

Project: MINI-GRID (IMG) 6.45MWp/10MWh
Location: JAJI, KADUNA
Contract:
Engineer: A. ADEFEMI
Filename: AES RENEWABLES

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Electrical Transient Analyzer Program

Load Flow Analysis

Loading Category (1): Design
Generation Category (1): Design
Load Diversity Factor: None

	Swing	V-Control	Load	Total
Number of Buses:	24	0	88	112

	XFMR2	XFMR3	Reactor	Line/Cable/ Busway	Impedance	Tie PD	Total
Number of Branches:	37	0	0	46	1	3	87

Method of Solution: Adaptive Newton-Raphson Method
Maximum No. of Iteration: 99
Precision of Solution: 0.0001000

System Frequency: 50.00 Hz
Unit System: Metric
Project Filename: AES RENEWABLES
Output Filename: C:\ETAP 2401\AES RENEWABLES\Load Flow - Ac.lfr

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Adjustments

<u>Tolerance</u>	<u>Apply Adjustments</u>	<u>Individual /Global</u>	<u>Percent</u>
Transformer Impedance:	Yes	Individual	
Reactor Impedance:	Yes	Individual	
Overload Heater Resistance:	No		
Transmission Line Length:	No		
Cable / Busway Length:	No		
<u>Temperature Correction</u>	<u>Apply Adjustments</u>	<u>Individual /Global</u>	<u>Degree C</u>
Transmission Line Resistance:	Yes	Individual	
Cable / Busway Resistance:	Yes	Individual	

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Bus Input Data

Bus			Initial Voltage		Load							
					Constant kVA		Constant Z		Constant I		Generic	
ID	kV	Sub-sys	% Mag.	Ang.	MW	Mvar	MW	Mvar	MW	Mvar	MW	Mvar
Bus2	11.000	1	100.0	0.0								
Bus3	0.415	1	100.0	0.0								
Bus8	0.800	1	100.0	0.0								
Bus9	0.415	1	100.0	0.0								
Bus10	0.415	28	100.0	0.0			0.009	0.004				
Bus15	11.000	1	100.0	0.0								
Bus26	11.000	1	100.0	0.0								
Bus27	11.000	1	100.0	0.0								
Bus28	11.000	1	100.0	0.0								
Bus29	11.000	1	100.0	0.0								
Bus30	11.000	1	100.0	0.0								
Bus32	11.000	1	100.0	0.0								
Bus34	11.000	1	100.0	0.0								
Bus35	11.000	1	100.0	0.0								
Bus36	11.000	1	100.0	0.0								
Bus37	11.000	1	100.0	0.0								
Bus38	11.000	1	100.0	0.0								
Bus39	11.000	1	100.0	0.0								
Bus40	11.000	1	100.0	0.0								
Bus41	11.000	1	100.0	0.0								
Bus42	11.000	1	100.0	0.0								
Bus43	11.000	1	100.0	0.0								
Bus45	0.415	1	100.0	0.0			0.114	0.050				
Bus46	11.000	1	100.0	0.0								
Bus47	11.000	1	100.0	0.0								
Bus48	11.000	1	100.0	0.0								
Bus49	11.000	1	100.0	0.0								
Bus50	11.000	1	100.0	0.0								
Bus51	11.000	1	100.0	0.0								
Bus52	11.000	1	100.0	0.0								
Bus54	11.000	1	100.0	0.0								
Bus55	11.000	1	100.0	0.0								
Bus56	11.000	1	100.0	0.0								

