

APPENDIX 2A

DETAILED TARIFF CALCULATIONS FOR YEAR 2011
FOR THE SALE OF ELECTRICITY TO THE MAIN GRID
IN TANZANIA
UNDER
STANDARDIZED SMALL POWER PURCHASE AGREEMENTS

FEBRUARY 2011

This is one of five documents that guide the Small Power Purchase Scheme in Tanzania for the Main Grid.

1. Standardised Small Power Purchase Agreement (SPPA) for the Main Grid
2. Standardised Tariff Calculation Methodology (STM)
3. Detailed Tariff Calculations under the SPPA for year 2011 [\[this document\]](#)
4. Electricity (Small Power Development) Rules, and
5. Electricity (Small Power Development) Guidelines.

DETAILED TARIFF CALCULATIONS FOR YEAR 2011
FOR THE SALE OF ELECTRICITY TO THE MAIN GRID
IN TANZANIA
UNDER
STANDARDIZED SMALL POWER PURCHASE AGREEMENTS

Mathematical symbols have the same meaning as defined in the approved “Standardised Tariff Methodology”.

1. Calculation of LRMC for the Main Grid

Special Note:

TANESCO has issued the “Power System Master Plan Study, August 2009”, 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 calculated in the August 2009 Master Plan Study was used.

Small Power Purchase Tariff Calculation for the Main Grid for year 2011			
A: Calculation of LRMC at the Generation Level	Unit	Value	Basis/Source
Generation Investment	UScts/kWh	4.59	Economic
Energy at Generation	UScts/kWh	3.31	Economic
Total Generation Busbar	UScts/kWh	7.90	PSMP-2009
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	5.97	Fin /Calculated
Energy at Generation	UScts/kWh	3.93	Fin /Calculated
Total Generation Busbar	UScts/kWh	9.90	Fin /Calculated
Financial LRMC at Generation Level	UScts/kWh	9.90	
Average selling price of USD from Sept '09 to Aug '10	TZS/USD	1,352.92	
Generation LRMC	TZS/kWh	133.98	

Please see Annex 1 for the daily average spot selling rate for USD for one year until end August 2010, from which the average selling rate until end August above was calculated.

Therefore, financial LRMC at generation level, $CA_G = 133.98\text{TZS/kWh}$

2. Adjustment to Reflect Costs of the Existing System

C: Calculation of Costs of the Existing Generation System			Source
Total Forecast Thermal Gen to TANESCO grid	GWh	2,956.00	TANESCO
2011 Forecast Cost of Thermal Generation on Grid			
Own Capacity Charges	million TZS	25,606.56	TANESCO
IPP Capacity Charges	million TZS	126,401.00	TANESCO
EPP Capacity Charges	million TZS	0.00	TANESCO
Total Capacity Charges	million TZS	152,007.56	TANESCO
Fuel and Variable O&M for ALL Plants	million TZS	196,356.73	TANESCO
Total Cost of Thermal Generation	million TZS	348,364.29	Calculated
2011 Forecast Average Thermal Generation Cost	TZS/kWh	117.85	
Exchange Rate used in TANESCO Cost of Service Study	TZS/USD	1,397.50	
Corrected for the mismatch btn Exchange Rates	TZS/kWh	114.17	

As shown above,

$$C_{IPP} = 126,401.00 \text{ million TZS}$$

$$C_{EPP} = 0.00 \text{ million TZS}$$

$$C_{TANESCO} = 25,606.56 \text{ million TZS}$$

$$F = 196,356.73 \text{ million TZS}$$

$$E_T = 2,956.00 \text{ GWh}$$

$$\text{Average thermal generation costs of 2011 } C_T = \frac{C_{IPP} + C_{EPP} + C_{TANESCO} + F}{E_T} \text{ TZS/kWh}$$

$$= 117.85 \text{ TZS/kWh}$$

TANESCO has undertaken a cost of service study at a forecast exchange rate of 1,397.50 TZS/USD. Therefore, the average thermal cost calculated above is corrected to the average exchange rate until end August 2010.

Average thermal generation cost 2011 C_T corrected = 114.17 TZS/kWh

D: Calculation of Avoided Cost of Generation		
LRMC Avoided Generation Cost	TZS/kWh	133.98
2011 Average Generation Cost	TZS/kWh	114.17
Average Generation Cost	TZS/kWh	124.08

3. Adjustment to Reflect Avoided Transmission Losses

E: Adjustment for Avoided Transmission Losses			
Energy loss on the HV Transmission Network			5.2%
Adjusted Avoided Cost at MV Distribution Level	TZS/kWh		130.88

F: Three Year Rolling Average			
Calculated SPP Tariff for year 2009	TZS/kWh		105.09
Calculated SPP Tariff for year 2010	TZS/kWh		127.42
Calculated SPP Tariff for year 2011	TZS/kWh		130.88
Standardised SPP Tariff for year 2011	TZS/kWh		121.13

4. Adjustment to Reflect Seasonality

G: Adjustment to Reflect Seasonality

Seasonality Adjustment			
Dry Season (August - November)			120%
Wet Season (Jan - Jul and December)			90%
Standardised Small Power Purchase Tariff	TZS/kWh		121.13
Dry Season (August - November)	TZS/kWh		145.36
Wet Season (Jan - Jul and December)	TZS/kWh		109.02

Tariff paid to all SPPs operating during the year will be the above standardised tariff, subject to the floor price and the cap defined in the next section.

5. Floor Price and the Price Cap

The Floor Price for all SPPAs executed in year 2011 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 **8.78%**

(see Annex 2). 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 2011) remaining valid as of 1st January 2011 shall be further increased by **8.78%**.

