EuropeAid/135818/IH/SER/TZ

Service Contract № FED/2016/375-441

Technical Assistance for the implementation of renewable energies and energy efficiency projects, including regulatory reforms" (Lot 2)

PROGRESS REPORT
JUNE TO DECEMBER 2016

December 2016

(Version 1)

MWH

This Project is implemented by Consortium led by

MWH

BUILDING A BETTER WORLD

in cooperation with:

MOTT MACDONALD

Mott MacDonald

PESCARES ITALIA

PESCARES Italia Srl

This project is financed by the European Union, under the Cotonou Agreement, through the European Development Fund (EDF). The EDF is the main instrument funded by the EU Member States for providing Community aid for development cooperation in the African, Caribbean and Pacific States and the Overseas Countries.

Report Title	**First Progress Report**
Version	Version 1.0
Date	16 January 2017
Prepared By	Niels Juhl Thomsen, KE1: Team leader/ Power Engineer Alejandro Saenz-Core, KE2: EE and RE Economist and Financing expert
Reviewer	Anca Andreescu, Project Manager MWH

BASIC PROJECT DATA

Project Title:	**Technical Assistance for the implementation of renewable energies and energy efficiency projects, including regulatory reforms (Lot 2)**		
Project ref. no:	EuropeAid/135818/IH/SER/TZ	Recipient organisation: Contact person: Address, telephone number and e-mail:	Ministry of Land, Water, Energy, and Environment, through Zanzibar Electricity Corporation (ZECO) Maulid Shiraz Hassan Head Office P:O:Box 235, Gulioni +255 774 386 247 Maulidh@hotmail.com
Service contract No:	FED/2016/375-441	Contracting Authority: Contact person: Address, telephone & fax number and e-mail:	The Alternate National Authorising Officer (NAO) Principal Secretary Ministry of Finance P.O.BOX 1154 Zanzibar, Tanzania E: info@mofeaznz.org T: +255 778 666664/5
Date of contract signature:	7th June 2016	Contractor's name and address:	MWH SA/NV A: Nysdam Office Park, Avenue Reine Astrid, 92, B-1310 La Hulpe, Belgium www.mwhglobal.com
Contract duration:	24 months	Contact person: Address, telephone & fax number and e-mail:	Ms Anca.Andreescu A: Nysdam Office Park, Avenue Reine Astrid, 92, B-1310 La Hulpe, Belgium T: +32 (0) 2 655 22 78 M: +45 20 60 18 24 F: +32 (0) 2 655 22 80 E: Anca.Andreescu@mwhglobal.com
Total contracted amount (Euro):	1.152.700,00 EUR	Project Team Leader Address, telephone number and e-mail:	Mr Niels Juhl Thomsen E: Niels.Juhl@Thomsen.as M: +255 (0) 774 771 229

TABLE OF CONTENTS

0 EXECUTIVE SUMMARY 8

1 PROGRESS IN THE FIRST REPORTING PERIOD 10

1.1 INTRODUCTION 10
1.2 ACTIVITIES 1 TO 5 11
1.3 ACTIVITY 6 12
1.4 ACTIVITY 7 13

2 PLANNING FOR THE NEXT REPORTING PERIOD 13

2.1 ACTIVITIES 1 TO 5 13
2.2 ACTIVITY 6 14
2.3 ACTIVITY 7 14
2.4 WORKPLAN 14

3 KEY ISSUES DURING THE FIRST REPORTING PERIOD 17

3.1 DELAYS IN IMPLEMENTATION OF LOT 1 17
3.2 CHANGE OF ELECTRICITY TARIFF 17
3.3 COORDINATION WITH SIDA 17
3.4 PROBLEMS AND BARRIERS ENCOUNTERED 17

4 PROJECT RESOURCES 18

5 ANNEXES 19

List of Annexes

Annex A	List of Steering Committee and Technical Committee members
Annex B	List of meetings held during the reporting period
Annex C	Draft review and outline of the regulatory framework
Annex D	Draft document of interpretation of the ZECO Act
Annex E	Analysis of subsea cables
Annex F	Market appraisal for RE & EE technologies in Zanzibar
Annex G	Communication and visibility plan

List of Acronyms

ACP	African, Caribbean and Pacific Countries
ADF	African Development Fund
AEGF	Africa Energy Guarantee Fund
AfDB	African Development Bank
CA	Contracting Authority
CTF	Clean Technology Fund
DoEM	Department of Energy and Minerals
DP	Development Partners
EAC	East African Community
EBRD	European Bank for Reconstruction and Development
EC	European Commission
EDF	European Development Fund
EE	Energy Efficiency
EEP	Energy and Environment Partnership
EIB	European Investment Bank
ESIA	Environmental and Social Impact Assessment
ESIRSR	Electricity Supply Industry Reform Strategy Roadmap
EU	European Union
EUD	EU Delegation
FIT	Feed-in Tariff
GCCA	Global Climate Change Alliance
GEEREF	Global Energy Efficiency and Renewable Energy Fund
GHG	Greenhouse Gas
GIZ	Die Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH
IPP	Independent Power Producer
KE	Key Expert
KfW	Kreditanstalt für Wiederafbau
MCA	Millennium Challenge Account
MCC	Millennium Challenge Corporation
MDGs	Millennium Development Goals
MKUZA	Swahili acronym for Zanzibar Strategy for Growth and Reduction of Poverty
MoF&P	Ministry of Finance and Planning
MoFEA	Ministry of Finance and Economic Affairs
MoU	Memorandum of Understanding
NGOs	Non-Governmental Agencies
NKE	Non-Key Expert
PPA	Power Purchase Agreement
PPIAF	Public-Private Infrastructure Advisory Facility
PPP	Public-Private Partnership
PV	Photo-Voltaic

RE	Renewable Energy
RES	Renewable Energy Sources
RGoZ	Revolutionary Government of Zanzibar
SCCF	Special Climate Change Fund
SEFA	Sustainable Energy for Africa
Sida	Swedish International Development Cooperation Agency
SPPA	Standard Power Purchase Agreement
TA	Technical Assistance
TANESCO	Tanzania Electricity Company
TL	Team Leader
ToR	Terms of Reference
WB	World Bank
ZCBE	Zanzibar College of Business Education
ZECO	Zanzibar Electricity Company
ZIP	Zanzibar Investment Policy
ZURA	Zanzibar Utility Regulatory Authority

0 EXECUTIVE SUMMARY

1 This Progress Report covers the period from June 7th to December 31st of 2016 and describes how assistance was delivered under the EU project ***"Technical Assistance for the implementation of renewable energies and energy efficiency projects, including regulatory reforms (Lot 2)"*** (EuropeAid/135818/IH/SER/TZ), Service Contract №FED/2016/375-441, hereafter interchangeably referred to as "the Project" and/or "RE & EE Lot 2". It is financed by the European Union, under the Cotonou Agreement, through the **European Development Fund (EDF)**.

2 The Project is part of the comprehensive ***EU programme in support of the RE and EE Initiative in Zanzibar*** that consisted of the preparatory TA "Bridging Phase", a contract for supply and installation of wind and solar measurement equipment (under implementation) and two (2) TA contracts for the implementation of the programme via 2 lots:

- Lot 1: Wind Resource and Solar Potential Analysis and full scale Feasibility Studies of wind and solar farms in the perspective of developing 40 MW wind farms in Unguja, 4 MW in Pemba and solar farms[1].
- Lot 2: Technical Assistance for the implementation of renewable energies and energy efficiency projects, including regulatory reforms – the present project.

3 The RE & EE Lot 2 project is a **24-month technical assistance effort**, whose main objective is to support the development of renewable energies in Zanzibar, promote implementation of energy efficiency and adequate regulatory and institutional framework through appropriate transfer of know-how and capacity developments of Key Stakeholders.

4 The contract is implemented by an international consortium, led by **MWH SA/NV** in cooperation with **Mott MacDonald** and **PESCARES Italia Srl**. The project contract was signed on 7th June 2016 and the project commenced on 13th June with Zanzibar Energy Development Partners Meeting considered also the project kick-off meeting.

1 The Beneficiary country is the **United Republic of Tanzania – Zanzibar**, and the Contracting Authority is The **Alternate National Authorizing Officer (NAO)** representing the Revolutionary Government of Zanzibar (RGoZ).

1 This 24-month project is divided into three project phases as follows:

- Inception Phase: Months 1.5 (Inception Report: week 6). Completed.
- Implementation Phase: Months 2-23 (draft Final Report: end of month 23). In Progress.
- Completion Phase: Month 24 (Final Report: end of month 24).

2 During the Inception Phase (6 weeks), the Project Team established a well-founded basis for the Project's implementation by setting up a project office at the Zanzibar Electricity Company (ZECO) and initiated the inception activities in accordance with the ToR and Technical Proposal. In this period, the Project Team concentrated mostly on:

- Familiarising with the state of play in the field and analyse the project start-up situation.
- Meeting all the (available) stakeholders.
- Reviewing the available project background information and lessons learnt.
- Compiling a database of all relevant documentation obtained.

[1] *The power plant sizes should be part of this assignment allowing for the absorption capacity of the grid and other technical-economic constraints*

- Adjusting the project activities on the basis of the inception period findings.
- Updating the project work plan considering also the progress of lot 1 activities and partners expectations.
- Charting the overall project planning for the forthcoming months of the Project implementation.

3 The **Inception Phase** was extended by 2 weeks by the Contracting Authority's no objection letter dated 22nd June and the Inception Report was duly submitted on 27th July 2016.

4 Next, the **Project Implementation Phase** started, with the preparation and delivery of specified activities designed to deliver the agreed results of the Project. The implementation phase covers a period of 22 months (months 2 to 23) and includes seven major activities:

- Activity 1: Opportunities Assessment of RE/EE Technologies for Zanzibar.
- Activity 2: Legal, Regulatory and Institutional Framework for Zanzibar for RE & EE.
- Activity 3: Supporting Mechanisms Introduced by the RGoZ and Geared to the Private Project Promoters.
- Activity 4: Technical Support to the RGoZ for Private Projects Implementation.
- Activity 5: Technical Support to the RGoZ for State-run Projects Implementation.
- Activity 6: Training and Know-How Transfer.
- Activity 7: Communication and Visibility.

5 Finally, the **Project Completion** phase will end up with the preparation and delivery of the Final Project Report and deliverables (24 month).

6 This first Progress Report covers the following sections:

- Section 1: Progress in the first reporting period.
- Section 2: Planning for the next reporting period.
- Section 3: Key issues during the first reporting period.
- Section 4: Project resources.

7 The Annexes contain the outputs produced in the reporting period, as mentioned in the various sections.

1 PROGRESS IN THE FIRST REPORTING PERIOD

1.1 Introduction

8 On 15th June 2016, a joint Steering Committee and Donor Coordination Meeting was held and acted as a Kick-off Meeting for the RE & EE Lot 2 Project.

9 The Inception Report was submitted on 27th July 2016 and approved by the Steering Committee in its meeting on 10th August 2016.

10 The management and coordination structure of the project was confirmed. It includes:

- The Contracting Authority: the Alternate National Authorizing Officer (NAO).
- The Implementing Agency: the Ministry of Land, Housing, Water and Energy (MLHWE).
- The Steering Committee established to monitor the Zanzibar Renewable Energy Programme and approve the main steps and decisions. It gathers representatives from different institutions, including Ministry of Finance (Chairman), MLWEE, ZECO, Ministry of Agriculture, Planning Commission and EU as observer. The list of members is provided in annex A.
- The Technical Committee established under the tutelage of MLHWE to implement the programme. It is comprised of officers of DoEM, Department of Land, Department of Environment, Department of Forest and Natural Resources, Planning Commission, ZECO and Ministry of Finance (multilateral cooperation). The list of members is provided in annex A.
- The Program Manager - Mr Maulid Shiraz to coordinate the implementation of the project. Mr Maulid Shiraz is an engineer working at ZECO in the Corporate Planning Department.
- The Secretary appointed to convene the Steering Committee and Technical Committee meetings and to ensure the coordination between MoF&P, the other institutions and the development partners. Ms Sabra Machano is the project main point of contact representing the Contracting Authority and at the same time the appointed Secretary.

11 Despite the existence of the Zanzibar 2020 Vision, which proposes more diversified priorities and objectives than the MKUZA II, RGoZ, October 2011, and with MKUSA III under preparation, the team experienced the lack of a shared Vision and coordination among the stakeholders. What has been reviled of MUKUSA III shows that it is not focusing on RE and EE, and only contains little about it. In all the meetings with stakeholders, the team highlighted the need for a common Vision in order to engage and create consensus and convey the message on building and enabling environment for the private sector investment.

12 In addition, during the meetings held (see annex B) the team discussed the capacity building gaps and needs covering various topics, such as Power Demand Methods and tools, and Public-Private Partnership training, among others.

13 Due to the delay of Lot 1, the uncertainty of the RE resources has prevailed during this period. For this reason as well as for the lack of a vision, strategy and strategic plan for both EE and RE, several activities were undertaken by the team for finding a way forward for Lot 2. Three options were described: 1: Put Lot 2 on hold until Lot 1 deliver, 2: focus on EE until Lot 1 deliver, and 3: Prepare vision, strategy and strategic plan for both EE and RE. At the meeting on 23rd November, the Steering Committee decided to opt for option 3, however further clarifications are needed on the scope of the Sida II project that recently had its Inception Report approved.

14 A number of overlaps were identified between the Sida II project and the RE & EE Lot 2. Sida II includes an update of the Energy Policy from 2006 and clarifications are needed to conclude if the update of the Energy Policy will actually also include strategies and strategic plans. Only little information has been provided by DoME who

claims to have prepared a strategy, but failed to share it. What has been shared in late November 2016 is an Energy Policy Implementation Plan covering 2013 to 2016 which did not include any strategy or strategic plan but a long list of activities. No output of the Implementation Plan has been shared. With regard to training, EE, and C&V, the overlap between the two projects seems to be much more substantial. Meetings for clarifications are being planned.

15 These discussions that have not yet reached a conclusion used more time than initially foreseen in the Inception Report.

1.2 Activities 1 to 5

16 A Draft Review and Outline of the Regulatory Framework, including Indicative Feed in Tariff for smaller solar systems on private parcels, has been prepared (see annex C). The proposed system was discussed at the Steering Committee Meeting on 23rd November 2016. The proposed system was accepted as a way forward.

17 The lack of infrastructure was identified as a major obstacle for development of larger solar and wind parks. This is not a surprise, as the present system is optimised for distribution from a single point on Unguja, as well as Pemba. With development of larger solar and wind parks, investments are needed. A note prepared by Lot 2 was discussed at the Steering Committee Meeting on 23rd November and permission to proceed with donor contact for seeking funding was approved. Further, for preparing larger solar and wind parks, the SC gave permission to call all the companies for consultations, one by one.

18 The evaluation of RE resources has not been prepared by Lot 1. The availability of resources has therefore been assumed based on general data and MESO maps. A preliminary feasibility study of solar projects has been made based on quotations from suppliers of solar PV equipment and their assumptions on solar radiation. This study shows that solar PV is able to deliver at prices lower than the price paid for delivery from TANESCO. However, the study leaves out all risks and uncertainties.

19 On the Steering Committee Meeting on 23rd November it was also decided to include to the programme a systematic registration of the production data from privately owned solar systems and wind measurements. This will call for cooperation with the owners to allow their data to be included and for DoEM and ZECO to provide also data as a supplement. At the same time, it will allow to gain experience and use it at an early stage.

20 At the Technical Committee Meeting on 10th November 2016. the possible topics for Energy Efficiency were discussed, namely:

- Improved cooking stoves;
- Building Codes – improving the building envelope;
- Replacing electric water heaters with solar thermal (by outlawing electric water heaters);
- Electric appliances – households and commercial (everything from toasters to air conditioners and further all electrical tools), by applying a labelling system similar to the EU;
- Regular inspection of emissions from vehicles to be combined with inspection of general roadworthiness;
- Replacement of two stroke engines by outlawing their import (two stroke engines are leaving a trail of inefficient combusted oil that is not evaporating and remains as a thin film of oil on water and on land).

21 It must be noted that these topics are not an official approved policy for Zanzibar.

22 For implementing Energy Efficiency actions, three main possibilities exist 1) use of the tax system (exceptions, subsidies, enforce extra taxes on undesired behaviour), 2) laws and injunctions (orders), or 3) voluntary achievements through campaigns. A mix of 1 & 2 is possible and should be combined with 3. Using voluntary

achievements alone has shown not to be efficient in the long run. Therefore it was agreed to proceed with a mix of 1, 2 and 3 which was also reported and approved at the Steering Committee Meeting on 23rd November.

23 Various meetings were held with stakeholders from Zanzibar, including Government agencies, education providers, RE and EE players, and civil society to review the main projects assumptions, and detect gaps and barriers related to renewable energy resource availability. The main findings were included in the Inception Report submitted in July 2016.

24 In the reporting period, relevant documents were reviewed by the team, including the existing policy documents, ZECO Act, ZURA Act and 2009 Energy Policy among others. A draft document of interpretation of the ZECO Act was also prepared (see annex D).

25 The operations and load management of subsea cables were assessed, together with the capacity constraint & power factor trends. The financial model to evaluate depreciation and amortization fee for main subsea cable was prepared (see annex E).

26 The team started the review of the RE and EE financial options best practice indicating key financial instruments used in various case studies, including the World Bank REFINe tool.

27 A Market Appraisal for RE & EE technologies in Zanzibar was prepared (see annex F).

28 The preparation of the database of existing RE projects in Zanzibar started.

29 The preparation of the Cost-Benefit Analysis and Multi-Criteria Matrix of projects started as well in the reporting period.

1.3 Activity 6

30 The training activities started with the mobilisation of a senior local Non-Key Expert who started the preparation of the training programme in November 2016.

31 A number of meetings were held with various institutions in order to start identifying the training needs. The institutions met included:

- Tanzania Commission of Science and Technology
- Zanzibar Bureau of Standards
- Karume Institute of Science and Technology
- Zanzibar Association of Tourism Investors
- Department of Energy and Minerals
- State University of Zanzibar
- Ministry of Agriculture, Natural resources, Livestock and Fisheries
- Zanzibar Environment Management Authority
- Zanzibar National Chamber of Commerce Industry and Agriculture
- Zanzibar Electricity Company
- Vocational Training Authority
- Zanzibar Utility Regulatory Authority
- Zanzibar Municipal Councils

1.4 Activity 7

32 Activity 7 progressed with the mobilisation of two Non-Key Experts (one senior international and one junior) starting September 2016.

33 Data collection was performed as a baseline study for the preparation of the Communication and Visibility Plan. The data was analysed including segmenting stakeholders for the purpose of preparation of the Communication and Visibility Plan.

34 The draft Communication and Visibility Plan (see annex G) was submitted to the Technical Committee and Steering Committee that approved the plan on its meeting on 23rd November 2016.

35 The concept note for the forum on RE & EE enabling environment that is scheduled to take place in January 2017 was prepared.

36 Graphic designers were consulted for the preparation of project visibility materials and quotations collected for the services.

37 The work on the contents of visibility materials started and a consultation was done regarding a possible slogan for the project. The selected slogan is "**Green Energy for Zanzibar**" and in Swahili it is "**Nishati Rafiki kwa Zanzibar**". The slogan can be used in both languages with one language in a larger font and the other language in a smaller font. The occasion determines which language is used in the larger font.

2 PLANNING FOR THE NEXT REPORTING PERIOD

2.1 Activities 1 to 5

38 The discussions regarding the preparation of strategies and strategic plans for RE and EE are ongoing. It is currently uncertain if these activities will proceed. If the decision is to proceed, the implementation of the activities mentioned below may be delayed however a framework will be created for all other outputs and their subsequent political adoption will become more likely.

39 To supplement the data from the measuring masts, it is planned to launch an additional activity for collection of data already available on Unguja and Pemba. This data is coming from private investors having established PV and thermal solar for supply of resorts and institutions, and some data from private wind measurements.

40 The outputs initiated in the first reporting period will be finalised, including the RE and EE financial option and the Cost-Benefit Analysis and Multi-Criteria Matrix of projects.

41 Subject to mobilisation of the required Non-Key Expert profiles and availability of data, the team will also proceed with

- the analysis of the legal, regulatory and institutional framework, including proposals for a conducive legal, regulatory and institutional framework in Zanzibar for RE & EE, and practical roll-out plans and documentation.
- the cost-benefit analysis of supporting mechanisms and instruments and proposals, recommendation and drafting of related supporting documents (guidelines, audits, etc).
- the drafting of technical support documents for private projects implementation, including bidding and contractual documents adopted by the Government and eventually to be used for licencing private investors.

- the drafting of technical support documents for state-run projects implementation, including feasibility study reports and methods for business planning, financing, EE awareness raising, and monitoring and evaluation plan.

2.2 Activity 6

42 Starting January 2017, training proposals will be developed based on the identified needed and consulted with the stakeholders. The vocational training centre in Pemba will be approached for further collaboration.

43 The identification and mobilisation of trainers is expected to be finalised by June 2017 to deploy the training programme.

44 Stakeholders' forums and learning platforms will be organised including the first forum on 24th January 2017.

45 A regional study tour for key/strategic stakeholders is planned to be organised early 2017.

2.3 Activity 7

46 The visibility materials are expected to be printed early 2017. Awareness raising and visibility campaigns will be launched, including the dissemination of the visibility materials produced.

47 Online information dissemination will also start to be implemented.

48 RE awareness campaigns programs will be run though the media.

49 Cultural events including road shows for a wide public and households to disseminate visibility materials and energy efficiency technologies will be organised.

50 The participation of key stakeholders in exhibitions to disseminate RE & EE technologies is to be facilitated.

51 The RE stakeholders list will be maintained up to date and new members added.

2.4 Workplan

52 The revised workplan for the remaining duration of the project as well as the indicative mobilisation of the experts is provided below.

The work plan below shows the original dates in colour and the revised dates in grey.

		Year	2016							2017												2018					
		Month	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6
ACTIVITY 1: Opportunities assessment of RE/EE technologies for Zanzibar																											
Activity 1.1	CONSOLIDATION OF DATABASE FOR RE AND EE																										
Activity 1.2	ASSESSMENT OF RESULTS/OUTCOMES OF LOT 1 FEASIBILITY STUDIES																										
Activity 1.3	ASSESSMENT OF FINANCING OPTIONS FOR RE AND EE INVESTMENTS AND MEASURES																										
Activity 1.4	REPORT ON OPPORTUNITIES ASSESSMENT ON RE & EE OPTIONS																										
ACTIVITY 2: RE & EE regulatory framework for Zanzibar																											
Activity 2.2	INVENTORY OF EFFECTIVE FINANCIAL INCENTIVES																										
Activity 2.3	REGULATORY IMPACT ASSESSMENT																										
Activity 2.4 -	DRAFTING OF REGULATORY GUIDE AS A WORKING PAPER, PRELIMINARY MANUAL AND BASIS FOR RECOMMENDATIONS ON COMPREHENSIVE REGULATION																										
Activity 2.5	DRAFTING LEGAL, REGULATORY AND INSTITUTIONAL FRAMEWORK																										
ACTIVITY 3: Supporting mechanisms introduced by the RGoZ and geared to the private project promoters																											
Activity 3.1 -	REVIEW OF INTERNATIONAL PRACTICES AND OPPORTUNITIES FOR MECHANISMS SUPPORTING THE PRIVATE SECTOR (ENABLING FRAMEWORK)																										
Activity 3.2	COST BENEFIT ANALYSIS																										
Activity 3.3 -	COMPREHENSIVE STRATEGY OF PRIVATE SECTOR SUPPORTING MECHANISMS																										
ACTIVITY 4: Technical support to the RGoZ for private projects implementation																											
Activity 4.1 -	SUPPORT RGOZ IN PRIVATE PROJECT PREPARATION																										
Activity 4.2 -	ADVISE ON PROCUREMENT PROCEDURES FOR PRIVATE PROJECTS																										
Activity 4.3 -	SUPPORT TO IMPLEMENTATION OF PILOT PROJECTS																										
Activity 4.4 -	PREPARATION OF BIOMASS POWER PLANT PROJECT																										
ACTIVITY 5: Technical support to the RGoZ for state-run projects implementation																											
Activity 5.1	IDENTIFY PROJECTS SUITABLE FOR IMPLEMENTATION BY GOVERNMENT																										
Activity 5.2	PREPARE IMPLEMENTATION PLAN FOR PRIORITY AND PILOT PROJECTS																										
Activity 5.3	ASSESS FINANCING OPTIONS FOR LARGER STATE RUN PROJECTS																										
Activity 5.4	SUPPORT TO RGOZ IN IMPLEMENTING STATE RUN PROJECTS																										
ACTIVITY 6: Training and learning process																											
Activity 6.1	PERFORM TRAINING NEEDS ASSESSMENT																										
Activity 6.2	DEVELOP TRAINING PLAN																										
Activity 6.3	ON THE JOB TRAINING AND KNOWLEDGE TRANSFER																										
ACTIVITY 7: Communication and visibility																											
Activity 7.1	DEVELOP COMMUNICATION AND VISIBILITY AND PLAN																										
Activity 7.2	DEVELOP SOCIAL MEDIA COMMUNICATION STRATEGY																										
Activity 7.3	IMPLEMENT COMMUNICATION AND VISIBILITY PLAN																										
CLOSING PHASE																											

Allocation of expert working days per expert/month

	Resources used 2016								Resources Planned 2017												Resources Planned 2018						
Calender month	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Project month	0	1	2	3	4	5	6	June to Dec	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
Key Expert 1: Team Leader	14	19	19	19	13	16.5	13	97	15	9,5	16	7	13	15	10	16	18	16	14	15	15	15	15	15	13	15	350
Key Expert 2: Economist and financing expert		13	8,5	21	15	13	6	76,5	16	15	23	6,5	5	12	10	9	12	12	8	5	7	6	5	1	2	9	240
NKE Legal		0	0	0	0	0	0	0	0	0	5	5	22	6	12	0	0	0	0	0	0	0	0	0	0	0	50
NKE Training		0	0	0	0	5	4	9	10	15	14	2	10	19	10	0	5	14	0	5	5	0	5	5	2	0	130
NKE Communication		0	0	13	14	13	15	55	17	17	18	16	18	18	15	14	13	15	12	10	15	10	10	15	12	0	300
NKE Senior International Experts		0	0	13	0	0	0	13	0	0	0	0	0	21	21	20	13	12	0	0	0	0	0	0	0	0	100

3 KEY ISSUES DURING THE FIRST REPORTING PERIOD

3.1 Delays in implementation of Lot 1

53 During the visits to the measuring masts on Unguja, it became evident that the masts are not generating data according to what was planned. The reports received on the operation of the masts indicates that it will take a huge effort to present data of a quality needed for investors.

54 The contract with the contractor erecting the masts was cancelled and efforts are made to bring the masts up to the standard originally commissioned.

55 The delay in accessing reliable data has affected and might further affect the feasibility studies to be prepared by Lot 1, and which are also essential for Lot 2 to progress.

3.2 Change of electricity tariff

56 Presently ZURA is preparing a regulation of electricity prices based on actual costs. Tariff was previously dictated by the government and not based on an estimate of the real costs.

3.3 Coordination with Sida

57 The Sida II project has started and that calls for close cooperation within several areas. The Sida II project is to support training and awareness in the energy sector, and the preparation of a Draft Energy Policy. All these issues are partly overlapping with Lot 2 and as soon as the Sida project is fully operational, the coordination of activities will be required especially with regards to Activity 6.1 Training Needs Assessment.

3.4 Problems and barriers encountered

58 The main difficulty encountered has been the access to previous studies and reports produced with the support of development donors.

59 The transmission lines are constrained in their capacity and do not allow handling production from large renewable energy projects.

4 PROJECT RESOURCES

60 The following table gives an overview of overall use of resources in the first reporting period:

		Name	Number of mandays (CONTRACT)	Number of mandays (USED TO END DEC 2016) (% USED)	
Key Experts	Key Expert 1: Team leader/ Power Engineer	Niels Juhl Thomsen	350	115,5	33%
	Key expert 2: EE and RE Economist	Alejandro Saenz-Core	240	76,5	32%
Non-Key Experts	Senior International Experts	Mark Jeffery	50	16	32%
		TBD	50	-	
	Senior Local Experts	Matthew Matimbwi	100	8,5	9%
		TBD	80	-	
	Junior Local Experts	Sebastian Paschal TBD	220 80	55 -	32%
Incidental Expenditure			220,000	392,36	0,2%
Expenditure verification			25,000	6250	25%

61 The use of the resources is in line with the overall implementation progress of the project.

62 The Incidental Expenditure budget will be mainly used starting 2017 for the communication and visibility and training activities.

5 ANNEXES

Annex A: List of Steering Committee and Technical Committee members

List of the Steering Committee Members of the Zanzibar Renewable Energy Programme

Steering Committee Member of the Zanzibar Renewable Energy Programme			
Name	**Designation**	**Institution**	**Email**
Mr. Khamis M. Omar	Principal Secretary	MoF&P	khamis_tra@hotmail.com
Mr. Ali Khalil Mirza	Principal Secretary	MLHWE	akmirza@zanlink.com
Mr. Abdalla A. Omar	President	ZNCCI	tarabeni1960@gmail.com
Ms. Mwandawa K. Moh'd	D. Chairperson	ANGOZA	Disabledwomen2012@gmail.com
Eng. Leopold Lwajabe	Engineer	EDF-PSU DNAO	llwajabe@psu.go.tz

In addition, possible SC invitees can be: General Manager – ZECO; Director of DoEM; Commissioner of External Finance; Commissioner of Planning Commission; Project Manager RE & EE; Secretary; EU delegation.

List of the Technical Committee Members

Members of the Technical Committee	
Mrs. Sabra I. Machano.	Ministry of Finance
Mr. Maulid Shiraz	ZECO
Mr. Sayyidomar Idarous	Dept. of Energy and Minerals
Mr. Salim H. Bakar	Dept. of Environment
Mr. Miza S. Khamis	Department of Environment
Mr. Mohamed Habib	Department of Land
Mrs. Maryam Dhahir	Planning Commission

Annex B: List of meetings held during the reporting period

Ministries and departments

- Ministry of Land, Water, Energy, and Environment
- Meetings with Department of Energy
- Ministry of Finance and Planning
- Ministry of Finance and Planning – the Public Private Partnership Unit
- Ministry of Infrastructure, Transportation, and Communication
- Ministry of Agriculture, Natural Resources, Livestock and Fisheries
- Department of Environment
- Department of Forestry
- Department of Environment
- Department of Urban and Rural Planning
- Visit to Pemba, meetings with Departments, authorities, and NGOs

Authorities

- ZURA.
- ZECO Planning Department, Legal Department, and Human resource
- Meetings with Technical Committee for the EU REEE Programme
- Zanzibar Environment Management Authority
- Zanzibar Vocational Training Authority
- Zanzibar Municipality Council
- Zanzibar Bureau of Standards
- COSTECH, government agency to promote science, technology and innovation
- Zanzibar Bureau of Standard
- Old Town Conservation & Development Authority
- Zanzibar Investment Promotion Authority

NGOs and possible developers

- Meetings with EU-D
- Possible RE Project developer, Zanzibar Renergy (NewCo)
- Possible RE Project developer, GSW
- Embassy of the Kingdom of Netherlands, Dar es Salaam
- Embassy of Denmark, Dar es Salaam
- REZA, Zanzibar Renewable Energy Association
- Zanzibar Sugar Factory Ltd, Mahonda
- Meetings with the Sida II Project
- Zanzibar Non-State Actors Support Programme (funded by EU)
- Zanzibar Recycling Company
- Meeting Project developer, visit to a combined solar and wind system, Paje
- Visit solar installation in SOS Children's Village
- Karume Institute of Science and Technology
- State University of Zanzibar
- Zanzibar National Chamber of Commerce Industry and Agriculture
- Zanzibar Association of Tourism Investors

Annex C: Draft review and outline of the regulatory framework

Draft Review and Outline of a Regulatory Framework, including Indicative Feed in Tariff for smaller solar systems on private parcels

TABLE OF CONTENTS:

1 INTRODUCTION 3

2 PRESENT REGULATORY FRAMEWORK FOR RENEWABLE ENERGY 3

2.1 ZANZIBAR ENERGY POLICY 2009 3

2.2 ZANZIBAR UTILITY REGULATORY AUTHORITY 3

2.3 ENERGY ACT 4

2.4 REGULATION ON RENEWABLE ENERGY 4

3 VISION, STRATEGY, STRATEGIC PLANS, ACTION PLANS 4

4 GRID PARITY 4

5 PURPOSE AND CONTENTS OF A REGULATORY FRAMEWORK 5

5.1 PURPOSE OF A REGULATORY FRAMEWORK 5

5.2 ELEMENTS OF A REGULATORY FRAMEWORK 5

5.2.1 Technical Regulation 5

5.2.2 Legal Regulation 5

5.2.3 Financial Regulation 6

5.2.4 Possible further elements for Large Scale Installations 6

6 CURRENT PRICES IN THE SYSTEM 7

7 POLICY DECISIONS 7

8 RANGE OF SIZES OF RE INSTALLATIONS 8

8.1 CONCERNS 8

8.2 LOCATION 8

9 SOLAR PV ON PRIVATE AND PUBLIC BUILDINGS OR GROUND 9

9.1 USE OF BATTERIES IN PV APPLICATIONS 9

9.2 BATTERY CONCERNS 9

9.3 POSSIBLE TARIFF FOR BANKING 9

9.4 INDICATIVE COSTS OF POWER FROM SOLAR PV 10

10 SOLAR AND WIND POWER FARMS 11

10.1 CONCERNS, FARMS 11

10.2 POSSIBLE FEED IN TARIFF FOR SOLAR, PRELIMINARY PROPOSAL FOR A TARIFF 11

10.2.1 Reasoning 11

10.2.2 Rooftop systems from10Wp up to 50Wp: 11

10.2.3 Financial Position for ZECO 12

10.3 POSSIBLE FEED IN TARIFF FOR WIND POWER. 12

List of Abbreviations:

EE	Energy Efficiency
IPP	Independent Power Producer
PPA	Power Purchase Agreement
PV	Photo Voltaic
RE	Renewable Energy
SIDA	Swedish International Development Cooperation Agency
TANESCO	Tanzania Electricity Supply Company
ZECO	Zanzibar Electricity Cooperation
ZURA	Zanzibar Utility Regulation Authority

1 Introduction

This note is to provide an overview of the regulatory systems introduced in the region and some international regulatory systems.