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					Load							
Bus			Initial Voltage		Constant kVA		Constant Z		Constant I		Generic	
ID	kV	Sub-sys	% Mag.	Ang.	MW	Mvar	MW	Mvar	MW	Mvar	MW	Mvar
Bus57	11.000	1	100.0	0.0								
Bus59	11.000	1	100.0	0.0								
Bus60	11.000	1	100.0	0.0								
Bus61	11.000	1	100.0	0.0								
Bus62	11.000	1	100.0	0.0								
Bus63	11.000	1	100.0	0.0								
Bus64	11.000	1	100.0	0.0								
Bus65	11.000	1	100.0	0.0								
Bus66	11.000	1	100.0	0.0								
Bus67	11.000	1	100.0	0.0								
Bus68	11.000	1	100.0	0.0								
Bus70	11.000	1	100.0	0.0								
Bus72	11.000	1	100.0	0.0								
Bus73	11.000	1	100.0	0.0								
Bus74	11.000	1	100.0	0.0								
Bus75	11.000	1	100.0	0.0								
Bus76	11.000	1	100.0	0.0								
Bus77	11.000	1	100.0	0.0								
Bus78	11.000	1	100.0	0.0								
Bus79	11.000	1	100.0	0.0								
Bus80	11.000	1	100.0	0.0								
Bus81	0.415	1	100.0	0.0			0.057	0.025				
Bus82	0.415	1	100.0	0.0			0.057	0.025				
Bus83	0.415	1	100.0	0.0			0.114	0.050				
Bus84	0.415	1	100.0	0.0			0.057	0.025				
Bus85	0.415	1	100.0	0.0			0.114	0.050				
Bus86	0.415	1	100.0	0.0			0.029	0.025				
Bus87	0.415	1	100.0	0.0	0.007	0.004	0.057	0.025				
Bus88	0.415	1	100.0	0.0			0.077	0.050				
Bus89	0.415	1	100.0	0.0			0.057	0.025				
Bus90	0.415	1	100.0	0.0			0.057	0.025				
Bus91	0.415	1	100.0	0.0			0.057	0.025				
Bus92	0.415	1	100.0	0.0			0.057	0.025				
Bus93	0.415	1	100.0	0.0			0.057	0.025				
Bus94	0.415	1	100.0	0.0			0.057	0.025				

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					Load							
Bus			Initial Voltage		Constant kVA		Constant Z		Constant I		Generic	
ID	kV	Sub-sys	% Mag.	Ang.	MW	Mvar	MW	Mvar	MW	Mvar	MW	Mvar
Bus95	0.415	1	100.0	0.0			0.035	0.025				
Bus96	0.415	1	100.0	0.0			0.057	0.025				
Bus97	0.415	1	100.0	0.0			0.114	0.050				
Bus98	0.415	1	100.0	0.0			0.057	0.025				
Bus99	0.415	1	100.0	0.0			0.057	0.025				
Bus100	0.415	1	100.0	0.0			0.057	0.025				
Bus101	0.415	1	100.0	0.0			0.057	0.025				
Bus102	0.415	1	100.0	0.0			0.025	0.025				
Bus103	0.415	1	100.0	0.0			0.057	0.025				
Bus104	0.415	1	100.0	0.0			0.057	0.025				
Bus105	0.415	1	100.0	0.0			0.057	0.025				
Bus106	0.415	1	100.0	0.0			0.057	0.025				
Bus107	0.415	1	100.0	0.0			0.025	0.025				
Bus108	0.415	1	100.0	0.0			0.057	0.025				
Bus109	0.415	1	100.0	0.0			0.057	0.025				
Bus110	0.415	1	100.0	0.0			0.057	0.025				
Bus111	0.415	1	100.0	0.0			0.057	0.025				
Bus112	0.415	1	100.0	0.0			0.057	0.025				
Bus113	0.800	4	100.0	0.0								
Bus114	0.800	1	100.0	0.0								
Bus115	0.415	1	100.0	0.0								
MV_BUS	11.000	1	105.0	0.0								
PCS 1~	0.800	4	100.0	0.0								
PCS 3~	0.800	4	100.0	0.0								
PCS 4~	0.800	4	100.0	0.0								
PCS 5~	0.800	4	100.0	0.0								
PCS 6~	0.800	4	100.0	0.0								
PCS 7~	0.800	4	100.0	0.0								
PCS 9~	0.800	4	100.0	0.0								
PCS 10~	0.800	4	100.0	0.0								
PCS 11~	0.800	4	100.0	0.0								
PCS 12~	0.800	4	100.0	0.0								
PCS 13~	0.800	4	100.0	0.0								
PCS 14~	0.800	4	100.0	0.0								
PCS 15~	0.800	4	100.0	0.0								

