fixed asset registry.
   The items are currently being finalised in the SAP accounting system
5. Accounting system shall meet the accounting requirements of each department
   This has now been implemented and the Maintenance project is now accounted for in the SAP system.

The KPMG audit had the following comments for the current year (2015):

1. The project accounts should be streamlined into the SAP accounting system by creating a module therein.
   a. *This has now been implemented and is functioning satisfactorily.*
2. Variance analysis between actuals and budget should be performed at least on a quarterly basis.
   a. *The budget is registered in the SAP accounting system, and variance analysis is readily available as a report in the system.* ***The RT recommends that the variance analysis is incorporated in the quarterly reporting to the RNE.***
3. Management should ensure compliance with the Public Procurement and Disposal of public asset Act, 2005 and its regulations. The management should further liaise with the Port Authority to find a proper way of reducing the time lag that consignments stay at the port.
   a. *The management has made sure that the tender board is involved in all tenders now, and the board includes professional procurement personnel. They therefore consider the compliance to be adequate now.*
   b. *The management has reached an agreement with the Ports Authority regarding tax exemptions, and the procedure is operating more smoothly now.*
4. Bank reconciliations should be signed with date by the preparer, reviewer and approving person.
   a. *This procedure was formerly manual, but is now performed electronically, and the dates are therefore automatically recorded in the system.*
5. Petty cash should be counted at end of every month and a cash count certificate should be maintained to support the balance.
   a. This recommendation has still not been implemented, and in the RT's opinion this should be implemented as soon as possible.
6. Withholding tax should be withheld for all relevant payments
   a. *The withholding tax was not withheld on one instance when a deputy made the payment. The issue seems to be under full control.*
7. Management should ensure proper segregation of duties in handling project expenditure. The four eyes principle needs to be put into effect.
   a. According to Ms Hamad, this is now secured by getting assistance from a person in the corporate finance department.
8. Management should ensure that once payments have been made, all payment vouchers including their respective supporting documents are cancelled or stamped "paid" so as to eliminate the risk of multiple payments.
   a. *Ms. Hamad confirmed that they now stamp the whole document with "paid" stamp*
9. Management should ensure that all staff travelling returns boarding passes as proof that they have actually travelled.
   a. *Many of the travel passes are now electronic, and the ferry does not give boarding passes.* ***It is the RT opinion that this is a very strict requirement and that this***

requirement from the auditor should be relieved. In many cases, boarding passes do not exist.

Conclusion and recommendation:

The management has followed up the recommendations from the auditor in a tidy manner, and have implemented most of the recommendations. It is the RT's view that the following items need to be followed up:

1. Variance reports of actual spending compared to budget for each main budget item should be reported regularly and the RT recommends that such overviews are included in the quarterly progress reports from Multiconsult in order to facilitate control of the project.
2. Petty cash should be counted and a signed certificate issued at each end of month.
3. The requirement from the auditor to present boarding passes for all staff travels should be eased to a level which is practically implementable. Boarding passes are not always available.

Ms. Riziki Faki Hamad, Head of Finance for the Capacity Building and Maintenance Project, has received training on project reporting management in South Africa, and has improved her skills through the training. She has been able to comply with the auditor's comments and had no major issues in the last audit. She has also managed to integrate the Project's accounts into ZECO's SAP accounting system. When needed, Hamad receives assistance from the system consultant "Doubleclick" who is based in Dar Es Salaam, either through phone or online for minor problems and sometimes visits them in Dar Es Salaam for resolving major issues. It is the RT's opinion that the head of finance is qualified to perform her job well with the required assistance from "Doubleclick". We would recommend that she receives further training on the SAP accounting package in order to become less dependent on external assistance and also to increase in-house capacity on accounting.

3.14 COMPARE THE UNIT COST OF SOME OF THE PROCURED EQUIPMENT WITH THE NATIONAL/SUB-SAHARAN BENCHMARKS, WITH DUE RECOGNITION OF THE MARKET SITUATION IN ZANZIBAR

The materials and equipment procured under this Project are mostly sourced by international competitive bidding (except for a few local purchase orders), with supply from a diversity of countries such as China (conductor) and South Africa (poles). The materials conform with ZECO standards and specifications. Seven tenders have already closed and two are yet to close (for transformers and accessories). The prices achieved so far are generally good and coming in below budget overall, as can be seen in the below table:

DETAILS	FIGURES IN NOK			
	BUDGET AMOUNT	ACTUAL AMOUNT	VARIANCE	DELIVERY
WOODEN POLES	6,250,710.00	8,209,992.05	1,959,282.05	April 2016
CONDUCTOR (ACSR, ABC)	7,762,500.00	6,420,514.57	(1,341,985.43)	April/June 2016
TOOLS AND SAFETY EQUIPMENT	1,978,230.00	424,904.99	(1,553,325.01)	April 2016
CROSS-ARMS AND INSULATORS	3,372,375.00	3,072,073.94	(300,301.06)	April 2016
STAYWIRE AND STAY ACCESSORIES	1,938,900.00	1,938,900.00	-	May 2016
AERIAL BUNDLE CONDUCTOR ACCESSORIES	1.576,650.00	1.576.650.00	-	May 2016
OFFICE FURNITURE	253,083.60	253,083.60	-	April 2016
VEHICLES CRANE	1,020,000.00	1,390,187.00	370,187.00	March 2016
DISTRIBUTION MANAGEMENT SOFTWARE	62,000.04	64,092.50	2,092.46	December 2015
SUB-TOTAL	**24,214,448.64**	**23,350,398.65**	**(864,049.99)**	

Comparing the unit prices achieved in the ZECO tenders with prices from Mozambique, Namibia, South Africa and Zimbabwe (which were averaged to a regional benchmark price for each item), it is evident

that the ZECO prices are generally fair and reasonable, as per the following table (the yellow highlights indicate items where the ZECO unit price was higher than the regional benchmark):