The assessment of the regulatory framework will cover the regulation of the electricity sector potentially impacting RE and EE projects. This includes the considerations of ZECO's monopoly on transmission and distribution of electricity, the licencing of petroleum dealers, and how to open for Independent Power Producers.

ZURA is presently preparing licensing for power generation, transmission, and distribution, with the purpose of establishing a tariff that reflect the costs. At the preparation date of this inception report, the regulation is so far not targeting the organisation of the power sector, instead Oil &Gas distribution utilities are regulated.

The regulation applicable to concessions, in particular the procedures and criteria for granting concessions for RE IPPs will need to be reviewed, in coordination with the on-going World Bank supported work on PPP in Zanzibar, in order to ensure that RE concessions are granted to projects developed under a feed-in tariff, quota or other mechanism.

The review of the regulation should check that the concessions for RE and EE are not subjected to the regulation of public sector tenders for goods and services, but fall under a specific regulation

2 Present Regulatory Framework for Renewable Energy

What policies and regulations are required to develop, build, operate and own a solar power plant on Zanzibar:

A. *Energy and Electricity Policy*
B. *Economic Policy and Regulation*
C. *Customer Protection and Environmental Policy and Regulation*
D. *Licenses and Contract Regulation*

2.1 Zanzibar Energy Policy 2009

Zanzibar Energy Policy from 2009 sets the frame for the energy sector. Among others it opens for ZECO to enter into Power Purchase Agreements (PPA) with private companies producing and feeding into the grid. The ZECO Act from 2009 confirms this. The option of introducing PPAs has therefore been utilised. If ZECO should sign a PPA, it has to keep the purchase price within the limits set by the TANESCO Tariff. If ZECO would pay more than that it would contribute to a deficit. If the price is lower, it needs to be at the point of feeding in to the grid, not to draw further costs for transmission lines.

2.2 Zanzibar Utility Regulatory Authority

Zanzibar Utility Regulation Authority (ZURA) is presently preparing efforts to regulate the electricity sector. The purpose of the regulation is first and foremost to implement a

methodology for calculation of the tariff, for the new tariff to include the true costs of the ZECO's activities in order achieve a balanced budget. This is in line with what ZURA did for the petroleum sector. Previous to ZURA's efforts, the prices of petroleum products were fixed using an unspecified methodology and, according to ZURA, sometimes the pricing did not allow for business and the supply was not sustained, leaving Zanzibar without supply.

ZURA is preparing to do similar for electricity sector. Presently, the tariff for electricity leaves ZECO with a huge financial deficit with no room for ZECO to generate sufficient revenue to cover its costs of operation. Several consumers are not paying their bills (including public sector entities) and on the other hand ZECO is not paying in full for the supply from Tanzania Mainland, TANESCO. It is self-evident that the present situation is unsustainable and that a solution must be found very soon. One way is to increase the tariff and other ways could be for the Government to cover the deficit and secure a financial position for ZECO to not only cover costs of operations, but also leave room for investments and depreciation.

To elevate ZECO from its present financial undesirable situation to a situation with financial balance would require a substantial leap in the tariff and/or a considerable contribution from Government Budget.

2.3 Energy Act

An Energy Act is currently under preparation with support from Swedish International Development Aid (SIDA). The support is part of a more comprehensive support programme and is yet to start the preparation of an Act.

2.4 Regulation on Renewable Energy

To be very precise about the present regulatory framework on connecting renewable energy to the Grid, it can be stated very short as there is no regulation. This, together with ZECO's financial position could lead to consumers investing in own capacity, thus leaving ZECO with lower turnover. Many of the bigger consumers have already installed PV for own consumption and more are coming. As no regulation is in force, connecting renewable energy to the grid is possible, and for many the electricity metre is running backwards during daytime when PVs are producing, only for the consumer to take back during evening. This is not illegal as there is no regulation or any law making it illegal and the consumers are therefore not violating any law or regulation, thus leaving ZECO without any means to introduce a fee for acting as an electricity bank.

However, ZECO could with the ZECO Act of 2006 propose to buy electricity from independent power producers at lower prices than the price paid to TANESCO. For every kWh purchased at e lower price, ZECO would earn a surplus compared to buying from TANESCO. To do so ZECO need to prepare a set of regulations for the Ministry of Land, Water, Environment, and Energy (MLWEE) approval.

3 Vision, Strategy, Strategic Plans, Action Plans

To be added later

4 Grid Parity

Grid Parity is when a technology can feed into the Grid at the price structure already ruling in the Grid or lower. If a technology cannot feed into the Grid at the ruling price structure, application of such technologies could be attractive for other reasons and these reasons could be economic, environmental, contribution to self-sufficiency, replacing import, creating work places, contribute to stability of supply, etc.

Whether to include technologies not able to feed in at grid parity or lower, requires a political decision on desired type of technologies (Vision), the kind of support that should be provided (Strategy), and the resources to be provided (Strategic plan). Based on the strategic plan, action plans for implementation can be prepared.

In Zanzibar, the Revolutionary Government of Zanzibar (RGoZ) has not adopted a Vision. Consequently, no strategy, no strategic plans, or any action plans have been prepared.

5 Purpose and Contents of a Regulatory Framework

5.1 Purpose of a Regulatory Framework

The Regulatory Framework is part of implementation and is the top priority of the Action Plan, and therefore relatively long down the road in the process starting with a Vision. The purpose of a regulatory system is simply to create order in a potentially chaotic implementing environment. The Regulatory Framework is to impose technical standards, legal rights framework, and fiscal conditions.

The establishment of regulatory framework will also create transparency in the sector and serve as a pool of experiences making it easier to decide on new project applications, no matter how they come around from the systems of calling (auctions, tender rounds, etc.).

Ultimately, a regulation is to create order in the flow of money in the system and make sure that all involved are paid a fee that can sustain their investments and operations. For ZECO it is a matter of fiscal balance, and for the owners of renewable energy installations it is a matter of covering costs. However, for the RGoZ, it is a matter of creating incentives/disincentives for decentralised power producers using Renewable Energy and maintaining and extending its infrastructure.

5.2 Elements of a Regulatory framework

There are three elements serving purposes in a Regulatory Framework: 1 Technical Regime, 2 Legal Regime, and 3 Fiscal Regime. Together these three regulates towards creating a whole securing appropriate technology, Training of staff in Operation & Maintenance, access to spare parts, quality of production, orderly contractual situation, and financial conditions clarified. As a whole the Regulatory Framework should create confidence of ZECO, confidence among investors, and some confidence that society is not robbed of its resources.

5.2.1 Technical Regulation

The Technical Regime includes quality of power feeding into the grid and states the quality of components in order to do it right – a Grid Code. This is to get the frequency and other indicators right. Further the Technical Regime should include demands on the quality of technology use as requirement of certification from an international recognised test centre. For solar the panel, the hardware of the control, and the software of the control should carry a certificate. List of requirements for other technologies is to be prepared.

The requirement of certification will also pave the way for investors to draw and insurance policy, that is essential for the investors to obtain credits from financing institutions. The insurance companies operating in the market already have specific requirements to certification of the technology. When preparing the Technical Regime, contacts to insurance companies should be made in order to align the demands.

Introducing different tariffs depending on the time of the day the flow occurs requires metres that can register the time. These metres carry costs, and the Grid operator or the parcel delivering to the grid can carry the costs. No matter who carries the costs, it requires that the Grid operator knows how to programme and how to maintain these metres. A standard metre must be required, not to have a number of different metres, all requiring specific skills to programme and maintain.

Connecting to the Grid also requires specified tolerances for the equipment used. The specification should be on the quality of power, and the security around the equipment.

Measures for restricting access to the connecting equipment and the metres should be introduced, specifying who has access and when.

The equipment should all be certified by an international accreditation entity. Especially as Zanzibar has introduced VAT exception for solar panels, it should be panels of quality getting the exemption.

5.2.2 Legal Regulation

The Legal Regime must include provisions of a standard contract, the lines of communications, the legal provisions on deliveries, settlement of disputes, ownership, rights of access to the grid, right to purchase, etc.

The Legal regulation is including the contractual stipulations of an agreement between ZECO and any power producer, big or small.

5.2.3 Financial Regulation

One of the key elements in a regulatory framework is the financial regime. Without the view to be able to earn a profit, no company wants to invest, on the other hand the Government/ZECO don't want to pay overprice.

The Fiscal Regime must include the fiscal part of the PPA and the methodology for calculations and this includes the point of connecting and the point of metering. In Zanzibar, there are two points of connecting larger producing units, and those are Chake Chake on Pemba and Zanzibar Town on Unguja. This implies that transmission costs could be significant and the entity paying must be compensated. If developers are paying the transmission line, third party access must be possible when capacity allows for it. If ZECO pays, the capacity should allow for further extension of production in the area of connection.

The financial regime can be composed several ways, with financial support up front as a subsidy, or with a PPA that ensure financial feasibility throughout operations for the entity investing. PPA could also take many forms, with or without price escalation linked to agreed indicators, a post project financial evaluation capping maximum return of investment. A PPA is to be negotiated between the partners. For the negotiations, solid data and information of the costs of generations could be.

5.2.4 Possible further elements for Large Scale Installations

5.2.4.1 Banking

The point of metering is the most important issue, as it has impacts on the others issues. As of now, no regulations are ruling, and that implies that a parcel supplied from ZECO can install electricity-producing devices, connect it to the grid and consume for own need. Whenever the devices are producing more than the self-consumption the excess is delivered to the Grid and the meter is running backwards. This is in principle allowing for Banking in the system, and the exchange with the Grid is one to one. If the device is solar panels producing more than the self-consumption during the day, the system is banking during the day, and drawing from the "Bank" at evening and night. ZECO is paid nothing for serving as a bank.

The producer should pay for the service of being provided with capacity and having the service of a "Bank", two metres should be installed, and none of them should be able to reverse. Of the two metres one is measuring the delivery to the parcel from the Grid and the second is measuring the delivery from the parcel to the Grid. The prices of the flow through the two meters do not necessary have to be the same. The selling price from the Grid includes the obligation to deliver at a given capacity at all times. The Grid buying price should reflect the service of the Grid acting as a electricity bank. The deferens in the buying and selling price should also reflect the time of the 24-hour circle the Parcel is banking and drawing from the "bank". During the peak hours in the evening delivery from a parcel should be paid more per unit to reflect the grid load. If a parcel with a solar system is banking during the day and drawing (consuming) during the evening, there is no gain for the Grid. If the electricity-producing device is producing 24 hours, the gain for Grid becomes more evident and the need for differencing the prices between the two metres becomes less.

In the bigger picture, the electricity banked during daytime will ultimately be "stored" in the hydro dams on the Mainland, but only to be released during evening peak. If the device is producing 24 hours it will represent a saving in the system and contribute to lower the need for capacity in the system.

Whatever way it is considered it will reduce the sale of ZECO and thus contribute to the financial stress.

The metering, registration of power exchange with the grid, and the billing requires an equipment and an organisation that can handle the management. Some of it could be expensive, and unless many power producers are connected, the management could be relative costly.

5.2.4.2 Wheeling

Wheeling is when a facility is producing electricity at one location and consumes electricity at another location. If no special arrangement is introduced, the production will be paid as a PPA, and at the location of consuming it will follow the normal tariff. To create an incentive to use of renewable energy, a tariff for wheeling could be introduced, a tariff depending on the time of the day wheeling is happening. The wheeling system could also have the element of tariff for "banking". If the facility is producing during the daytime and the consumption is at night during the peak hours, this should be reflected in the tariff.

This situation is very relevant for larger consumers that have no space within their premises to host RE installations and therefor acquire land away from their own premises. This calls for investments to make exchange of electricity possible and for a tariff for wheeling.

6 Current Prices in the system

The current prices in the system are added up by several components:

Item	TZS/kWh	USc
TANESCO kWh	153	7
TANESCO Peak Load	44	2
Cost of Cable	109	5
Losses	65	3
Costs of transmission and distribution	44	2
Total	414	19

Table 1: Cost Components of electricity supply

Table 1 shows the total delivery costs of ZECO per kWh at the gate of an average consumer. The costs are composed of the TANESCO charge for one kWh and the average cost per kWh for the charge of the peak load. The cost of the sea cable is the capital costs per kWh and the cost of operation. The losses in the ZECO transmission and distribution system is more than 20% entailing that for every kWh making landfall in Zanzibar, only less than 0.8 kWh reach the point of tariffing. This means that ZECO has to buy more than 1,25 kWh from TANESCO to deliver 1 kWh to the average consumer in Zanzibar.

When ZECO is considering buying electricity from a parcel with RE installation the price to consider is not necessary the TANESCO tariff for buying, but the actual total costs of delivering to the gate of the average parcel.

This implies that ZECO could pay up to 19 USc for electricity without losing money. However, as a foreign donor donated the sea cable, it seems like the capital costs are not included in the considerations of ZECO, and the costs considered are only 14 USc per kWh.

7 Policy decisions

Several policy decisions must be made to compose a Regulatory Framework to determine the details of the regulation. The details are about the point of metering and the possibilities of using the ZECO network for Banking and Wheeling, and determining these has implications for the prices in the PPA.

The principle or the Power Purchase Agreement is another important Policy issue, as it determines the level of incentives or disincentives for installing renewable energy. For large-scale energy plants the PPA price is determining whether investments are made or not. Even if it is a Government project through ZECO, the internal PPA Price should have an impact on the electricity tariff to balance deficit/surplus.

Renewable energy is in its infancy in Zanzibar, and some kind of incentive is necessary to stimulate the development. When the concept of renewable energy is accepted, the prices paid in the system can be adjusted. In some countries the incentives has been introduced

with a fixed schedule for phasing the incentive out, but the plan always is revised, as developers never make it on time.

However, the terms and conditions for new agreements should be evaluated regularly.

A key issue is trust between the parties entering an agreement. The investor must have confidence in stability in a contractual engagement over several years. On the other hand, the Government must have confidence in the contract and that it will be honoured throughout.

A central issue for the regulatory framework is what should be included in the financial settlement.

One way is to measure ingoing and outgoing power separately and let ingoing power be subject to the ruling tariff. The outgoing power could be all what is produced from the RE installation and let it be subject to a tariff. Another way is to let the ingoing – outgoing power be subject to the ruling tariff if positive and if negative subject to another tariff. During some hours, the outgoing could be bigger than ingoing, though the average balance is positive ingoing. In that case a fee for using the grid as storage (banking fee) must be introduced.

In any case a tariff for purchasing power need to be established, and the deferens between the two is crucial for the success. If the difference is too big, parcels might choose to have two separate systems within the premises as one system supplied by ZECO and another system supplied by RE installation.

8 Range of Sizes of RE installations

8.1 Concerns

At present, ZECO has no legal basis for issuing charges for any RE facility connected to the grid, as there cannot be any misuse due to lack of regulation. Introducing regulations will make it possible to enforce the rules.

There is a difference between connecting a small-scale installation and installing a larger scale RE installation on the premises of a private person, resort, or an institution.

A small-scale installation not producing sufficient to make the metre run backwards at any time of the day, could be considered different from a larger scale installation that entails use of Banking and/or wheeling. For RE systems exporting to the Grid, special metres should be installed to separately measure consumption and feeding into the grid. When installing metres, it could easily be as metres with facilities of registration the time of the day the consumption/feed-in is taking place.

Size of the RE matters for ZECO, and even relative size of the RE matters. Absolute size is the capacity of installed RE and relative size is the exchange of power compared to the consumption.

Capacity of 50 Wp and less could be a major contributor to the electricity generation when their contribution is added together, but regulation could be very resource demanding to enforce, and rules not enforced are meaningless.

Wind energy is considered as an out of urban areas application and only in limited cases they could be treated as the small-scale PV systems are treated. The wind turbine capacity will be established outside urban areas in dedicated areas and form clusters or wind turbines in so-called wind farms.

8.2 Location

No matter the size, solar panels could create reflections of light if placed wrongly.

Every wind turbine regardless the size is generating power when the rotor turns. This creates visual disturbance. If wind turbines are close to housing it could create “stroboscopic” effects when the sun is low.

For these reasons, location of wind turbines and solar panels should be with concern to the surroundings. Generally, a wind turbine does not belong in an urban area and solar panels must be installed not to create reflections bothering neighbours, traffic, and other bypasses’.

These restrictions are usually part of the physical planning of an area and should not be the concern of the utility. However, in the case where physical planning is absent, the utility could take the role of advising on installations, not only the technical specifications but also the location.

9 Solar PV on private and public buildings or ground

9.1 Use of batteries in PV applications

As batteries are expensive and a potential environmental hazard, they should be avoided. The deal between RGoZ and the PV owners could be that the PV owners are saving the battery pack when grid connected and ZECO earns the fee for acting as a Banking Agent for electricity. However, this requires that the supply from the ZECO grid is consistent and with only minor disturbances.

As grid connected PVs rely on the Banking principle, it also indicates the span that could be charged for actually doing Banking of electricity. For a bigger system serving multiple households or a resort, the battery pack is usually 30% of the total investment costs of the system. However, the batteries have a much shorter lifetime than the PV panels, and considering the fee for Banking must also include that regular power cuts is reducing the value of the grid to act as a reliable Bank that could replace batteries. When paying a fee for Banking, one must be sure to be able to make a deposit and to redraw deposits at any time. This implies that investments in the grid to establish higher reliability is needed, and that could be as establishing closed loop circuits in the transmission and eliminate the radial single lines that by design is contributing to power cuts.

The main reason for investing in solar systems and batteries is to protect against power cuts from the grid. Solar power systems with batteries are delivering at much higher costs than the grid, but it always delivers. To convince the investor not to include the batteries, the grid must always deliver, and when this is achieved, a deal on splitting the difference of the costs of batteries can be made, until then, the split will be in disfavour of the grid.

9.2 Battery Concerns

Solar PVs not connected to the grid comes with batteries to store energy for evening/night and batteries are expensive from a financial and economic point of view.

Batteries have a limited lifetime and when warned out is hazardous waste. The small batteries are not much different from a battery in a car, truck, or a boat.

Alone the battery issue makes it attractive to have the PV systems connected to the grid not to increase the environmental exposure from used batteries. Further, non-grid connected systems that could be connected do not contribute to the overall capacity of the island. The grid connected PVs will reduce to needed import of electricity, thus contributing to the economy of Zanzibar.

The off-grid solutions will still need a battery pack to store the energy. As only 10% of the population is outside the reach of the grid, the battery problem is marginal compared to the number of used batteries from cars, trucks, boats, and other use.

9.3 Possible tariff for Banking

When batteries are added to the smaller systems, the costs increase to 27 USc from small systems and 20 USc from middle range system.

For the calculation above a discount rate of 3.5% is used for a 20 years NPV. The level of the discount rate can be discussed and the level chosen has an impact on the NPV unit costs from solar. However, the app 10USc difference between systems with and without batteries remains fairly constant at app10 USc.

With a well-functioning and reliable grid supply, the ideal would be to split equally between ZECO and the PV system the app 10 USc the batteries are adding to the costs per kWh. However, the main argument for installing PV systems is that that the grid supply is unreliable and power is needed as continues supply, and the willingness to pay for continuous service is reflected in the costs of alternatives implemented.

ZECO has a tariff for sale of electricity, and excess delivery at the gate from a PV plant is worth nothing for ZECO. For it to represent a value for ZECO it has to be transmitted to another consumer, delivered, and necessary billing made. All this, draw cost on ZECO and for this reason a margin for ZECO must be provided. The sale tariff of ZECO's is as an average close to 9 USc, as is also the price ZECO pays for deliveries from TANESCO, and until a new tariff is introduced, the incentives for ZECO to actively invest in facilities to continuously serve consumers and connected RE systems are not exciting.

Success criteria for grid stability can be applied for ZECO to start investing in the grid to avoid power cuts for consumers. The success criteria only need to include a few elements, namely:

- Sufficient capacity to deliver the demand of the costumer and take the load for banking (cap).
- Number of power cuts (cut).
- Time not delivering (h) as %.
- Time not delivering between sunset and sunrise (hN) as %.

If full time service, the payment for banking is 5 USc/kWh and with less service the payment is reduced.

Possible calculation:

$$0<(cap*(1-h)*(1-hN))/((1+cut)*0.5))>5 \text{ USc}$$

This way of calculating will reduce the payment if power cuts occur and also reduce payment depending on the downtime. If downtime is occurring after sunset the payment will be reduced further. The basic idea is to give incentive to have as few power cuts as possible and as little downtime as possible. If power cuts is happening often, the grid is not as good as a battery pack and some might be tempted to establish a battery pack.

On the consumer side, the condition should be that banking is one condition, another is own consumption. If a solar plant is net delivering to the grid, a different tariff should kick in for the excess delivery.

The above discussion is only valid if all pay their dues in full. At present this is not the case and that makes shadow pricing illusive if based on tariffs.

ZECO have the right and the obligation to buy excess power production from PV. For the owner of a RE plant the excess power at the gate has no value if not connected and sold to the grid. If an owner finds a neighbour willing to buy, the owner selling, face the same demand on reliability and consistency as ZECO. As only ZECO has the right to distribute power, an arrangement of the kind requires special permission. A single solar power plant cannot live up to that and the owner would have to buy from the grid to provide constant deliveries. If not, it will be reflected a lower price for the exchange.

9.4 Indicative Costs of Power from solar PV

For indication of the costs of power from PVs, a preliminary financial feasibility study has been made. This study is only indicative, and a higher level of certainty will be available when Lot 1 is delivering the comprehensive feasibility studies.

The indicative feasibility Calculations on smaller and larger PV systems suggests that the costs of one kWh are app 285 – 305 TZS (app 13 – 14 USc), and 220 TZS (app10 USc) in the array of 15kWp to 40kWp systems. When batteries are added to the system, the costs of smaller systems increase to 590 TZS (app 27 USc) and to 435 TZS (app 20 USc) from larger systems.

For systems of 1MWp and up, the cost per kWh becomes considerably lower due to better utilisation of the resources involved, discounts due to the scale of procurement. Financial feasibility of a 5 MWp installation show that costs add up to 8 to 9 USc per kWh, thus in parity with the bare costs of purchasing from TANESCO.

10 Solar and Wind Power Farms

10.1 Concerns, Farms

Wind turbines are larger constructions that require free access to the wind. They should therefore be installed outside the normal range of the grid. Further, wind turbines require high voltage reactive power from the grid, very stiff connection to the grid, and will therefore always have a transformer and an element of transmission. These costs are usually part of the development.

In Zanzibar, some areas are reserved for solar and wind farm development and these outside urban areas.

The present situation is that any larger renewable energy plant on Unguja will have to be connected to the main transformer near Zanzibar Town and on Pemba the transformer near Chake Chake. This will add considerable to the costs of implementing larger renewable energy capacity and the capacity of the transformers also determinates the upper limit for the capacity of renewable energy installations, unless extended.

The areas on Unguja and Pemba, reserved for wind and solar park development, are all on a distance from the main transformers.

As farms are on sites outside urban areas, the transmission of power becomes an issue. If the farms are ready to deliver at the gate of the farms, the transmission lines must be built from the farm sites to the transformers.

The ownership of transmission must be public to ensure third party access to the transmission lines, thus supporting the diversity of investors.

10.2 Possible Feed in Tariff for Solar, Preliminary Proposal for a tariff

10.2.1 Reasoning

This preliminary proposal is guided by the desire to keep it simple. There are many elements that could be introduced and the more elements added the complexity of managing the system also increases.

No matter the system introduced, it requires an explanation of the logic behind it for the investors to understand.

The logic behind the proposal below is a trade-off between ZECO and the investor. The investor saves the costs of the batteries and ZECO is paid for the services of maintaining the network and paid for service of being a bank (from the day time to the night time) for electricity. The electricity purchased will mean that ZECO will not have to buy and amount of electricity from TANESCO.

The fiscal balance of this arrangement has to be calculated, and that can be done when the potential has been elaborated and the potential resources are mapped.

One of the consequences of the proposal is also that all electricity produced outside own premises must be exchanged with ZECO on a PPA.

10.2.2 Rooftop systems from10Wp up to 50Wp:

These systems will produce from 15 kWh/y and up to 80 kWh/y.

Two-metre mode: ZECO tariff for ingoing power, and 80% of ZECO tariff for outgoing power. That is 240 TZS (app11 USc) for ingoing power, and 220 TZS (app 8 USc) for outgoing power. All figures without VAT.

Systems bigger than 50 Wp and up to any size. Specification and regulating the quality of connection and the quality of power feed into the Grid. Any solar panel connected should be certified by an international recognised accreditation entity. For the implementation of the regulation, metres must be installed that can separately measure ingoing power, and power produced by the PV panels. All power consumed will be paid according to the ruling tariff, and all power produced and delivered to the grid will be paid according to a separate tariff of 80% of the ZECO Tariff.

PV Capacity	Mode of metering	Monthly metre reading
1. Rooftop applications or similar inside own premises (one parcel) with power consumption.		
Less than 10 Wp.	Non-reversible metre.	Ingoing power: Consumer tariff.
10 - 50 Wp	One integrated or two separate non-reversible metres.	Ingoing power: Consumer tariff. Outgoing power 80% of the ZECO Tariff
1 kWp – oo kWp	One integrated or two separate non-reversible metres.	Ingoing power: Consumer tariff. Outgoing power 80% of the ZECO Tariff
2. Applications on one parcel with consumption supplying other consumption centres. **If connected by self-owned and self-paid cabling and equipment.**	Metring at one of the premises (parcel) of choosing. One integrated or two separate non-reversible metres. On all other supplied premises (parcel(s)), separate non-reversible metre(s).	Consumer tariff on ingoing power, and fro ouygoing power the TANESCO tariff for ZECO, or tariff agreed in a PPA.
3. Applications on premises (parcel) separate from premises (parcel) of any consumption (solar farm) except for the operating system.	One integrated or two separate non-reversible metres.	Net-outgoing: TANESCO tariff for ZECO (kWh + kVA), or tariff agreed in a PPA.

10.2.3 Financial Position for ZECO

10.3 Possible Feed in Tariff for Wind Power.

The Feasibility studies of Lot 1 will show the possibilities.

PRELIMINARY DRAFT
Note on preparing for investments in solar- and wind farms

1 Introduction

This note is to prepare for the coming investments in solar- and wind farms. This is early preparation as the true resources are not yet know. Only when Lot 1 has delivered, the true potential is known, and the specifics can be prepared. However, some preparations can be made, and this note is for the Steering Committee to approve these early activities.

The early preparations are about alignment of expectations with potential investors, and necessary preparations for investments. Among the preparations is how to organise transmission of electricity from the farms, to points where it can feed into the grid. The present capacity of both the Pemba and Unguja grid is too limited for larger farms with production of more than 8 MW.

One issue is the limited capacity of the sea cable from the mainland to supply peak on Unguja that already takes 85% of the capacity, and it is increasing sharply, and if no preparations are done, the capacity of the present sea cable will not be able to support the evening peak that could show urgent in a few years. Electricity from solar panels is not the answer to this issue, as solar panels only produce electricity during the daytime. Other means needs to be considered.

When both Unguja and Pemba have established solar and wind farms, the production of electricity during low consumption hours of the 24 hours' circle could be bigger than the demand for consumption. This opens for export of electricity from Zanzibar. As an early preparation of such situation, would be to make provisions for ZECO selling electricity to TANESCO.

2 Alignment of expectations with potential RE investors.

2.1 Government expectations

Government expectations are based on what has been going on Tanzania Mainland and internationally. However, the expectations are not detailed or expressed in visions and strategies. This is partly down to the pending analysis of the potential for renewable energy that is to be presented by the EU Programme, Lot 1. Unfortunate delays in surfacing the potential has been holding back initiatives while the interest for developing renewable energy has grown.

The indications from the preliminary collection of data shows significant resources of solar and wind energy resources. The indications are sufficiently strong to justify preliminary activities to start preparing for meeting the expectations.

For now, the resources are more or less unknown, but when information on the resources is known, the terms and conditions could be determined and it is for Zanzibar not to give away its resources, but secure the rightful share for the society.

The information on resources to be made available will be with a degree of uncertainty and in a possible contract with a potential investor could be included some escape clauses in case of huge windfall profits for the investors.

2.2 Investor Expectations

Investor expectations are based on significant resources and that the government can offer financial terms for a Power Purchase Agreement that can make the investments financial viable. Resent development in other countries shows solar farms approved that can produce electricity for 2 USc and recently an off-shore wind farm has been approved that will produce for the cost of 5 USc. Off-shore wind farms has always been much costlier than on-shore wind farms and at a price of 5 USc, costs are showing to come down on on-shore applications as well.

When an investor is to engage in a contractual obligation, trust of the other part is able to honour the contractual obligations is instrumental. A PPA could be for as many as 25 years, and for the investment to be viable for the investor he must trust that payment will be made over the full contract period. For the RGoZ it is important to find trust that the investor will be able to deliver over an equally long period.

The exact expectations among the potential investors on level of production and costs are not know, though a number of interested investors have made contact. It is therefore suggested to hold a round of meetings with potential investors to surface their expectation for entering into an agreement.

2.3 Meetings to uncover investor expectations

Aligning expectations between government and investors is a first step, and a method is to meet the investors that have shown interest one by one. As part of the approach is to send an agenda for each meeting and asking the investors to present their opinion and their sources of information, their methods for determining resources, their interpretation of financial viability, their demands for contract elements, demand for guaranties,

The meetings require an introduction from the government representatives on its intensions, but apart from that it is for the potential investors to uncover their intensions. It is Zanzibar owning the resources and the companies are in it to earn a profit. Processing the outcomes of the meetings could give a solid impression of the balance between the two parties.

Tentative agenda for meetings with potential investors:

- Brief project presentation
- Consortium/partners
- Organisational presence on Zanzibar & Management
- The Project
  Technology
  Application
  Lay-out
  Resources, expectations and sources of information
  Production profile over a full calendar year and over a 24 hours' circle
  Electrical connection to the Grid
  Decommissioning at the end of project lifetime
  Others
- Project implementation
  Timing
  Organisation of implementation
  Entities involved in implementation
  Others
- Operational phase
  Organisation
  Strategies for O&M (spare part availability, staff, skill building of staff, staff maintenance plan
- Financing and costs
  Technical lifetime and financial lifetime
  Others
- Requirements for a PPA
  Price demand
  duration
  Specific conditions
  Others

3 Infrastructure investments

3.1 Present situation

Investments and production of electricity by individuals is causing problems with the "traffic" in the grid and requires a stiff grid that can handle it. This has been dealt with in a separate note.

When considering investments in large solar and wind parks this will create a need for transmitting the production to centres (transformers) from where the electricity can be distributed to the consumers.

The need to re-inforce the capacity of the transmission is not surprising. The present grid is designed to receive all electricity at one point and distribute from there. With several parks producing from different locations and produce more than the need of the locality, the design of the structure need to be extended to serve the points of connecting the farms and transmission to the major consumption centre in Zanzibar Town.

As of now, the grid is estimated to be able to host 8 MW solar or wind from different locations. This however, is very limited compared to the potential that could be located within the areas reserved for solar and wind farms.

3.2 Need for infrastructure when solar and wind farms show

When solar and wind parks are introduced in the transmission system, the structure of feed in points is changing from one point to multiple points. Consequently, the structure of the transmission grid needs to change to allow for multiple feed-in points. The capacity of the needed additional transmission depends naturally on the capacity of the farms, and the expectations of future extensions.

If larger farms are established away from the larger consumption centres, the present electricity grid does not have the capacity to handle it. Some of the electricity could be transmitted via overhead lines to the consumption centres and distributed. However, parks are expected produce more than the local need end therefor to be transmitted over longer distances.

The true potential for capacity is not yet known, but based on experience from other parts of the world it will be well above the present capacity of 8MW. Consequently, extension of the transmission is necessary when considering permission to construct solar and wind farms.

The tentative capacity of the extension of the transmission capacity is to be made based on expectations. Just as important is to determine how to secure funding of the costs, and who will be the owner of the new transmission capacity. Several options are available. However, as RGoZ holds the rights to issue licences for exploiting the renewable energy sources, options for licencing different entities should be kept open. This implies that third party access to the transmission is a key element when considering the options for financing.

The transmission capacity needs to be operational by the inauguration of the first larger farm, and that could be within a few years from the licencing agreement has been signed. This is making it urgent to secure funding for the transmission lines. One option is to secure public ownership by providing funds from the state and or from external donors. A second option is to call for private financing and pay a yearly fee for using the line.

It is proposed to make a hearing-round with the donors who have shown interest in supporting development of the infrastructure for transmission. Among those are notably Norway and SIDA who have previously supported investments. Recently the Netherlands expressed interest as well. Other donors that might be interested are EU, African Development Bank, World Bank and Danida (Denmark).

It is suggested to contact the donor agencies to enquire about possibilities.

4 The capacity of the sea cable

4.1 The growing evening peak of electricity demand

The present sea cable to Unguja has a capacity of 100MW and that is well above the daily load of 60 – 65MW. However, the daily load is not constant, and the peak load of the day is during the evening and that is up to 85MW and increasing. This implies that additional supply to satisfy the peak load is becoming urgent. On Pemba the situation is less urgent.