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Bus					Load							
					Initial Voltage		Constant kVA		Constant Z		Constant I	
ID	kV	Sub-sys	% Mag.	Ang.	MW	Mvar	MW	Mvar	MW	Mvar	MW	Mvar
PCS 16~	0.800	4	100.0	0.0								
PCS 17~	0.800	4	100.0	0.0								
PCS 18~	0.800	4	100.0	0.0								
PCS 19~	0.800	4	100.0	0.0								
PCS 20~	0.800	4	100.0	0.0								
PCS 21~	0.800	4	100.0	0.0								
PCS 22~	0.800	4	100.0	0.0								
PCS 23~	0.800	4	100.0	0.0								
PCS 24~	0.800	4	100.0	0.0								
Total Number of Buses: 112					0.007	0.004	2.024	0.949	0.000	0.000	0.000	0.000

Generation Bus				Voltage		Generation			Mvar Limits	
ID	kV	Type	Sub-sys	% Mag.	Angle	MW	Mvar	% PF	Max	Min
Bus8	0.800	Mvar/PF Control	1	100.0	0.0	1.817	0.000	100.0		
Bus10	0.415	Swing	28	100.0	0.0					
Bus15	11.000	Swing	1	100.0	0.0					
Bus113	0.800	Mvar/PF Control	4	100.0	0.0	0.295	0.029	99.5		
PCS 1~	0.800	Swing	4	100.0	0.0					
PCS 3~	0.800	Swing	4	100.0	0.0					
PCS 4~	0.800	Swing	4	100.0	0.0					
PCS 5~	0.800	Swing	4	100.0	0.0					
PCS 6~	0.800	Swing	4	100.0	0.0					
PCS 7~	0.800	Swing	4	100.0	0.0					
PCS 9~	0.800	Swing	4	100.0	0.0					
PCS 10~	0.800	Swing	4	100.0	0.0					
PCS 11~	0.800	Swing	4	100.0	0.0					
PCS 12~	0.800	Swing	4	100.0	0.0					
PCS 13~	0.800	Swing	4	100.0	0.0					
PCS 14~	0.800	Swing	4	100.0	0.0					
PCS 15~	0.800	Swing	4	100.0	0.0					
PCS 16~	0.800	Swing	4	100.0	0.0					
PCS 17~	0.800	Swing	4	100.0	0.0					
PCS 18~	0.800	Swing	4	100.0	0.0					
PCS 19~	0.800	Swing	4	100.0	0.0					
PCS 20~	0.800	Swing	4	100.0	0.0					

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Generation Bus				Voltage		Generation			Mvar Limits	
ID	kV	Type	Sub-sys	% Mag.	Angle	MW	Mvar	% PF	Max	Min
PCS 21~	0.800	Swing	4	100.0	0.0					
PCS 22~	0.800	Swing	4	100.0	0.0					
PCS 23~	0.800	Swing	4	100.0	0.0					
PCS 24~	0.800	Swing	4	100.0	0.0					
						2.112	0.029			

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Line/Cable/Busway Input Data

ohms or siemens/1000 m per Conductor (Cable) or per Phase (Line/Busway)