BENCHMARK UNIT PRICE COMPARISON FOR ELECTRIFICATION MATERIALS PROCURED BY ZECO

Wooden Poles, creosote treated SABS	ZECO Unit Price	Benchmark Unit Cost	Difference	Comment
9m	109.00	81.29	-27.71	
10m	122.00	99.19	-22.81	includes
11m medium	139.00	117.36	-21.64	transport cost
11m stout	200.00	136.41	-63.59	from South
12m	159.00	146.23	-12.77	Africa
13m	210.00	166.69	-43.31	
Conductor	**ZECO Unit Price**	**Benchmark Unit Cost**	**Difference**	**Comment**
Hare ACSR 100sqmm	0.97	1.31	0.33	
Rabbit ACSR 50sqmm	0.50	0.67	0.17	
ABC 4 x 95sqmm [m]	3.75	6.01	2.26	
ABC 4 x 50sqmm [m]	2.04	4.09	2.05	
ABC 2 x 50sqmm [m]	0.97	2.52	1.55	
Crossarms and insulators	**ZECO Unit Price**	**Benchmark Unit Cost**	**Difference**	**Comment**
For E pole (incl L 2.8m x 2, 2 x Cruzetas, 2 x M20x300mr	63.36	76.96	13.60	
For H pole (incl U 3m x 2, 2 x M20 x 1m varao roscado, 8	105.98	113.83	7.85	
Line fittings for ACSR 100sqmm (incl pistola, parafuso ol	6.80	17.25	10.45	
Line fittings for ACSR 50sqmm (incl pistola, parafuso olh	6.57	15.76	9.19	
Top tie ACSR 100sqmm (twin - tie)	1.53	8.83	7.30	
Side tie ACSR 100sqmm	0.99	3.45	2.46	
Top tie ACSR 50sqmm (twin-tie)	1.07	7.57	6.50	
Side tie ACSR 50sqmm	0.98	2.14	1.16	
Glass disc insulator	7.14	13.94	6.80	
33kV pin insulator Incl spindle M20	10.94	20.84	9.90	
33kV polymeric strain insulator	10.25	21.92	11.67	
33kV polymeric horiz insulator	39.97	15.68	-24.29	
Tools and safety equipment	**ZECO Unit Price**	**Benchmark Unit Cost**	**Difference**	**Comment**
Tirfor 2 ton HIT-16	338.99	200.00	-92.03	
Wire for Tirfor 20m		46.96		
Hand winch 500kg	688.24	43.33	-644.91	specs unknown
Ratchet puller 1500kg	128.40	352.00	223.60	
Davits	277.35			
Pole climbing shoes, adjustable	88.34	99.17	10.83	
Petrol driven drill machine	801.24	250.84	-550.40	specs unknown
Cordless drill machine	626.61	184.17	-442.44	specs unknown
Stringin blocks for ACSR - (roldar	73.45	77.23	3.77	
Stringin blocks for XLPE cables (rol	88.14	66.01	-22.13	
Wooden bits for petrol drill: M19x330mm	46.23	6.32	-39.91	
Wooden bits for petrol drill: M25x330mm	70.88	14.73	-56.15	
Safety belts	48.28	133.43	85.15	
Hydraulic cable cutter (Rechargeable Battery operated c	667.70	1 187.07	519.37	
Tool kits for electricians with backpack	-	53.22	53.22	
Cable drum jack - 2T	1 664.11	978.72	-685.39	specs unknown
Outdoor live line tester	1 104.27	843.73	-260.54	specs unknown
Come along for ACSR 50-100sqmm	52.70	179.23	126.53	
Come along for ABC	144.84	115.64	-29.20	
33kV earthin cables	462.25	438.67	-23.58	
11kV earthing cables	410.89	438.67	27.78	

ABC accessories	ZECO Unit Price	Benchmark Unit Cost	Difference	Comment
Suspension clamps for 4x95	1.41	5.61	4.20	
Suspension clamps for 4x50	1.41	3.80	2.39	
Suspension clamps for 2x50	1.52	3.53	2.01	
Anchor clamps for 4x95	6.02	6.52	0.50	
Anchor clamps for 4x50	6.02	6.04	0.02	
Anchor clamps for 2x50	6.02	5.74	-0.28	
Anchor hook bolts M16x250	1.36	2.94	1.58	
Special hook bolts M16x300	1.52	3.33	1.81	
Insulated piercing connectors 95/95	1.26	2.35	1.09	
Insulated piercing connectors 95/50	1.26	2.47	1.21	
Insulated piercing connectors 50/50	1.26	1.73	0.47	
Insulated piercing connectors 50/25	1.16	1.73	0.57	
Insulated compression sleeve 95mm	0.93	0.89	-0.04	
Insulated compression sleeve 50mm	0.93	1.07	0.14	
Insulated end cap 95	0.14	0.20	0.06	
Insulated end cap 50	0.13	0.20	0.07	
Pigtail assemblies M16x3000 (pigtail bolt only)	1.52	10.13	8.61	
pigtail assemblies M16x2500 (pigtail	1.36	10.80	9.44	
Insulated tool (spanner for piercing connector)	46.68	23.73	-22.95	
Come along clamp for ABC 4x95	23.69	115.64	91.95	
Come along clamp for ABC 4x50	23.69	105.57	81.88	
Stay wire and accessories	**ZECO Unit Price**	**Benchmark Unit Cost**	**Difference**	**Comment**
Stay wire [m]	0.46	6.79	6.33	
Stay rod M16x1850	11.53	17.83	6.30	
Stay insulator	0.46	1.50	1.04	
Pole top make-off	4.06	11.17	7.11	
Coach screw - Base plate 380x380x5mm	0.08	5.92	5.84	
Guy grip dead end	1.99	4.32	2.33	
Stay material HT	**ZECO Unit Price**	**Benchmark Unit Cost**	**Difference**	**Comment**
Stay wire [m]	0.56	1.12	0.56	
Stay rod M20x2400	17.90	29.65	11.75	
Stay insulator	1.08	2.71	1.63	
Pole top make-off	4.06	8.61	4.55	
Coach screw - Base plate 450x450x5mm	0.08	6.32	6.24	
Guy grip dead end	1.99	4.96	2.97	

The unit prices obtained for each country are listed in Section 5.2 in the Appendices.

3.15 Provide recommendation on how to ensure sustainability of the project's input by proposing an exit strategy. Project activities to be considered less priority should be identified, as well as activities to be considered included

As elaborated in the progress assessment earlier on in this review, many of the Project outcomes and outputs have already been achieved or are on track, while others are lacking focus and progress. In order to achieve sustainability of preventive maintenance in ZECO, the RT recommends to place high priority on certain aspects requiring attention in the next period. These are highlighted in red below, while medium priorities are highlighted in yellow and low priority ones in green:

INDICATOR	LARGELY ACCOMPLISHED	REQUIRES ATTENTION	PRIORITY
1. Improved access to reliable and affordable electricity supply			
OCI 1.4: MWh sold to tariff groups Z1, Z2, Z3 and Z4	• n/a (beyond the direct control of the maintenance unit)	• Expedite transformer procurement	High
OCI 2.1: % population connected to the grid	• n/a (customer connections are not the responsibility of the maintenance unit)	• Also measure and report number of new connections	Low
OCI 2.2: number of connected schools	• n/a (customer connections are not the responsibility of the maintenance unit)	•	
OCI 2.3: number of connected medical facilities	• n/a (customer connections are not the responsibility of the maintenance unit)	•	
Affordability	• Lifeline tariff implemented	•	
2. Improved quality of electricity supply			
OCI 1.1: Average duration of unplanned outages	•	• Focus awareness on this indicator, to improve maintenance practices	medium
OCI 1.2: Average number of unplanned outages per month	•	• Focus awareness on this indicator, to improve maintenance practices • Record the causes of outages to identify focus areas for maintenance	medium
OCI 1.3: Number of voltage drops per month	•	• Focus awareness on this indicator, to improve maintenance practices	medium
3. A competent maintenance unit performing preventive maintenance			
OCI 3.2: ZECO participation in renewables seminars	• ZECO staff participated in 2 seminars to date • ZECO staff involved with EU project (wind and solar)	•	
OPI 1.1: Twinning implementation	•	• Procure a twinning arrangement that focuses on mainteannce planning and establishing an effective preventive maintenance system • If no suitable twinning partner can be identified, then engage a dedicated technical assistant with expertise in maintenance planning and system implementation (for at least 6 months)	Hign
OPI 1.2: Maintenance routines and procedures	•	• Urgently establish maintenance planning and management systems and procedures	High
OPI 1.3: Training of staff	• Training schedule on track	• Continue with technical training of maintenance teams, on a rotational basis • Additional support/training for project coordinator required, to fully capacitate her to lead the maintenance function in ZECO	Medium
OPI 1.4: Training of female staff	• Training schedule on track • Above target	• Implement recommendations of gender study	Low
Planning capability	• Scheduling network rehabilitation and upgrades • Minimising customer inconvenience • Outsourcing non-core activities	• Systemisation: procedures and routines • Structured planning • Prioritisation and scheduling • GIS application for maintenance planning	High
Technical capability	• Network surveys • Network rehabilitation, upgrade and extension	•	
Management capability	• Project accounting • Reporting • Organising crews	• HR management • Preventive maintenance planning • Incentives for field crews	High