If no preparations are done, the capacity of the present sea cable will not be able to support the evening peak, that could show urgent in a few years. Electricity from solar panels is not the answer to this issue, as solar panels only produce electricity during the daytime. Other means needs to be considered. Wind energy would help as wind turbines will produce during the peak hours, but also electricity storing facilities could contribute. The main issue is to have electricity supply available on Unguja to satisfy the peak hour demand.

An obvious way of addressing the issue is to introduce efficiency in the use of electricity and/or to introduce interruptible costumers. That could be larger consumers accepting a no power situation during a few hours of the day, such as the water authority. Further, it could be neighbouring resorts accepting sequential interruption of 30 minutes.

5 Possible export of electricity to the Mainland

The sea cables were laid for supply of Unguja and Pemba and they are operated as such. However, if larger solar and wind farms are established on Unguja and Pemba, production from these could exceed to demand for some hours of the day.

When both Unguja and Pemba have established solar and wind farms, the production of electricity during low consumption hours of the 24 hours' circle could be bigger than the demand for consumption. It could especially be from solar PVs during daylight and from wind during the small hours of the night. As an early preparation of this situation, the Contract between ZECO and TANESCO should be revisited to make provisions for ZECO selling electricity to TANESCO during hours with excess electricity production.

6 Request

Above some issues of concern has been described. To start addressing these issues it is proposed to prepare for:

1. Holding meetings, one by one, with those potential investors who have made a LOI for establishing solar and wind farms. The purpose with the meetings is to surface their expectations in greater details.
2. To initiate activities for seeking funding to extension of the electrical infrastructure, namely to pay a visit to potential donors at their representations in Dar es Salaam, Norway, SIDA, the Netherlands, EU, African Development Bank, World Bank and Danida (Denmark).

7 Addressing the Risks

Several risks are identified at present, but not all risks has been identified. The major risks are first and foremost connected to the resources, as no measurements has been made public available. The risk is less for solar PV and more on the potential wind energy. Risks are always pointing two ways. For the companies, it is to engage in a contractual commitment that and then the resources show to be less than expected. For the Government, the risk is to give a licence on conditions that are assuming lass resources than what actually show, thus losing an income. These are the simple risks.

More complicated are the financial risks. When entering a contractual commitment, the partners need to trust that the other part can actually honour the contractual obligations. From the investors point of view is if the Government is able and willing to pay for the energy delivered and over the contractual period. From the Government point of view, it is if the investor can be trusted to actually implement and operate the project. If an investor is misjudged and not delivering it could be a costly affair. First because the space is not developed and therefor the resources remain untapped, secondly because any unfinished business needs to be cleared from the site. For these reasons, there must be a financial guarantee in return of any licence, covering any failure to honour the terms and conditions in the licence. This includes guarantee of bankruptcy, negligence, carelessness, etc.

A guarantee for the payment of the companies should also be issued by the Government.

The Hearing-round with companies having shown interest will reveal more about the risks the companies are considering and how they are going to handle the risks.

Risks, and how these are dealt with, will add to the costs of producing. A guarantee has to be paid for and the evaluation of the risk by the entity issuing the guarantee will determine the costs. However, the investor facing the risks will include the risks in the calculation of the return of investment. For risky investments with a high volume of money involved will usually require a demand for an Internal Rate of Return (IRR) of 15% in real terms (after tax, not including inflation, and in a currency considered safe). If the risks are considered to be higher the demand for IRR will be higher.

An example. With the international level of interest rate, a 4% IRR is not an unlikely scenario. At that level, a 5 MW solar plant could produce at 7 USc per kWh. If 10% IRR the production would be at 11USc per kWh, and at 15% IRR it would be 15USc per kWh. This example shows how the inclusion of risk could dramatically change the price of electricity and also how important it is to alleviate the risks.

Annex D: Draft document of interpretation of the ZECO Act

ZECO ACT Interpretation and conclusion on the scope of work of ZECO

The main goal of this paper is to provide a high level interpretation of the ZECO Act relate to its scope of work, powers and duties and capabilities to enter in electricity purchase agreements with RE projects.

The assessment has done by a non-legal professional with experience in energy regulatory and energy contract studies (Mr. Alejandro SAENZ CORE).

ZECO Act or Zanzibar Electricity Corporation Act was approved by the RGoZ parliament in May 5th 2006 as Act#3; the version on-line could be found in the following link:
http://www.zanzibarassembly.go.tz/act_2006/act_2.pdf

The version posted on-line missed Page 11; and instead it has two #10 pages.

The document creates a legal entity and defines the ZECO Corporation, its establishment, its functions, its board of directors, its General Manager, Officers and Staff Powers and Duties, and the Corporation's terms and conditions of operations; including its relationship with the Minister MLWE&E.

It also provides powers to the Corporation, full monopoly powers on the electricity sector. ZECO is a full state-own Corporation, operating as a single buyer and single seller/supplier of electricity in areas located in Zanzibar.

Assessment of Main Sections of the ZECO Act content

Section 2 - Interpretation

It provides the "Interpretation" of terms used in the document, and in particular it is possible to find two specific terms which are clarify later:

"licence" means a licence (for Generation purpose) granted under **Section 27 of this Act**; and

"special agreement" means any agreement for the supply of electricity made between the Corporation and any Consumer, which by reason of any peculiarity in supply or demand, contains some special term or price, quantity to be consumed, period or otherwise, which term or condition is not reasonably applicable to every consumer of any general class of supply".

Comments – Any Generation in Zanzibar needs a Licence. ZECO could entrance in "special agreements" outside the tariff schedule.

Section 4 - Functions of the Corporation

It describes the functions of the corporation stated in items from (a) to (g).

Special interest should be put on the items (b), (e), and (f) as follows:

Item (b) says "the **investigation of new or additional facilities for the generation and supply of electricity** within Zanzibar";

Item (e) says "to **enter into contracts with any public, local authority or any person for the purchase and supply of electricity** or for any other purpose"; and

Item (f) says "to **enter into agreements for purchase of electricity in bulk from independent power producers** within or outside Zanzibar for resale to consumers".

Comments - These last two Items (e) and (f) are "single-buyer" clauses that allows ZECO to enter in agreements with Small (Item (e)) and Bulk/Larger (Item (f)) electricity producers for the resale to ZECO consumers.

Section 26 – Monthly and annual reports

It describes the content and standards to follow in the proportion of the financial reports.

Special interest should be put on the items (1), and (2) as follows:

Item (1) says "The General Manager shall within three months after the end of each financial year submit annual report to the Board which shall then be submitted to the Minister in respect of that year…";

Item (2) says "The financial statements forming part of the report shall: sub-item (a) says "be prepared in accordance with International Accepted Accounting Practices"- GAAP.

Comments - This Section allows ZECO to provide Annual Financial Statements that could help in guaranteeing Financial/Commercial Obligations such as the ones related to Power Purchase Agreements with Independent Power Producers as the ones quoted in Section 4 Item (f).

Section 27 – Power of thee Minister to issue licence

Item (1) says "The Minister may **grant a licence to any entity or person who wonts to invest in the electricity generation**, in any area in Zanzibar on such terms and conditions as may be specified in the licence"

Comments - This item is clear in the sense that any party investing in electricity generation in any area in Zanzibar should have a Licence from the Minister (MLWE&E). The "in any area in Zanzibar" implication is related to on-grid or off-grid units, either for back-up or PV solar panels, or another energy source connected or not to the ZECO grid. Then, any generation unit is Zanzibar without licence from the Minister is not legally allowed to produce electricity and it is illegal and it is punishable for non-compliance vis-a-vis this ZECO ACT. See below Section 53.

Section 35 – Security for payment.

It says "The Corporation may, before executing the work necessary for connecting the premises of an owner or occupier to any distributing main, by notice in writing require such owner or occupier, within seven days of the service of such notice, to give security for the payment of all moneys which may become due in respect of such work **or of the supply of electricity to such owner or occupier** or of both such work and such supply and, if the owner or occupier fails to comply with the terms of the notice, may refuse to supply electricity for the premises for so long as the failure continues."

Comments - This Section empowers the Corporation to request "Security for payment" or a Deposit from Consumers, This is relevant when ZECO has several consumers not paying the electricity bill. What is the status of this Security of Payment? and which part of the ZECO is handling the un-payment bills situations?

Section 36 – Discontinuance of supply to Consumer in certain events.

Item (1) says "Where a Consumer uses **any form of lamp or apparatus of such kind**, or the electricity supplied to him in such manner, as to interfere unduly or improperly with the efficient supply of electricity to any person or commits an offence under sections 39, 40 or 41, the Corporation may, without prejudice to the right to sue for and recover any amount due by the Consumer for electricity supplied or otherwise, forthwith cut off the supply of electricity and for that purpose cut or disconnect any service line or other works and remove any works the property of the Corporation and may discontinue the supply of electricity to such Consumer."

Comments - This item refers to the potential impact on the ZECO supply of electricity services, for instance interfering in the quality of services of electricity supply; and a right of ZECO of discontinuing the supply. Then if Quality Service is a problem because a PV solar panel installation, ZECO is empowered to disconnect the facility.

Section 53 – Powers to make regulations.

Item (1) says "The Minister may make regulations generally with respect to the generation, transmission, distribution, supply and use of electricity and to the construction, maintenance and operation of electrical apparatus and. Without prejudice to thee generally of the foregoing, with respect to: sub-items (a) to (d)".

In particular sub-Item (c) refers to "the issuance and conditions of licences by the Minister for thee generation of electricity"; and sub-item (d) refers to "the regulation and control of the generation of electricity."

Item (2) says "In making any regulations under this Act, the Minister may direct that the breach of any regulations so made shall be punishable with a fine of one million shillings or the imprisonment not exceeding six months or to both such fine and imprisonment and, in case of the continuing offence, to a further fine of ten thousand shillings for each day during which the offence continues."

This Section establish the ruling power of the Minister (MLWE&E) and the fines and punishment for not accomplishing these rules (including this ACT).

Conclusion on previous comments

- The ZECO Act is a monopoly Act and it empowers the Corporation to operate as the single purchaser and supplier of electricity in areas in Zanzibar.
- All installations of electricity generation in areas in Zanzibar should have a licence from the Minister (MLWE&E), otherwise they are punishable according to Section 53. This clause is general including on-grid and off-grid units, and all ranges of generation, and technologies, and different uses such as back-up ones.
- Section 4 allows ZECO to enter in electricity purchase agreements with Small (Item (e)) and Bulk/Larger (Item (f)) electricity producers for the resale to ZECO consumers.
- Non-compliance with this ZECO Act entitles the Corporation to disconnect the supply and applied the fine and punishment established by the Minister for non-compliance or breach of any regulation indicated in Section 53.

Annex – Another Sections relevant to comment

Section 10 - Powers and functions of the Board

It describes the powers and functions of the Board stated in items from (a) to (e).

Special interest should be put on item (d) as follows:

Item (d) says "with the approval of the minister, to set out electricity tariff rates and ensure that the tariff structure is reviewed from time to time to cover cost of production; including generation, transmission, transformation, distribution, supply, maintenance and administration

Comments - Before the existence of ZURA, ZECO with the approval of the Minister was allowed to set out the Tariff Schedule.

Section 16 – Assignment of powers and duties

It describes the powers and duties of the General Manager of the Corporation.

Comments – No Applicable

Section 30 – Removal of works erected on any property

Item (2) says "In the event of any dispute arising between the person and the Corporation on any question arising out of the provisions of this section the matter shall be referred to the **Consumers Appeal Committee** established under Section 44 of this Act".

Comments - See details below in Section 44.

Section 31 – Power to enter land to prevent accident, etc

Item (1) says "The Corporation or any person authorized by the Corporation may, for the purpose of preventing the occurrence of any accident, restoring the supply of electricity or repairing any damage caused by any accident, enter upon any land or building:

Sub-item (a) cut down or remove any tree, plant, underwood or other construction, not being a building, which endangers or interferes with works the property of the Corporation;

Sub-item (b) do such things as may be necessary to prevent the occurrence of any accident or to restore the supply of electricity or to repair any damage caused as a result of any accident."

Comments - These sub-Items open the case for disconnecting any "other construction" in order to prevent accidents which could be extended to quality service of delivery…See below also Sections 34 and 36.

Section 32 - Meters

Item (1) says "Save as provide in any agreement made between the Corporation and a Consumer, the amount of electricity supplied to a consumer shall be ascertained by means of an appropriate meter or meters, fixed and connected with a service line by the Corporation."

Item (2) says "The Consumer shall provide such meter with a cut out, conductor, poles and their accessories that will be found necessary for such supply of electricity,"

Item (3) says “All such meters, cut-outs, conductors, accessories or any materials supplied by consumer shall comply with quality standards to be set out by the Corporation and approved by the Minister.”

Item (4) says “The Corporation shall have the right to reject any supplied meters that do not comply with such quality standards.”

Item (5) says “All materials supplied by a Consumer shall be the property of the Corporation.”

Comments - These Items clarify the meters issues, indicating that meters should comply with the Quality Standards of the Corporation, otherwise the Corporation will reject them. The materials provided by the Consumer in this regard will be property of the Corporation, and not compensation is thought.

Section 33 – Supply for private purposes.

Item (1) says “The Corporation shall, upon being requested to do by the owner or occupier of any premises situated within fifty meters from a distributing main in which the Corporation for the time being, maintaining a supply of electricity for the purpose of general supply for private purposes, give and continue to give a supply of electricity for those premises and shall furnish and lay such service lines as may be necessary for supplying such electricity.”

Item (2) says “If the owner’s premises is located beyond fifty meters from the distributing main, the Corporation may extend the distribution line and give supply to the owner if materials for construction of such line are in stock or after the owner has made payments for cost of extension of the line.”

Comments - These Items refers to fifty meters as a connection extension to connect consumers.

Section 34 – Refusal to give a supply for non-compliance with the Act.

Item (1) says “The Consumer shall ensure that his/her installation is protected with circuit breaker against earth leakage or short circuits.”

Item (2) says “The Corporation may refuse to give a supply if they are satisfied that the Consumer’s installation is not suitable and fails to comply with this Act or with the Rules and Regulations made under this Act.”

Comments – ZECO to establish when an installation is ready to connect

Section 44 – Consumers Appeal Committee.

Item (1) says “The Minister shall set up Consumers Appeal Committee to hear and determine consumers’ complaints against decisions of the Corporation in relation to supply of energy, installations, disconnections or person aggrieved by any action or intended to be taken by Corporation under Section 29 of this Act.”

Item (4) says “The Chairperson and the members shall be appointed by the Minister”

Comments - This Section creates the Consumers Appeal Committee, with Chairperson and memebrs appointed by the Minister (MLWE&E).

Annex E: Analysis of subsea cables

OPTIMIZE ENERGY MANAGEMENT IN ZANZIBAR

INTRODUCTION

Background t

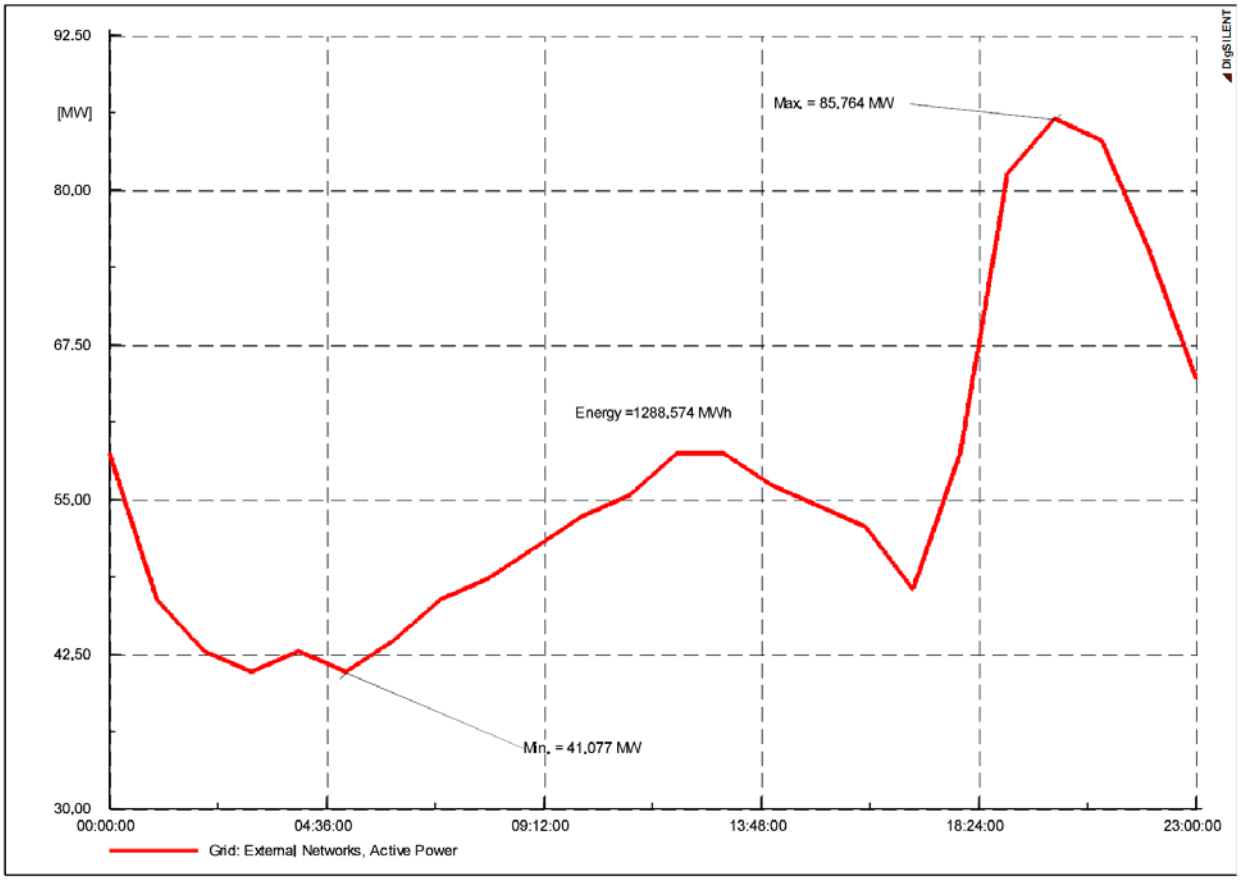
Any development needs energy to support the activities of the country in affordable, reliable, and in quality manner. The power sector in Zanzibar was for a long period characterized by different problems such as load shedding due to lack of power capacity, high technical and non-technical losses, lack of reactive power management, and tariffs that do not fully reflect costs, low collection rates, and low capacity of the utility organization.

From 21 May to 19 June 2008, Unguja suffered from a major failure of its electric infrastructure, which left the island mostly dependent on diesel generators. The failure was caused by damage of submarine cable. Another blackout happened from 10 December 2009 to 23 March 2010, caused by a problem with the submarine cable again that supplied electricity from mainland Tanzania. This inflicted a serious shock to Unguja's fragile economy. This is because Zanzibar (Unguja and Pemba) totally dependent on import electricity from Tanzania mainland.

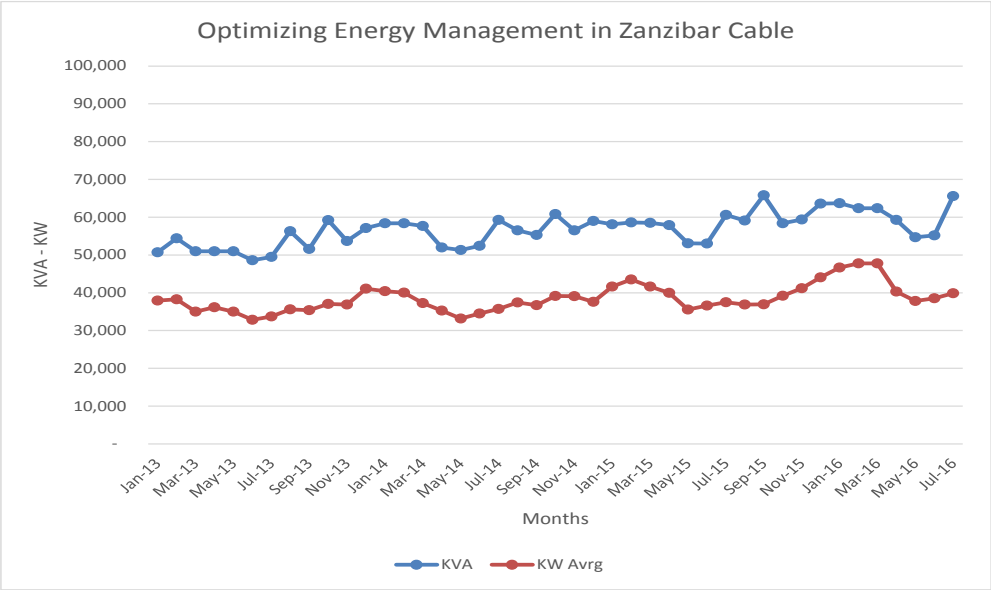
The role of providing electricity service to Zanzibar is placed on Zanzibar Electricity Corporation (ZECO) which is an autonomous Government Corporation responsible for generation, transmission and distribution of electricity in Zanzibar Islands (ACT NO.3 2006). ZECO has no its own sources of electricity generation which lead to purchase electricity from Tanzania Electricity Company (TANESCO) for reselling

Unguja (Zanzibar Island) is supplied with two parallel submarine cable of electricity from Tanzania mainland through a 39-km, 100MW submarine cable from RasKiromoni (near Dar as Salaam) to RasFumba on Unguja. The construction works begun in October 2012 sponsored by Millenium Challenge Corporation of United State of America and was funded by a US$68 million grant from the United States through the Millennium Challenge Corporation. The cable became operational in April 2013. The previous is 45MW submarine cable was built by Norway in 1980. Following the inauguration of the new 100MW cable, the 45MW has been refurbished and it is operational as a backup.

The picture shows the Unguja estimated load curve for typical day

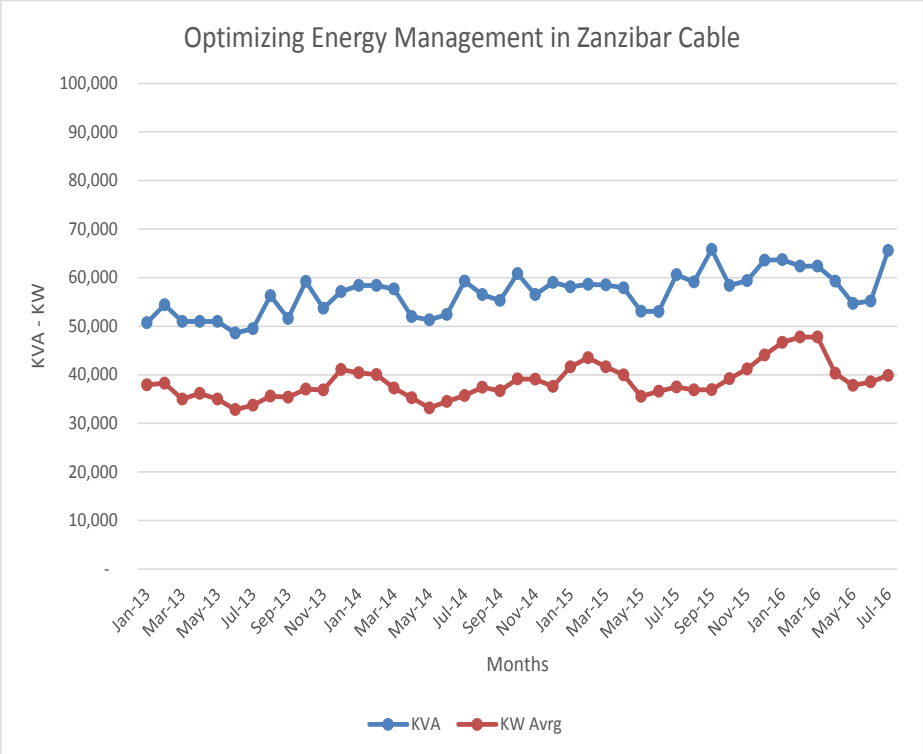


Factor that influence energy management have been studied such as Study by Momani (2013), Fotsing, Njomo and Tchinda (2014) they have linked temperature as a factor that influencing Electricity Peak Demand (EPD) in contrast, study by Platchkov and Pollitt (2011) they has linked economy to the factor influencing EPD while study by Keshav, Srikantha and Rosenberg (2012) has address strategies to tackle the problem of peak demand by controlling domestic appliance in order to prevent situation facing Electricity utility especially difficult to deliver affordable and reliable electricity.



Statement of the research problem

The table shows monthly energy data consumption , Increasing demand as shown in the chart, the current operation of the load of the cable and the current mismanagement of the reactive power(low power factor) are foreseeing to create constraints in achieving sooner the maximum capacity of the current cables, for instance the one connected between Mainland Tanzania and Zanzibar Island. And the time of achieving the cable maximum capacity would be around **less than 6-years**, as a simple demand projection (KVA Consumed in Blue Color) shown below:



From the same simple demand projection, it is possible to see that the power demand (KW in Red Color) requirements without consider any energy efficiency programme application will extend the time of achieving the cable maximum capacity for more than 12 years.

According to the statistic data and mismanagement of reactive power the bill of electricity from TANESCO will be increase and will be critical condition in financial situation of the utilities in Zanzibar. This will be effect the company ZECO to pay more money due to higher loses.

The rapidly of high demand lead the submarine cable maximum capacity (100MW) to achieve in a very short time and will be against with actual plan that can be operate for many years (up to 2030)

Main Research Objective

To support Zanzibar Electricity Corporation (ZECO) for providing as much as possible the optimization of energy management in Zanzibar in order deliver good and secure service (electricity reliability and security of supply) and extend the current cable operations without putting in danger the Zanzibar Energy Supply.

The Specific objective

- To examine factors that influence energy demand increase
- To examine factors that influence power factor reduction
- To examine factors that enhance promotion of energy efficiency

Research Questions

- What is factor influence energy demand to increase?
- What is the factor influence power factor reduction?
- What the factor influence the stakeholder not using energy efficiency?

Justification

The main issues surrounding this study to come up with factors that influence energy demand in Zanzibar order to enable ZECO can manage improving energy efficiency and reducing energy demand are widely considered. Meanwhile the opportunities for ZECO are to pay low consumption and gain more benefits. The International Energy Agency (IEA) and other bodies are placing increasing priority on reducing energy demand, the European Commission has proposed long-term targets for energy demand reduction and countries throughout the world

Summaries

This chapter has demonstrate the overview, background to the optimize energy management in Zanzibar, the objective of the research together with the research question of the study, background to the study also was summarized in the problem statement, while significance and scope of the study was devised. On implementation of this project will expect to archive the following :-

1. Zanzibar Strategy for growth and reduction of poverty (ZSGRP II) 2010 – 2015 under the following interventions
    (i) Expand and maintain the present electricity infrastructure in Zanzibar.
    (i) Ensure the financial sustainability of ZECO

2. Zanzibar Energy Policy with the following objective :-
    (ii) To increase energy efficiency within the energy sector of Zanzibar.
    (iii) To increase the reliability, affordability and independence of modern energy supply in Zanzibar.

References

General energy background

1) ZANZIBAR ENERGY SECTOR REVIEW, UNDAP, Jul 2015
2) Zanzibar Energy Policy, Dec 2009
3) Zanzibar Energy Policy, Implementation Plan Department of Energy and Minerals, 2013
4) Energy Sector Review: Sector Survey, Zanzibar Planning Commission, 2014
5) Gender, Health and Social Aspects of SE4ALL Goals: Women's economic empowerment, Power point, Energia, ESMAP, Nov 2013
6) Zanzibar Regulatory Utility Authority (ZURA) Act, 2013
7) SDG energy goals
8) Zanzibar Environmental Policy, RGoZ, 2013
9) Fossil Fuels and Renewable Energy – The Zanzibar Case Study Aboud S. Jumbe, Policy Planning & Research Unit, Department of Environment
10) Fossil Fuel to Renewable Energy, Comparator Study of Subsidy Reforms and Energy Transitions in African and Indian Ocean Island States, United Nations Office for Sustainable Development.

Statistical information

1) 2002 Census analytical report
2) 2012 Population and Housing Census, Population Distribution by Administrative Areas
3) 2012 Population and Housing Census, Preliminary Results; Analysis of Population Growth
4) Dynamics and Socio-Economic Development Perspectives, NBS/OCGS June 2013
5) 2012 Population and Housing Census, Basic Demographic and Socio-Economic Profile Report Statistical Tables, Tanzania Zanzibar. NBS/OCGS April 2014
6) 2012 Population and Housing Census, Basic Demographic and Socio-Economic Profile, Tanzania Zanzibar, April 2014

Electricity sector

1) TANESCO and ZECO loss reduction study MCA Sept 11.
2) Zanzibar Renewable Energy Feed-in-Tariffs, Second Draft -NEXANT Jan 2013
3) Zanzibar Potential Independent Power Producer Interviews – NEXANT Jan 2013
4) Zanzibar Renewable Energy Assessment, EU/MWH consultants, June 2012
5) SIDA, Zanzibar Energy Diagnostic Study AF-Process AB, May 2005
6) SIDA, End of Term Review of the Swedish Support to the Zanzibar Energy Sector 2007 – 09, Spanne et al Consultants, June 2010
7) SIDA, Energy Sector Programme Phase II, Project Document, Oct 2013
8) TANESCO Tariffs 2014
9) Model Power Purchase Agreement relating to the Wind Power Generation Plant
10) EWURA SPPA Document 2012
11) EAC Regional Scoping Study to Identify Potential areas for Intervention by the EAC Secretariat on Renewable Energy and Energy Efficiency, EAC/GIZ consultant Gerard Hendriksen, Dec 2013
12) Adaptation of Feed-in Tariff for remote mini-grids: Tanzania as an illustrative case, Renewable and Sustainable Energy Reviews, Volume 53, January 2016, Pages 306–318

Climate Change Information

1) The Economics of Climate Change in Zanzibar, Technical Report (Final Version), UKaid, July 2012

Others

[5] – CESI/RESPECT, June 2015 - “Study the Energy Losses (TL and NTL) in Electricity Distribution Companies System in Jordan” - Task III - Implementing the Methodology (TL and NTL in EDCO Network); and Task V - Proposing measures and a Roadmap for each DISCO to reduce the Losses.

[6] – “Regulation of the Power Sector”, Chapter 12 “Security of Generation Supply in Electricity Markets”, I. Pérez-Arriaga et Al., Springer, London, 2013 - - ISBN 978-1-4471-5034-3 (eBook).

[11] - R. Viral and D. K. Khatod, "Optimal planning of distributed generation systems in distribution system: A review," Renew. Sustain. Energy Rev., vol. 16, no. 7, pp. 5146-5165, Sep. 2012.

[12] - A. Nourai, V. I. Kogan, and C. M. Schafer, "Load leveling reduces T&D line losses," IEEE Trans. Power Del., vol. 23, no. 4, pp. 2168-2173, Oct. 2008.

[14] - V. Ajjarapu and B. Lee, "Bibliography on voltage stability," IEEE Trans. Power Syst., vol. 13, no. 1, pp. 115-125, Feb. 1998.

[15] - R. B. Prada and L. J. Souza, "Voltage stability and thermal limit: Constraints on the maximum loading of electrical energy distribution feeders," Proc. IEE Gener. Transm. Distrib., vol. 145, no. 5, pp. 573-577, Sep. 1998.

[16] - M. Chakravorty and D. Das, "Voltage stability analysis of radial distribution networks," Int. J. Elect. Power Energy Syst., vol. 23, no. 2, pp. 129-135, Feb. 2001.

[17] - W.-S. Tan, M. Y. Hassan, M. S. Majid, and H. Abdul Rahman, "Optimal distributed renewable generation planning: A review of different approaches," Renew. Sustain. Energy Rev., vol. 18, pp. 626-645, Feb. 2013.

[18] - L. F. Ochoa, A. Padilha-Feltrin, and G. P. Harrison, "Evaluating distributed generation impacts with a multi-objective index," IEEE Trans. Power Del., vol. 21, no. 3, pp. 1452-1458, Jul. 2006.

[19] - L. F. Ochoa, A. Padilha-Feltrin, and G. P. Harrison, "Evaluating distributed time varying generation through a multi-objective index," IEEE Trans. Power Del., vol. 23, no. 2, pp. 1132-1138, Apr. 2008.

[20] - V. H. Méndez, J. Rivier, J. I. d. l. Fuente, T. Gómez, J. Arceluz, J. Marín, and A. Madurga, "Impact of distributed generation on distribution investment deferral," Int. J. Elect. Power Energy Syst., vol. 28, no. 4, pp. 244-252, May 2006.

[21] - Paris Climate Agreement signed by Tanzania on 22nd April 2016 - https://en.wikipedia.org/wiki/Paris_Agreement#Parties_and_signatories

[22] - Allen J. Wood &Bruce F. Wollenberg.(1996). Power Generation , Operation, and Control:Wiley, John & Sons.

[23] - H.N.Ng.M.M.A.Salama (1995).Fuzzy Optimal Capacitor Sizing and Placement. Canadian Conference on Electrical and Computer Engineering Vol.2 (5-8). P680-683.

[24] - Dr. G. Thomas Bellarmine. (1997). Optimum Series Compensated High Voltage Transmission Lines, Southeastcon '97 .Proceeding of Engineering New Century.:IEEE, P307-309

[25] - S.W.Cichanowaki & G.R. Newcomb.(1991). Power Capacitors, Electrical Electronics Insulation .*Proceedings of Conference of the 20th Boston '91 EEIC/ICWA Exposition.*

[26] - Bergen, Arthur R. / Vittal, Vijay Bergen, Arthur R. / Vittal &Vijay.(1999). Power System Analysis: Pearson.