Line/Cable/Busway		Length							
ID	Library	Size	Adj. (m)	% Tol.	#/Phase	T (°C)	R	X	Y
Cable3	11NALS1	500	5.0	0.0	1	75	0.074985	0.200609	0.0001829
Line1		111	165.0	0.0	1	75	0.314041	0.291078	0.0000041
Line2		111	254.0	0.0	1	75	0.314041	0.291078	0.0000041
Line3		111	393.0	0.0	1	75	0.314041	0.291078	0.0000041
Line4		111	259.0	0.0	1	75	0.314041	0.291078	0.0000041
Line5		111	765.0	0.0	1	75	0.314041	0.291078	0.0000041
Line6		111	50.0	0.0	1	75	0.314041	0.291078	0.0000041
Line7		111	2600.0	0.0	1	75	0.314041	0.291078	0.0000041
Line8		111	3600.0	0.0	1	75	0.314041	0.291078	0.0000041
Line9		111	3300.0	0.0	1	75	0.314041	0.291078	0.0000041
Line10		111	1818.0	0.0	1	75	0.314041	0.291078	0.0000041
Line11		111	360.0	0.0	1	75	0.314041	0.291078	0.0000041
Line12		111	65.0	0.0	1	75	0.314041	0.291078	0.0000041
Line13		111	609.0	0.0	1	75	0.314041	0.291078	0.0000041
Line14		111	822.0	0.0	1	75	0.314041	0.291078	0.0000041
Line15		111	200.0	0.0	1	75	0.314041	0.291078	0.0000041
Line16		111	449.0	0.0	1	75	0.314041	0.291078	0.0000041
Line17		111	1660.0	0.0	1	75	0.314041	0.291078	0.0000041
Line18		111	2070.0	0.0	1	75	0.314041	0.291078	0.0000041
Line19		111	609.0	0.0	1	75	0.314041	0.291078	0.0000041
Line20		111	300.0	0.0	1	75	0.314041	0.291078	0.0000041
Line21		111	684.0	0.0	1	75	0.314041	0.291078	0.0000041
Line22		111	555.0	0.0	1	75	0.314041	0.291078	0.0000041
Line23		111	1100.0	0.0	1	75	0.314041	0.291078	0.0000041
Line24		111	491.0	0.0	1	75	0.314041	0.291078	0.0000041
Line25		111	200.0	0.0	1	75	0.314041	0.291078	0.0000041
Line26		111	335.0	0.0	1	75	0.314041	0.291078	0.0000041
Line27		111	149.0	0.0	1	75	0.314041	0.291078	0.0000041
Line28		111	119.0	0.0	1	75	0.314041	0.291078	0.0000041
Line29		111	300.0	0.0	1	75	0.314041	0.291078	0.0000041
Line30		111	90.0	0.0	1	75	0.314041	0.291078	0.0000041
Line31		111	150.0	0.0	1	75	0.314041	0.291078	0.0000041
Line32		111	332.0	0.0	1	75	0.314041	0.291078	0.0000041
Line33		111	200.0	0.0	1	75	0.314041	0.291078	0.0000041

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ohms or siemens/1000 m per Conductor (Cable) or per Phase (Line/Busway)

Line/Cable/Busway		Library	Size	Length		#/Phase	T (°C)	R	X	Y
				Adj. (m)	% Tol.					
Line34			111	100.0	0.0	1	75	0.314041	0.291078	0.0000041
Line35			111	132.0	0.0	1	75	0.314041	0.291078	0.0000041
Line36			111	132.0	0.0	1	75	0.314041	0.291078	0.0000041
Line37			111	100.0	0.0	1	75	0.314041	0.291078	0.0000041
Line38			111	142.0	0.0	1	75	0.314041	0.291078	0.0000041
Line39			111	100.0	0.0	1	75	0.314041	0.291078	0.0000041
Line40			111	700.0	0.0	1	75	0.314041	0.291078	0.0000041
Line41			111	250.0	0.0	1	75	0.314041	0.291078	0.0000041
Line42			111	1450.0	0.0	1	75	0.314041	0.291078	0.0000041
Line43			111	230.0	0.0	1	75	0.314041	0.291078	0.0000041
Line44			111	777.0	0.0	1	75	0.314041	0.291078	0.0000041
Line45			111	1244.0	0.0	1	75	0.314041	0.291078	0.0000041

Line / Cable / Busway resistances are listed at the specified temperatures.

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2-Winding Transformer Input Data