INDICATOR	LARGELY ACCOMPLISHED	REQUIRES ATTENTION	PRIORITY
Procurement and inventory management	• Tendering • Contract management • Stock keeping	• Software based stock control • Disposal of replaced materials	Low
4. Further electrification on Zanzibar in accordance with a prioritised plan			
OCI 2.1: % population connected to the grid	• n/a (customer connections are not the responsibility of the maintenance unit)	• Also measure and report number of new connections	Low
OCI 2.2: number of connected schools	• n/a (customer connections are not the responsibility of the maintenance unit)	•	
OCI 2.3: number of connected medical facilities	• n/a (customer connections are not the responsibility of the maintenance unit)	•	
OCI 3.1: MWs of grid-connected renewables installed	• High-level prefeasibility study for a 5MW solar plant • EU project doing feasibility study for wind farms and solar projects	•	
OPI 4.1: EMP finalised	• EMP completed in Dec 2014	• Revision and update	High
OPI 4.2: EMP adopted by ZECO	• Distribution maintenance projects ongoing, but behind schedule	• Board approval • Adoption as official investment guide	High
OPI 4.3: Investment in accordance with EMP	• Distribution maintenance projects ongoing, but behind schedule	• Expedite transformer procurement • Continue to set realistic targets in the annual workplans, and implement accordingly • Measure and report on the number of projects completed	High
5. Connection of customers in a feasible manner			
OCI 2.1: % population connected to the grid	• n/a (customer connections are not the responsibility of the maintenance unit)	• Also measure and report number of new connections	Low
OCI 2.2: number of connected schools	• n/a (customer connections are not the responsibility of the maintenance unit)	•	
OCI 2.3: number of connected medical facilities	• n/a (customer connections are not the responsibility of the maintenance unit)	•	
6. Fostering economic development in intervention areas (job creation)			

Job creation	• Engagement of local communities/indivuduals for
	  ○ bush clearing
	  ○ collection, transport and delivery of replaced line materials to the ZECO depots
	• Access to electricity improves economic prospects in local communities
	  ○ Lighting
	  ○ Battery charging
	  ○ Refrigeration
	  ○ Electric appliances
	  ○ Power tools
		• Consider awareness campaigns about benefits/uses, costs and dangers of electricity
		• Coordinate electrical appliance availability with local business people and traders
		• Consider bulk buying of good quality standard appliances, in order to enhance affordability
		• Consider a subsidised loan scheme for electric appliance
			Medium

7. Move towards more environmentally energy forms			
OCI 3.1: MWs of grid-connected renewables installed	•	• ZECO to actively participate in EU project	Medium
OPI 5.1: FS for Unguja solar PV plant	• Progress under EU project	• ZECO to actively participate in EU project	Medium
OPI 5.2: Investment decision	•	•	
Decide on fate of Mtoni generators	•	• ZECO/GoZ needs to take a decision about the existing generators, whether to retain these as an emergency	High

INDICATOR	LARGELY ACCOMPLISHED	REQUIRES ATTENTION	PRIORITY
		backup (which will require a budget allocation) or to sell them off (which will release much-needed capital from a stranded asset) • Ongoing maintenance of the generator sets is essential, even though they are not presently in use, so as to avoid dilapidation of a relatively new and valuable asset	
8. A successful project implementation			
OPI 2.1: Preventive maintenance equipment for Unguja	• Most equipment has arrived	•	
OPI 2.2: Preventive maintenance equipment for Pemba	• Most equipment has arrived	•	
OPI 2.3: Preventive maintenance budget	•	• Implement a maintenance budget, with allocations to support the Project	High
OPI 3.1: Corrective maintenance budget	• Existing	•	
OPI 3.2: Corrective maintenance equipment for Unguja	• Being procured on an ongoing basis	•	
OPI 3.3: Corrective maintenance equipment for Pemba	• Being procured on an ongoing basis	•	
OPI 3.4: Expanded storage facility	• Implemented	•	
Maintenance planning systemisation	•	• Establish preventive maintenance planning systems and procedures as a matter of priority, so as to ensure a sustainable maintenance function in ZECO	High
Continuous capacity building	•	• Continue with capacptiy building efforts (technical training, maintenance planning and management)	Medium
Institutionalise preventive maintenance unit		• Prepare now for integrating network maintenance in ZECO's functional and organisational structures, beyond the horizon of the Project ○ Introduce a separate budget item for maintenance ○ Clarify the future organisational structure, and the role of preventive maintenance (part of operations, or separate unit)	High
Transparent communication		• Introduce benchmarks and performance indicators for ZECO to publicise on a regular basis, to transparently demonstrate improvements in service delivery, eg ○ Frequency, duration and causes of outages ○ Number of new connections	Medium

a) Recommendations for an exit strategy (in 2018)

With the Norwegian support to the Project scheduled to draw to a close in 2018, it is important to consider an appropriate exit strategy that ensures continuity and sustainability of a preventive maintenance culture in ZECO. In this regard, the RT recommends that the high priority areas as highlighted above are addressed with urgency and focus during the remaining term of the

project, to ensure that these aspects take hold in ZECO and the organisation has time to adapt before the funding subsides. This is expected to ensure sufficient capacity building on preventive maintenance to sustainably continue without external funding, which will enable Norway to exit the Project with confidence that it has achieved its objectives.

These high priority aspects from the above table can be summarised in 8 key priorities, as follows:

H1 Expedite transformer procurement
H2 Procure a suitable twinning partner
H3 Revise and approve the EMP, adopt as the guide for maintenance planning and investment
H4 Systemise maintenance planning (structured procedures and routines)
H5 Establish an annual preventive maintenance budget, and allocate funds to it
H6 Practice preventive maintenance planning (scheduling/budgeting of projects and activities)
H7 Institutionalise the maintenance unit within ZECO
H8 Decide on the fate of the Mtoni generators

The medium priorities can be summarised under the following 5 headings:

M1 Continued capacity building
M2 Focus on QoS indicators for improved maintenance focus
M3 Promote commercial awareness around electricity access (for job creation and energy efficiency)
M4 Actively participate in renewable energy initiatives
M5 Transparent communication of KPIs

The low priorities can be summarised as follows:

L1 Measure and report number of new connections
L2 Implement gender study recommendations
L3 Disposal of replaced materials
L4 Software-based stock control

3.16 PROJECT PHASE I-IV JOB CREATION AND PRIVATE SECTOR DEVELOPMENT

The end review report for the Phase IV prepared by Nordic Consulting Group and Norconsult in 2009 concluded that:

“The positive impacts of REP are clearly visible in Unguja, with the establishment of activity in tourism in the rural areas. Still the benefits are smaller than expected since the overall 20% connection rate has not been achieved. Additionally there is little impact from the project on capacity building within ZECO, in particular related to maintenance.

In Pemba the effects from electrification are limited by the lacking production capacity of the Wesha Power Station. A high quality rural network is in place but with little energy to distribute, awaiting the arrival of the sea cable.”

During the field visit, the RT team observed several small businesses, like carpenter workshops and welding workshops. These companies had mostly been connected after the cables were installed. The owners reported a significant increase in productivity after they were connected, since they now could be using electrical tools instead of manual tools. One of the workshops specializing in producing carriages for bulls, said that while he previously spent 2-3 weeks on one carriage, he now spent 3 days, improving his profitability significantly.

The ILPI report "Impact assessment of Norwegian support to the energy and road sectors in Pemba" from March 2015 reported that, 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 1 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

Source: ILPI

As can be seen from the table, there was a significant growth in both the number of connected businesses and the power usage from 2009 to 2014, indicating that the connection had a significant impact on the private sector development in Pemba. The report also concludes that the electrification has had a significant effect on agricultural development as products can be stored properly for a longer period of time.

The report also found significant positive developments of tourism in Unguja in the period since the cables were installed, as shown in the table below. Most likely the growth would have been lower without improvements in electricity supply.