6. Annual Tariff Announcement

Press Announcement: Tariffs to Small Power Producers on the Main Grid of Tanzania			2011
Prices payable to Small Power Producers operating under the standardized Small Power Purchase Agreements (SPPAs) with TANESCO shall be as follows:			
Standardized SPP Tariff for year 2011			
	121.13	TZS/kWh	
Dry Season (August to November)	145.36	TZS/kWh	
Wet Season (January to July, and December)	109.02	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.		
Accordingly, for SPPAs that remain valid as of 1st January, the price cap shall be adjusted by 8.78% .			

Annex 1: Selling Rate for USD for one year until end August 2010

Average exchange rate for one year ending 31 August 2010

Summary of average rate per Month	
	Spot Selling
August'10	1,448.37
July'10	1,394.91
June'10	1391.74
May'10	1,372.00
April'10	1,352.11
March'10	1,341.47
February'10	1,338.38
January '10	1,331.91
December'09	1,327.27
November'09	1,325.14
October'09	1,315.78
September'09	1,309.25
Total	16,247.04
Average	1,353.92
	1,353.92

Annex 2: Tanzania CPI for the period 2003 to August 2010

CPI	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2001	Tanzania CPI was redefined to be 100.0 in Dec 2001											100.0
2002	102.6	104.1	103.8	104.7	104.4	103.3	103.7	103.3	104.4	105.1	105.3	107.3
2003	107.3	108.9	109.4	109.9	110.4	109.3	108.7	109.4	109.3	111.2	111.5	113.3
	4.58%	4.61%	5.39%	4.97%	5.75%	5.81%	4.82%	5.91%	4.69%	5.80%	5.89%	5.59%
2004	114.5	113.3	114.0	114.7	114.4	113	112.9	114.4	115.4	117.8	118.1	118.5
	6.71%	4.04%	4.20%	4.37%	3.62%	3.39%	3.86%	4.57%	5.58%	5.94%	5.92%	4.59%
2005	118.9	118.6	118.6	119.5	120.6	120.6	119.9	121.2	121	122.6	123.4	125.5
	3.84%	4.68%	4.04%	4.18%	5.42%	6.73%	6.20%	5.94%	4.85%	4.07%	4.49%	5.91%
2006	126.8	127.9	128.9	130.1	132.3	131.3	127.6	127.8	128	130	131.1	133.9
	6.64%	7.84%	8.68%	8.87%	9.70%	8.87%	6.42%	5.45%	5.79%	6.04%	6.24%	6.69%
2007	135.7	137.2	138.2	138.1	138.9	139	139.1	137.8	138.6	139.2	140.7	142.5
	7.02%	7.27%	7.21%	6.15%	4.99%	5.86%	9.01%	7.82%	8.28%	7.08%	7.32%	6.42%
2008	147.4	149.4	150.7	151.5	151.6	151.9	152.3	151.3	154.7	155.6	158.0	161.7
	8.62%	8.89%	9.04%	9.70%	9.14%	9.28%	9.49%	9.80%	11.62%	11.78%	12.30%	13.47%
2009	166.4	169.3	170.3	169.7	168.8	168.1	168.9	169.6	173.4	175.3	177.7	181.5
	12.89%	13.32%	13.01%	12.01%	11.35%	10.66%	10.90%	12.10%	12.09%	12.66%	12.47%	12.24%
2010	184.5	185.6	185.7	185.6	182.2	180.2	179.5	180.8	181.2			
	10.88%	9.63%	9.04%	9.37%	7.94%	7.20%	6.28%	6.60%	4.50%			
	Average of 60 months ending August 2009						8.78%					

Annex 3: Computation of the Fuel and Variable O&M Component

A. Songas' Average Unit Cost of Energy (Fuel + VOM) based on 3 months (July, Aug & Sept'10)				
	USD	Ex Rate	TZS	Total kWh delivered
July	1,518,274.48	1518	2,304,740,660.64	127,045,702.69
			1,971,671,451.00	
August	1,573,302.07	1528	2,404,005,562.96	129,795,422.25
			2,027,615,189.00	
September	1514687.66	1520	1,933,047,186.00	124,959,807.95
			10,641,080,049.60	381,800,932.89
	Songas Energy Component Rate		27.87	TZS/kWh
B. IPTL Energy Unit Cost Estimation based on April & May'10 Invoices				
Energy Purchase Price, Fuel (April & May '10)			172.38 \$/MWh	
			17.238 Usc/kWh	
Variable O&M Component (VOM) Payment				
Current VOM rate			7.56095 \$/MWh	
Current rate Lube Oil			3.17000 \$/MWh	
Contingency (5%)			0.53655 \$/MWh	
Total VOM rate			11.26750 \$/MWh	
			1.12675 Usc/kWh	
Total Fuel + VOM rate			18.36475 Usc/kWh	
Exc Rate			1,397.50	
	IPTL Energy Component Rate		256.65	TZS/kWh
C. Computation of Fuel and Variable O&M for ALL Plants*				
			GWh	TZS m**
		IPTL	361	92,649.97
		Songas	1357	37,820.61
		Mwanza	82	16,456
		Ubungo Wartsila	782	33,769
		Ubungo EPP	0	-
		Tegeta GT	344	11,874
		MPM1/TPC (SPP)	18	1,980
		ZUZU	8	1,378
		TANWAT	3.9	429
		Total	2955.9	196,356.73
*Energy output quantities per plant is as approved in the EWURA Tariff Order to TANESCO No. 010-019				
**Energy costs apart from Songas and IPTL is computed using rates established in the COSS.				