[31] - Improving Power Distribution Company Operations to Accelerate Power Sector Reform, March 2005, USAID - http://pdf.usaid.gov/pdf_docs/Pnadj549.pdf

[32] – Monitoring Performance of Electric Utilities, Indicators and Benchmarking in Sub-Saharan Africa, 2009, World Bank - https://www.esmap.org/sites/esmap.org/files/P099234_AFR_Monitoring%20Performance%20of%20Electric%20Utilities_Tallapragada_0.pdf

[33] - Reducing Technical and Non-Technical Losses in the Power Sector, July 2009, World Bank - http://siteresources.worldbank.org/EXTESC/Resources/Background_paper_Reducing_losses_in_the_power_sector.pdf

[34] - Key Performance Indicators (KPIs) for Distribution Utility, Kunjan Bagdia Blog, April 22nd 2011 - http://blog.pmanifold.com/2011/04/key-performance-indicators-kpis-for.html

[35] – Practical electricity distribution system loss reduction - ECEEE - http://www.eceee.org/library/conference_proceedings/eceee_Summer_Studies/1993/Panel_4/p4_17/paper

Best Practices in Distribution Loss Reduction Volume - 1, USAID, 2005 http://npti.in/Download/Distribution/Drum/Best%20Practices%20in%20Distribution%20Loss%20Reduction%20Vol-1%20Reference%20Book%20December%202005.pdf

Best Practices in Distribution Loss Reduction Volume - 2, USAID, 2005 http://npti.in/Download/Distribution/Drum/Best%20Practices%20in%20Distribution%20Loss%20Reduction%20Vol-2%20Reference%20Book%20December%202005.pdf

Best Practices in Distribution Loss Reduction http://www.indiacore.com/bulletin/2011-nov-jayant-sinha-best-practices-distribution.pdf
best business practices in energy efficiency

http://www.c2es.org/docUploads/PEW_EnergyEfficiency_FullReport.pdf

BEST POLICY PRACTICES FOR PROMOTING ENERGY EFFICIENCY - https://www.unece.org/fileadmin/DAM/energy/se/pdfs/geee/pub/ECE_Best_Practices_in_EE_publication.pdf

	Charges	Tshs			Source	https://www.oanda.com/currency/converter/
	Service Charge per Month		-		1 US$	2.126,16 Tsh
	Demand Charge per KVA		16.550,00			
	Energy Charge per kWh		152,00			
	Load					
	Max 65,000 kW	65.000,00	kW		yearly	
	Energy 30d	46.800.000,00	kWh		561.600.000,00	
	PF - 95% (KVA)	68.421,05	kVA			
6%	losses cable	2.808.000,00	kWh			

Charges	**Tshs**	Tshs/kWh	Usc/kWh
Service Charge per Month	-	-	
Demand Charge per KVA	1.132.368.421,05	24,20	**1,14**
Energy Charge per kWh	7.113.600.000,00	152,00	**7,15**
Total Tshs	8.245.968.421,05	**176,20**	**8,29**

	Tshs/kWh	**US$c/kWh**
Delivered at Mainland	**176,20**	**8,29**
Additionals at ZECO T&D	**Tshs/kWh**	**US$c/kWh**
Cable Losses+O&M	**9,12**	**0,43**
Cable Depreciation	**81,05**	**3,81**
Devivered at ZECO T&D	**266,37**	**12,53**
Additionals at Consumer	**Tshs/kWh**	**US$c/kWh**
T&D Losses	53,15	**2,50**
O&M+Adm+Billing's ZECO	42,52	**2,00**
Delivered at Consumer	**362,04**	**17,03**

Annex F: Market appraisal for RE & EE technologies in Zanzibar

Market Appraisal in Zanzibar for RE & EE technologies

Table of Contents

Introduction 3
Investment Appraisal Background 3
Economic drivers in Zanzibar Economy 4
Key Economic Development Opportunities 5
Aspects of renewable energy and energy efficiency technologies appraisal in Zanzibar 5
Environmental impact of electricity, by fuel type 7
Generation pricing by fuel 8
Electricity pricing In Zanzibar 9
TANESCO purchase pricing 10
Computing the under-sea cable depreciation fee 11
Renewable Energy Market Appraisal 13
Large wind and solar competitive procurement pricing 13
Large Wind competitive procurement prices 14
Large Solar competitive procurement prices 15
What is the future perception of Large Wind and Solar Pricing? 16
What is the expectation for the near future in large wind utility-scale pricing? 17
What is the expectation for the near future in solar utility-scale pricing? 19
Small solar and wind pricing 21
Small wind pricing 21
What is the current situation of small wind generators in Africa and in the region? 22
Small Solar House Systems (SHS) 24
What is the current situation in Africa and in the region? Grid-connected rooftop solar PV in Africa 24
What are the cost reduction potentials for solar home systems in Africa? 25
Energy Efficient Market Appraisal 27
Energy Balance in Zanzibar 27
The cost of energy efficiency for electricity providers: a US case study 30
Energy Efficiency in Buildings in East Africa 30
Conclusion 32

References 33

Another relevant sources of Information 35

Energy Efficiency 35

List of Tables

Table 1 - Environmental impact of electricity, by some fuel types 7

Table 2 - Electricity production costs of photovoltaics compared to conventional power generators in the USA 8

Table 3 – Current ZEO Tariff Schedule (valid since November 2016) 9

Table 4 - TANESCO Tariff Schedule 10

Table 5 – 2016 purchase cost for ZECO in mainland for 65-MW load with 95% load factor 11

Table 6 – Undersea Cable Depreciation, Losses and O&M 11

Table 7 – 2016 ZECO full delivered cost at consumers in Zanzibar Island 11

Table 8 - Solar Competitive Procurement pricing in Abu Dhabi September 2016 15

Table 9 - Global weighted average solar and wind power investment costs, capacity factors and LCOEs, 2015 and 2025 16

Table of Figures

Figure 1- Gross Domestic Product Percentage Shares by Activity 2006-2010 4

Figure 2 – Last large wind and solar competitive procurement exercises (at Dec 2015) 13

Figure 3– US Competitiveness of Wind Power Improved in 2014 14

Figure 4 - Total installed cost reductions for onshore wind farms by source, 2015-2025 17

Figure 5 - Levelised cost of electricity of onshore wind, 1983-2025 18

Figure 6 - Global weighted average utility-scale solar PV total installed costs, 2009-2025 19

Figure 7 - Global utility-scale solar PV LCOE ranges by project, 2010-2025 20

Figure 8 - 2013 Small Wind Turbine Installed Costs 21

Figure 9 - Levelized Costs of Energy and Capacity Factors for Selected Distributed Wind Projects 22

Figure 10 - Global weighted average onshore wind levelised cost of electricity reductions by source, 2015-2025 23

Figure 11 - Comparison of average total installed cost of residential solar PV systems, 2010-2015 24

Figure 12 - Average cost reduction potential of solar home systems (>1 kW) in Africa relative to the best in class, 2013-2014 26

Figure 13 – Zanzibar Energy Balance Estimation (2010) 27

Figure 14 – Energy Consumed during whole building life cycle 28

Figure 15 – Levelised cost comparison among energy supply sources in the United States 30

Introduction

Renewable energy projects produce heat and electricity using sources of energy which are regenerated over short time periods. Energy efficient projects use alternative technologies, fuels and management systems to reduce heat and electricity consumption.

Their recent rise of utilization of RE and EE technologies in modern society has been driven by their low environmental impacts relative to fossil fuel alternatives. However, as they mature, renewable energy and energy efficient technologies must demonstrate not only their environmental benefits but also their financial and economic competitiveness.

This paper focuses on the market appraisal of those technologies, using approaches that take into account the unique economic, environmental and energy characteristics of renewable energy and energy efficient technologies potential applications in Zanzibar.

All those require a systematic approach to assessing their relative Cost and Benefit Analyze (CBA) in combination with a multi-criteria decision analysis (MCDA)[1] with the intention to make these decisions as efficiently as possible.

Investment Appraisal Background[2]

The process of investment appraisal has been developed to meet the needs of the private investors interested in developing any project. However, the cost and benefit assessments to the wider community were often ignored, often because they have no market value and are thus difficult to quantify them.

As energy supply infrastructure became more widely deployed in developed countries in the mid-20th century and as societies became more environmentally and socially aware, these cost and benefit assessments became more apparent. For example, fossil fuel combustion for industrial and domestic heating caused smog, resulting in increased health problems, including higher health costs and lost productivity. As these impacts often had no direct market value and were, therefore, difficult to monetize, methods other than investment appraisal become necessary. One solution to this was cost–benefit analysis (CBA or benefit–cost analysis), which was first developed in the mid-19th century but was not used in practice until the 1930s for assessing the attractiveness to society of large infrastructural projects. CBA is typically used to monetize and compare the costs and benefits of large projects or policies that have societal impacts. It attempts to approximate and account for the monetary values of non-marketed goods and services such as air and water quality, employment impacts or displaced local industry. A project is beneficial where its societal benefits outweigh its costs.

However, many large energy projects are complex and have important attributes which were difficult to quantify and value. Then, in projects of public importance where environmental and social criteria assumed significant importance, purely economic approaches such as CBA or investment appraisal couldn't represent all of the attributes which might be considered for an accurate and efficient assessment.

The emergence of multi-criteria decision analysis (MCDA) in the 1960s and 1970s attempted to address this failure by allowing impacts on different scales to be compared. It breaks the assessment problem in smaller parts to facilitate analysis and aggregates these in a way that allows a project ranking to be made. MCDA is now widely used to shortlist options for large energy projects of public importance such as wind and PV farms, and transmission infrastructure related to those projects.

In this paper is just addressing the Market Appraisal, the Cost-Benefit Analyze and the multi-criteria decision analysis are developed in separate paper.

---

[1] Remark: Many large energy projects are complex and have important attributes that are difficult to either quantify or monetize or both in particular in an economy depending on touristic activities such Zanzibar. For example, the visual impact of wind turbines on the landscape may affect house prices for the local population and amenity value for tourists: these effects can be difficult to quantify and value.

[2] Reference [1]

Economic drivers in Zanzibar Economy

In the past, Zanzibar's economy was based primarily on the production of cloves (90% grown on the island of Pemba) and fisheries, the principal foreign exchange earners. Exports have suffered from the downturn in the clove market.[3]

The Revolutionary Government of Zanzibar has been more aggressive than its mainland counterpart in instituting economic reforms and has legalized foreign exchange bureaus on the islands. This has loosened up the economy and dramatically increased the availability of consumer commodities.

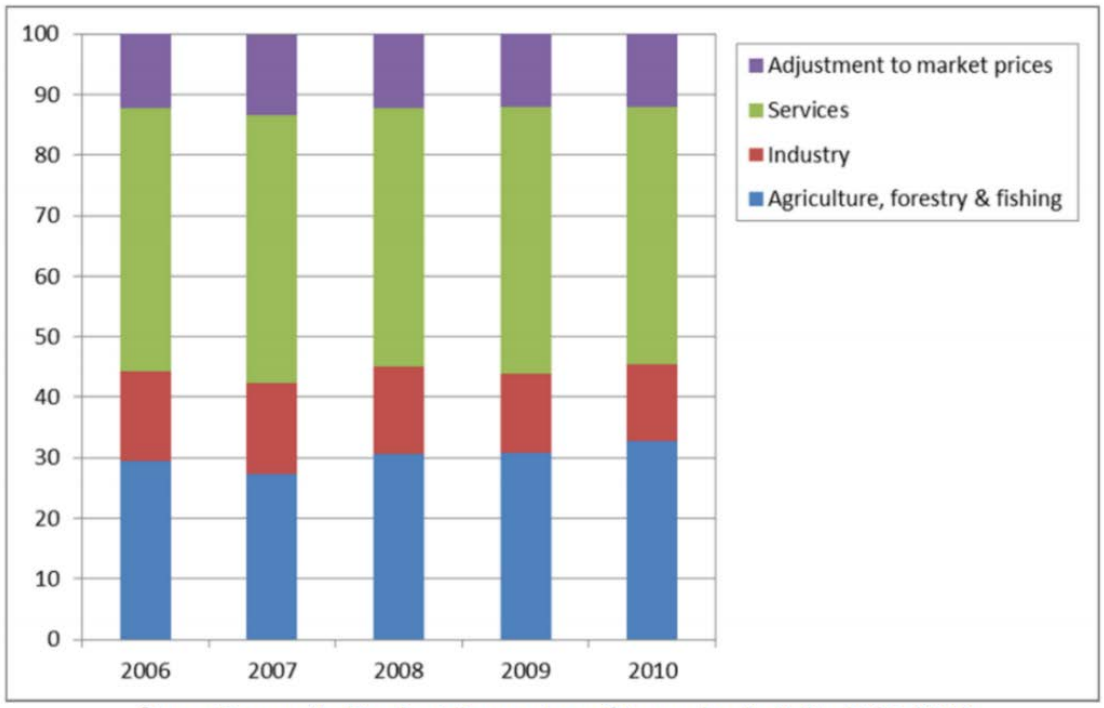
Furthermore, with external funding, the government plans to make the port of Zanzibar a free port. Rehabilitation of current port facilities and plans to extend these facilities is the precursor to the free port. The island's manufacturing sector is limited mainly to import substitution industries, such as cigarettes, shoes, and process agricultural products.

The government designated two export-producing zones and encouraged the development of offshore financial services. Zanzibar still imports much of its staple requirements, petroleum products, and manufactured articles.

Tourism has been an increasingly promising sectors, and a number of new hotels and resorts have been built in recent years, and some new ones has been announced.[4]

According with recent information from the Zanzibar Statistical Outlook, RoGZ, 2010, the **Figure 1** shows the main economic sectors in Zanzibar[5]

Figure 1- Gross Domestic Product Percentage Shares by Activity 2006-2010



Source: Reference [4]

[3] Reference [2]
[4] Reference [3]
[5] Reference [4]

The service sector, including the Tourism sector, (45% GDP) is one of the main economic driver of Zanzibar, then environmental protection, and marine conservation of Zanzibar natural resources would be enhanced in any proposed energy solution to not affect the tourism sector.

Key Economic Development Opportunities[6]

- The private sector in Zanzibar is rapidly evolving and significant investments particularly in the tourism industry over the past ten years are changing the economic landscape in Zanzibar. As the economy moves more towards a service orientation, new businesses are emerging in transport, hotels and restaurants, construction, finance and banking as well as agriculture. These businesses have both local and foreign ownership and operate with differing levels of sophistication;
- Zanzibaris have inherent attributes, skills and strengths that have yet to be fully exploited: Zanzibar has historically developed certain comparative strengths – spice trade, musical interest and talent, unique furniture, a unique history and culture, a diverse marine life. These strengths could be developed much further to build a strong base of small and medium enterprises that could complement the growth of other industries like tourism;
- Zanzibar has great potentials owing to its strategic position in the globe. The fastest growing sector in Zanzibar and much of Africa is telecommunications with Zantel being Zanzibar's largest tax payer. In Zanzibar, there is a bulk of investment in telecommunications, which is privately dominated. Targeted investments in this segment have the potential to create a dynamic supporting industry in Zanzibar that can create employment and attract significant investments. Further to that, Zanzibar can be a regional hub for financial services, especially Islamic Banking, Takaful and the like. A good number of graduates in the field are produced annually by the Zanzibar University. Kenya and Malawi are making good use of these young talents; and
- Previous Renewable Resources studies in Zanzibar and Pemba have proved that Biomass Projects are not feasible due to the over cutting situation without control existing in the Islands. In addition the sources of biogas or Landfill Gas are limited, and experts found a limit of 1MW potential. Then, the abundant renewable resources are wind, solar and ocean energy. Because profiting "Ocean Energy" is costly today, effort would be put in exploiting wind and solar renewable energy opportunities. Related to energy efficiency opportunities, urgent energy efficiency measures that would be produced energy savings, and included in building codes and energy performance standards to be adopted in Zanzibar.[7]

Aspects of renewable energy and energy efficiency technologies appraisal in Zanzibar[8]

In general, the appraisal of renewable energy and energy-efficient technologies in Zanzibar are no different to the assessment of any other capital projects. Although we will see that some project performance measures are specific to the specific field, the main appraisal techniques described here such as investment appraisal, CBA, and multi-criteria analysis are widely applied to other investments, both large and small.

Nevertheless, renewable and energy-efficient projects do have unique characteristics in Zanzibar, which project developers must be aware of in order to undertake a proper assessment, we are referring not only to environmental aspects but also to energy independence and energy security RGoZ mindset.

Many renewable and energy-efficient projects are characterized by high initial investment costs and low operational costs. This is true for technologies such as wind, PV and solar thermal as well as energy-efficient measures such as building sector external and internal insulation and ventilation equipment.

---

[6] Reference [5]

[7] Remark: In the Section Energy Efficient Market Appraisal, it was shown that the Building Sector consumes 70% of the energy matrix in Zanzibar, which is equivalent to twice the average energy consumed by non-OECD Countries in the same sector.

[8] Reference [1]

Conventional fossil fuel-fired generation plant, on the other hand, has lower capital costs as a proportion of total life cycle costs with relatively higher operational outgoings because of the ongoing need to purchase fossil fuels in the international markets. This means that renewable energy and energy-efficient supply projects are generally less exposed to fluctuations in variable costs as compared to fossil fuel-fired generation ones due to the high price volatility of fuel inputs, particularly oil and its derivatives.

Renewables do remain exposed to fluctuations in revenues resulting from changes in the unit cost of energy outputs, such as electricity and heat, as does conventional plant, although input and output prices tend to move together, thus acting as a natural 'hedge' to revenue risk for fossil fuel-fired generation plant.

Often, the 'revenues' in renewable or energy-efficient projects are avoided costs such as the cost of grid electricity displaced by embedded generators. Revenues from many renewable projects may also include long-term price supports such as feed-in-tariffs, which provide a fixed production tariff or tariff floor. However, these can represent a significant risk because a single regulatory decision can greatly alter the basis of an initial investment decision. This political risk is exacerbated by the long payback periods needed for many renewable energy technologies. For example, PV feed-in-tariffs were reduced in the United Kingdom, Spain, Germany and Bulgaria, between 2009 and 2011. Societal imperatives can also shift quickly: the Great Recession of 2009 focused public debate on economic growth and employment while costly emissions' mitigation policies dropped down the priority list.

The identification and quantification of project risk are, therefore, an important task in many renewable and energy-efficient project assessments.

The fast-changing energy and renewables landscape results in other risks too. Technology costs are evolving quickly: real capital costs of installed US commercial PV system have more than halved in the 15 years between 1998 and 2013 (Feldman et al., 2012), whereas the development of hydraulic fracturing technology has been associated with a drop in nominal US wellhead natural gas prices from $6.25 to $2.66/1000 ft3 between 2007 and 2012 (US EIA, 2014). Therefore, the timing of investments in renewable energy and energy-efficient projects and policies is particularly important.

For example, investing under conditions of strong global growth is likely to be more attractive as energy prices are likely to be higher giving greater certainty to short- and medium-term revenues. Moreover, technology costs in the future are likely to be lower, possibly resulting in better returns to the private investor and lower technology subsidies.

In some countries, many renewable energy technologies rely on national subsidies for a variety of reasons, not least because they may not be competitive with conventional alternatives. The approach is controversial as governments do not have a reputation for 'picking winners', particularly in a field as technologically complex as energy conversion, storage, transmission and efficiency. These subsidies include feed-in-tariffs, capital subsidies, tax rebates and renewable obligations certificates. Opponents argue that putting a price on the negative effects of fossil fuels using a carbon tax is a more efficient approach because the market would adopt the technology with the lowest marginal abatement cost, thus resulting in lower overall societal costs as compared with subsidies. However, renewables' subsidies are regarded by others as important in encouraging investment in emerging low carbon technologies, accelerating market growth and reducing technology costs.

Policy makers must apply project appraisal techniques to answer the questions: What is the minimum support necessary to support a technology? Is this cost-effective in supporting key government policies such as energy independence and security? It is important that where subsidies are introduced they represent value for money for the taxpayer.

Project developers should be aware that renewable energy-supply technologies do not always offer identical outputs to the conventional alternatives. A unit of electricity from a wind turbine is not the same as that from a thermal power station because the latter is almost always available when it is needed (i.e. it is 'dispatchable'), whereas the former is only available when the wind is blowing and its availability cannot be guaranteed when needed (and it, therefore, is 'non-dispatchable'). An accurate comparative analysis should always compare like-

with-like; for example, storage and backup should be included with intermittent renewable generation when comparing it with dispatchable plant, so that identical levels of service are provided in each case. This approach should be considered when comparing any intermittent technology (wind, solar and ocean). However, **when compared to conventional alternatives, renewable energy projects can provide additional benefits to society over fossil fuel alternatives, which should be considered as part of the assessment process.** These include emissions reductions, local employment as well as increased security of energy-supply due to reduced import dependency (in net energy importing countries only). Social costs imposed by renewable and energy-efficient projects should also be included. The energy efficiency projects save energy and offsetting any related emissions.

Environmental impact of electricity, by fuel type[9]

The environmental impact of the energy industry is diverse. Most electricity today is generated by burning fossil fuels and producing steam which is then used to drive a steam turbine that, in turn, drives an electrical generator. Such systems allow electricity to be generated where it is needed, since fossil fuels can readily be transported. They also take advantage of a large infrastructure designed to support consumer automobiles.

More serious are concerns about the emissions that result from fossil fuel burning from electricity generation. Consumption of fossil fuel resources leads to global warming and climate change. Rapidly advancing technologies can achieve a transition of energy generation, water and waste management, and food production towards better environmental and energy usage practices using methods of systems ecology and industrial eco-friendly. In recent years there has been a trend towards the increased commercialization of various renewable energy sources.

Table 1 - Environmental impact of electricity, by some fuel types

Fuel	Stage	Consequences
Coal and lignite	Fuel extraction and transport	Emissions: SO2, NOx, particulate matter, CO2, radioactivity
		Liquid effluents: acid water/rain
		Solid waste: mining waste
		Land use: subsidence, visual impact, habitat alteration, noise
	Generation	Emissions: SO2, NOx, particulate matter, CO2, heavy metals
		Liquid effluents: chemical products, thermal pollution
		Solid waste: slag, ash
		Land use: visual impact
Oil and derivates	Fuel extraction and transport	Emissions: SO2, NOx, CO2, H2S, CH4
		Liquid effluents: chemical products, fuel spills
		Land use: subsidence, visual impact, odour, habitat alteration
		Noise
	Generation	Emissions: SO2, NOx, CO2
		Liquid effluents: chemical products, thermal pollution
		Land use: visual impact
Natural Gas	Fuel extraction and transport	Emissions: SO2, NOx, CO2, H2S, CH4
		Land use: visual impact, accident risk, habitat alteration
		Noise
	Generation	Emissions: NOx, CO2
		Liquid effluents: chemical products, thermal pollution
		Land use: visual impact
Solar	Generation	Solid waste: heavy metals contained in components
		Land use: visual impact
Wind	Generation	Land use: habitat alteration, visual impact, Noise
Biomass	Collection and transport	Emissions: SO2, NOx, particulate matter, CO2
		Liquid effluents: non-point pollution
		Land use: visual impact, erosion
	Generation	Emissions: NOx, particulate matter
		Liquid effluents: chemical products, thermal pollution
		Solid waste: slag, ash
Electricity	Transmission and distribution	Emissions: electromagnetic fields
		Land use: habitat alteration, visual impact

[9] Reference [6] and Reference [7]

Source: Reference [8] [10]

The environmental impact of electricity generation is significant because modern society uses large amounts of electrical power. This power is normally generated at power plants that convert some other kind of energy into electrical power. Each system has advantages and disadvantages, but many of them pose environmental concerns. The **Table 1** above summaries the environmental impact of electricity, by fuel type that would be used in Zanzibar.

Generation pricing by fuel

In November 2015, the investment bank Lazard headquartered in New York, published a study on the current electricity production costs of renewables in the US compared to conventional power generators. The best **large-scale photovoltaic power plants can produce electricity at 50 USD per MWh**. The upper limit at 60 USD per MWh. In comparison, coal-fired plants are between 65 USD and $150 per MWh, nuclear power at 97 USD per MWh. **Small photovoltaic power plants on roofs of houses are still at 184-300 USD per MWh**, but which can do without electricity transport costs. **Onshore wind turbines are 32-77 USD per MWh.** One drawback is the intermittency of solar and wind power. [11] [12]

The **Table 2** below shows electricity production cast comparisons at November 2015.

Table 2 - Electricity production costs of photovoltaics compared to conventional power generators in the USA

Plant Type (USD/MWh)	Low	High
Solar PV-Rooftop Residential	184	300
Solar PV-Rooftop C&I	109	193
Solar PV-Crystalline Utility Scale	58	70
Solar PV-Thin Film Utility Scale	50	60
Solar Thermal with Storage	119	181
Fuel Cell	106	167
Microturbine	79	89
Geothermal	82	117
Biomass Direct	82	110
Wind	32	77
Energy Efficiency	0	50
Battery Storage	**	**
Diesel Reciprocating Engine	212	281
Natural Gas Reciprocating Engine	68	101
Gas Peaking	165	218
IGCC	96	183
Nuclear	97	136
Coal	65	150
Gas Combined Cycle	52	78

Source: Reference [9]

As it was point out in previous Renewable Resources studies in Zanzibar and Pemba, it proved that Biomass Projects are not feasible due to the over cutting without any sustainable practice in the Islands. In addition the sources of biogas or Landfill Gas are limited, and this source has capped at 1MW potential. Then, the abundant

[10] Remarks: BioGas Emissions are similar to the ones indicated for Natural Gas. Energy efficiency projects are producing energy savings, then it saves emissions.
[11] Reference [9]
[12] Remark: The study suggests a solution in batteries as a storage, but these are still expensive so far.

renewable resources are wind, solar and ocean energy. “Ocean Energy” is limited today due to the especial materials needed.

Then this paper focused on wind and solar renewable energy opportunities; and in urgent energy efficiency measures that would be produced energy savings, and included in building codes and energy performance standards to be adopted in Zanzibar.[13]

Electricity pricing In Zanzibar

Today, ZECO, a 100% RGoZ owned company, is authorized by Law (ZECO Act) to act as the single buyer and single seller of electricity in Zanzibar and Pemba Islands.

ZECO purchases the electricity from TANESCO through undersea cables. ZECO operates the electric system and it provides its service with high reliability, however there are frequents system shouts down and disconnections that sometimes are outside the ZECO control.

ZECO is regulated by ZURA, Zanzibar Utility Regulatory Activity which is responsible for tariff approval and regulation and license issuance.

The latest ZECO Tariff Schedule approved is shown in the **Table 3** below.

Table 3 – Current ZEO Tariff Schedule (valid since November 2016)

	Category	Type	Value	Units
1	Residential Consumers <50kWh	Z0	79.20	Tshs/kWh
	Residential >50 (> 50 kWh)		480.00	Tshs/kWh
2	Service Category (0 - <1,500kWh)	Z1	266.40	Tshs/kWh
	(1501kWh - ALL)		288.00	Tshs/kWh
3	Small Industries (0 - <5000kWh)	Z2	206.40	Tshs/kWh
	(5001kWh - ALL)		255.60	Tshs/kWh
4	Large and Medium Industries (0 - >10,000 kWh)	Z3	172.00	Tshs/kWh
	(10001 kWh - ALL)		202.80	Tshs/kWh
5	Municipality Lighting (All units)	Z4	266.40	Tshs/month
6	Fees on Demand (KVA)		16,000.00	Tshs/kVA

Source: ZECO

There are more than 350 hotels, tourism resorts and SPAs near the sea front of the islands, and many of them have diesel generators as a back-up in case the ZECO service drops. There are also small scale domestic privately own renewable energy facilities spread in all the islands, some of them working totally off-grid ZECO network.

Since 2010, RGoZ and ZECO has got willing to achieve energy independence and energy security from TANESCO after the events happened some years before.

From 21 May to 19 June 2008, Unguja suffered from a major failure of its electric infrastructure, which left the island mostly dependent on diesel generators. The failure originated in mainland Tanzania.

[13] Remark: In the Section Energy Efficient Market Appraisal, it was shown that the Building Sector consumes 70% of the energy matrix in Zanzibar, which is equivalent to twice the average energy consumed by non-OECD Countries in the same sector.

Another blackout happened from 10 December 2009 to 23 March 2010, caused by a problem with the submarine cable that supplied electricity from mainland Tanzania. This inflicted a serious shock to Unguja's fragile economy depending on the Tourism Sector.

This is why the energy independence and energy security aspects should be considered as additional value for any solution.

TANESCO purchase pricing

TANESCO supplies electricity to Zanzibar and Pemba Islands from Mainland Tanzania through two undersea cables.

TANESCO pricing is decided by EWURA and officially indicated in TANESCO Tariff Schedule. As shows below in **Table 4**.

Table 4 - TANESCO Tariff Schedule

CUSTOMER CATEGORY		COMPONENT	Year 2014 *from* ***1-Jan-14*** *(TSh)*	Year 2015 *from* ***1-March-15*** *(TSh)*	Year 2016 *from* ***1-April-16*** *(TSh)*
D1	Domestic Low Usage	Basic charge	0	0	0
		Energy charge 0 – 75 kWh/mo	100	100	100
	High Cost Units Penalty - High Usage	Energy charge Above 75 kWh	350	350	350
T1	General Use	Basic charge/mo	5,520	5,520	0
		Energy charge	306	298	292
T2	Low Voltage Supply	Basic charge/mo	14,233	14,233	14,233
		Energy charge	205	200	195
		Demand (kVA)	15,004	15,004	15,004
T3/ T3MV	Medium Voltage Supply	Basic charge/mo	16,769	16,769	16,769
		Energy charge	163	159	157
		Demand (kVA)	13,200	13,200	13,200
T5/ T3HV	High Voltage Supply	Basic charge/mo	0	0	0
		Energy charge	159	156	152
		Demand (kVA)	16,550	16,550	16,550
Approving Authority			EWURA	EWURA	EWURA

Source: Reference [10][14]

[14] T5 HV is the TANESCO selling Tariff for ZECO

This tariff for a 65 MW average-load at 95% load factor is equivalent to the values indicated in Table 5, below.

Table 5 – 2016 purchase cost for ZECO in mainland for 65-MW load with 95% load factor

Charges	**Tshs**	Tshs/kWh	Usc/kWh
Service Charge per Month	-	-	
Demand Charge per KVA	1,132,368,421.05	24.20	**1.14**
Energy Charge per kWh	7,113,600,000.00	152.00	**7.15**
Total Tshs	8,245,968,421.05	**176.20**	**8.29**
		Tshs/kWh	**US$c/kWh**
	Delivered at Mainland	**176.20**	**8.29**

Source: REEE Team Calculations

This is the equivalent of TANESCO pricing of electricity delivered in Mainland before to deliver it to ZECO in Zanzibar Island.

Computing the under-sea cable depreciation fee

Then if we compute the potential charges due to the depreciation and amortization of the 100-MW undersea cable which was deployed by MCC.[15]

The full undersea cable investment was around US$130 million Dollars[16], if it lasts around 25 years, then the supposed Depreciation and Amortization and Operational and Maintenance fee amount that should be collected would be around US$13.2 million per year[17]. The Table 6 shows this utilization fees.

Table 6 – Undersea Cable Depreciation, Losses and O&M

Additionals at ZECO T&D	**Tshs/kWh**	**US$c/kWh**
Cable Losses+O&M	**9.12**	**0.43**
Cable Depreciation	**81.05**	**3.81**
Devivered at ZECO T&D	**266.37**	**12.53**

Source: REEE Team Calculations

Then the ZECO delivered cost at consumers in Zanzibar Island should include this additional charge, then the equivalent electricity pricing is shown in the Table 7.

Table 7 – 2016 ZECO full delivered cost at consumers in Zanzibar Island

Additionals at Consumer	**Tshs/kWh**	**US$c/kWh**
T&D Losses	53.15	**2.50**
O&M+Adm+Billing's ZECO	42.52	**2.00**
Delivered at Consumer	**362.04**	**17.03**

Source: REEE Team Calculations

[15] Remark: A 132 kV 100 MW cable is feeding the Unguja Island from Tanzania mainland through a transformer station located in Zanzibar Town. The entire Unguja Island is being suppliedd from this main transformer.
[16] Reference [11]
[17] Remark: This annual fee allows a positive net present value of the investment positive and a return of 8%

These values are estimated but they are realistic in the current ZECO Configuration.

Compering the **ZECO Tariff Schedule** and the **ZECO full delivered cost at consumers in Zanzibar Island** is possible to see that ZECO is operating with a narrow value added or no-added value at all. This situation becomes revenue losses when and when large consumers such as ZAWA are not paying their invoice (20% of ZECO demand).