	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

Conclusion and recommendation:

The project has created new businesses and jobs through providing electricity. As in most other developing countries, businesses are facing serious constraints in developing their activity due to lack of knowledge and access to capital. The RT recommends that future electrification programmes either provide, or cooperate with other development partners to provide, capital (both grants and loan facilities) and training for people interested in setting up new businesses. Such programmes would greatly improve the opportunities for job creation in areas which are electrified.

3.17 Follow-up of the Emergency Power and Back-up Capacity Program from 2010

The review assessed the plans for the emergency generators and compared theses to the terms of the Grant Agreement for the project dated 10 March 2010, to enable the Embassy to determine appropriate steps to close the Agreement.

3.17.1 Assess ZECO's plans regarding the future use of the generators

The RT has visited and inspected the Mtoni power station where 32 high-speed diesel generators of 800kVA each have been installed with Norwegian support, following an extended power deficit in 2009 as a result of a faulty undersea cable that left large parts of the island without electricity for 3 months. The decision to purchase the generators, instead of renting them, despite apparent awareness that this would be a short-term solution, seems to have been taken in reaction to the crisis, and as slow-speed generators would have taken too long to manufacture.

The RT interviewed various stakeholders about the generators and what ZECO should do with them, which revealed the following facts and ideas:

- The generators were acquired in 2010
- The old 45MW undersea cable was repaired by the time the gensets were installed
- The new 100MW undersea cable was commissioned in 2012 (MCC project)
- The generators have not been used often, only running during peak periods for 2 hours at a time
- They are still new having only run 250 operating hours on average (the RT inspection confirmed that they appear in good condition)
- Diesel generation cost 560 TSh/kWh 4 years ago
- ZECO was operating the generators entirely at own cost, without government subsidy
- This is exacerbated by the fact that some government institutions do not pay (most of) their electricity bills, owing ZECO billions of Shilling, and ZECO does not disconnect these consumers "because of politics"
- The generators are not being used any longer due to their high operating cost, not even in times of undersee cable breakdown
- The ZECO operations staff would start the generators once a week, to keep them from deteriorating due to non-use
- The last time they were operated was in February 2016, according to the log book in the control room
- The generators need to be serviced before they can be started again
- The batteries are dry, ZECO was in the process of filling them up with distilled water to prevent damage
- No oil changes were necessary yet – there appears to be no plan in place for disposal of old oil

a) What should happen to the generators?

The RT asked that question to various stakeholders during the interviews, revealing that no concrete plans are presently in place. In 2013, the original supplier of the gensets (Mantrac) apparently offered to buy them back, but Government decided not to sell them at the time. Before the 2015 elections, the generator sale was up for discussion again, but without conclusion, with this situation persisting to the present day.

The RT recorded the following answers from stakeholders to the question of what should happen with the generators:

- No decision has been taken about the fate of the generators
- A backup power source is crucial for Unguja, could be solar and/or wind in combination with the gensets
  - However, high-speed generators are not suitable for continuous operation, and therefore not a good back-up option except for short-term emergency use
  - Investigate swopping the gensets for low speed machines running on HFO
- ZECO could simply sell the generators while they are still in good condition
  - The gensets are a stranded asset of significant value that could be converted to cash, to pay for other urgent needs like an alternative back-up solution
- The generators could be converted to run on natural gas, with a pipeline from the mainland supplying the gas
- It is not an option to deploy the gensets elsewhere on the island eg at the main hospital or at water pumping stations
  - The hospital already has a genset
  - Pump stations have much smaller demand
- A likely option is that Government will provide a subsidy to operate the generators when needed

Recommendation:

In this regard, the RT recommends that a study is undertaken to properly evaluate the various options for the generators, with Zanzibar's energy situation/ambitions and policy guidelines in mind.

b) Closing the donor project

The 2010 grant agreement stipulates that

- ZECO is the client and owner of the generators and is responsible for operation and maintenance
- ZECO needed to guarantee the generators' longevity by way of an operations and maintenance plan
- ZECO is obliged to follow the environmental management plan "until the generators are either decommissioned or relocated for other use"
- GoZ is required to ensure that the project funds are properly accounted for, including any accrued interest. Any unspent disbursed funds and accrued interest shall be returned to the project or MFA upon completion of the Programme.
- After the commissioning of the new submarine cable the parties shall meet and prepare a plan in which the future usage of the generators is described and agreed upon.
- The agreement shall remain in force until 30 June 2013, or until the parties have fulfilled all obligations arising from it.

The RT learnt during the mission that in order to close this donor project (which was supported by Norway, Sweden and DFID), the Ministry of Lands, Water, Energy and Environment ("MLWEE") needs to write a letter to the Royal Norwegian Embassy. This letter can only be written, however, once a decision about the fate of the gensets has been taken. The new minister that has come to office after the 2015 elections has to be appraised of the situation so that the fate of the generators may be discussed and a decided.

The Ministry of Finance was not aware that the project is still open, and promised to follow up immediately. They arranged high-level consultations between the ZECO General Manager and the Principal Secretaries of the Ministry of Finance and MLWEE, where a decision was taken to retain the generators as a back-up source of power. With this decision in hand, the Commissioner of External Finance will now convene a meeting with the Embassies of Norway and Sweden, as well as DFID, to agree on the way forward.

3.17.2 Assess to what extent the current maintenance program incorporates the future use of the generators

The current maintenance programme (this Project) does not include the maintenance of the generators and neither considers the future use of the generators. Generator maintenance is undertaken by ZECO operations staff.

3.17.3 Lifeline Tariffs

ZECO introduced lifeline tariffs several years ago for usage up to 50 kWh. After last year's 20% tariff adjustment the lifeline tariff was increased to 79 TZS/kWh (3.48 USc/kWh) compared to the general tariff of 266 TZS/kWh (11.70 USc/kWh).

3.17.4 Disposure of waste oil from the generators

During the site visit at Mtoni where the generators are located, the RT asked the maintenance team about the procedures for disposure of waste oil. The RT was told that there is no policy on how to handle waste oil. The units have still not been serviced due to very little usage, so there has been no disposal of oil as of yet, but when asked what they would do with the waste oil, they indicated that they most likely would pour it into the ground at site.

Recommendation:

Since the generators are in high need of servicing, it is vital that ZECO informs RNE/Norad of how they plan to dispose of the waste oil as soon as possible. We suggest that the TA to ZECO should follow up on this in order to secure that the oil is not spilled on the ground at site.

4 Conclusions

4.1 Overall Performance Assessment

The key review findings indicate that ZECO has made significant progress in upgrading the transmission lines in Unguja and Pemba, and the procurement of the equipment and materials for the transmission lines have been below budget. The procurement and installation of transmission lines are delayed, and it is especially important to start the procurement of the transformers as soon as possible in order to secure the installation by the end of the programme.

Capacity building was one of the key objectives of the programme, and 22 technicians have undergone training with TANESCO and 7 managers have attended relevant courses in South Africa. The training has been successful, leading to increased knowledge and ability to handle their responsibilities. The Twinning arrangement has still not been organized and this should be a priority for the remainder of the programme. There is an urgent need for systemisation in preventive maintenance, which requires development and implementation of structured procedures and routines, and active practice of these procedures and routines supported by a suitable twinning or consultancy arrangement. The general impression is that the line upgrades are receiving too much focus at present, at the cost of capacity building within preventive maintenance.

The maintenance unit was originally set up as a separate project organization, but this approach was revised and updated during the inception phase to ensure better integration throughout the ZECO organisation. Presently, the maintenance functions are structured under the Project Coordinator, but the maintenance unit team members report directly to the ZECO management unit where they are located. While this enhances the maintenance work to be harmonized within the organization, it is important that during the remainder of the Project emphasis is placed on full integration and institutionalisation of the maintenance functions within the ZECO organisation, including assignment of a (preventive) maintenance budget.

