

APPENDIX 3B

DETAILED TARIFF CALCULATIONS FOR YEAR 2015
FOR THE SALE OF ELECTRICITY TO THE MINI-GRIDS
IN TANZANIA
UNDER
STANDARDIZED SMALL POWER PURCHASE AGREEMENTS
IN TANZANIA

JANUARY 2015

This is one of the five documents that guide the Small Power Purchase Scheme in Tanzania for Mini-grids.

1. Standardised Small Power Purchase Agreement (SPPA) for Mini-grids,
2. Standardised Tariff Calculation Methodology (STM) for Mini-grids,
3. Detailed Tariff Calculations under the SPPA for year 2015 [\[this document\]](#),
4. Electricity (Small Power Development) Rules, and
5. Electricity (Small Power Development) Guidelines.

DETAILED TARIFF CALCULATIONS FOR YEAR 2015

FOR THE SALE OF ELECTRICITY TO THE MINI-GRIDS

IN TANZANIA

UNDER

STANDARDIZED SMALL POWER PURCHASE AGREEMENTS

Mathematical symbols have the same meaning as defined in the accompanying document titled "Standardised Tariff Methodology".

1. Calculation of LRMC for the Main Grid

Special Note:

The Ministry of Energy and Minerals has submitted the "Power System Master Plan Study, 2012 Update", which contains an updated calculation of Long-run Marginal Costs, using a different approach, which is acceptable. Therefore, steps 1, 2 and 3 given in the approved Standardised Tariff Methodology were not conducted in this calculation. Instead, the LRMC as calculated in the 2012 PSMP Updated was used.

Small Power Purchase Tariff Calculation for the Mini-Grid for year 2015			
A: Calculation of LRMC at the Generation Level	Unit	Value	Basis/Source
Generation Investment	UScts/kWh	5.29	Economic
Energy at Generation	UScts/kWh	3.81	Economic
Total Generation Busbar	UScts/kWh	9.10	PSMP-2012
B: Converting LRMC from Economic to Financial Costs			
Average Taxes for Generation Investments	Estimste	30%	Excl VAT if any
Average Taxes on Fuel	Estimste	19%	Excl VAT if any
LRMC			
Generation Investments	UScts/kWh	6.87	Fin /Calculated
Energy at Generation	UScts/kWh	4.54	Fin /Calculated
Total Generation Busbar	UScts/kWh	11.41	Fin /Calculated
Financial LRMC at Generation Level	UScts/kWh	11.41	
Average selling price of USD from Sept '13 to Aug '14	TZS/USD	1,632.20	
Generation LRMC	TZS/kWh	186.24	

Please see Annex 1 for the average spot selling rates for USD for one year until the end of August 2014, from which the average selling rate until the end of August above was calculated.

Therefore, $CA_G = 186.24$ TZS/kWh

2. Adjustment to Reflect Avoided Transmission Losses

C: Adjustment for Avoided Transmission Losses			
Average generation cost	TZS/kWh		158.24
Energy loss on the HV Transmission Network	% of net generation		5.2%
Adjusted Avoided Cost at MV Distribution Level	TZS/kWh		166.92

3. Calculation of Average Incremental Costs in Mini-grids

D. Incremental Capacity Cost of Mini-grids			
			<u>Source</u>
-			
Cost of a new diesel engine generator (typically 1 MW)	431.84	USD/kW	Estimate
Average selling price of USD from Sept '13 to Aug '14	1,632.20	TZS/USD	See TZS-USD rates
Cost of a new diesel engine generator (typically 1 MW)	704,843.75	TZS/kW	Calculated
Economic life of a diesel engine-generator	5	years	
Annual maintenance cost as a share of investment	4.0%	per year	Estimate
Real discount rate	10%	per year	As in Masterplan
Annual capacity factor	50%		Estimate
PV factor	3.79		Calculated
Annuity factor	0.275		Calculated
Annualised capital cost	185,936.00	TZS/kW	Calculated
Annual maintenance cost	28,193.75	TZS/kW	Calculated
Annual capacity cost	214,129.75	TZS/kW	Calculated
Energy delivered from 1 kW of capacity	4,380	kWh	Calculated
Incremental capacity cost	48.89	TZS/kWh	Calculated
E. Incremental Fuel, Lubrication and Maintenance Costs of Mini-grids			
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Fuel consumption rate for full-load operation	0.275	litre/kWh	Estimate
Adjustment factor to account for part load operation	10.0%		Estimate
Estimated fuel consumption rate	0.3025	litre/kWh	Calculated
Lubricating oil and variable maintenance costs	10.0%	of fuel costs	Estimate
One-year average price of fuel (Sept 2012 to Aug 2013)	2,298.93	TZS/litre	EWURA
Incremental Variable Cost	764.97	TZS/kWh	Calculated
Incremental Capacity and Variable Cost of Mini-grids	813.86	TZS/kWh	Calculated