In addition, this situation could become worst in the short term when TANESCO will be allowed by EWURA (Regulatory Authority in Mainland) to increase TANESCO Tariff in 2017 at the requested increasing for the ZECO Tariff (19.1% on energy charges and 14.9% on capacity charges) over the current Tariff values.[18]

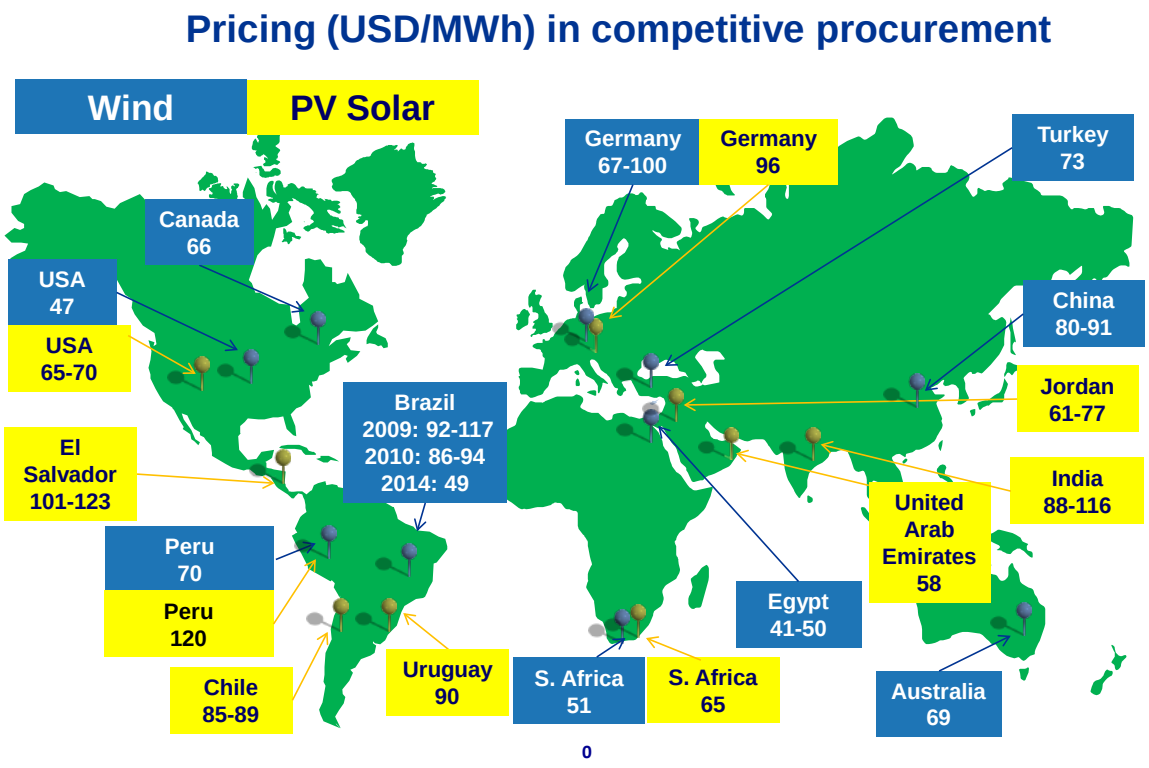
[18] Reference [10]

Renewable Energy Market Appraisal

Large wind and solar competitive procurement pricing

Large wind and solar competitive procurement pricing exercises have become a common international practice all over the world, the **Figure 2** below is showing some of the last competitive exercises at December 2015;

Figure 2 – Last large wind and solar competitive procurement exercises (at Dec 2015)



Source: Reference [12]

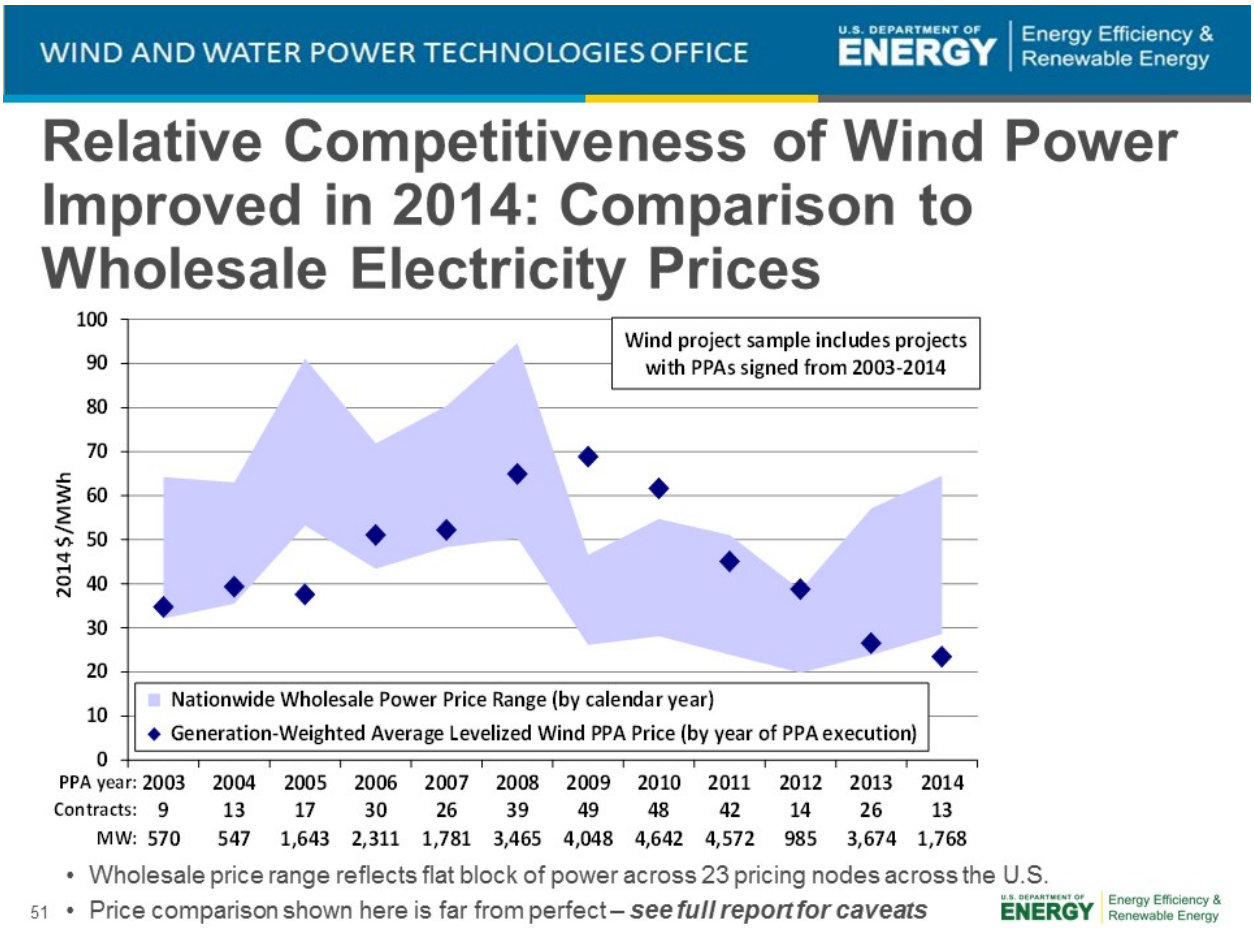
Below latest news on large wind and solar competitive procurement processes are provided.

Large Wind competitive procurement prices

One of the lowest Wind competitive procurement prices have been registered in April 2013, in Brazil. Wind farms have won 55% of contracts awarded by Brazil's national energy agency at $45/MWh (**4.5 cents/kWh**).[19]

In USA, the Wind competitive procurement pricing is more aggressive such as the one shown in the **Figure 3** below, in 2014 prices "fell to around $23.5 per MWh (**2.35 cents/kWh**) nationwide." The reason it is falling is that wind projects are producing more efficiently, thanks to taller turbines that reach better winds and harvest them with longer blades and more sophisticated controller software.[20]

Figure 3– US Competitiveness of Wind Power Improved in 2014



Source: Reference [15]

In Morocco, in January 2016, it was launched a 850MW tender of five large-scale wind energy projects in different locations; 150MW Tanger 2 in the northern part of the country, 300MW at Tiskrad, Laayoune, 200MW at Jbel Lahdid,100MW near Boujdour, and 100MW at Midelt; and the average bids was $US30/MWh, **with the lowest at around $US25/MWh (2.5 cents/kWh)**.[21]

[19] Reference [13]
[20] Reference [14]
[21] Reference [16]

Large Solar competitive procurement prices

One of the lowest Solar competitive procurement prices have been registered was in Atacama, Chile in August 2016, 12 MW PV Solar plant at US$29.10/MWh (US$cents 2.91/kWh)).[22]

Finally, at the close of this paper, the latest lowest competitive procurement prices have been registered in Abu Dhabi in September 2016, 350 MW PV Solar plant at Price US$24.20/MWh (US$cents 2.42/kWh))

In addition to the official bids, local media is reporting that one of the consortiums offered a price as low as USD 0.23 per kWh, provided that the PV project could be larger than 1.1 GW. The initial size of the project was set at 350 MW, but the Abu Dhabi Electricity and Water Authority (ADWEA) invited bidders to put forth bids for a larger project if they so wished. Presumably ADWEA is deciding whether 1.1 GW is a little too large for the project.

Here below the comparative **Table 8** including the other bidders;

Table 8 - Solar Competitive Procurement pricing in Abu Dhabi September 2016

Managing Member	Consortium Member		IRR (%)	LEC (in fils/kWh)	Weighted LEC (in fils/kWh)	Ranking based on Weighted LEC
Marubeni	Jinko Solar		7.00%	10.796 (USD 2.940c)	8.888 (USD 2.420c)	1
Masdar	EDF	PAL	7.00%	11.311 (USD 3.080c)	9.404 (USD 2.533c)	2
Tenaga	Phelan Energy		7.15%	11.512 (USD 3.135c)	9.543 (USD 2.598c)	3
RWE	8-Electric		7.00%	13.038 (USD 3.550c)	10.720 (USD 2.919c)	4
JGC	First Solar	Sojitz	8.46%	13.840 (USD 3.769c)	11.339 (USD 3.088c)	5
Kepco	Q Cells	GSE	7.00%	15.980 (USD 4.351c)	13.349 (USD 3.635c)	6

Source: Middle East Solar Industry Association (MESIA)

Source: Reference [17]

[22] Reference [18]

What is the future perception of Large Wind and Solar Pricing?[23]

A new report from the International Renewable Energy Agency (IRENA) highlights the recent cost reductions in solar and wind energy technologies and reveals the potential to further cut costs by between a quarter and two-thirds by 2025.

Public debate around renewable energy has suffered from the perception that renewables are not cost-effective. Yet as renewable energy technology equipment costs continue to fall and the technologies themselves become more efficient, the cost of renewable energy solutions is declining.

The IRENA report, entitled The Power to Change: Solar and Wind Cost Reduction Potential to 2025[24], examines trends in the deployment and evolution of renewable energy technologies and looks at their cost reduction potential over the coming years. It predicts that the cost of electricity from solar and wind energy technologies could decrease by at least 26% and as much as 59% between 2015 and 2025. Main findings are shown in **Table 9.**

Table 9 - Global weighted average solar and wind power investment costs, capacity factors and LCOEs, 2015 and 2025

	Global weighted average data								
	Investment costs (2015 USD/kW)		Percent change	Capacity factor		Percent change[2]	LCOE (2015 USD/kWh)		Percent change
	2015	2025		2015	2025		2015	2025	
Solar PV	1 810	790	-57%	18%	19%	8%	0.13	0.06	-59%
CSP (PTC: parabolic trough collector)	5 550	3 700	-33%	41%	45%	8.4%	0.15 -0.19	0.09 -0.12	-37%
CSP (ST: solar tower)	5 700	3 600	-37%	46%	49%	7.6%	0.15 -0.19	0.08 -0.11	-43%
Onshore wind	1 560	1 370	-12%	27%	30%	11%	0.07	0.05	-26%
Offshore wind	4 650	3 950	-15%	43%	45%	4%	0.18	0.12	-35%

Source: Reference [20]

Several factors have contributed to the cost reductions seen in recent years. Support policies for wind and solar energy have led to a steady increase in deployment which has helped to set favorable market conditions.

The continuous evolution of technologies has increased capacities and efficiency. Meanwhile, as solar and wind energy markets grow, both regionally and globally, renewable energy manufacturers benefit from economies of scale and new opportunities to make supply chains more efficient.

Competitive pressures are also driving down costs as project developers focused on applying best practices. With the decline in equipment costs set to continue, there will be a new focus on best practice **balance of system (BoS),** operations and maintenance (O&M) and capital costs as drivers of further reductions. As these cost structures vary greatly across different markets, the right regulatory and policy frameworks will be key to unlocking their cost-saving potential.

Below more details on potential Wind and Solar declining costs are developed.

[23] Reference [19]
[24] Reference [20]

What is the expectation for the near future in large wind utility-scale pricing?

Despite the substantial cost reductions that have occurred since the deployment of wind power on a commercial scale in the early 1980s, onshore wind still holds significant cost reduction potential for the period out to 2025. IRENA has assessed the cost reduction potential for onshore wind from a top-down and bottom-up perspective. The top-down analysis is based on a learning curve analysis, while the bottom-up analysis looked at trends in wind turbine technologies and wind farm development to estimate the shift to higher performance turbines in different markets and cost implications of new technology innovations.

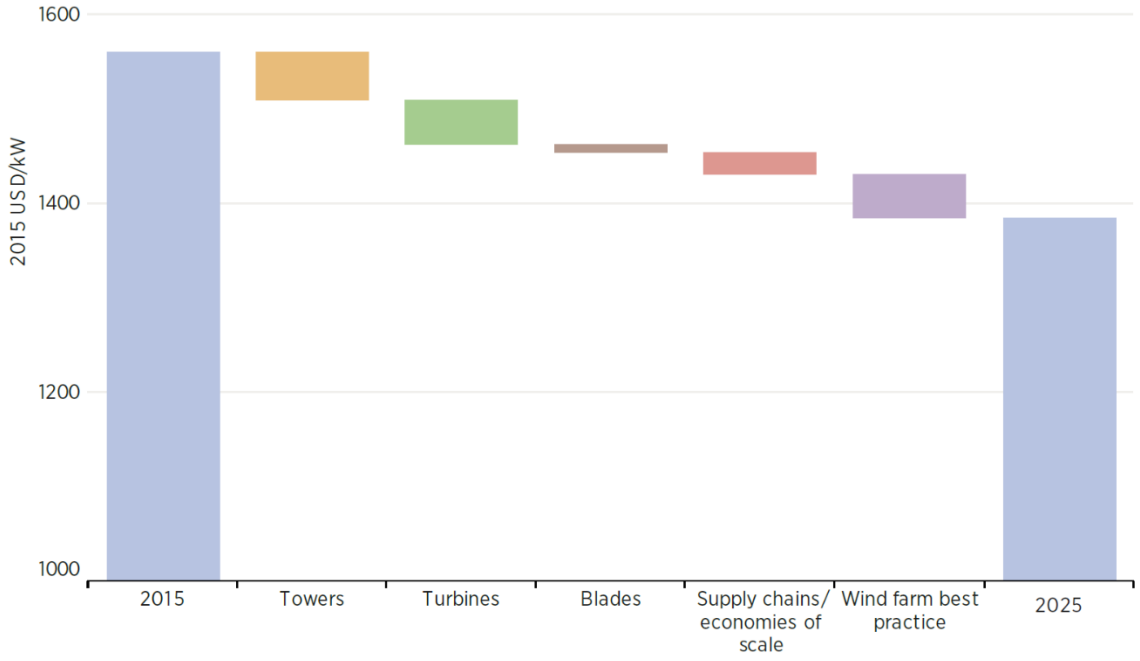
Estimates of the contribution of increased market scale and maturity are harder to assess, but have been estimated based on trends in turbine pricing and analysis by consultants of supply chain efficiencies. In terms of deployment, the next doubling of onshore wind is likely to occur between 2020 and 2022, depending on deployment rates.

Accelerated deployment in the IRENA Remap 2030 analysis (IRENA, 2016a)[25], however, suggests that under an aggressive deployment scenario, a doubling from 2014 values could occur as soon as 2019.

There will be significant variations in the cost reduction potential depending on the market. More competitive markets using today's latest technologies are going to benefit from incremental technological improvements and greater economies of scale, as well as competitive pressures.

Out to 2025, the global weighted average **total installed costs of onshore wind farms could fall by around 12% and account for 34%** of the total LCOE cost reduction potential. In order of importance, the key areas for installed cost reduction are: larger turbines, advanced towers, increased application of best practice in wind farm development, lean supply chains and advanced blades. Look at **Figure 4** showing the potential cost reductions.

Figure 4 - Total installed cost reductions for onshore wind farms by source, 2015-2025



Source: Reference [20]

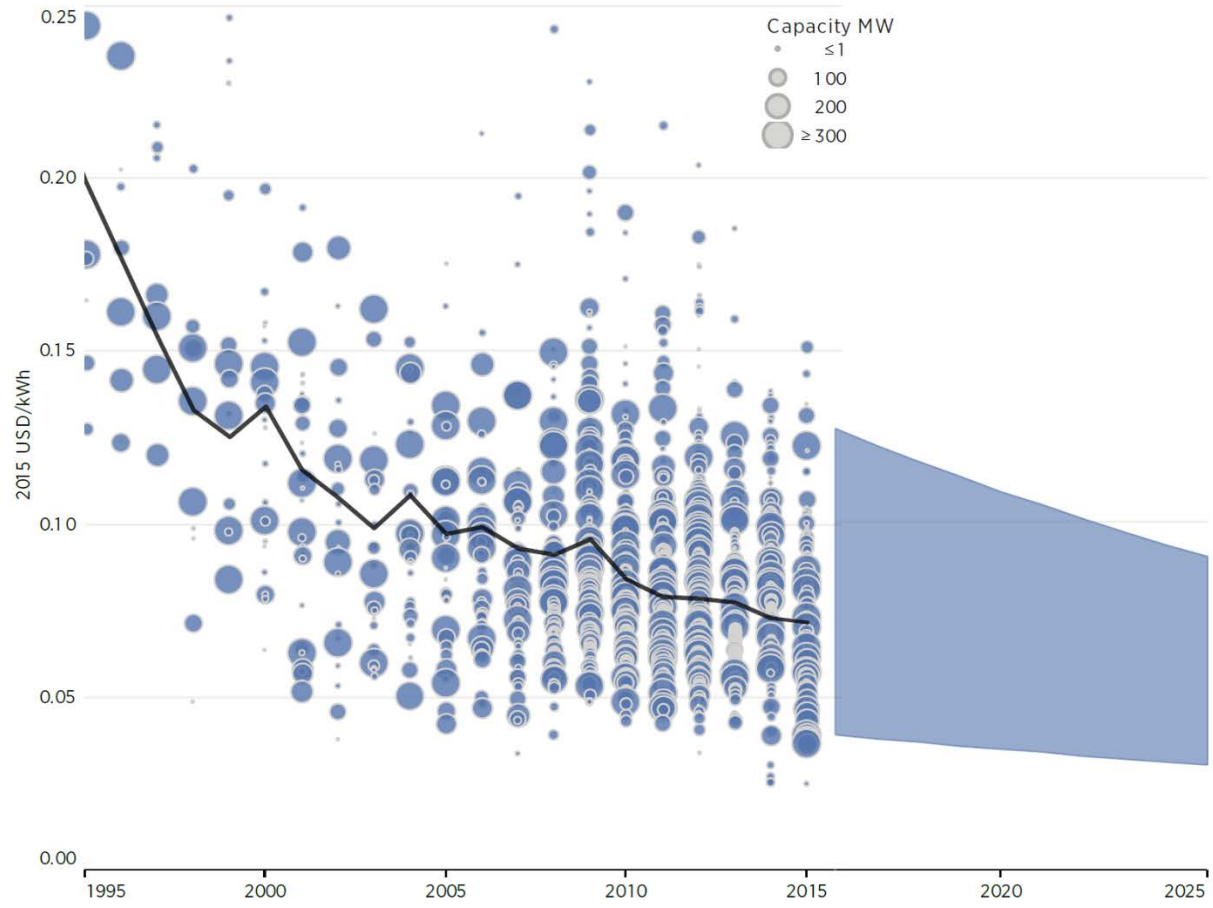
[25] Reference [21]

Onshore wind is now a highly competitive source of new power generation capacity, with medium-and even low-wind speed sites now economically viable with recent wind turbine improvements. This has greatly broadened the competitive situation of what is already a modular and versatile power generation technology.

The potential improvement in capacity factors by 2025 could result in reducing the global weighted average LCOE of onshore wind by around USD 0.01/kWh, or 49% of the total projected reduction in onshore wind LCOE of USD 0.018/kWh as the global weighted average LCOE falls to USD 0.053/kWh by 2025, reductions are shown in **Figure 5.**

The ongoing announcements of record low power purchase agreement and tender prices for large, notably in Morocco (January) in 2016, highlight just how rapidly wind costs continue to decline.

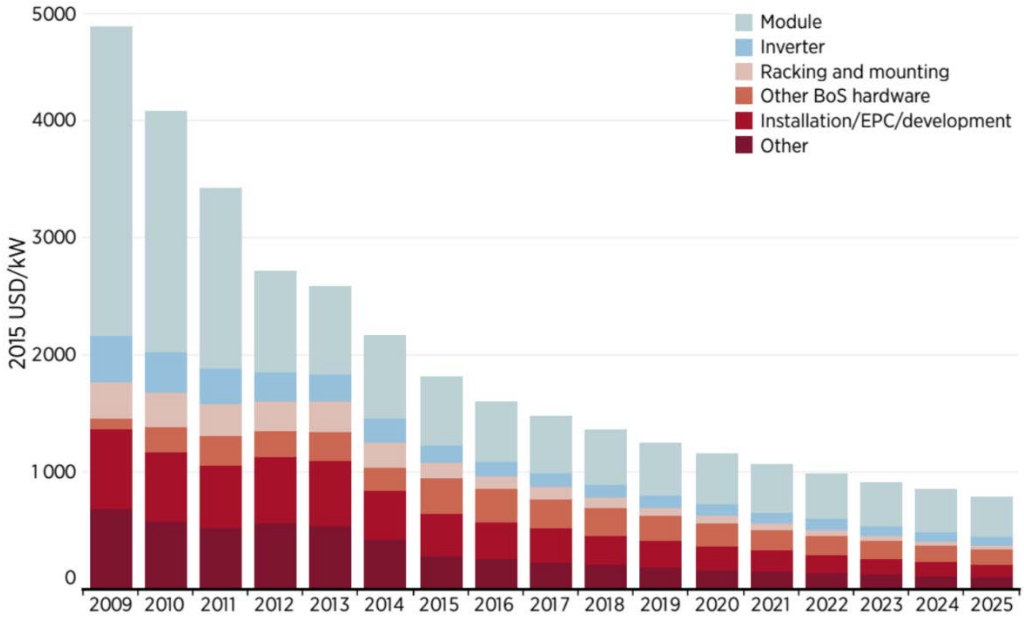
Figure 5 - Levelised cost of electricity of onshore wind, 1983-2025



Source: Reference [20]

What is the expectation for the near future in solar utility-scale pricing?

Figure 6 - Global weighted average utility-scale solar PV total installed costs, 2009-2025



Source: Reference [20]

As it is shown in **Figure 6** above there is a constant reduction on competitive procurement pricing of Solar PV Systems, and lower prices are expected for the near future.

According to the last report from IRENA called "Power to Change" issued in June 2016[26]; the biggest cost reduction opportunities for solar PV modules will happen at either end of the crystalline silicon module value chain. Cheaper polysilicon production will halve polysilicon costs per watt by 2025 and account for one-third of the total module cost reduction potential. This will occur along with increased process capacity, reduced electricity consumption and the uptake of manufacturing methods different from the classic "Siemens" process.

The next largest cost reduction potential comes from cell-to-module manufacturing. In this, the cost is expected to decline by around one-third for crystalline technologies and to contribute another third to the overall reduction potential.

Given that current country average module prices range from USD 0.52 to USD 0.72/W, absolute cost reductions from modules will be relatively modest. As a result of the high share of Balance-of-System (BoS) costs today on average, globally, the bulk of the total PV system installed cost reduction potential in the next decade will come from continuous BoS cost reductions.

The central case presented above for the global weighted average installed cost assumes significant convergence towards best practice costs, as well as reductions in today's BoS best practice costs.

However, with the right policy settings, including the sharing of policy and regulatory best practices, and stable growth policies for new markets, even larger BoS cost reductions could be achieved. This could result in an additional USD 0.16/W reduction in the global weighted average total installed cost of utility scale solar PV to

[26] Reference [20]

USD 0.63/W in 2025 (a 65% reduction over 2015). If convergence towards best practice is slower than in the central case, then total installed costs could fall to USD 1.04/W (a 43% reduction over 2015).

The possible reductions in installed costs could see the LCOE of utility-scale PV projects fall by an average of 59% during years 2015-2025, with project costs in the range of USD 0.03 to USD 0.12/kWh by 2025.

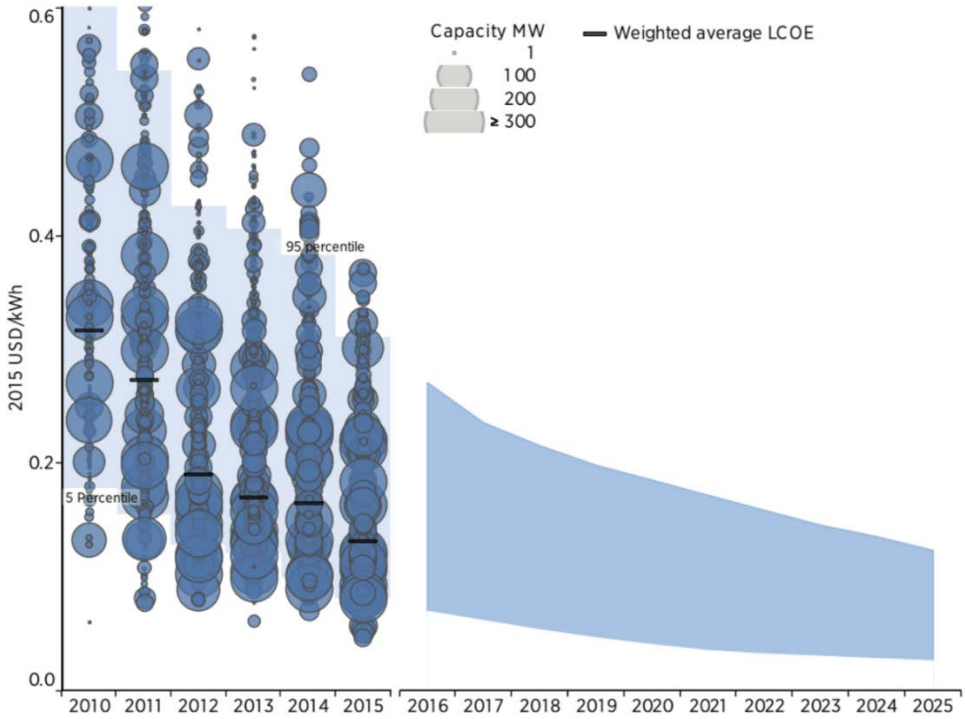
The **Figure 7** below shows the range of Levelised Cost of Electricity (LCOE)[27] utility-scale PV projects from 2010 to 2015 (left-hand side) and the potential cost reductions in the LCOE to 2025 (right-hand side), taking into account individual project cost variations.

From 2010-2015, the capacity weighted average LCOE decreased by more than half. The LCOE of utility-scale PV systems will continue to follow a downward trend and should fall slightly more than installed costs, as system losses are reduced somewhat and the global weighted average capacity factor grows with increasing deployment in regions with excellent solar resources.

By 2025, the project level cost range will narrow, as convergence in BoS costs accelerates and falls between USD0.03 and USD0.12/kWh. This projected LCOE range accounts for all the individual project differences from irradiation levels and capital costs in the different countries. Lower costs will be possible if longer economic lifetimes are assumed, or the weighted average cost of capital (WACC) is lower than the 7.5% assumed for OECD countries and China and 10% for the rest of the world.

The ongoing announcements of record low power purchase agreement and tender prices for solar PV, notably in Chile (August) and Abu Dhabi (September) in 2016, highlight just how rapidly solar PV costs continue to decline.

Figure 7 - Global utility-scale solar PV LCOE ranges by project, 2010-2025



Source: Reference [20]

[27] Reference [20], page 24 – "Calculating the Levelised Cost of Electricity - The LCOE of renewable energy technologies varies by technology, country and project, based on the renewable energy resource, capital and operating costs, and the efficiency/ performance of the technology."

Small solar and wind pricing

Small scale Wind and Solar prices have decreased as well, however the retailers not had very transparent practices, and these have created lots of skepticism.

In Zanzibar, there are various small scale solar and wing facilities, during our interviews with stakeholders no data about pricing were available.

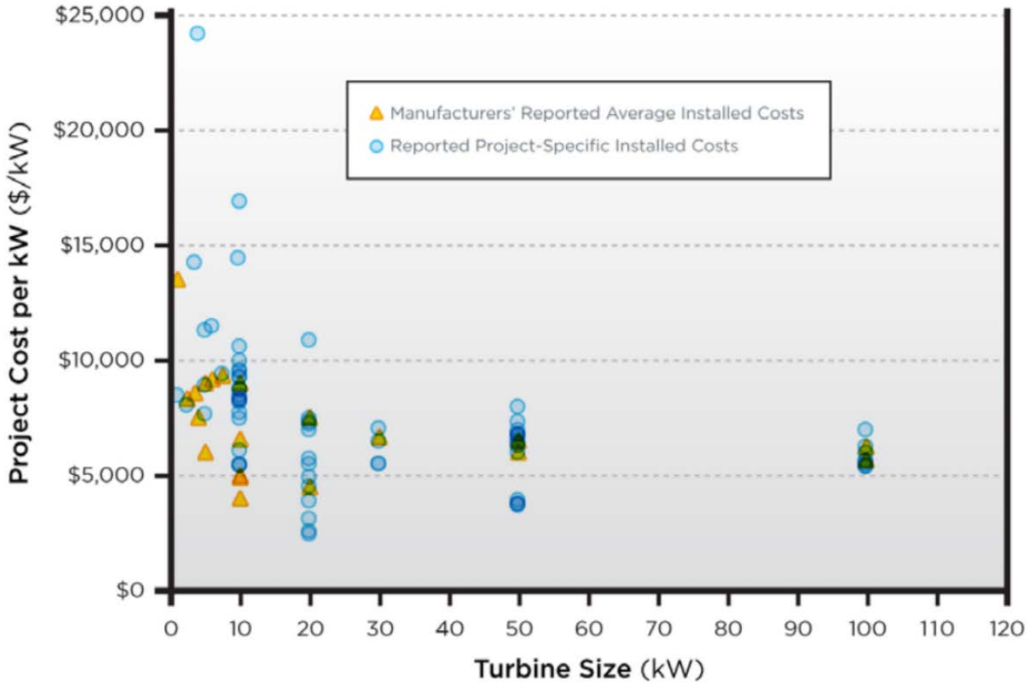
Small wind pricing[28] [29]

Since 2003, nearly 72,000 wind turbines have been deployed in distributed applications across all USA, totaling over 842 MW in cumulative capacity.

Sales of small wind turbines only accounted for 3.7 MW, or roughly 6% of overall distributed wind capacity in 2014. That represents a drop from 5.6 MW in 2013.To compensate for weaker domestic sales, U.S. small wind turbine manufacturers shifted their focus to growing international markets. Exports from U.S.-based small wind turbine manufacturers increased 70% from 8 MW in 2012 to 13.6 MW in 2013. U.S. small wind turbines were exported to more than 50 countries in 2013, with top export markets identified as Italy, UK, Germany, Greece, China, Japan, Korea, Mexico, and Nigeria. In 2013, 76% of U.S. manufacturers' new small wind sales capacity went to non-U.S. markets, a substantial increase from 57% in 2012.

Installed cost and wind turbine energy production (i.e., capacity factor) drive a wind project's LCOE. In general, the higher the capacity factor, the lower the LCOE as it is shown in **Figure 8** and **Figure 9**.

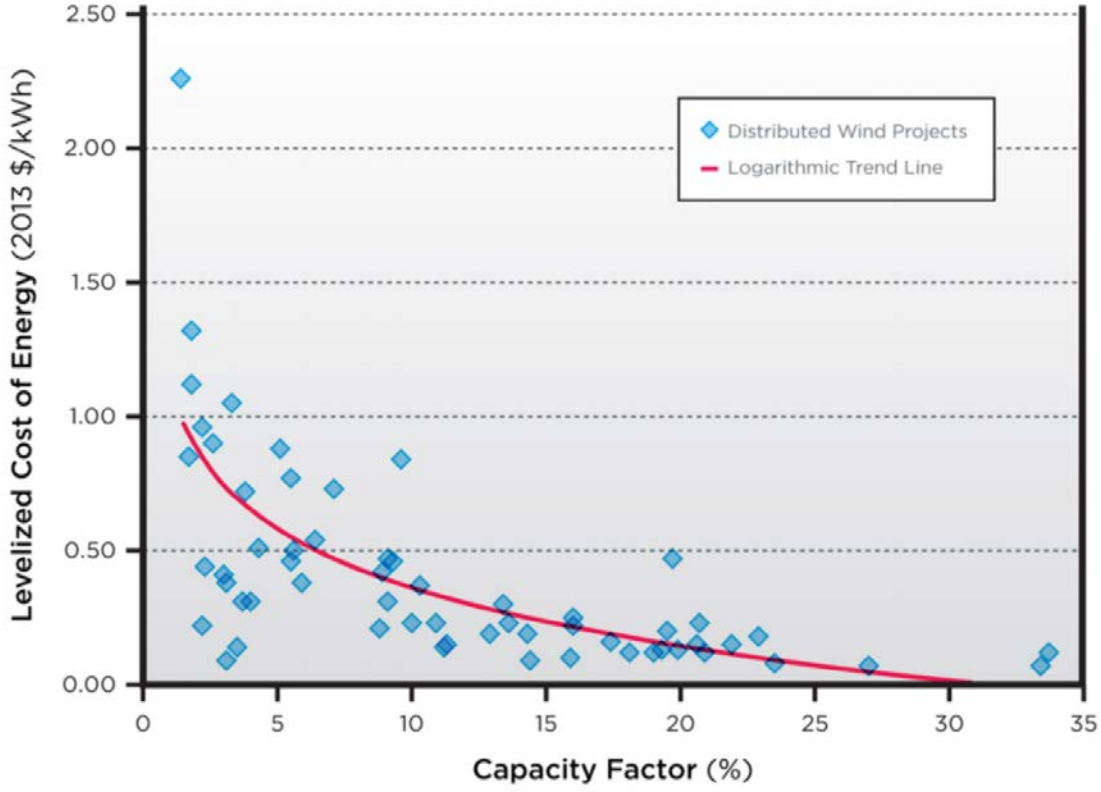
Figure 8 - 2013 Small Wind Turbine Installed Costs



Source: Reference [22]

[28] Reference [22]
[29] Reference [23]

Figure 9 - Levelized Costs of Energy and Capacity Factors for Selected Distributed Wind Projects[30]



Source: Reference [22]

What is the current situation of small wind generators in Africa and in the region?[31]

Production of wind turbine components on the African continent has been limited to small scale system producers **mainly in South Africa and Egypt**. In South Africa, manufacturers such as Kestrel Renewable Energy, African Wind Power and Palmtree Power produce low capacity turbines (less than 300 kW) that are not adequate for large-scale commercial power production and connection to national grids. At the higher capacity level of localised production in South Africa, Isivunguvungu Wind Energy Converters (I-WEC) produces wind turbine systems with a capacity of up to 2.5MW. In Egypt, the wind turbine manufacturing industry is dominated by El Sewedy through its two subsidiaries: El Sewedy for Wind Energy Generation (SWEG) with a plant that produces wind turbines of 1.65 MW capacity; and SET SIAG El Sewedy Towers - a joint venture with Germany's SIAG Schaaf Industrie AG that manufactures towers and rotor blades.