The cooperation with other development partners is well organised and the communication is frequent and open. This ensures that no overlap of funding is taking place.

The EU is focusing their development support on renewable energy, and it is important that the electrification master plan updates are coordinated with these activities in order to ensure sufficient transmission capacity for the developments of future power generation.

The review team (RT) visited the site of the emergency power and back-up generators at Mtoni, which were financed by Norway during the power crisis in 2010. The units are still in a good condition, but are in urgent need of servicing. They have been operating only 250 hours on average since the installation in 2010, and are not used due to the high cost of diesel. Zanzibar does need back-up capacity on the island in case the supply from mainland is interrupted. Currently the hospitals and water supply have their own back-up generators. The RT recommends that a study is undertaken to properly evaluate the various options for the generators, with Zanzibar's energy situation/ambitions and policy guidelines in mind.

The financial sustainability of ZECO is still weak, but the 20% tariff increase last autumn improved the situation somewhat. Pre-paid meters are now being installed with financial support from Sweden, and this will improve the revenue collection. The regulator, ZURA, is still in its inception phase, and has still not started to regulate the electricity sector. To secure the financial viability of ZECO, a cost of service study should be undertaken to support the efforts of ZURA. ZURA was originally supported by MCC, but they pulled back their support to Zanzibar after the last election, and Sweden is now considering to reallocate some of their support to ZURA.

There is significant gender inequality in ZECO, which reflects the general gender inequality in the technical fields in Zanzibar. The technical assistant (TA) commissioned a consultant who developed a

"Proposed Plan for the ZECO Gender Equality Strategy". This plan seems to be a well-developed tool which is supported by the ZECO management. We therefore recommend that the plan is implemented by ZECO and that the implementation is monitored by the TA.

Based on reviews by Norconsult / NCG (2009) and ILPI (2015) the RT concludes that the project phase i-iv project has had a significant impact on private sector development and job creation in both Pemba and Unguja. There was a significant growth in both the number of connected businesses and the power usage from 2009 to 2014 in Pemba, and the electrification had a significant effect on agricultural development since products can be stored properly for a longer period of time. Significant positive developments of tourism in Unguja took place after the new connection to mainland was finalised.

4.2 RECOMMENDATIONS / PRIORITIES FOR THE REMAINING PERIOD OF THE PROGRAMME

These high priority aspects are identified for the remaining period of the programme:

10. Expedite transformer procurement
11. Procure a suitable twinning partner
12. Revise and approve the EMP, adopt as the guide for maintenance planning and investment
13. Systemise maintenance planning (structured procedures and routines)
14. Establish an annual preventive maintenance budget, and allocate funds to it
15. Practice preventive maintenance planning (scheduling/budgeting of projects and activities)
16. Institutionalise the maintenance unit within ZECO
17. Undertake a study to decide on the fate of the Mtoni generators
18. Implement the "Proposed Plan for the ZECO Gender Equality Strategy"

Other recommendations include:

15. Continued capacity building
16. Focus on QoS indicators for improved maintenance focus
17. Promote commercial awareness around electricity access (for job creation and energy efficiency)
18. Actively participate in renewable energy initiatives
19. Transparent communication of KPIs
20. Perform a cost of service study for ZECO (not necessarily under this programme)

5 Appendices

5.1 BIBLIOGRAPHY

- Framework agreement with Norad (01.11.2010) Participation in planning workshop and drafting of PD for a possible new programme
- Report "Norwegian support to Zanzibarian energy sector", Norplan (06.12.2010)
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- Audit and Management Letter for 26-months (January 2014-February 2016), KPMG 2016
- ZECO Gender Assessment and Action Plan, October 2016
- Grant Agreement for Emergency Power and Back-up Capacity Programme, 2010
- End-review Phase IV extension Rural Electrification, 2009
- Pemba Impact Study, ILPI 2015
- Award letters with Multiconsult | Norplan as technical assistant (January 2014 and March 2015)
- Framework agreement between the Embassy and Multiconsult | Norplan on technical advisory services to the energy sector (November 2013)
- Quarterly progress reports by Multiconsult (May 2016, August 2016, October 2016)
- Minutes from annual meetings (April 2013, November 2014, October 2015, April 2016)
- Minutes of meeting on tentative inception report (March 2013) and related email from Embassy to ZECO with comments to the draft minutes of meeting (May 2013)
- Assessment Report by Baker Tilly (December 2013) and ZECO management response to the Baker Tilly report (December 2013)
- Letter by the Embassy to the Permanent Secretary in Zanzibar Ministry of Lands, Housing, Water and Energy with comments to the Inception report dated July 2013 (October 2013)
- Review by PWC of ZECO report (June 2014) and ZECO response to PWC report (2015)
- Decision document for amended grant agreement (March 2015)

5.2 BENCHMARK PRICES FOR ELECTRIFICATION MATERIALS

Wooden Poles, creosote treated SABS	ZECO Unit Price	Mozambique	Namibia 1	Namibia 2	South Africa	Zimbabwe	Benchmark Unit Cost	Difference	Comment
9m	109.00	72.15	106.67	77.48	82.15	68.00	81.29	-27.71	
10m	122.00	78.25	120.00	99.84	98.69		99.19	-22.81	includes
11m medium	139.00	121.62	133.33	132.53	106.30	93.00	117.36	-21.64	transport costs
11m stout	200.00	160.25	140.00	139.09	106.30		136.41	-63.59	from South
12m	159.00	126.24	186.67	145.58	126.45		146.23	-12.77	Africa
13m	210.00	183.10	200.00	166.04	173.32	111.00	166.69	-43.31	

Conductor		Mozambique	Namibia 1	Namibia 2	South Africa	Zimbabwe	Benchmark Unit Cost	Difference	Comment
Hare ACSR 100sqmm	0.97	1.15	1.67	1.22	0.71	1.79	1.31	0.33	
Rabbit ACSR 50sqmm	0.50	0.68	0.67	0.69	0.59	0.72	0.67	0.17	
ABC 4 x 95sqmm [m]	3.75	5.36	6.00	7.31	5.36		6.01	2.26	
ABC 4 x 50sqmm [m]	2.04	3.36	4.67	5.00	3.33		4.09	2.05	
ABC 2 x 50sqmm [m]	1.04	1.74	3.33	-	2.50		2.52	1.48	

Crossarms and insulators	ZECO Unit Price	Mozambique	Namibia 1	Namibia 2	South Africa	Zimbabwe	Benchmark Unit Cost	Difference	Comment
For E pole (incl L 2.8m x 2, 2 x Cruzetas, 2 x M20x300r	63.36	119.51		62.98	85.33	40.00	76.96	13.60	
For H pole (incl U 3m x 2, 2 x M20 x 1m varao roscado	105.98	191.69		-	102.80	47.00	113.83	7.85	
Line fittings for ACSR 100sqmm (incl pistola, parafuso	6.80	28.65		17.64	5.46		17.25	10.45	
Line fittings for ACSR 50sqmm (incl pistola, parafuso	6.57	28.65		15.59	3.03		15.76	9.19	
Top tie ACSR 100sqmm (twin - tie)	1.53	11.20		5.75	8.91	9.46	8.83	7.30	
Side tie ACSR 100sqmm	0.99			2.99	3.92		3.45	2.46	
Top tie ACSR 50sqmm (twin-tie)	1.07	11.20		8.74	3.30	7.02	7.57	6.50	
Side tie ACSR 50sqmm	0.98			2.70	1.57		2.14	1.16	
Glass disc insulator	7.14			11.09	16.80		13.94	6.80	
33kV pin insulator Incl spindle M20	10.94	33.50		15.11	20.30	14.43	20.84	9.90	
33kV polymeric strain insulator	10.25	23.25		24.04	18.47		21.92	11.67	
33kV polymeric horiz insulator	39.97	23.25		15.11	8.67		15.68	-24.29	