4. Tariff for SPPs Connected to Mini-grids

The tariff for SPPs connected to mini-grids shall be the average of

- (a) Adjusted avoided cost of supply CA'_G , and
- (b) Total Incremental Cost of mini-grids CI_G

$$\text{Tariff for SPPs connected to mini-grids } T_{SPP} = \frac{1}{2} [CA'_G + CI_G]$$

<u>F. Tariff for SPPs Connected to Mini-grids</u>			
Incremental Capacity and Variable Cost of Mini-grids (CI_G)	813.86	TZS/kWh	Calculated Calculated in C
LRMC at MV Distribution level of main grid (CA'_G)	166.92	TZS/kWh	above
Average of grid LRMC and mini-grid incremental costs	490.39	TZS/kWh	
Standardized Mini-grid SPP Tariff for the year 2015	490.39	TZS/kWh	

5. Floor Price and the Price Cap

The Floor Price for all SPPAs executed in year 2015 shall be the above tariffs. If the above tariffs are less than the floor prices stated in any SPPA, the floor price stated in such SPPA shall be paid.

The Price Cap shall be calculated as follows: The five-year moving average of the change in Tanzania Consumer Price Index (CPI), for the adjustment of the price cap of SPPs is [10.19%]. (see the table below). The price cap stated in any SPPA signed in a previous year (already adjusted to account for any price cap adjustments announced in subsequent years prior to 2013) remaining valid as of 1st January 2015 shall be further increased by [10.19%].

6. Annual Tariff Announcement

Press Announcement: Tariffs to Small Power Producers on Mini-grids in Tanzania

2015

Prices payable to Small Power Producers operating under the standardized Small Power Purchase Agreements (SPPAs) with TANESCO shall be as follows:

Standardized Mini-grid SPP Tariff for the year **490.39** TZS/kWh

For new SPPAs signed during the year,

- The floor price will be the tariffs stated above.
- The price cap will be 1.5 times the tariffs stated above, subject to adjustment for inflation on the basis of the five-year moving average of Tanzania Consumer Price Index.

For SPPAs that remain valid as of 1st January, the price cap shall be adjusted by

[10.19%].

Annex 1: Selling Rate for USD for one year until the end of August 2014

Summary of average rate per Month	
	Spot Selling
August'14	1,665.48
July'14	1,663.70
June'14	1,658.94
May'14	1,646.72
April'14	1,637.10
March'14	1,634.01
February'14	1,625.63
January '14	1,609.77
December'13	1,603.28
November'13	1,612.38
October'13	1,611.79
September'13	1,617.65
Total	19,586.45
Average	1,632.20

Annex 3: Average Cap Prices for Diesel announced by EWURA

Average Cap Prices for Diesel announced by EWURA

Date	Bukoba (Tshs/Lt)	Kigoma (Tshs/Lt)	Musoma (Tshs/Lt)	Katavi (Tshs/Lt)	Sumbawanga (Tshs/Lt)
4-Sep-13	2,275	2,291	2,238	2,268	2,233
2-Oct-13	2,279	2,295	2,242	2,271	2,236
6-Nov-13	2,281	2,297	2,244	2,273	2,238
4-Dec-13	2,316	2,332	2,280	2,309	2,274
1-Jan-14	2,304	2,320	2,267	2,297	2,262
5-Feb-14	2,329	2,344	2,292	2,321	2,286
5-Mar-14	2,255	2,271	2,218	2,247	2,213
2-Apr-14	2,364	2,380	2,327	2,357	2,322
7-May-14	2,355	2,371	2,319	2,348	2,313
4-Jun-14	2,340	2,356	2,303	2,332	2,297
2-Jul-14	2,338	2,354	2,302	2,331	2,296
6-Aug-14	2,321	2,337	2,284	2,313	2,278
	2,313.08	2,329.00	2,276.33	2,305.58	2,270.67
	Avg. TZS/Litre		2,298.93		

Note: The price derived is the average of the five most expensive regions for each month between September 2013 and August 2014.