The manufacturing landscape in Africa is poised to change as more global players increase their presence on the African continent.

[30] Remark: The amount of annual energy production that can be achieved by a distributed wind project is driven by many variables, primarily the project's available wind resource and siting (e.g., tower height, local obstructions, and other micro-siting issues). For example, the capacity factors for the 30 projects using 10-kW wind turbines in this selected group of projects range from 1.7% to 21.9%, supporting the idea that siting issues strongly influence capacity factors.

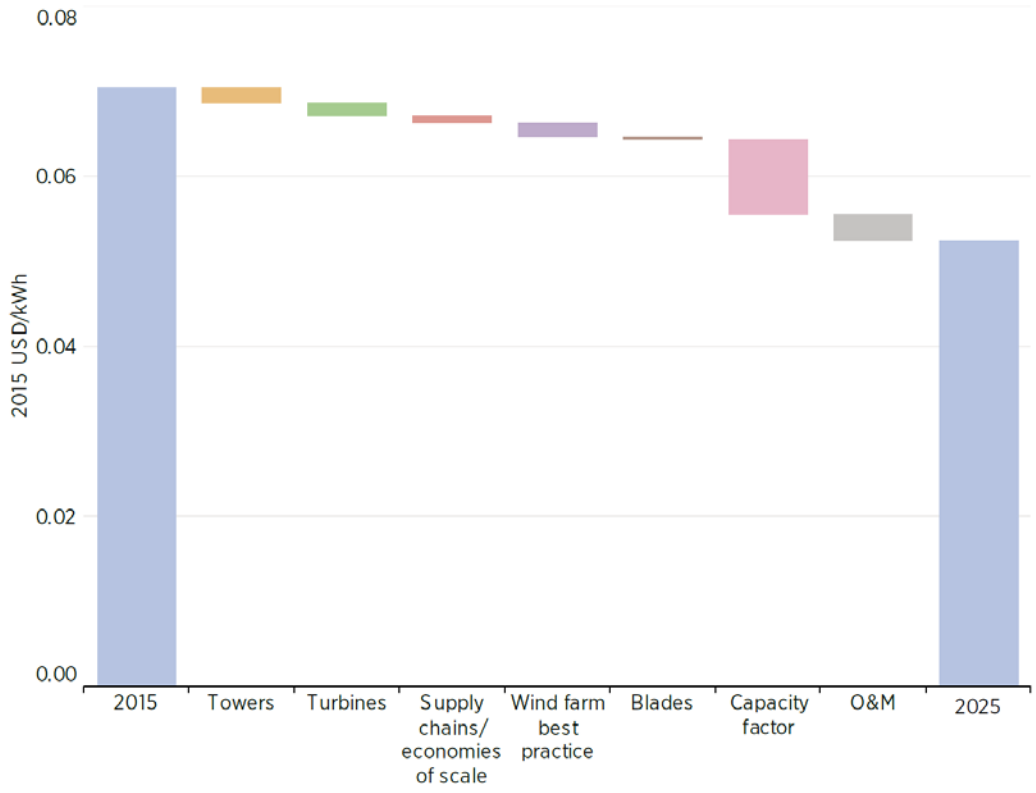
[31] Reference [24]

In South Africa such developments have been encouraged through the Renewable Energy Independent Producers Procurement Programme (REIPPP) that is targeting installation of 1,850 MW of on shore wind power with at least 35% local content requirements. Both South Africa and Egypt owe their success in the manufacturing industry to the existence of adequate regulatory and policy frameworks, well established research and development institutions and a relatively low cost of doing business in the two countries. However, more needs to be done to boost the industry.

Local content in a wind turbine manufacturing industry that is well integrated with the local supply chain creates jobs and enhances capacity for local companies to become more innovative and competitive. Studies have demonstrated that local production of wind energy components could reduce system costs by 25% in the long term (Razavi, 2012).

Potential cost reduction is showing in **Figure 10** below.

Figure 10 - Global weighted average onshore wind levelised cost of electricity reductions by source, 2015-2025



Source: Reference [20]

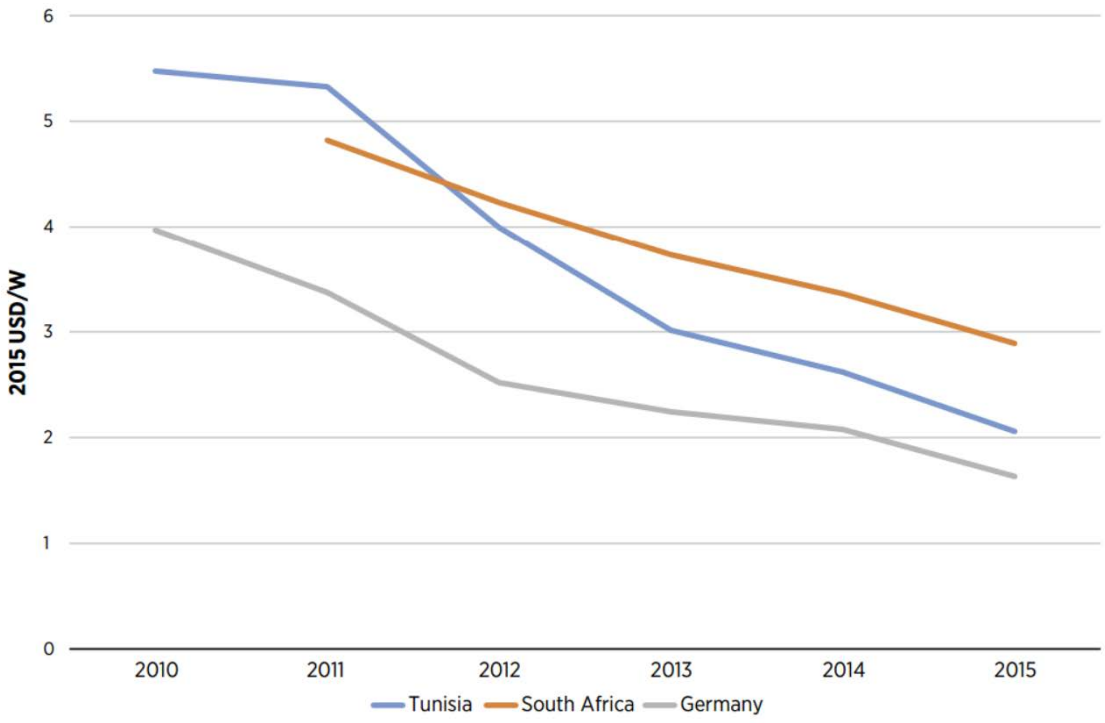
Small Solar House Systems (SHS)[32]

US consumers paid on average "$3.79 per watt in gross cost and achieved payback in just 7.5 years." Given that the design life of most solar equipment is 25 to 30 years, solar is now a sound investment in many areas in America. For homes with solar, the systems met an average 85 percent of total demand in 2015, and the average 7.9-kilowatt system saves roughly $2,000 on electricity costs each year.[33]

What is the current situation in Africa and in the region? Grid-connected rooftop solar PV in Africa[34]

Most of the grid-connected residential solar PV systems in Africa are installed either in North African countries or in South Africa. Tunisia and South Africa in particular have established markets, while Morocco has successfully used solar PV to electrify villages. These markets have competitive costs compared to OECD countries. **Figure 11** below depicts these costs trends.

Figure 11 - Comparison of average total installed cost of residential solar PV systems, 2010-2015



Note: Data for Tunisia for 2015 are IRENA estimates.

Source: Reference [27]

In Tunisia, the government initiated the PROSOL – Elec programme in 2010. This programme aims to support the development of solar PV connected to the national grid network, especially in the residential sector. A key aspect of the programme lies in its innovative financing mechanism, which combines investment grants (up to 30%) and

[32] Reference [25]
[33] Reference [26]
[34] Reference [27]

loans. In 2010, the average cost for residential systems in Tunisia was around USD 5.5/W, but costs had fallen to USD 2.6/W by 2014; data for 2015 are not finalised but are estimated at around USD 2.1/W.

Small-scale distributed solar PV in South Africa represented around one-fifth of the market between 2013 and 2015, with around 170 MW of new rooftop capacity installed in 2015. The South African rooftop market is being driven purely by economics, as there are no major support policies in place.

The Moroccan government initiated the deployment of SHS as a solution for rural electrification in 1996. The country therefore was a pioneer in this application. This initiative, which also included grid extension, has provided more than 12 million people with access to the grid, and a total of 5,159 SHS have been deployed in the country (Morocco World News, 2015).

In Ghana, solar panels are free from import duty charges, but batteries, inverters and accessories are not, unless they are already packaged with the panels before they enter the country (pre-packaging is often unfeasible for larger-scale systems). The Renewable Energy Department at the Ghana Ministry of Energy presented that the cost of PV energy delivery for a 100 Wp solar home system providing three lighting points and a socket for radio/TV (about 300 Wh/day) has an initial capital cost of about US$1,100. This number is therefore comparable to the ranges presented previously.

In Tanzania, in February 2016, EWURA launched a Competitive Bidding Framework for Solar and Wind Small Power Projects in Tanzania mainland, this competitive tendering accepted for projects to generate between 1 MW and 10 MW using Wind and Solar generation technologies, with pricing related to the REFIT (feed-in tariff framework).[35]

What are the cost reduction potentials for solar home systems in Africa?[36]

Although the costs of SHS systems have come down with declining costs in solar PV modules and many BoS components, there remains a wide differential between the most competitive cost structures for SHS and the average.

These cost differentials, as well as the cost differentials compared to a much more established SHS market like Bangladesh, provide a starting point for examining what an “efficient” cost structure might look like for Africa.

The **Figure 12** below shows a comparison between one of the higher-cost, larger than 1 kW SHS in the database with the best practice project in Africa for which IRENA has detailed data. This shows the potential sources of cost reduction if African SHS systems costs are moved rapidly to the local best practice.

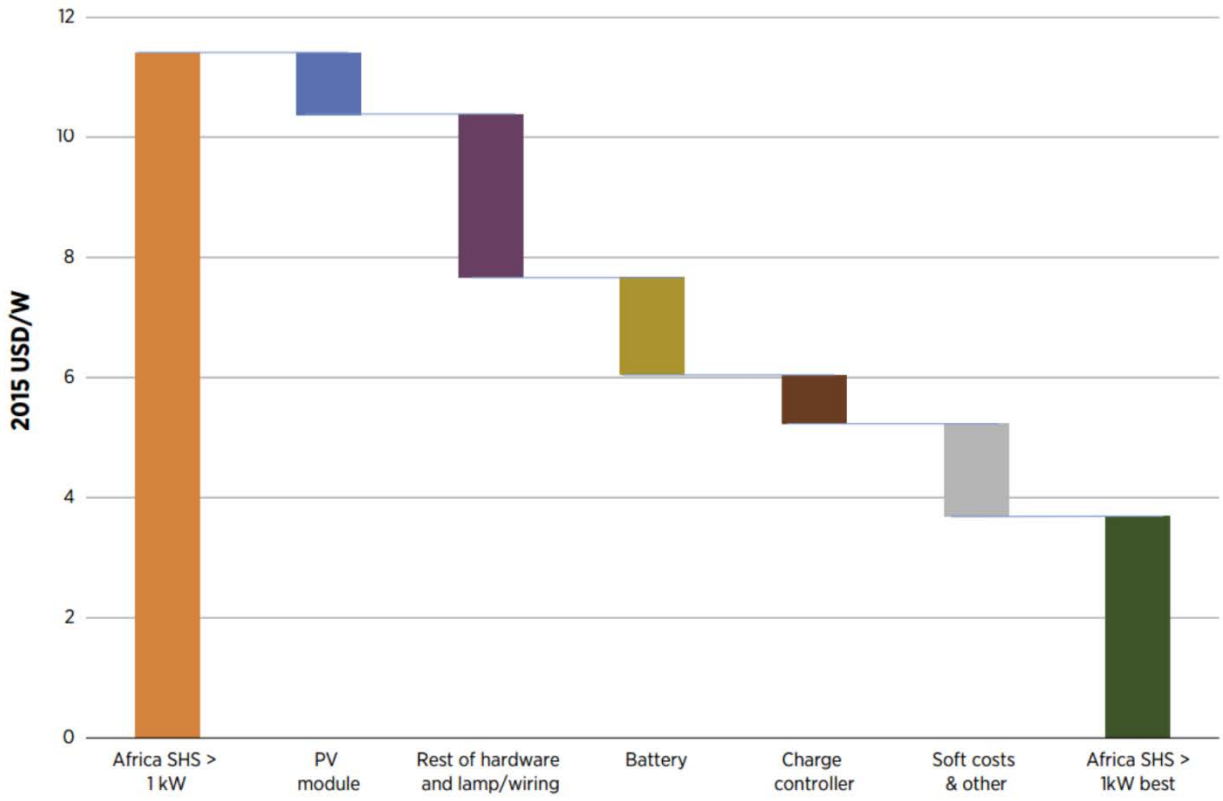
Overall, **this comparison suggests that cost reductions of around 68% could be possible**. The average specific cost per watt of solar PV modules for Africa’s best practice example are around half the average value experienced and account for 9% of the total reduction in installed costs. Reducing the balance of the hardware costs to African best practice levels would account for 24% of the reduction in total installed costs, battery costs would account for 14%, the charge controller for 7% and the soft costs for 14%.

This comparison needs to be treated with some caution, as it is not clear that the cost allocation has been applied rigorously in all cases. This is due predominantly to a poor understanding of the cost

[35] Reference [28]
[36] Reference [27]

breakdown, but in some cases it undoubtedly reflects confusion about where to allocate costs at the more detailed level requested.

Figure 12 - Average cost reduction potential of solar home systems (>1 kW) in Africa relative to the best in class, 2013-2014 [37]



Source: World Bank, 2013; Reference [29]

[37] Reference [29]

Energy Efficient Market Appraisal

Energy efficiency is the cleanest, cheapest energy resource that any region or country have (this statement is valid world-wide[38] [39]).

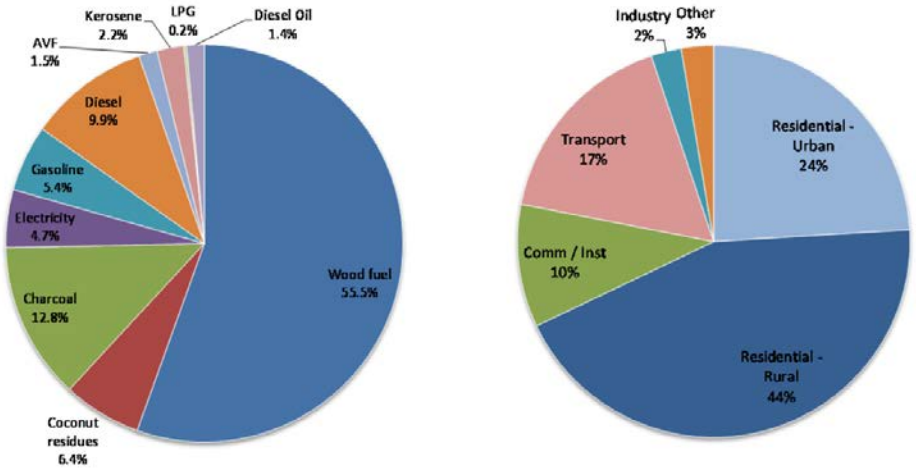
In the case of Zanzibar, efficiency could significantly help ZECO to lower its current TANESCO bill, reduces mainland energy dependence, and creates jobs in Zanzibar.

To help bring the benefits of energy efficiency to Zanzibar, the RGoZ, ZECO and other Government Organizations such as Zanzibar Bureau of Standards (ZBS) would pursue an aggressive strategy to save more energy through efficiency programs, such as incentives to upgrade buildings, lighting, heating and cooling systems so that customers can meet their power needs with less electricity. Promoting energy efficiency for the many benefits it offers, making the business case for efficiency to the Zanzibar Community, and working with the RGoZ, ZECO and/or donors to create financial models that remove disincentives and provide incentives that encourage customers to save energy. In addition, growing use of appliances and consumer electronics is a source of rising household energy consumption, particularly networked devices that provide such end-uses as entertainment and communication (e.g. radio, TV, mobile phones, personal computers, among others). This is one of the reasons for introducing leveling and performance standards on the appliances and consumer electronics coming from abroad Zanzibar.

Energy Balance in Zanzibar

In 2010, the Zanzibar energy balance estimation[40] indicated that the building sector that dominates it, **at 68%**, primarily based on the use of biomass fuels, followed by transport at 17%. The industry estimate in particular requires further development to improve its robustness. As it shown in the **Figure 13** below:

Figure 13 – Zanzibar Energy Balance Estimation (2010)



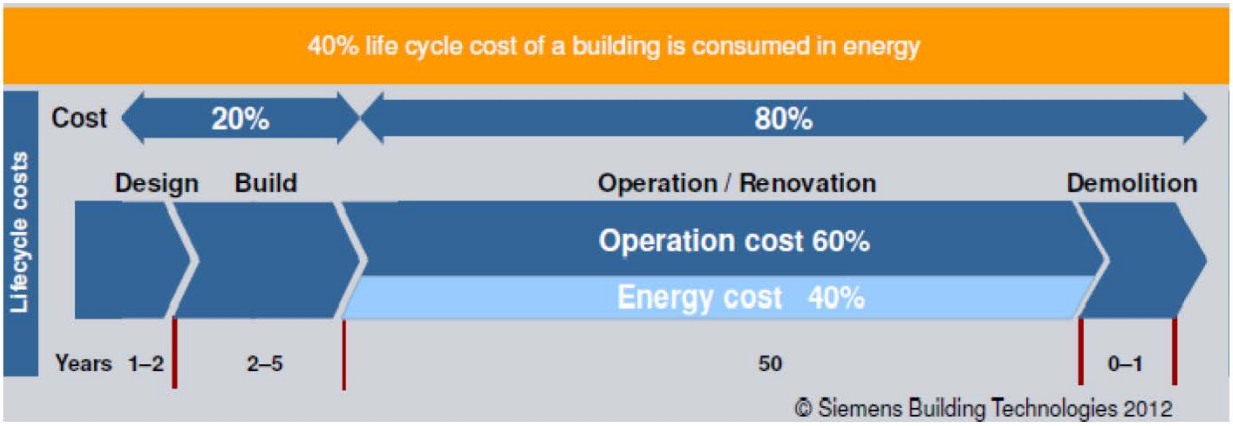
Source: Reference [32]

[38]Reference [30]
[39]Reference [31]
[40]Reference [32]

Globally[41], the buildings sector is a large energy-consuming sector, accounting **for more than 30% of global total final energy consumption (TFC)** [42]. At the subsector level, residential buildings account for three-quarters of buildings sector energy use and nonresidential[43] buildings for one-quarter.

Furthermore, from another information source[44], the building sector in the world consumes around 40% of world-wide energy, and on average 40% life cycle cost of a building is consumed in energy, as depicted in the **Figure 14** below.

Figure 14 – Energy Consumed during whole building life cycle



Source: Reference [34]

Then the way buildings are planned and designed today has a direct implication on their energy bills.

To address the global challenges of climate change and the high cost of energy it is essential to adopt urban and rural planning and building design methodologies that are energy conscious and environmentally friendly, considering Best Practices Building codes applications.[45]

To design an energy efficient built environment involves minimizing the wastage of resources while maximizing the use of renewable energy sources and passive building design options. These basic criteria would include:

- Optimization of the structure's energy efficiency;
- Minimization of the energy demand of buildings;
- Maximization of the efficiency of energy supply;
- Maximization of the share of renewable energy sources.

[41] Reference [33]
[42] Remark; Today, SIDA II project and the DoEM are currently remaking and reorganizing the Zanzibar energy balance in Zanzibar. Because the quality of materials used for building purposes in Zanzibar, it is estimated that this figure would be twice higher for Zanzibar.
[43] Remark: Non-residential buildings refer to commercial and public services buildings with non-residential uses such as offices, hospitals, schools, public administration, mercantile and hospitality. Non-residential buildings exclude industrial buildings and residential buildings.
[44] Reference [34]
[45] Reference [35]

Current improvements in design and technology offer new opportunities to be competitive in the domestic and international market. Green buildings generally offer a more comfortable, healthier and cost effective solution for living and working. To go green means to maintain a competitive edge in the market.[46]

Energy efficient appliances and the latest energy saving technology is an important feature of green buildings.

Switching to energy saving lighting, for instance, helps to reduce your **overall electricity bills by up to 20%**. Compared to conventional lighting, compact fluorescent lamps or LED lamps emit the same amount of visible light, but save up to 88% of the electric power needed for lighting and also have an eight to fifteen times longer lifetime.

Air conditioning systems today save as much as 50% of the electricity that earlier models from the 80s and 90s used to eat up. Ceiling and room fans are not a new technology, but are still a viable low energy alternative in many buildings, especially those featuring bioclimatic design.

Electric water heaters are among the most power hungry consumers in any building (whether commercial, private or public). **Today, solar water heating technology is affordable and will reduce electricity consumption for hot water by as much as 80% compared to electrical resistance water heaters.**

Today, there are energy saving alternatives for literally all the appliances available for household and commercial use. It is also necessary to be aware of these new trends in order to comply with the legal requirements of integrated building design and building codes.

The appliances discussed here are “finished” products and are therefore distinguished from building materials or building components. These appliances have low environmental impact and high performance (all would comply with international performance standards).

And they are designed to meet three basic criteria:

- Effective and efficient use of materials,
- Energy saving,
- Low or no toxicity.

Energy efficiency devices are self-paid though the energy savings.

Energy savings mean cost savings, while the performance of an appliance is the same or better when compared to the baseline. The premium, if any, that we need to pay today for an energy saving alternative (or sometimes to replace a still functioning older piece of equipment) can be expected to be paid off in a time span that is significantly shorter than the life span of the new equipment itself. This means that investments in energy saving technology will soon turn into profits.

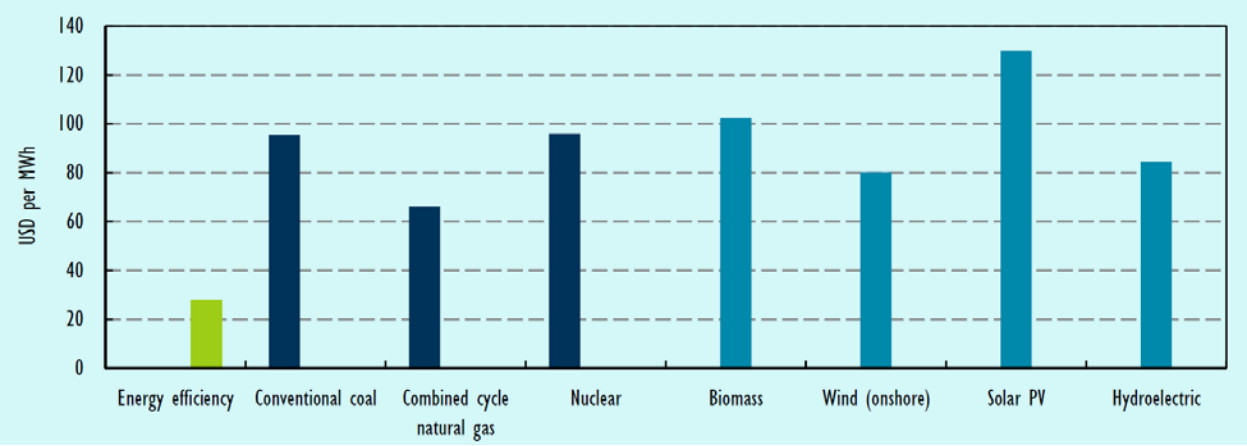
Related to Cooking Stoves, firewood and charcoal are the main cooking fuel for the majority of the urban and rural poor. Improved cooking stoves should be promoted as they significantly reduce the fuel needed for cooking. It is necessary to understand the **affordability of the commercial energies** and the wiliness to switch cooking fuels from these households.

[46] Reference [36]

The cost of energy efficiency for electricity providers: a US case study[47]

End-use energy efficiency investments are often the least-cost investment from an energy supply perspective, and can reduce the total investment cost needed to replace retiring generation. With costs ranging from USD 0.00/MWh to USD 50.00/MWh of demand avoided, efficiency has the least capital outlay of new supply (Lazard, 2014). Estimates on the levelised cost of energy efficiency compared to other sources of electricity supply in the United States show that energy efficiency can provide energy savings at costs substantially lower than the next cheapest supply option as it is shown in **Figure 15**

Figure 15 – Levelised cost comparison among energy supply sources in the United States



Source: Reference [37]

Energy efficiency costs are estimated by Molina (2014)[48] at between USD 20/MWh and **USD 50/MWh** in 2012, with the **average cost being USD 28/MWh.** The levelised cost of electricity generation uses estimates from the US Department of Energy (US DoE) for new plants in 2019.

Energy Efficiency in Buildings in East Africa[49]

"Promoting Energy Efficiency in Buildings in East Africa" is a 48 month project implemented by UN-Habitat in collaboration with UNEP and the five East African countries (Kenya, Uganda, Rwanda, Burundi and **Tanzania**, including Zanzibar). The project's main objective is to improve energy efficiency, energy saving and conservation measures in buildings in the members countries of the East African Community. The project concept was approved by GEF in 2009 and a funding was provided for project preparation. The full size project was approved in **May 2011** by the GEF CEO for funding.

The aim of the project is to mainstream energy efficiency (EE) measures into housing policies, building codes and building practices in East Africa and to achieve considerable avoidance of GHG emissions as a result of improved building practice. Subsequently, it will be possible to use the existing generated

[47] Reference [33]
[48] Reference [37]
[49] Reference [38]

electricity more efficiently and thus to expand the electricity supply to satisfy the increasing demand by both residential and economic productive activities of the partner countries.

In order to promote energy efficiency, the project has developed 5 components:

1. Establishment of energy efficiency data and benchmarks in the building sector;
2. Formulation and adoption of provisions for energy efficiency in building codes and regulations;
3. Awareness raising and capacity building in EE and best practices in the building sector;
4. Appropriate financial framework for the implementation of EE measures in buildings;
5. Development and implementation of pilot projects.

This project plans to realize the following Expected Outcomes:

- Energy Consumption trends in the building sector in East Africa established.
- Performance based energy consumption benchmarks for buildings established.
- Energy Efficiency potential in the building sector in East Africa estimated.
- Methodology and process for collection of climatic data in each participating country regarding specific requirements for EEB, RET and bioclimatic design improved.
- Principles of EEB integrated in country specific building codes.
- Toolkits and guidelines developed for the application of EEB.
- Capacities of building code administration staff strengthened.
- Awareness raising campaign conducted.
- Technical training and capacity built for practitioners in EEB.
- East African Green Buildings Award established.
- Awareness of opportunities and benefits of EE finance in buildings, by the top-level management in the finance community in East Africa, created.
- Capacity of the local finance community in each participating country reinforced.
- Capacity of the private sector at national level regarding estimating investment requirements and risks of EEB finance reinforced.
- Pilot financial mechanisms in the main partner countries, Kenya, Uganda and Tanzania are established.
- Demonstration projects designed.
- Demonstration projects implemented.

This project has developed in 2013 the "DRAFT RULES FOR ENERGY EFFICIENCY IN BUILDINGS"[50] including proposed rules for Zanzibar.

[50] Reference [39]

Conclusion

The previous information shows in summary that in latest competitive procurement processes

- Wind generation projects in Morocco has achieved pricing at **$2.50 cents/kWh**;
- PV Solar projects in Abu Dhabi has achieved pricing at **$2.42 cents/kWh**; and
- Energy Efficiency in USA has achieved pricing at **$2.00 cents/kWh**.

Then, Wind and Solar utility-scale competitive procurement processes and Energy Efficiency projects are providing indicative prices that are quite competitive with the current TANESCO Tariff paid by ZECO in 2016, equivalent to **$12.53cents/kWh delivered costs at the ZECO T&D system at Unguja Island**; this ZECO delivered cost of supply are estimating at **$17.03cents/kWh at the middle/low voltage consumers**.[51]

In addition, Wind and Solar projects investment values are foreseeing to decrease in the mid and long run (IRENA studies).

ZECO is losing revenues due to its current Tariff Schedule which is considering a low margin which is sensitive to the lack of payment of large consumers such as ZAWA.[52]

Small Scale Renewable projects are starting to be competitive with the ZECO Tariff for Residential consumers and this situation should be urgently addressed for ZECO Senior Management.

There is an existing framework "Promoting Energy Efficiency in Buildings in East Africa", which is a project implemented by UN-Habitat in collaboration with UNEP and the five East African countries (Kenya, Uganda, Rwanda, Burundi and Tanzania, **including Zanzibar).** In 2013 this framework produced the "DRAFT RULES FOR ENERGY EFFICIENCY IN BUILDINGS"[53] including proposed rules for Zanzibar. These rules are quite promising and could open new energy efficiency opportunities in Zanzibar.

This paper is just addressing the Market Appraisal, the Cost-Benefit Analyze and the multi-criteria decision analysis are developed in separate paper.

[51] Remark: This situation could become worst in the short term when TANESCO will be allowed by EWURA (Regulatory Authority in Mainland) to increase TANESCO Tariff in 2017 at the requested increasing for the ZECO Tariff (19.1% on energy charges and 14.9% on capacity charges) over the current Tariff values.
[52] Remark: Compering the ZECO Tariff Schedule and the ZECO full delivered cost at consumers in Zanzibar Island is possible to see that ZECO is operating with a narrow value added or no-added value at all. This situation becomes revenue losses when and when large consumers such as ZAWA are not paying their invoice (20% of ZECO demand).
[53] Reference [39]

References

[1] - Renewable Energy and Energy Efficiency: Assessment of Projects and Policies, Aidan Duffy, Martin Rogers, Lacour Ayompe, 2015 - http://eu.wiley.com/WileyCDA/WileyTitle/productCd-1118631048,subjectCd-ECD0.html

[2] - https://en.wikipedia.org/wiki/Economy_of_Tanzania

[3] - Dubai World Africa to invest $150 million Muyuni Beach Resort- http://www.africa-ata.org/dubai.htm

[4] - http://www.economics-of-cc-in-zanzibar.org/images/Climate_Screening_of_Programmes_and_Development_Plans_vs_3.pdf

[5] – Private Sector Contribution in Zanzibar Economic Development - http://znccia.or.tz/Fuko/Private%20Sector%20Contribution%20in%20Zanzibar%20Economic%20Development%20(1).pdf

[6] - Environmental impact of energy industry - https://en.wikipedia.org/wiki/Environmental_impact_of_the_energy_industry;

[7] - Environmental impact of electricity generation - https://en.wikipedia.org/wiki/Environmental_impact_of_electricity_generation

[8] - Regulation of the Power Sector, Chapter 11 Environmental Regulation; Table 11.1; page 541 and 542; Ignacio Perez-Arriaga and Pedro Linares; Springer-Verlag, London 2013;

[9] – Cost of electricity by source, Lazard November 2015, https://en.wikipedia.org/wiki/Cost_of_electricity_by_source

[10] - TANESCO Tariff - http://www.ewura.go.tz/?p=2060;

http://144.76.33.232/wp-content/uploads/2016/04/TANESCO-ORDER-2016-ENGLISH.pdf

http://www.ewura.go.tz/wp-content/uploads/2016/11/Tanesco_Public-Notice_English_04Nov2016.pdf

http://www.ewura.go.tz/wp-content/uploads/2016/11/TANESCO%20Tariff%20Adjustment%20Application%20for%20year%202017.pdf

[11] - MCC investment in the 132 KV-100MW undersea cable - http://zanzibarnikwetu.blogspot.com/2013/04/698m-projects-under-mcc-pact-completed.html

[12] - Solar and Wind Competitive Procurement processes - IRENA book - http://www.irena.org/DocumentDownloads/Publications/Renewable_Energy_Auctions_A_Guide_to_Design.pdf; When Solar & Wind Prices Are “Too Low” And Solar & Wind Power “Too Dominant” - https://cleantechnica.com/2016/07/27/solar-wind-prices-low/

[13] - https://cleantechnica.com/2013/04/18/cheap-wind-power-disrupting-brazilian-energy-market/

[14] - http://www.utilitydive.com/news/how-winds-record-low-prices-are-driving-a-big-build-cycle/404044/

[15] - 2014 Wind Technologies Market Report; US DOE; August 2015 - http://energy.gov/sites/prod/files/2015/08/f25/2014-Wind-Technologies-Market-Report-8.7.pdf

[16] - http://reneweconomy.com.au/new-low-for-wind-energy-costs-morocco-tender-averages-us30mwh-81108/

[17] - Solar Competitive Procurement pricing in Abu Dhabi September 2016 - http://www.pv-magazine.com/news/details/beitrag/abu-dhabi--three-world-record-bids-entered-for-sweihan-solar-project_100026191/#ixzz4KsAnVKFa

[18] - Chile competitive procurement pricing 12 MW PV Solar plant - http://www.ecowatch.com/solar-price-chile-1982242311.html

[19] - http://www.vergnet.com/fr/news/new-cost-analysis-shows-solid-business-case-renewable-energy-generation/

[20] - Power to Change, IRENA, June 2016 - http://www.irena.org/DocumentDownloads/Publications/IRENA_Power_to_Change_2016.pdf

[21] - Toolkit of Voluntary Options for Renewable Energy Deployment, IRENA - http://www.irena.org/remap/IRENA_REmap_G20_background_paper_2016.pdf

[22] - Distributed Wind Market Report, August 2014 - http://www.pnnl.gov/main/publications/external/technical_reports/PNNL-23484.pdf

[23] - Small Wind Systems - http://energy.gov/energysaver/small-wind-electric-systems

[24] – Development of Wind Energy in Africa, 2013, AfDB, Page 11 - http://www.afdb.org/fileadmin/uploads/afdb/Documents/Publications/Working%20Paper%20170%20-%20Development%20of%20Wind%20Energy%20in%20Africa.pdf; http://www.kestrelwind.co.za/

[25] - Small PV Solar Systems - http://energy.gov/energysaver/small-solar-electric-systems

[26] - EnergySage Releases Inaugural U.S. Solar Marketplace Intel Report, October 2015 - https://www.energysage.com/press/energysage-marketplace-intel-report; https://www.energysage.com/data/; http://www.triplepundit.com/2016/01/5-solar-energy-trends-2016-residential-market/

[27] - Solar PV in Africa – Costs and Markets, IRENA, September 2016 https://www.irena.org/DocumentDownloads/Publications/IRENA_Solar_PV_Costs_Africa_2016.pdf

[28} - Competitive Bidding Framework for Solar and Wind Small Power Projects-Tanzania, February 2016 - http://www.ewura.go.tz/?p=1969

[29] - Connection Charges and Electricity Access in Sub-Saharan Africa; World Bank; 2013; Washington, DC - https://openknowledge.worldbank.org/bitstream/handle/10986/15871/WPS6511.pdf?sequence=1&isAllowed=y

[30] - Studies: Efficiency Still the Cheapest Energy Resource - https://www.greentechmedia.com/articles/read/studies-efficiency-still-the-cheapest-energy-resource

[31] - Energy Statistics of Non-OECD Countries - http://www.oecd-ilibrary.org/energy/energy-statistics-of-non-oecd-countries_19962851-en

[32] - The Economics of Climate Change in Zanzibar, July 2012, UKAid. Page 10, Figure 2

[33] - IEA - MEDIUM TERM ENERGY EFFICIENCY MARKET REPORT 2015

[34] - “Buildings of the Future”, PPT presentation, 2012 Energy Week, World Bank, Author: Chip O’Donnell, Infrastructure and Cities Sector, Siemens Industry, Inc.