Tools and safety equipment	ZECO Unit Price	Mozambique	Namibia 1	Namibia 2	South Africa	Zimbabwe	Benchmark Unit Cost	Difference	Comment
Tirfor 2 ton HIT-16	338.99			-	200.00		200.00	-92.03	
Wire for Tirfor 20m				-	46.96		46.96		
Hand winch 500kg	688.24			-	43.33		43.33	-644.91	specs unknown
Ratchet puller 1500kg	128.40			-	352.00		352.00	223.60	
Davits	277.35			-					
Pole climbing shoes, adjustable	88.34	109.00		-	89.33		99.17	10.83	
Petrol driven drill machine	801.24			-	250.84		250.84	-550.40	specs unknown
Cordless drill machine	626.61			-	184.17		184.17	-442.44	specs unknown
Stringin blocks for ACSR - (rolc	73.45	50.45		-	104.00		77.23	3.77	
Stringin blocks for XLPE cables (r	88.14	75.36		-	56.67		66.01	-22.13	
Wooden bits for petrol drill: M19x330mm	46.23			-	10.13	2.50	6.32	-39.91	
Wooden bits for petrol drill: M25x330mm	70.88			-	14.73		14.73	-56.15	
Safety belts	48.28	94.20		-	172.67		133.43	85.15	
Hydraulic cable cutter (Rechargeable Battery operatec	667.70	1 280.64		-	1 093.50		1 187.07	519.37	
Tool kits for electricians with backpack	-	53.22		-			53.22	53.22	
Cable drum jack - 2T	1 664.11			1 379.09	578.35		978.72	-685.39	specs unknown
Outdoor live line tester	1 104.27			-	843.73		843.73	-260.54	specs unknown
Come along for ACSR 50-100sqmm	52.70	122.00		-	236.47		179.23	126.53	
Come along for ABC	144.84	122.00		55.11	169.80		115.64	-29.20	
33kV earthin cables	462.25	413.00		-	464.33		438.67	-23.58	
11kV earthing cables	410.89	413.00		-	464.33		438.67	27.78	

ABC accessories	ZECO Unit Price	Mozambique	Namibia 1	Namibia 2	South Africa	Zimbabwe	Benchmark Unit Cost	Difference	Comment
Suspension clamps for 4x95	1.41	5.65	13.33	1.02	2.45		5.61	4.20	
Suspension clamps for 4x50	1.41	5.65	6.67	1.02	1.85		3.80	2.39	
Suspension clamps for 2x50	1.52	4.93	6.33	1.02	1.85		3.53	2.01	
Anchor clamps for 4x95	6.02	9.01		4.23	6.32		6.52	0.50	
Anchor clamps for 4x50	6.02	9.01		4.23	4.87		6.04	0.02	
Anchor clamps for 2x50	6.02	8.12		4.23	4.87		5.74	-0.28	
Anchor hook bolts M16x250	1.36	4.28		2.27	2.28		2.94	1.58	
Special hook bolts M16x300	1.52	4.45		3.27	2.28		3.33	1.81	

ABC accessories	ZECO Unit Price	Mozambique	Namibia 1	Namibia 2	South Africa	Zimbabwe	Benchmark Unit Cost	Difference	Comment
Insulated piercing connectors 95/95	1.26	3.41		1.82	2.17	1.98	2.35	1.09	
Insulated piercing connectors 95/50	1.26	3.41		1.82	2.17		2.47	1.21	
Insulated piercing connectors 50/50	1.26	1.96		1.82	1.41		1.73	0.47	
Insulated piercing connectors 50/25	1.16	1.96		1.82	1.41		1.73	0.57	
Insulated compression sleeve 95mm	0.93			-	0.89		0.89	-0.04	
Insulated compression sleeve 50mm	0.93			1.71	0.43		1.07	0.14	
Insulated end cap 95	0.14			0.11	0.29		0.20	0.06	
Insulated end cap 50	0.13			0.11	0.29		0.20	0.07	
Pigtail assemblies M16x3000 (pigtail bolt only)	1.52	4.45		2.27	23.67		10.13	8.61	
pigtail assemblies M16x2500 (pigtail b	1.36	4.45		2.27	25.67		10.80	9.44	
Insulated tool (spanner for piercing connector)	46.68			-	23.73		23.73	-22.95	
Come along clamp for ABC 4x95	23.69	122.00		55.11	169.80		115.64	91.95	
Come along clamp for ABC 4x50	23.69	91.80		55.11	169.80		105.57	81.88	

Stay wire and accessories	ZECO Unit Price	Mozambique	Namibia 1	Namibia 2	South Africa	Zimbabwe	Benchmark Unit Cost	Difference	Comment
Stay wire [m]	0.46	0.62		0.78	1.11	24.65	6.79	6.33	
Stay rod M16x1850	11.53	22.50		6.07	23.67	19.10	17.83	6.30	
Stay insulator	0.46	1.74		1.77	1.29	1.20	1.50	1.04	
Pole top make-off	4.06	10.17		15.47	7.87		11.17	7.11	
Coach screw - Base plate 380x380x5mm	0.08	17.05		0.59	0.13		5.92	5.84	
Guy grip dead end	1.99	5.90		4.26	2.82		4.32	2.33	

Stay material HT	ZECO Unit Price	Mozambique	Namibia 1	Namibia 2	South Africa	Zimbabwe	Benchmark Unit Cost	Difference	Comment
Stay wire [m]	0.56	1.60		1.06	0.70		1.12	0.56	
Stay rod M20x2400	17.90	34.70		11.96	42.30		29.65	11.75	
Stay insulator	1.08	5.08		1.77	1.29		2.71	1.63	
Pole top make-off	4.06	10.94		7.02	7.87		8.61	4.55	
Coach screw - Base plate 450x450x5mm	0.08	18.25		0.59	0.13		6.32	6.24	
Guy grip dead end	1.99	8.73		3.34	2.82		4.96	2.97	

5.3 LIST OF CONDUCTED MEETINGS

Institution	Contacted Persons/Activity	Place	Date	Time
Multiconsult	Linn Silje Undem Andrew Yager Ryan Glenn Anderson	Multiconsult Office, Oslo	19.01.2017	14:00 – 15:00
Norconsult	Midterm-review Team Meeting Members	Double Tree Hotel	23.01.2017	08:00 – 08:30
ZECO	1. Ms Salma H. Mussa Capacity Building and Maintenance in ZECO, Ag. Project Coordinator	ZECO Saateni Office	23.01.2017	09:00 – 10:00
	2. Mr Hassan A. Mbarouk ZECO General Manager	ZECO Headquarters	23.01.2017	11:15 – 12:30
	3. Mr Maulid Shirazi Hassan Ag. ZECO Corporate Planning Manager, 4. Ms. Majuma H. Ussi ZECO HR and Administration Manager 5. Ms. Riziki Faki Hamad Capacity Building and Maintenance Project Finance Head 6. Mr. Saleh M. Abdulkadir Capacity Building and Maintenance Project Procurement Head	ZECO Headquarters	23.01.2017	12:45 – 13:30
Royal Norwegian Embassy NORAD	Katrine Vestbøstad Monica Blaalid Kristin T. Wæringsaasen	Double Tree Hotel via WhatsApp call	23.01.2017	14:30 – 15:00

Institution	Contacted Persons/Activity	Place	Date	Time
Consultant EU RE&EE programme	1. Attending Forum on the EU Programme on Renewable Energy and Energy Efficiency.	Zanzibar Ocean View Hotel	24.01.2017	09:00 – 10:45
ZECO	1. Site Visiting of Project materials at Saateni, Unguja. 2. Site Visiting of emergency generators at Mtoni. 3. Site Visiting of replacement of rotten poles at Nungwi, Unguja.	Site	24.01.2017	11:00 – 16:30
ZURA	Mr Abdalla H. Steni Director of Regulatory Zanzibar Utilities Regulatory Authority (ZURA)	ZURA Office, ZSTC Building	25.01.2017	09:00 – 10:00
Ministry of Lands, Water, Energy and Environment	Mr Salum Machano Project Monitoring and Evaluation Office, Ministry of Land, Water, Energy and Environment	Ministry of Lands, Water, Energy and Environment Office	25.01.2017	10:30 – 11:00
Ministry of Finance	Ms Sabra Machano Issa Head of Resource Mobilization and Monitoring Ministry of Finance	Ministry of Finance Office	25.01.2017	11:30 – 12:00
ZECO	Ms. Riziki Faki Hamad Capacity Building and Maintenance Project Finance Head	ZECO Saateni Office	25.01.2017	13:30 – 14:00

Institution	Contacted Persons/Activity	Place	Date	Time
Consultant EU RE&EE programme	Niels Juel Thomsen TA for Zanzibar RE & EE Programme, Lot 2	Consultant EU RE&EE programme Office (ZECO Saateni Office)	25.01.2017	14:00 – 14:30
ZECO	Mr Hassan A. Mbarouk ZECO General Manager	ZECO Headquarters	25.01.2017	14:40 – 15:20
Norplan/Multiconsult	Mr. Said Chilima Norplan/Multiconsult Technical Assistant Consultant in ZECO	ZECO Saateni Office	25.01.2017	15:30 – 16:30
ZECO	1. Mr. Salim Masoud Saleh ZECO Pemba Branch Manager 2. Mr. Amour Khalid Project Maintenance Engineer Capacity Building and Maintenance Project – Pemba	ZECO Head Office Pemba	26.01.2017	09:30 – 10:20
ZECO	1. Site Visiting of Project materials at Wesha Substation, Pemba. 2. Site Visiting of replacement of rotten poles at Ukutini, Pemba. 3. Interviewing beneficiaries of Tanga – Pemba Subsea Project.	Site	26.01.2017	11:00 – 14:30
Swedish Embassy	Stephen Mwakifwamba	Swedish Embassy	27.01.2017	09:00 – 10:00
European Union	Mikael Melin, Programme Manager Energy	Office of the delegation of the European Union to Tanzania	27.01.2017	11:00 – 12:00

Institution	Contacted Persons/Activity	Place	Date	Time
Royal Norwegian Embassy	Katrine Vestbøstad Monica Blaalid	Norwegian Embassy	27.01.2017	13:00 – 14:30
Multiconsult	Phone meeting with Linn Silje Undem	Phone	06.02.2017	14:30 – 15:00

Kristin T. Wæringsaasen from Norad participated in all meetings and field visit on 23. and 24. January .

5.4 TERMS OF REFERENCE FOR THIS ASSIGNMENT

Terms of Reference
Midterm-review of Capacity Building on Maintenance in Zanzibar Electricity Corporation

07 December 2016

1. INTRODUCTION

Zanzibar Electricity Corporation (ZECO) is the utility owned by the Revolutionary Government of Zanzibar responsible for generation, transmission and distribution of electricity in the Island of Zanzibar.

Norway has supported Zanzibar in the implementation of phase one to four of an electricity transmission and distribution project on Zanzibar (Rural Electrification Project (REP)) as well as the Tanga-Pemba subsea cable project. Following these projects, Zanzibar requested in December 2011 for support to a capacity building project for ZECO with focus on maintenance, an electrification masterplan and a new electrification project. The Grant Agreement for the capacity building of ZECO was signed in December 2012 with a Norwegian contribution of NOK 82 000 000 to finance the project in the planned four-year period 2012 – 2016. Four senior staff from the Rural Electrification Project (Phase IV and V Extension, Tanga Submarine Project and the Emergency Generator of Mteni) was allocated by ZECO to the newly established Maintenance Unit. Knut Riise who had been involved in the REP was appointed by ZECO as Project Manager for the Rural Electrification and Maintenance Project and had a contract directly with ZECO. An inception phase was initiated in the first half of 2013. However, key expected outputs were not as expected.

In January 2014, Norplan/Multiconsult was contracted as Technical Assistant (TA) to re-do the six-month inception phase and to do the electrification master plan. The contract was awarded through the Embassy's framework agreement with Norplan/Multiconsult. In January 2015, a second award letter was signed with Norplan/Multiconsult to provide technical assistance to the implementation of the project in the period 2015-2018.

Following initial delays and misunderstandings, the Grant Agreement was amended, restated in its entirety. The amended agreement, signed 17 March 2015, made necessary clarifications and extended the project period until 2018.

The challenging and unsustainable financial situation of ZECO and its inability to collect payments was supposed to be addressed in the second phase of SIDA's Financial Turnaround Project. This was highlighted in the Embassy's assessment of the sustainability of the project and the decision to enter into the Grant Agreement. However, the Swedish program has been delayed and several years compared to planned timeline and was launched November 2016.

The key outcomes as stated in the Grant Agreement are:

I. Improved access to reliable and affordable electricity supply
II. Improved quality of electricity supply
III. A competent maintenance unit performing preventive maintenance planning and work

The intended impact of the project is to contribute to improved economic and social development in a sustainable way in Zanzibar, through increased access to affordable, reliable and sustainable electricity services.

In 2010 Norway supported another project with ZECO, namely the "Emergency Power and Back-up Capacity Programme" (TAN-10/0005). The programme was successfully implemented and finalised, but some issues are still pending. According to the Grant Agreement Article III Clause 1, the generators shall be for the sole of ZECO to supply in times of needed electricity to the main grid until the connection of the submarine cable to Unguja supported by the Millennium Challenge Account (MCC) was in place, commissioned in 2013. The Grant Agreement further states that once the submarine cable is in place the parties shall meet and prepare a plan in which the future usage of the procured generator sets will be described and agreed upon. This meeting is yet to take place, and ZECO's plans for the future use of the generators have not yet been communicated.

2. PURPOSE

The purpose of this assignment is to assess the process and progress of the project in fulfilling its objectives. The midterm review shall also be forward looking and provide recommendations for the remaining period of the project in order to achieve the set objectives in an efficient way. The review shall assess key issues found to be pertinent to meet the planned results of the project.

The scope of work is further detailed below.

3. SCOPE OF WORK/PRIORITY ISSUES

3.1. Midterm-review of the Capacity Building and Maintenance Project

The **review** shall assess, but not necessarily be limited to the following issues or items:

- the achievements of the support compared to the purposes and objectives as set forth in the Agreements between Tanzania and Norway, and further detailed in the approved Goal Hierarchy for the project;
- assess the process and action taken when key outputs in the project were not as expected in 2013.
- to what extent the agreed outputs and outcomes have been achieved and reported, or is expected to be to be achieved;
- the efficiency and effectiveness of the programme with regards to human and financial resources
    - assess to what extent economical resources and inputs in terms of funds, expertise and time are converted to outputs;
    - assess to what extent the training has been cost-efficient, value for money and sustainable, and identify areas where the training has benefitted ZECO as an organisation;
    - assess programme design, participation of relevant stakeholders, and project organization, monitoring and reporting;
    - recommend on how to improve efficiency and effectiveness, and how to convert outcomes into realistic measurable savings/increased income for ZECO;

- Assess project relevance in light of actual/planned tariff level and collection rates.