[35] - Guidelines for Green Building in East Africa - http://eebea.org/sites/default/files/documents/%5BJobNumber%5D/UETN%2001_Guidelines%20for%20Green%20Building__A4_JN.pdf

[36] – Energy Efficiency Appliance cost reductions - http://eebea.org/sites/default/files/documents/%5BJobNumber%5D/UETN%2005_EE%20Appliances_A4_JN.pdf

[37] - Molina, M. (2014), The Best Value for America's Energy Dollar: A National Review of the Cost of Utility Energy Efficiency Programs American Council for an Energy-Efficient America (ACEEE), Washington, www.cectoxic.org/AEEE_Best_Value_is_Energy_Efficiency.pdf (accessed 6 July 2015); US EIA (US Energy Information Administration) (2015), Levelized Cost and Levelized Avoided Cost of New Generation Resources in the Annual Energy Outlook 2015, US DoE, Washington, www.eia.gov/forecasts/aeo/pdf/electricity_generation.pdf (accessed 4 July 2015); IEA (2014a), Energy Technology Perspectives 2014: Harnessing Electricity's Potential, OECD/IEA, Paris, available at www.iea.org/bookshop/472-Energy_Technology_Perspectives_2014 (accessed 6 July 2015). http://in.gov/iurc/files/ACEEE_Attachment_G_ACEEE_Cost_of_Saved_Energy_Report.pdf

[38] - Energy Efficiency in Buildings in East Africa - http://eebea.org/?q=all-documents; http://eebea.org/?q=node/84

[39] - "Draft Rules for Energy Efficiency in Buildings, Proposals for Tanzania", UN Habitant, 2013 - http://eebea.org/sites/default/files/documents/%5BJobNumber%5D/Tanzania_Draft%20rules%20for%20Energy%20Efficiency%20in%20Building.pdf

Another relevant sources of Information

Financing RE and EE Projects – 2016 –

http://fs-unep-centre.org/sites/default/files/publications/globaltrendsinrenewableenergyinvestment2016lowres_0.pdf

Locally Manufactured Small Wind Turbines in Ethiopia: Is the LCOE Competitive with the Alternatives for Rural Electrification, and if so, where?
https://www.academia.edu/7865944/Locally_Manufactured_Small_Wind_Turbines_in_Ethiopia_Is_the_Levelised_Cost_of_Energy_Competitive_with_the_Alternatives_for_Rural_Electrification_and_if_so_where?auto=download

A Wind Turbine Recipe Book; Hugh Piggott; Jan 2009 - http://davidpalpacuer.free.fr/anciensite/Projets/Eolien/A%20Wind%20Turbine%20Recipe%20Book_zbook.in.pdf

Energy Efficiency

http://www.unep.org/sbci/pdfs/PromotingEEBEastAfrica.pdf

http://mirror.unhabitat.org/downloads/docs/Technical%20material-%20Promoting%20Energy%20Efficiency%20in%20Buildings.pdf

https://sustainabledevelopment.un.org/content/documents/22436UN-Habitat.pdf

http://eebea.org/sites/default/files/documents/%5BJobNumber%5D/06.Draft%20Resource%20Energy%20Efficiency%20Building%20Codes%20for%20Tropical%20Countries_ZB.pdf

http://eebea.org/sites/default/files/documents/%5BJobNumber%5D/UETN%2007_Energy%20and%20Resource%20Efficiency%20Checklist_A4_JN.pdf

http://eebea.org/sites/default/files/documents/%5BJobNumber%5D/Energy%20Audit%20draft%20questionnaires_FINAL.pdf

http://eebea.org/sites/default/files/documents/%5BJobNumber%5D/Building%20energy%20audit%20profile.pdf

http://eebea.org/sites/default/files/documents/%5BJobNumber%5D/UETN%2002_Climate%20and%20Architecture_A4_JN.pdf

Annex G: Communication and visibility plan

EuropeAid/135818/IH/SER/TZ

Service Contract № FED/2016/375-441

Technical Assistance for the implementation of renewable energies and energy efficiency projects, including regulatory reforms" (Lot 2)

COMMUNICATION AND VISIBILITY PLAN

21 November 2016

(Version 0.3)

MWH

This Project is implemented by Consortium led by

MWH

BUILDING A BETTER WORLD

in cooperation with:

Mott MacDonald

PESCARES Italia Srl

This technical assistance operation is financed by the European Union, under the Cotonou Agreement, through the European Development Fund (EDF). The EDF is the main instrument funded by the EU Member States for providing Community aid for development cooperation in the African, Caribbean and Pacific States and the Overseas Countries.

Report Title	**Communication and Visibility Plan**
Version	Version 0.3
Date	2I November 2016
Prepared By	Mark Jeffery, Senior Communication Expert Sebastian Sanga, Junior Communication Expert
Reviewer	Anca Andreescu, Project Manager MWH

BASIC PROJECT DATA

Project Title:	**Technical Assistance for the implementation of renewable energies and energy efficiency projects, including regulatory reforms (Lot 2)**		
Project ref. no:	EuropeAid/135818/IH/SER/TZ	Recipient organisation: Contact person: Address, telephone number and e-mail:	Ministry of Land, Water, Energy, and Environment, through Zanzibar Electricity Corporation (ZECO) Maulid Shiraz Hassan Head Office P:O:Box 235, Gulioni +255 774 386 247 Maulidh@hotmail.com
Service contract No:	FED/2016/375-441	Contracting Authority: Contact person: Address, telephone & fax number and e-mail:	The Alternate National Authorising Officer (NAO) Principal Secretary Ministry of Finance P.O.BOX 1154 Zanzibar, Tanzania E: info@mofeaznz.org T: +255 778 666664/5
Date of contract signature:	7th June 2016	Contractor's name and address:	MWH SA/NV A: Nysdam Office Park, Avenue Reine Astrid, 92, B-1310 La Hulpe, Belgium www.mwhglobal.com
Contract duration:	24 months	Contact person: Address, telephone & fax number and e-mail:	Ms Anca.Andreescu A: Nysdam Office Park, Avenue Reine Astrid, 92, B-1310 La Hulpe, Belgium T: +32 (0) 2 655 22 78 M: +45 20 60 18 24 F: +32 (0) 2 655 22 80 E: Anca.Andreescu@mwhglobal.com
Total contracted amount (Euro):	1.152.700,00 EUR	Project Team Leader Address, telephone number and e-mail:	Mr Niels Juhl Thomsen E: Niels.Juhl@Thomsen.as M: +255 (0) 774 771 229

TABLE OF CONTENTS

1 INTRODUCTION 7
2 PROJECT CONTEXT 9
2.1 PROJECT OVERVIEW 9
2.2 COMMUNICATION AND VISIBILITY TERMS OF REFERENCE 10
2.3 APPROACH 11
3 TARGET AUDIENCE SEGMENTATION AND PROFILES 12
3.1 SEGMENTATION 12
3.2 LARGER ENTERPRISES WITH HIGH ENERGY DEMANDS 13
3.3 STATE ENERGY INSTITUTIONS 14
3.4 PRIVATE SECTOR / SOCIAL ENTERPRISE RE AND EE SUPPLIERS 15
3.5 SMES AND ORGANISATIONS WITH SIGNIFICANT ENERGY USE 16
3.6 DOMESTIC ENERGY USERS 17
3.7 RANKING TARGET AUDIENCES 18
4 COMMUNICATION TOOLS AND CHANNELS 19
4.1 COMMUNICATIONS MIX 19
4.2 PARTNERS TO REACH TARGET AUDIENCES 20
4.3 APPROACHES TO RAISING AWARENESS ON RE AND EE 21
5 TARGET AUDIENCE ENGAGEMENT 22
5.1 KEY MESSAGES 22
5.2 PROMOTION OF RE AND EE 23
6 IMPLEMENTATION PLAN 24
6.1 RE AND EE C&V ACTIVITIES 24
6.2 WORK PLAN 29
6.3 ESTIMATED BUDGET 31
7 ANNEX A: OUTLINE OF COMMUNICATION AND VISIBILITY PLAN FROM THE INCEPTION REPORT 33

List of Acronyms

Comms	Communications
CSO	Civil Society Organisation
C&V	Communication and Visibility
DEM	Department of Energy and Minerals
DFI	Direct Foreign Investment
DP	Development Partner
EE	Energy Efficiency
EOI	Expression of Interest
EU	European Union
GSW	Gold Solar and Wind
HHs	Households
INGO	International NGO
IPP	Independent Power Producer
KAP	Knowledge Attitude and Practice
LPG	Liquefied Petroleum Gas
MDAs	Ministries, Departments and Agencies
MLWEE	Ministry of Land Water, Energy and Environment
NGOs	Non-Governmental Agencies
PPA	Power Purchase Agreement
PRO	Public Relations Officer
PV	Photo-Voltaic
RE	Renewable Energy
REZA	Renewable Energy Zanzibar Association
RGoZ	Revolutionary Government of Zanzibar
SIDA	Swedish International Development Agency
SME	Small and Medium Enterprises
SMS	Short Messaging System
SWH	Solar water heater
TA	Technical Assistance
TANESCO	Tanzania Electricity Supply Company
ToR	Terms of Reference
SME	Small and Medium Enterprise
SMS	Short message system
ZATI	Zanzibar Association of Tourism Investors
ZANREC	Zanzibar Recycling
ZAWA	Zanzibar Water Authority
ZECO	Zanzibar Electricity Company
ZIPA	Zanzibar Investment Promotion Authority
ZURA	Zanzibar Utility Regulatory Authority

1 INTRODUCTION

1 The Communication and Visibility Plan has been formulated to respond to the needs of the TA project and to address the current situation regarding RE and EE in Zanzibar. Despite government and development interventions concerning power supply, fuel efficiency, and policy, plus considerable private sector investment in RE, the Project Inception Report notes the lack of coherence around a common vision. A symptom of the lack of a common vision is stakeholders working in "silos" instead of sharing experiences, viewpoints and learning. Without a common understanding RE investment decisions are made in an isolated way, the overall development of the energy sector is slowed and EE measures are inconsistently applied.

2 The response of the C&V plan is to create a space for the development of such a vision that would give direction to regulatory reform and at the same time put specific technical interventions such as the Lot 1 Wind and Solar Potential assessment into an investment context. Such a vision would include encouraging a joint understanding of the different roles that stakeholders should can play and better awareness of opportunities for RE and EE.

3 In this way the C&V Plan delivers Result 7 of the Project logframe namely: Improved awareness of RE & EE among the population of Zanzibar

4 The C&V Plan is presented in a series of infographics that: summarise the key issues; segment target audiences; describe potential communication tools; identifies partners to reach target audiences; describe the mix of tools and partners that will be used to disseminate key messages; define the visibility framework for messaging; and describe the selected activities that will be used in the plan, how they will be implemented in a work plan and their cost.

5 The target segments are:

1. Larger enterprises with high energy demands;
2. State energy institutions;
3. Private sector / social enterprise RE and EE suppliers;
4. SMEs and organisations with significant energy use;
5. Domestic users.

By segmenting the energy sector in this way the C&V strategy aims to do more than only promote energy efficiency (though this is included. It also takes a strategic approach to building interest and participation in RE and EE for Zanzibar.

6 Potential communication tools include making use of the mass media and direct messaging but of equal significance is where RE and EE messages come from. So the plan recommends working with influential partners that are well positioned to promote RE and EE to their own constituencies, customers, communities etc. The tools and partners are then brought together in packages of activities that speak to the target segments.

7 Implementation of the C&V plan is divided into three stages namely, set-up, encouraging a conversation about RE and EE, and building consensus towards a common vision. The timing of the three phase is presented in a work plan that runs to the end of the TA in mid 2018.

8 The **set-up phase** readies the tools and prepares the partners, and includes developing some core materials and further developing the social media and information sharing strategy and including setting up online fora. It also includes preparing RE initiative branding and Project visibility for the subsequent activities. EU visibility requirements are also put in place.

9 The next phase helps **articulate the issues** that face the different segments in the absence of a common vision and framework for RE and EE. This entails enabling advocates for RE and EE in the Zanzibar context, and

also demonstrating how the energy sector has responded to RE and EE opportunities in other countries. This phase draws the segments together in a conversation about the direction for RE and EE and culminates in a RE and EE stakeholder event.

10 The final phase supports **development of consensus** about the RE and EE direction for Zanzibar including regulatory reform and policy.

11 The activities under the plan are supported by an annual budget. It is estimated that the total cost each year will be €53,400 with a one-off purchase of equipment of €1600.

12 The C&V plan is intended to provide a sound framework within which knowledge and experience can be shared and a common vision can be developed. It has been formulated so that it can accommodate a dynamic situation in which the scope of the project is still being defined.

2 PROJECT CONTEXT

2.1 Project Overview

13 The main factors guiding the development of the Communication and Visibility Plan from a Project perspective are detailed below:

Project Overview	
Description	• The project, Technical Assistance for the implementation of renewable energies and energy efficiency projects, including regulatory reforms (Lot 2) is a two-year programme (2016-2018) supported by the EU • Lot 1 covers Wind Resource and Solar Potential Analysis for Unguja and Pemba Islands
Issues from Inception Report	• Absence of common vision will create problems in developing strategies, strategic plans, and action plans putting at risk the implementation of tangibles RE and EE projects • Absence of standards, internal rules and codes, fundamental for controlling efficiency of the electric devices entering Zanzibar • Absence of methods for applying international Best Practices
Project Activities	• The next steps will be focused on developing the project's implementation methodology, encouraging stakeholders' in adopting a common vision, and providing capacity building to key stakeholders (in particular, ZECO), meeting their needs and filling gaps
Project Purpose	
Main Objectives	• The main objective of the Project is to support the development of renewable energies in Zanzibar, promote implementation of energy efficiency and adequate regulatory and institutional framework through appropriate transfer of know-how and capacity development of Key Stakeholders

2.2 Communication and Visibility Terms of Reference

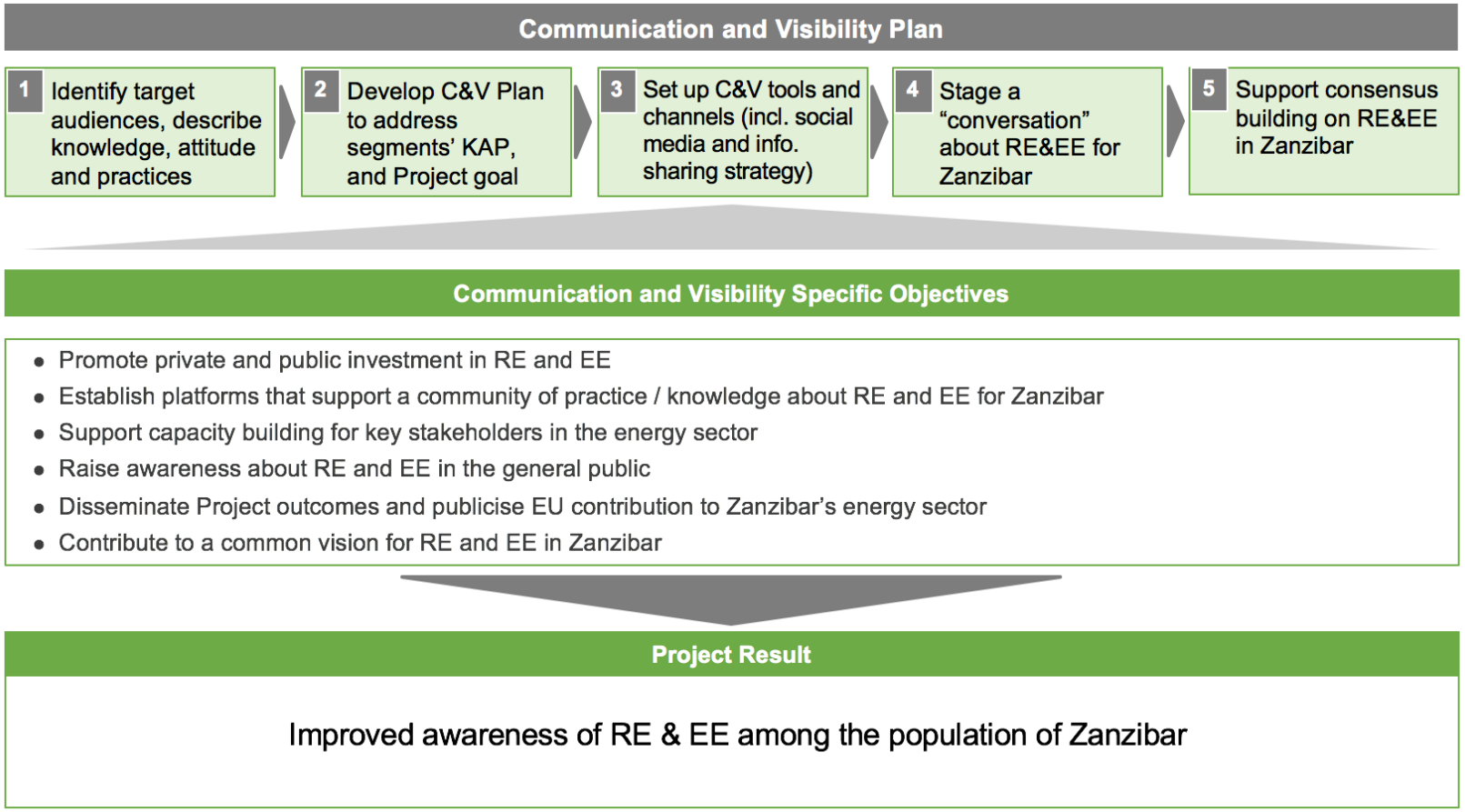
The Terms of Reference for Communication and Visibility are summarised below:

Communication goal	• Raise awareness of the Zanzibar population on opportunities offered by RE & EE technologies as well as the support provided by EU in the energy sector in Zanzibar, and to ensure the sustainability and dissemination of project outcomes and results of the 2 projects (lot 1 and lot 2)
Intended Audience	• The general public (i.e. consumers of electricity in Zanzibar) • Potential private sector investors • Energy sector operators (i.e. staff of ZECO, Planning Commission) • Other development partners with similar projects
Communication outputs (Activity 7)	• Consultation with RGoZ and EUD done • Development of the Communication and Visibility Plan • Budget compiled for brochures, awareness campaigns, publishing, etc. • Social Media Communication and Information Sharing Strategy • Visibility content developed for internet and social media • Virtual project profile developed and registered on capacity4dev.eu • Content for websites (RGoZ and ZECO) developed • Information for communication and visibility compiled • Workshops, events and other activity planned in the C&V strategy organised & implemented • Regular updating of traditional and social media on project progress • Feedback from audiences sought • Awareness raising tools prepared • Monthly Progress Report on Communication and Visibility

Source: RE and EE Terms of Reference, Communication Component Terms of Reference

2.3 Approach

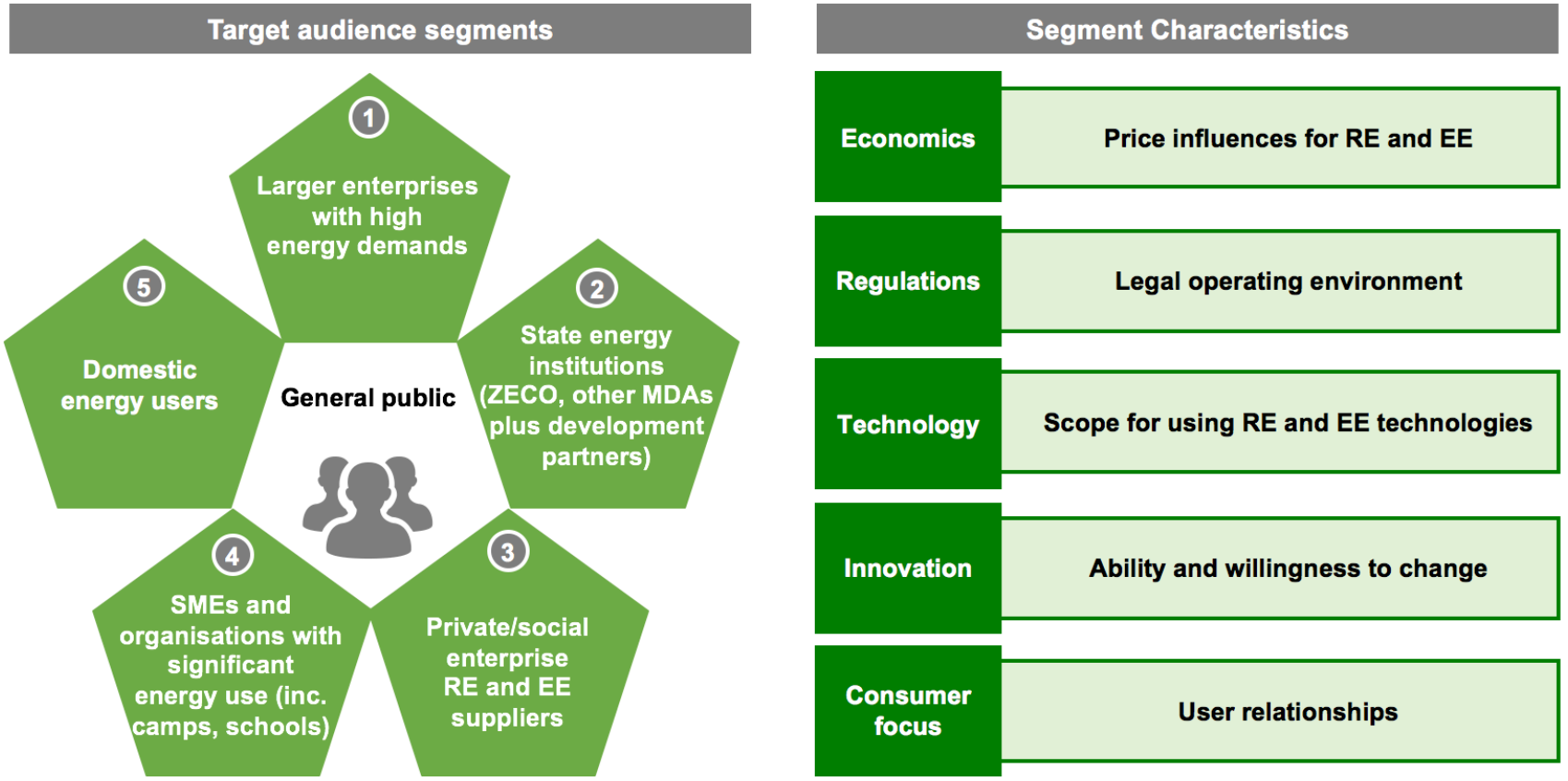
14 The communication plan comprises five stages. The plan begins with the development of a C&V strategy for the Project based on a situation analysis of the stakeholders and the status of RE & EE in Zanzibar undertaken in September 2106 by the TA communication consultants. Stages 1 and 2 form this document. Stages 3 to 5 consist of the implementation of the plan beginning in October 2016. The five stages give expression to the Communication and Visibility objectives drawn from the Project Inception Report and Project ToR. These contribute to the desired result for the strategy; improved awareness of RE and EE among the population of Zanzibar.



3 TARGET AUDIENCE SEGMENTATION AND PROFILES

3.1 Segmentation

15 Five segments are targeted by the C&V Plan. Each segment can be mapped with reference to five dimensions that influence potential engagement with RE and EE. Each of these segments are profiled in subsequent sub-sections. Taken altogether the five segments comprise the general public.



3.2 Larger Enterprises with high energy demands

16 Zanzibar has the potential for further investment in wind and solar generation by virtue of a significant tourism sector (with proven FDI) serving eco-aware customers. Another major power user is the public water company, ZAWA. Industrial power use is limited to a few special purpose enterprises.

① Segment: Larger Enterprises with high energy demands

Segment Profile

- Dominated by tourism sector that needs an assured electricity supply for customers that use A/C, kettles, electric water heaters and for their kitchens that use LPG
- Some resorts open to providing solar and wind generation to feed into ZECO grid but many installed PV systems already feeding in (and so reducing bills) without regulation in force
- ±300 hotels on Unguja, most with diesel generators to cover outages from ZECO, each spending up to $4-5000 monthly on diesel, looking for savings
- ZAWA a major consumer of electricity on Pemba through 24/7 water pumping without any demand management, using premium tariff electricity yet not paying ZECO bills

Economics	**unit cost diesel 45¢, solar 12¢, V5 tariff 25¢**
Regulation	**Businesses and public sector power use unregulated**
Technology	**No large-scale grid RE yet but increasing private off-grid generation that does not contribute to ZECO**
Innovation	**Private sector embraces change easily**
Consumer focus	**Tourism is vital for the islands' economy**

Attitude towards RE and EE

- PV and SWH makes good economic sense for hoteliers so there is already a growing installation base and strong interest in RE and EE
- However further expansion constrained by some concerns over regulatory scope of ZURA and ZECO
- Green credentials a positive sales point for western customers, so may be sensitive to customer perceptions
- Most public sector bulk users don't pay electricity bills for operating their equipment

Opportunity to promote RE & EE

Low — *High*

Examples of stakeholders in this segment

- Major resorts and housing developments
- Hotels and restaurants that serve the tourist market
- Tour operators and travel services
- ZATI (Zanzibar Association of Tourism Investors), trade organisation
- ZAWA (Zanzibar Water Authority), state utility
- ZIPA (Zanzibar Investment Promotion Authority), state IPA
- A few large industries such as sugar cane processing

Note: The V5 level tariff is the ZECO business rate for electricity, V1 is for households

3.3 State Energy Institutions

17 A major player in the energy environment is ZECO, which is one of Zanzibar's biggest organisations and a major employer but also, by law, a state monopoly supplier of electricity through the grid. It has no generation capacity itself. ZECO is technically a part of the MLWEE. DPs support both ZECO and other Ministry departments.

② Segment: State energy institutions

Segment Profile

- ZECO has not been actively involved in promoting RE but has promoted EE through leaflets and mass media albeit without evaluation of effectiveness
- Mapping of wind and solar potential is underway but reliable data that would guide infrastructure investment is not available until end 2017
- Many energy sector studies and reports have been produced with donor support but are not easily accessible
- ZECO doesn't operate to recover costs for either buying or selling electricity, thus the incentive for ZECO investment in RE & EE is weak and the opportunity for private investment limited to highest level tariff payers
- This all contributes to a lack of "common vision" and thus little direction on how RE might contribute to energy generation and supply

Economics	**ZECO buys electricity from TANESCO but pays for <50%. Customer tariffs do not reflect actual costs**
Regulation	**No regulatory framework for RE and EE yet agreed**
Technology	**No large-scale grid RE yet but increasing private off-grid generation that does not contribute to ZECO**
Innovation	**State institutions slow to adapt to the economics of power generation**
Consumer focus	**Unable to make government customers pay, politically difficult to raise domestic tariffs**

Attitude towards RE and EE

- The cost of electricity supply is a political issue and this hinders ZECO operating as a financially sound utility with the effect that the public and private investment climate for grid RE is poor.
- Without a common vision to guide action, ZECO attitude towards private sector RE development is constrained, though it recognises the potential for energy independence. Other stakeholders promote technical solutions without addressing the political and economic issues that impact on energy
- As a public utility ZECO cannot sanction other public sector users making promotion of EE measures difficult

Opportunity to promote RE & EE

Low — *High*

Stakeholders in this segment

- ZECO
- Ministry of Land, Water, Energy and Environment, including:
  – Department of Energy and Minerals
  – Department of Environment
- ZURA (Zanzibar Utility Regulation Authority)
- Development partners
- Politicians with an interest in power and energy issues
- Other related projects and programmes

3.4 Private sector / social enterprise RE and EE suppliers

18 Major investors and small business suppliers both service the tourism sector, which includes resorts and smaller boutique hotels and restaurants. Scope for extending RE and EE benefits to communities is demonstrated by social enterprises, some developers and INGOs but is not embraced by ZECO or RGoZ more generally.

③ Segment: Private sector / social enterprise RE and EE suppliers

Segment Profile

- RE sales opportunities in the tourism sector are being actively pursued by private sector companies
- Developers are planning large off-grid complexes that use directly imported RE equipment, these may generate excess power potentially available to the grid
- PV and SWH installer/suppliers already service many individual hotels
- There are no PPAs with ZECO and hence no precedent for large-scale private sector RE generation for the grid
- Social enterprises and INGOs are taking an interest in business scale RE but lack of regulatory framework can stymie initiatives

Economics	**Suppliers engaging in market without necessarily having data on RE and EE potential**
Regulation	**No regulatory framework for RE and EE yet agreed**
Technology	**RE generation would need to be integrated into the ZECO grid transmission infrastructure**
Innovation	**Private sector willing to embrace change quickly**
Consumer focus	**Customer orientation high**

Attitude towards RE and EE

- RE PV and SWH technology installation to hotels already considered a viable business opportunity by small business and social enterprises
- International manufacturers introduced to Zanzibar through RE generation for large scale resort developers may look to other opportunities
- The private sector is open to partnership with ZECO but the lack of regulatory framework and responsiveness leads to disenchantment
- No overview of technical and economic data, government initiatives and studies creates uncertainty about investment environment

Examples of stakeholders in this segment

- Omani Investors (developing major resort in northern Unguja)
- Commercial RE importers, suppliers and installers
- ZANREC (social enterprise with Swedish and Belgium impact investors)
- Gold Solar Wind (working in education settings)

3.5 SMEs and organisations with significant energy use

19 Schools, camps and artisanal businesses use significant quantities of wood and charcoal for food processing and cooking. Charcoal is mostly imported from the mainland whereas fuelwood is cut locally. The cost of charcoal is rising.

④ Segment: SMEs and organisations with significant energy use (inc. camps, schools)

Segment Profile

- Fuelwood is big part of the energy mix for certain SMEs with LPG making a smaller but growing contribution. Very few cook with electricity
- Government institutions like prisons and schools etc. are often significant users of fuelwood but are not obliged to use efficient stoves
- Bakeries, small industry and food processing have large fuelwood requirements but the cost is not necessarily a significant part of production, and the cost of improvement perceived to be high
- A few businesses and organisations are already deploying alternative or improved EE measures, so could demonstrate "do-ability"
- SMEs and organisations employ or serve a wider population and have potential to be influential beyond their immediate sphere of operations

Economics	**Potential savings in wood use of 50–70%**
Regulation	**No government guidelines on business or institutional use of energy**
Technology	**Improved technologies available**
Innovation	**Reluctance to change due to perceived high costs**
Consumer focus	**Not necessarily "green" but close relationship with customers, users and communities**

Attitude towards RE and EE

- Some awareness about RE and EE technologies is already present
- There is clear potential for improvements in fuelwood EE for certain business users although the general economics of innovation are a perceived barrier, however SME's may have access to credit and state organisations access to some capital spending
- Government institutions have potential for fuelwood EE and can be regulated more easily but requires managerial will and leadership
- Government offices may not pay ZECO bills, so electricity EE meaningless

Examples of stakeholders in this segment

- Bakeries
- School Canteens
- Army camps and prisons
- Fish and Spice driers
- Smaller restaurants

3.6 Domestic energy users

20 Many households could benefit immediately through energy efficient cooking and electrical appliances but uptake is constrained by affordability (rather than willingness to pay), so in the absence of subsidy schemes most potential for EE lies in better use.

5 Segment: Domestic energy users

Segment Profile

- Energy efficient lighting has been promoted through ZECO but has not been extended to appliance choice. EE lighting already widely in use.
- Overall electricity use is in decline due to cost or outages
- >80% of HHs are connectable to grid but <50% actually hooked up due to cost of connection. ZECO scheme to make connection more affordable
- Low awareness of running costs of home appliances and how to use well
- Charcoal and wood remain the main energy sources used in low income HHs in both town and rural areas
- LPG more affordable for urban middle income HHs but high upfront costs of a large cylinder a big barrier for poor households
- LPG considered dangerous and kerosene unpopular and "dirty"

Economics	**97% of cooking uses wood and charcoal**
Regulation	**Regulation weak or not in place**
Technology	**EE lighting used widely, improved stoves available**
Innovation	**No fundamental resistance to change bar cost**
Consumer focus	**No organisation representing consumers**

Attitude towards RE and EE

- High up-front costs deter most ordinary households from using more efficient non-biofuel water heating and cooking appliances
- Even improved stoves are considered expensive
- SWH and PV only affordable for middle-high income users
- EE measures that cost nothing or with payment through instalments may have potential

Examples of stakeholders in this segment

- Poor farming households in rural areas
- Poor households in urban areas
- Middle income households
- Households with members in formal employment

3.7 Ranking target audiences

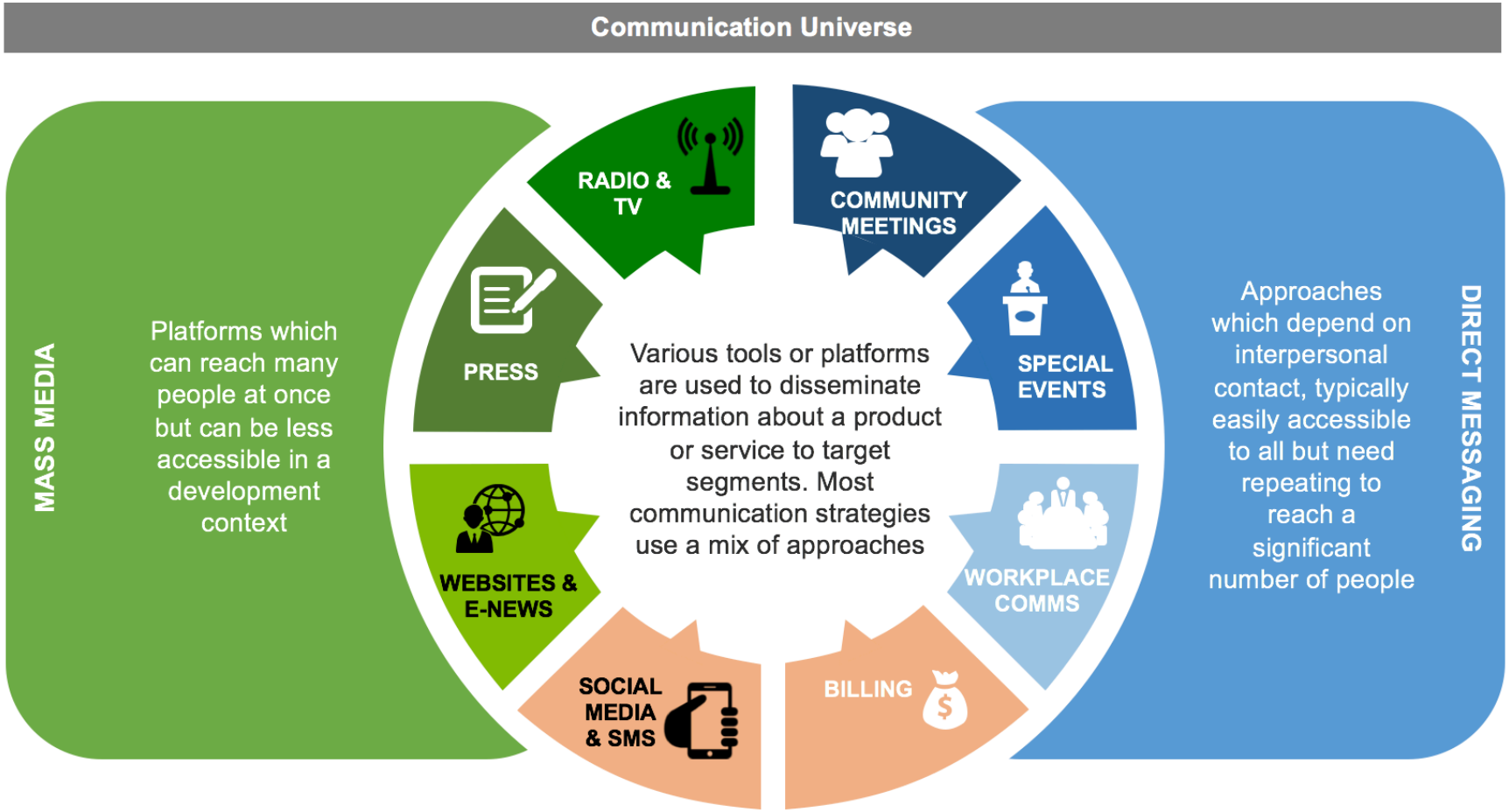
21 Considering the opportunities to promote RE and EE described in the profiles, the five segments can be ranked. However, since all segments will need to be targeted for a common vision to take hold and awareness raised. The C&V plan will take advantage of influential leaders from each segment to show the way.

Segment	Opportunity for impact	Rationale
Larger enterprises with high energy demands	**HIGH**	• Resorts have much to gain from RE and EE since they spend significant amounts on electricity or on diesel during outages, thus many already have some solar PV and SWH. Can more easily afford to invest in RE and have a need due to size and green customer expectation but only discretionary interest in *promoting* RE & EE as banking units with ZECO and a mindset of operating independently. The sector is mostly motivated by enlightened self-interest but opportunities exist for identifying individual **champions** for RE and EE for Zanzibar
SMEs with significant energy use	**MEDIUM**	• These institutions and enterprises can be considered as potential **exemplars for change**. They have high energy requirements and, as businesses, can afford some capital expenditure and have some access to credit • The government can both require and assist institutions and businesses to adopt EE technologies but need to agree and implement a plan of action
Private / social enterprise RE and EE suppliers	**HIGH**	• These entrepreneurs can be considered potential **allies** for RE and EE since they exist to sell RE solutions to HHs, larger enterprises and SMEs • However both suppliers and customers need a clear regulatory framework and direction from government to increase the size of the market
State energy institutions	**MEDIUM**	• MDAs are potential **ambassadors** but they need to embrace market-led developments and then aim to promote a RE & EE strategy with users including providing a welcoming enabling environment • MDAs access DP support for RE and EE projects but an overall lack of co-ordination, and common vision compromises sustainability and impact
Domestic energy users	**LOW**	• HHs can be considered as **slow adopters** since with the exception of the better off that have discretionary spending, few ordinary families have the means to invest in RE or even basic EE technologies. • However simple EE advice, and low cost technologies may be attractive especially where HH members can be facilitated through workplaces

4 COMMUNICATION TOOLS AND CHANNELS

4.1 Communications mix

22 There are 3 main types of engagement tools; mass media, social media and direct communications, some are best suited for a particular target audience. Many organisations also have financial transactions with their customers, providing another communication opportunity. 2-way communication is possible with all tools.



4.2 Partners to reach target audiences

23 For the purposes of promoting RE and EE to target audiences, the Project can work through selected partner networks and channels to extend messages to their own constituencies. Wherever possible these messages will then be shared and amplified through the mass media, thus helping build a common vision across segments.

Channel	Suitability as promoters	Rationale
RE and EE working group	**MEDIUM**	• The Project is advocating for the formation of a stakeholder working group to help develop a common vision for RE and EE. These same stakeholders would also have links to other DP programmes (e.g. SIDA). The members of such a working group should be briefed to be strong advocates for RE and EE, they can be influential especially if they have political connections
Business organisations	**MEDIUM**	• Chambers of Commerce link local businesses together, they are a potential conduit to enterprises selling RE and EE technologies to SMEs and those who might buy, but may need training to understand the opportunities and constraints in the market • ZATI is the trade body for tourist sector which is the major user of energy
ZECO	**HIGH**	• ZECO is in regular contact with customers through pre- and post-paid billing including transactions in offices, through mobile payments, and paper billing, there is an opportunity to use these and other transactions for EE messaging • The ZECO PR unit already uses radio, leaflets etc. for messaging on outages and EE tips
REZA and other CSOs	**HIGH**	• These are small, local CSOs that have already promoted EE and RE technologies with the direct support of foundations or as part of DP programmes. Typically they work with poor HHs with entry to communities and awareness raising facilitated thru' Shehas (local government officers). Also RE and EE "demonstration" schools in Unguja and Pemba islands
Mass Media	**HIGH**	• Considering its size, Zanzibar has a rich media environment with both government and private TV, radio and newspapers. However journalists will need training to accurately cover RE and EE issues although the themes of government performance and energy independence should prove attractive for their audiences.

4.3 Approaches to raising awareness on RE and EE

24 RE and EE communication plan recommends using a mix of communication approaches to reach **across** target segments to raise awareness. The same tools are likely to be used throughout the Project, but the messengers are likely to be revised in the course of implementation.

Target segment	Recommended approach	Messengers
Larger enterprises with high energy demands	• platforms for "champions" opinion in mass media, tourist trade magazines and business press • e-bulletin / Facebook • RE and EE stakeholder event	• **Champions** identified from the segment will act as initiators of a "conversation" in the mass and trade media about what RE and EE means for Zanzibar from their perspective. As actual or potential RE investors their opinions have credibility when articulating how the market needs to develop. These opinions will be recycled thru' an e-bulletin, social media and at events
State energy institutions (ZECO, other MDAs plus development partners)	• e-bulletin / Facebook • best practice regional study tour • platforms for "ambassadors" opinions in mass media • websites and forums • RE and EE stakeholder event	• **Ambassadors** identified from within MDAs across the segment will add momentum to developing a common vision by sharing best practice following a highly publicised regional study tour • Do-ability and technical/financial background will be made available in online learning/knowledge forums, this will substantiate personal experience and be re-affirmed at events
private / social enterprise RE and EE suppliers	• Chamber of Commerce events • e-bulletin / Facebook • platforms for "agents" opinions in mass media • RE and EE stakeholder event	• Selected **allies** identified from entrepreneurs and social enterprises in this segment will demonstrate accessibility of medium- to small-scale RE and EE solutions for homes and small business but also speak about constraints to growing the market in the absence of a common vision
SMEs with significant energy use	• best practice regional study tour • platforms for "exemplars" in media • RE and EE stakeholder event	• **Exemplars** identified from this segment will showcase how RE and EE contributes to their enterprises but also speak about the difficulties of deploying technologies in the Zanzibar context
Domestic energy users	• ZECO-payment messaging • promote RE & EE thru' supporting CSO and business impact • platforms for CSO and business opinions in media • RE and EE stakeholder event	• **Slow adopters** need incentives and/or credit to widely access RE and improved EE technologies, however ZECO payment messaging will promote better EE in homes • CSOs and business **allies** installing or advocating RE&EE with will be promoted, broadening their impact. Their constraints will be articulated in the media and at events

5 TARGET AUDIENCE ENGAGEMENT

5.1 Key messages

25 A key message is the framework within which specific details can be explored. In this context, the detailed content for RE and EE will be articulated through advocates from each segment that elaborate on their key messages. These express the specific interests of each segment but also work together towards creating a common vision.

Channel	Key messages
Larger enterprises with high energy demands	• The private sector has make sure that its needs are understood by government, so that its RE investments are secure • The private sector can make an important contribution to energy self-sufficiency for Zanzibar
State energy institutions (ZECO, other MDAs plus DPs)	• Energy security for Zanzibar means diversifying generation by including RE • Investment in RE will need the collaboration of private and public sectors • Business can save money by managing demand through EE
Private sector RE and EE suppliers	• RE solutions make good economic sense for business and homes • RE and EE contributes to Zanzibar's energy self-sufficiency • The sector can do a lot more for Zanzibar given the right environment to grow
SMEs with significant energy use (inc. camps, schools)	• Our enterprise has already saved money and become more energy secure by adopting RE and EE solutions; other businesses and the public sector can learn from our experience. • Our approach helps protect Zanzibar's environment and helps sustainability
Domestic energy users	• Energy efficiency can save money for all households; learn from our experience • Technology is available to help you save even more • Zanzibar can become more self-sufficient by managing its energy use

5.2 Promotion of RE and EE

26 The strategy aims to create a **common understanding** of RE and EE for Zanzibar, this "shared-ness" can be expressed through branding of interventions. Here, the brand connotes qualities within which various products/activities are positioned. The credibility of the brand is underwritten by signalling the backing of government and of development partners or *visibility.* Branding will be applied across all C&V activities described in subsequent sections.

Branding component	Positioning purpose
RE and EE logo	• A RE and EE logo will be applied wherever the Project lends support to the 5 EE or 2RE initiatives, and wherever there is knowledge and information sharing. It will therefore be applied to both channels and activities concerning any of the target segments. The positioning purpose of the logo is to cement disparate elements of RE and EE together. It will appear wherever a visual element can be added.
RE and EE slogan	• A RE and EE slogan will be also applied in support of project initiatives, and wherever there is knowledge and information sharing, and across channels and activities. The positioning purpose of the slogan is to encapsulate the idea of a shared vision for RE and EE in Zanzibar. The slogan can be used together with the logo as visual elements, on its own when spoken, or integrated into the body of messaging.
EU visibility	• In this context, the purpose of EU visibility is two-fold: 1. to raise awareness about the European Union partnership with the RGoZ and its contribution towards Zanzibar's development, 2. to add credibility to the RE and EE project and its activities and outputs. EU visibility procedures are defined in the Communication and Visibility manual for external actions. In the main, EU visibility badging is applied to infrastructure, events and reports.
Project identity	• The Project will be positioned as a joint venture between the Department of Energy and Minerals (as part of the MWLEE) and the European Union. The credibility of the Project is demonstrated directly through government and DP backing through the deployment of their logos, and also indirectly by using "in association with …" each time when sharing segment activities. • The Project aims to facilitate an enabling environment for RE and EE investment and uptake, so, as facilitator, is itself a channel that is subject to branding.

6 IMPLEMENTATION PLAN

6.1 RE and EE C&V activities

27 This section describes the ten communication and visibility activities necessary to implement the plan.

	Project visibility	EU visibility
Description & Resources	• Intended to consistently raise the profile of RE & EE interventions for all activities under the Project • Agreed use by RE and EE advocate partners	• The EU visibility rules include: - a technical description of the EU flag design and colours - how to incorporate the flag into designs - rules on how the flag is used • include a disclaimer in any publication internet links should refer to official EU sources • EU visibility must take account of the completion of an action
Steps to Develop	• Design a RE&EE promotion logo suitable for all communication materials and useable by all stakeholders • Design and print pull-up banners / teardrops • Marketing collateral for use at events and workshops • Bumper stickers and other visibility materials for events, sales points etc. • Estimated annual budget €19000	• Summarise EU visibility rules for sharing with project beneficiaries • Use the EU flag and acknowledgement on: - project documentation (contracts, ToRs, reports, training materials, and publications) - any equipment distributed (such as computers, vehicles etc.) - during training events and at the premises of training providers - on websites - mentioned in any audio-visual materials • Estimated annual budget € 0, included in project visibility

EU visibility rules are available at: http://ec.europa.eu/europeaid/work/visibility

	Platforms in the mass media	E-bulletin / Facebook
Description & Resources	• Primarily intended to create awareness about energy issues that face Zanzibar among government, CSOs and business • Secondarily educate public about energy choices being made in public and private sector • Journalists will generate stories with Project support • Estimated annual budget €5950	• Primarily intended to build conversation and consensus among energy sector stakeholders about direction for RE and EE for Zanzibar • Secondarily provides opportunity for individuals to participate in debate • Stories will be initiated by REEE project comms experts • Estimated budget €200 (design and technical set up)
Steps to Develop	• Identify best mass media opportunities for RE and EE messaging • Meet mass media editors • Plan media orientation event • Hold media orientation event • Devise schedule for opinion pieces • Commission monthly opinion pieces • Opinion pieces in mass media (1 – 12)	• Agree E-bulletin / Facebook protocols • Publish micro-information to to Facebook page • Devise database for RE and EE stakeholders • Add existing contact details to database • Identify designer for e-bulletin • Commissioner designer for e-bulletin and test format • Devise schedule for e-bulletin • Write e-bulletin items (1 – 12) • Distribute e-bulletin (1 – 12) • Monthly updates to stakeholder database

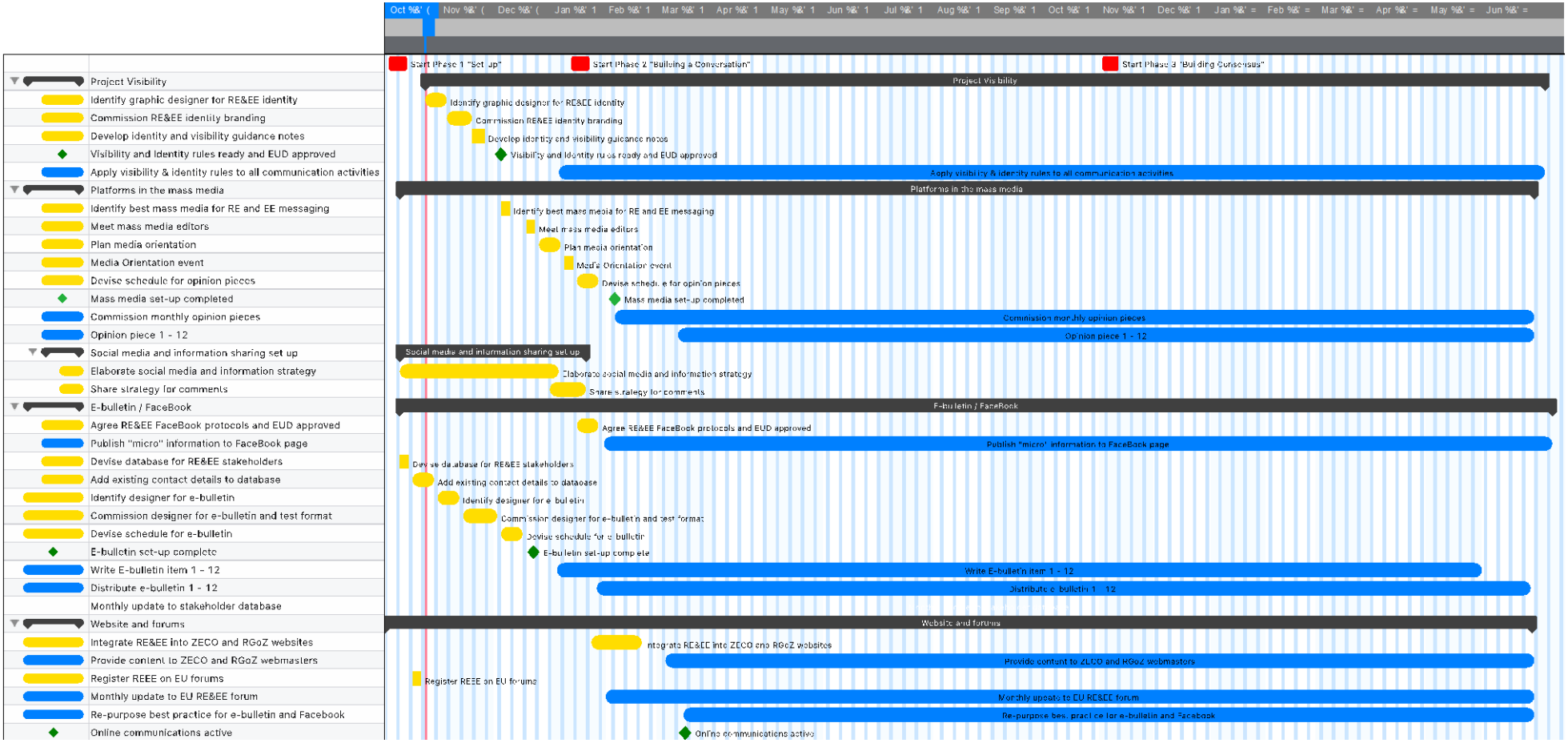
	best practice regional study tour	website and forums
Description & Resources	• Primarily intended to build support for developing a cross-stakeholder vision for RE&EE for Zanzibar, the tour will be for potential advocates from the target segments • Secondarily intended to generate micro-news items for e-bulletin and Facebook conversation • The study tour will be budgeted as part of RE&EE training activities • The tour will be organised by training and communication experts • Estimated budget €9000	• Primarily intended as a resource for sharing practice and experience from the Project with other regional and international practitioners • Secondarily compliments study tour and training by disseminating best international practice to Zanzibar stakeholders • Content generated by communication expert, technical implementation through webmasters • Estimated annual budget €0.00
Steps to Develop	• Identify candidates from segments • Formulate draft schedule for tour • Share study preparations through e-bulletin and social media • Study tour travel arrangements • Study tour • Generate opinion pieces from participants for mass media platforms	• Integrate RE&EE into ZECO and RGoZ websites • Provide content to ZECO and RGoZ webmasters • Register RE&EE Project on EU forum: capacity4dev.eu • Monthly updates to EU project forum • Re-purpose international experiences for e-bulletin and Facebook

	Advocacy and visibility events	RE and EE stakeholder event
Description & Resources	• Primarily intended to identify suitable channels for each target segment capable of reaching their constituencies on REEE issues • Secondarily raises awareness among constituencies about REEE for Zanzibar through Project presentations • Helps identify ways of building impact for CSOs and business • Events will be organised by communications expert with presentations from Project team / core working group • Estimated annual budget €1000	• Primarily intended as climax to ”conversation” phase of strategy setting scene for building of consensus over REEE direction • Secondarily engages public with decisions made by energy sector stakeholder • Helps re-strategize for Phase 3 ”Building Consensus” • Event will be planned by communications expert and delivered by event manager • Estimated budget €9600
Steps to Develop	• Develop advocacy relations with partner channels • Build calendar of Zanzibar public events • Identify events most suitable for promoting RE and EE • RE and EE presentations at 3 partner channel event and meetings • RE and EE advocacy and awareness evaluation	• Identify advocates for presentations • Formulate event format and schedule • Commission event manager • Publicity for stakeholder event • Stakeholder event held • Review C&V strategy and reposition communications for Phase 3: Building Consensus

	ZECO billing messaging	Build impact for CSOs and business
Description & Resources	• Primarily intended as main way to promote EE for ZECO customers • Secondarily will use ZECO pay-sites as public display boards • Messages developed by communication expert with ZECO PRO • delivered through paper receipts/bills and by SMS mobile payment acknowledgement • Estimated annual budget €2700	• Primarily intended to amplifying existing local REEE initiatives for a wider public audience through "marketing support" to good practice from NGOs and businesses • Secondarily builds public demand for credible RE and EE solutions • Comms expert invites EOI, selected CSOs and business implement marketing plans • Estimated annual budget €33500
Steps to Develop	• Engage with ZECO customer billing division • Negotiate inclusion of EE messaging on bills • EE messages scheduled and agreed • EE messages included with ZECO billing (mobile and pay-sites) • EE messages for all ZECO payment methods	• Compile inventory of CSOs and businesses with RE and EE interest • Formulate EOI notice for providing marketing support • Evaluate responsive EOI and negotiate marketing support packages • Marketing support packages agreed • Add CSO and business links to online REEE messages • Incorporate CSO and business activities into media platforms • Implement other marketing support in line with EOI

6.2 Work Plan

28 An implementation roadmap has been developed for implementing the RE and EE C&V Plan over the remaining months of the Project. The roadmap has been divided into 3 phases; set-up, building the conversation, and developing consensus. The approach for the third phase will be decided following a review of the Strategy in Q3 2017.




Best practice regional study tour
Identify candidates from segments
Formulate draft schedule
Study tour travel arrangements
Share study tour on social media
Study tour
Opinion pieces from participants for mass media
Advocacy and Visibilty Events
Develop advocacy relations within partner channels
Build calendar of Zanzibar public events
Identify events most suitable for promoting RE&EE
RE&EE presentations x 3
RE&EE awareness evaluation
RE&EE stakeholder event
Identify advocates for presentations
Formulate event format and schedule
Commission event manager
Publicity for stakeholder event
Stakeholder event held
Review C&V plan and re strategise for consensus building
ZECO billing messaging
Engage with ZECO customer billing division
Negotiate inclusion of EE messaging on bills
EE messages scheduled and agreed
EE messages included with ZECO billing (mobile and paysites)
EE messaging for all ZECO payment transactions
Build impact for CSOs and businesses
Compile inventory of CSOs and businesses with RE&EE interest
Formulate EOI notice for marketing support
Evaluate EOI and negotiate marketing support packages
Marketing support packages agreed
Add CSO and Business links to online REEE messages
Incorporate CSO and Business activities into media platforms
Other marketing support

6.3 Estimated budget

	RE and EE Communications: annual budget								
	Activity	**Cost type**	**Units**	**T Shillings ea.**	**total**		**notes**	**sub-totals TzSh**	**sub-totals €**
1	**Project Visibilty**								
	design of RE&EE logo in vector format	graphic designer fee /day	1	150000	150000				
	project brochure / leaflet	A4 folded leaflet in full colour x 2500 print run	2500	720	1800000				
		designer fee /day	2	150000	300000				
	pull-up banner	print and supply	2	350000	700000				
	marketing collateral	folders, stationery x250	1	150000	150000				
	flyer	A5 leaflet in full colour x10000 print run	10000	150	1500000				
	translation	fee / day	5	150000	750000				
	bumper sticker	narrow vinyl sticker in two colours x1000	1000	1000	1000000				
	printed caps	one-colour screen print x1000	1000	15000	15000000				
	printed t-shirts	two-colour screen print x1000	1000	25000	25000000				
								46350000	19082
2	**Platforms in the mass media**								
	orientation workshops	hire of venue and catering /day 25px x 2	50	80000	4000000				
	feature article in national newspaper (each)	journalist expenses each article	12	100000	1200000				
		advertorial / 1 page	2	1200000	2400000				
	Facilitate media visits to RE sites	Transport and incentives for journalists	4	600000	2400000				
	TV discussion programme / segment	appearance on breakfast / evening show	3	2500000	7500000				
								17500000	7205
3	**E-bulletin / Facebook**								
	E-bulletin	design e-bulletin template (days)	3	150000	450000				
		bulletin e-distribution	12	20	240				
		content for e-bulletin, maintain mailing list	12	0	0		no material cost		
	Facebook page	content for Facebook	12	0	0		no material cost		
								450240	185
4	**Best Practice Regional Study Tour**								
	Travel	regional flights 10pax, 2 locations	30	485000	14550000		from training budget		
		vehicle hire, 10 days	10	485000	4850000		from training budget		
	Per diems	RGOZ rates 10pax 10 days	10	250000	2500000		from training budget		
								21900000	9016
5	**Website and forums**								
	EU community-of-learning site	content for capacity4dev - refresh monthly	12	0	0		no material cost		
	Zanzibar government website	content for www.zanzibar.go.tz - refesh every two months	6	0	0		no material cost		
	ZECO website	content for tukuza.net - refresh every two months	6	0	0		no material cost		
	Specialist expert inputs	develop content and write draft	12	150000	1800000				
								1800000	741

6	**Advocacy and Visbility Events**								
	RE & EE presentations at partner channel meetings	presentation cost	6	0	0		no material cost		
	travel in Unguja	fuel lump sum /monthly	12	240000	2880000				
	travel in Pemba	car hire and fuel / days	12	275000	3300000				2544
								6180000	
7	**RE and EE Stakeholder Event**								
	Facilitate Joint Platform for media, RE firms & Govt/ZECO to discuss RE & EE issues	Event manager lump sum fee to include set up of event and media coverage and expert facilitation	1	1250000	1250000				
		Venue hire and hotel package for 50pax	50	80000	4000000				
	Guide to RE & EE in RGoZ	A4 brochure two-colour, 8 pages x500 (incl.designing)	500	4000	2000000				
	TV discussion programme / segment	appearance on breakfast / evening show	2	2500000	5000000				
	radio spots / jingles	script and record	2	500000	1000000				
		broadcast fee per run (60sec. 30 broadcasts)	40	250000	10000000				
								23250000	9572
8	**ZECO billing messaging**								
	payment message	incorporate EE message into moble payments	1	5000000	5000000				
	payment message	incorporate EE message into ZECO billing	1	0	0		no material cost		
	posters for schools, utility offices, NGO premises	A1 poster full colour x 1000	1000	1500	1500000				
								6500000	2676
9	**Build impact for CSOs and businesses**								
	Facilitate RE enterprises to display RE & EE technologies through national events/festivals	Hire a pavillion/space for RE firms	1	2500000	2500000				
	Cultural events with RE & EE presence	events in 11 districts of Zanzibar (over two years)	11	2500000	27500000				
								30000000	12351
	Annual estimated expenditure	**€1 @ TzSh2429**						**153930240**	**€ 63,371.86**
	Equipment - one off purchase								
	Data projector	hi-power data projector	1	1850000	1850000				
		spare projector lamp	1	540000	540000				
	Digital DSLR	e.g. Canon EOD700D with 18-55 lens	1	1600000	1600000				
		€1 @ TzSh2429						**3990000**	**€ 1,642.65**

7 ANNEX A: OUTLINE OF COMMUNICATION AND VISIBILITY PLAN FROM THE INCEPTION REPORT

29 The goal of the communication and visibility activities under **Activity 7 Communication and Visibility** of the current project (lot 2) is to raise awareness of the Zanzibar population on opportunities offered by RE & EE technologies as well as the support provided by EU in the energy sector in Zanzibar, and to ensure the sustainability and dissemination of project outcomes and results of the 2 lots (lot 1 and lot 2). In particular, this activity revolves around the development and implementation of a communication and visibility plan aiming at effective communication actions fitted to the different target audiences:

- The general public (i.e. the consumers of electricity on Zanzibar)
- Potential private sector investors
- Energy sector operators (i.e. staff of ZECO, Planning Commission)
- Other development partners with similar projects

30 A key feature of the communication and visibility efforts will be the capitalisation and sharing of knowledge of technical and pedagogical value related to the project implementation, and RE & EE by establishment of a knowledge management platform as part of the partner's Internet webpages, capacity4dev.eu web platform and the use of social media.

31 All the communication and visibility measures will be designed and implemented in line with the ***EU visibility guidelines for external actions*** (http://europa.eu.int/comm/europeaid/visibility/index_en.htm), and in close coordination with the EU Delegation to Tanzania and RGoZ. Any activity with information or visibility relevance will be consulted with and ex-ante approved by the EU Delegation in Tanzania. No public statement or press materials can be issued unless cleared with RGoZ and the EU Delegation to Tanzania.

7.1 Purpose of Communication and Visibility Activities

32 The Communication and Visibility Plan forms an integral part of the project implementation and aims to ensure that project communications are targeted, effective and well-coordinated, as well as the project is visible, accessible and accountable to the stakeholders and general public.

33 The appropriate project visibility will be carried out in compliance with the EU External Actions Communication and Visibility Manual throughout the entire project duration.

34 This communications plan defines how the general communication strategy will be expressed through practical public relations activities, defining project key messages, project target audience, and the tools at our disposal.

7.2 Overall Communication Objective

35 The overall communication objective of the project is to ensure the highest sustainability and dissemination of project results of the both Lot 1 and Lot 2 of Zanzibar Renewable Energy Programme. This will be achieved through ensuring the capitalisation and sharing of knowledge on project implementation, benefits of RE & EE technologies, as well as the support provided by EU in the Zanzibar energy sector.

7.3 Communication Goal and Objectives

36 The ultimate goal is to build public awareness and education on the Energy Efficiency and Renewable Energy in order to initiate actions that will result in improvement of peoples' quality of living.

37 The Communication and Visibility Plan objectives are:

- to raise awareness of the Lot 1 and Lot 2 projects and their activities, objectives and impact;
- to enhance the visibility of the EU role and contribution in the energy sector in Zanzibar;
- to promote the EE & RE and their benefits to the Zanzibar population;
- to ensure the highest sustainability and dissemination of project results through ensuring the capitalisation and sharing of knowledge on project implementation.

7.4 Key Messages

- Introduction and investment in renewable energy technologies and expansion of renewable energy capacity will help to eliminate energy poverty and to enhance people prosperity.
- Increasing the use of renewable energy and improved energy efficiency leads to economic growth, increased social equity, improved health and environmental sustainability.
- Awareness of different energy efficiency options can result in EE behaviour change
- EU is financing and supporting the energy sector development in Zanzibar and thus contributing to the improvement of life quality and wellbeing of Zanzibar population.

7.5 Target Groups

The following potential target groups will be reached:

- The general public (i.e. the consumers of electricity on Zanzibar)
- Potential private sector investors
- Energy sector operators (i.e. staff of ZECO, Planning Commission)
- Other development partners with similar projects
- Wider development community (via the capacity4dev.eu web platform)

7.6 Communication Tools

- Personal interactions (daily contact through meetings, phone conversations);
- Project events: workshops, training activities, round tables, conferences, promotional events;
- Press releases, publication of articles, newsletter (a periodic update sent to our mailing list)
- Brochures, flyers and other promotional material;
- Web presence and social media: Website, Twitter, Facebook, LinkedIn, YouTube,
- Repositories: online storage space for the project documents, articles and data.

! Nota Bene: The Communication and Visibility Plan to be elaborated by an experienced Communication Expert expected to be deployed by the project in August 2016. The coincidence of events during the project inception period has delayed a bit the input on this activity but this will be compensated with intensive action in the beginning of the implementation phase.