- to what extent the professional level and knowledge of the staff at ZECO has been increased as intended, comment on the relevance and easiness of monitoring of the indicators set;
- assess how the programme is complementary to other development partner's (DPs) support;
- relevance to national development plans and policies
- to what extent the issues raised and lessons learned in the Rural Electrification Programme (REP) phase IV end review (April 2009), Inception report by the TA (May 2015), as well as the Pemba Impact assessment (March 2015) are relevant and were addressed in this project;
- to what extent the tasks set out in the award letter to the TA were followed up, and whether the role of the TA is relevant and efficient for the purpose of the project;
- to what extent the Electrification Master Plan (EMP) targets have been met, the process and involvement of ZECO in developing the plan and the relevance of the for the future development of electrification on Zanzibar beyond this project;
- incorporation of cross-cutting issues, including gender awareness, climate change, environment, anti-corruption, and recommend on how to strengthen relevant cross-cutting issues in implementation and reporting. Human rights is now a cross-cutting issue to be considered in all development cooperation; Assess to what extent human rights is relevant to the agreement and how to be incorporated in the future to assess the project's effect on human rights;
- to what extent the major risk factors (internal and external) listed in the Grant Agreements Annex I have been addressed;
- assess the relevance and the competence of ZECO to implement the recommendations provided by the Auditor in the audit for 2014-2016, and which areas to be included in the future cooperation under the Grant Agreement;
- Compare the unit cost of some of the procured equipment with the national/sub-Saharan benchmarks, with due recognition of the market situation in Zanzibar.
- provide recommendation on how to ensure sustainability of the project's input by proposing an exit strategy. Project activities to be considered less priority should be identified, as well as activities to be considered included;

The team shall review any additional issues mutually determined to be relevant to the purpose of this assignment.

3.2. Follow-up of Phase I – IV extension with regards to job creation and private sector development

Assess to what extent the project Phase I-IV extension has contributed to job creation and private sector development, and recommend on how to strengthen such work in the ongoing project;

3.3. Follow-up of the Emergency Power and Back-up Capacity Program from 2010

The **review** shall also assess the following issues or items as stated in the Grant Agreement for the project dated 10 March 2010 in order to close the Agreement:

- ZECO's plans to regarding the future use of the generators;
- to what extent the current maintenance program incorporates the future use of the generators;
- confirm whether the Life Line Tariffs for low-volume low-income groups has been implemented;
- whether ZECO dealt with disposure of waste oil from the generators in an environmentally acceptable way

4. IMPLEMENTATION OF THE ASSIGNMENT

4.1. Methodology to be applied

The study shall partly be done as a desk study, and partly as fieldwork in Tanzania/Zanzibar (islands of Unguja and Pemba). The team is expected to have extensive meetings with stakeholders, counterparts, development partners and other partners providing relevant input for the purpose of the end-review.

Start-up meetings with Norad and Multiconsult, and with RNE and ZECO on arrival as well as wrap-up meeting prior to the departure from Tanzania shall be included. A presentation to Norad of draft report shall be included.

4.2. Team composition

The team shall consist of a team leader who has the overall responsibility for the assignment. It is envisaged that the team leader will be assisted by a team of international/local experts. It is considered beneficial for the assignment to include local experts. The team should altogether cover the following disciplines and qualifications:

- Thorough knowledge, academic qualifications, experience and understanding of the legal, technical and regulatory framework of Zanzibar's energy sector;
- Thorough knowledge and experience within utility operation and management including energy economics and capacity building;
- Experience from similar assignments, including competence of cross cutting issuest;
- Extensive knowledge of Norwegian development policies, administration and practices, including Results Management in Development Cooperation;
- Strong critical analytic skills;
- Fluency in English and preferably Swahili

4.3. Timetable for preparation, field work and reporting

The assignment is to be conducted in the first quarter of 2017. The deadline for submitting the draft report is beginning of February2017. The work shall include a 10 work-days fact-finding mission to Tanzania/Zanzibar including return travel.

The following are the expected outputs of the assignment:

- A mission preparation note shall be submitted to Norad for approval prior to the arrival to Tanzania. The note shall include the key issues identified, a detailed work plan and proposed detailed table of content for the report (in line with Appendix 1);
- A draft report shall be submitted 2 weeks after returning from mission to Tanzania. Norad shall request comments from RNE, ZECO and Multiconsult and submit to the consultant within 2 weeks.
- and final report addressing issues as defined in this ToR shall be submitted 2 weeks after comments have been received;

The final report shall be in English and preferably not exceed 30 effective pages, excluding an executive summary and relevant annexes. The report shall be submitted electronically.

4.4. Budget

Based on the timetable, scope of work and team composition as defined in this ToR, the consultant is requested to prepare a budget in line with the table below.

Budget item	**Unit of measure**	**Unit cost**	**Total for budget item**
Fee – consultant no 1			
Fee – consultant no *2, 3, 4, etc*			
Travel and accommodation			
To be filled in as considered necessary			
Total			

APPENDIX 1

Required report format (proposed changes needs to be approved by the Client)

1 Executive Summary

2 Introduction

3 Midterm-review of the Capacity and Maintenance Programme

5 Other issues (optional)

6 Conclusions and recommendations

Annexes

Annex A: Terms of Reference

Annex B: Document List

Annex C: Persons contacted

5.5 OVERVIEW OF CONTRACTS BETWEEN MULTICONSULT/NORPLAN AND RNE

Overview of contracts between Multiconsult/Norplan and RNE

Date	Activity	Embassy's comment
Mid Oct 2010	Norplan was engaged by their framework agreement with Norad to participate in a planning seminar with ZECO to discuss future collaboration and submission of a summary report (Nov 2010) from the discussion in preparation for a Project Document (PD) to be developed.	
May 2011	Norplan was engaged by their framework agreement with Norad to **assist ZECO** in preparation of the Programme Document for the new collaboration. The Final PD was submitted by Zanzibar in December 2011.	
2012 April	Norad desk appraisal.	Main recommendations included: - 6 months inception phase - Chief Maintenance Advisor to assist maintenance unit of ZECO.
2012 May	Norplan submits a draft ToR for the 'Chief Maintenance Advisor', on an assignment for Norad under their framework agreement. The draft ToR was a follow up from Norad's desk appraisal.	
2012 Dec	Grant Agreement signed between the Norwegian Ministry of Foreign Affairs and the Revolutionary Government of Zanzibar.	Inception phase starts up. ZECO proposes Kuri Consult (Knut Riise) to assist ZECO in the inception phase. The documents found on the archive indicates that procurement of the 'Chief Maintenance Advisor' as well as twinning partner was to be procured during the inception phase.
2013 July	Inception report submitted by PS in MLHWE	In a letter dated 07.10.2013 the Embassy informs MLHWE that the quality of the inception report is not as expected and that there is a need to redo the inception phase if project is to continue. Procurement of 'chief maintenance advisor' and twinning partner did not take place during this period.

Date	Activity	Embassy's comment
2013 Dec	The Embassy enters into a Consultancy service contract (Framework Agreement) with Multiconsult|Norplan.	The contract was awarded after international tendering.
2014 Jan	An Award letter is signed over the Framework Agreement with Multiconsult to assist ZECO in redoing the inception phase including the development of the Electrification Master Plan.	The decision to redo the inception phase put pressure on the partners to identify acceptable solutions for the way forward. The recently signed Framework agreement and the use of Multiconsult was considered a good solution in that regard. The Embassy is of the opinion that there are no obvious conflict of interest between the work conducted in preparing the PD in 2011 and draft ToR in 2012 and the assignment in 2014 given that close to 2 years have passed and the fact that the ToRs were prepared with the intention for ZECO to procure the services through a tender process.
2014 Oct.	Multiconsult delivered the inception report with the Masterplan as an integrated part. This also included the work plan, budget and tender documents for main Phase.	
2015 March	Signed Amended Grant Agreement between the Norwegian Ministry of Foreign Affairs and the Revolutionary Government of Zanzibar, extended to 2018	
2015 March	Second Award letter is signed with Multiconsult for TA throughout implementation of the project up to 2018.	