Transformer		Rating					Z Variation			% Tap Setting		Adjusted	Phase Shift	
ID	Phase	MVA	Prim. kV	Sec. kV	% Z1	X1/R1	+ 5%	- 5%	% Tol.	Prim.	Sec.	% Z	Type	Angle
500KVA PRIMARY	3-Phase	0.500	11.000	0.415	5.00	3.50	0	0	0	5.000	0	5.0000	Dyn	0.000
AIRTEL BIRNIN YERO	3-Phase	0.050	11.000	0.415	4.00	1.50	0	0	0	0	0	4.0000	Dyn	0.000
ALHAJI BALA	3-Phase	0.300	11.000	0.415	4.00	1.50	0	0	0	0	0	4.0000	Dyn	0.000
Aux TR	3-Phase	0.250	11.000	0.415	7.50	3.50	0	0	0	0	0	7.5000	Dyn	0.000
BABBAN GIDA	3-Phase	0.300	11.000	0.415	5.00	3.50	0	0	0	0	-2.500	5.0000	Dyn	0.000
BIRNIN YERO 1	3-Phase	0.300	11.000	0.415	4.00	1.50	0	0	0	0	0	4.0000	Dyn	0.000
BIRNIN YERO 1 RELIEF	3-Phase	0.300	11.000	0.415	4.00	1.50	0	0	0	0	0	4.0000	Dyn	0.000
BIRNIN YERO 2	3-Phase	0.300	11.000	0.415	4.00	1.50	0	0	0	0	0	4.0000	Dyn	0.000
DANDAMI	3-Phase	0.100	11.000	0.415	5.00	3.50	0	0	0	0	0	5.0000	Dyn	0.000
FIRST GATE	3-Phase	0.500	11.000	0.415	5.00	3.50	0	0	0	0	-2.500	5.0000	Dyn	0.000
FOUNDATION	3-Phase	0.300	11.000	0.415	4.00	1.50	0	0	0	0	0	4.0000	Dyn	0.000
FRSC	3-Phase	0.100	11.000	0.415	4.00	1.50	0	0	0	0	0	4.0000	Dyn	0.000
HAYIN SADAUKI	3-Phase	0.300	11.000	0.415	4.00	1.50	0	0	0	0	0	4.0000	Dyn	0.000
HAYIN UMMA	3-Phase	0.300	11.000	0.415	4.00	1.50	0	0	0	0	0	4.0000	Dyn	0.000
HYDRAF WATER	3-Phase	0.300	11.000	0.415	4.00	1.50	0	0	0	0	0	4.0000	Dyn	0.000
IHS BOOSTER STATION	3-Phase	0.050	11.000	0.415	5.00	3.50	0	0	0	0	-2.500	5.0000	Dyn	0.000
JAFI	3-Phase	0.500	11.000	0.415	4.00	1.50	0	0	0	0	0	4.0000	Dyn	0.000
KAHO VILLAGE	3-Phase	0.300	11.000	0.415	5.00	3.50	0	0	0	0	-5.000	5.0000	Dyn	0.000
KAMPANIN PATE RELIEF	3-Phase	0.300	11.000	0.415	5.00	3.50	0	0	0	0	-2.500	5.0000	Dyn	0.000
KAN ZAURE	3-Phase	0.200	11.000	0.415	5.00	3.50	0	0	0	0	-2.500	5.0000	Dyn	0.000
KANGADA	3-Phase	0.500	11.000	0.415	5.00	3.50	0	0	0	0	-5.000	5.0000	Dyn	0.000
KARGO DAM	3-Phase	0.300	11.000	0.415	5.00	3.50	0	0	0	0	-5.000	5.0000	Dyn	0.000
MTN BIRNIN YERO	3-Phase	0.050	11.000	0.415	4.00	1.50	0	0	0	0	0	4.0000	Dyn	0.000
POLICE DIVISION HG	3-Phase	0.200	11.000	0.415	4.00	1.50	0	0	0	0	0	4.0000	Dyn	0.000
PROPOSED KWARAU VILLAGE R	3-Phase	0.200	11.000	0.415	4.00	1.50	0	0	0	0	0	4.0000	Dyn	0.000
PULLO FARM	3-Phase	0.100	11.000	0.415	4.00	1.50	0	0	0	0	0	4.0000	Dyn	0.000
SHEHU KARAWU	3-Phase	0.300	11.000	0.415	4.00	1.50	0	0	0	0	0	4.0000	Dyn	0.000
SKYPET	3-Phase	0.200	11.000	0.415	4.00	1.50	0	0	0	0	0	4.0000	Dyn	0.000
STS	3-Phase	6.600	11.000	0.800	7.50	3.50	0	0	0	5.000	0	7.5000	Dyn	0.000
STS 2	3-Phase	6.600	11.000	0.800	8.35	13.00	0	0	0	-5.000	0	8.3500	Dyn	0.000
T2	3-Phase	5.000	11.000	0.415	7.15	8.50	0	0	0	7.300	0	7.1500	Dyn	0.000
T10	3-Phase	0.100	11.000	0.415	5.00	3.50	0	0	0	0	-5.000	5.0000	Dyn	0.000
TSOHON BIRNIN YERO	3-Phase	0.300	11.000	0.415	5.00	3.50	0	0	0	0	-5.000	5.0000	Dyn	0.000
U/ RIMI	3-Phase	0.200	11.000	0.415	5.00	3.50	0	0	0	0	-5.000	5.0000	Dyn	0.000
URWA	3-Phase	0.050	11.000	0.415	4.00	1.50	0	0	0	0	0	4.0000	Dyn	0.000
ZARIA ROAD 1 500KVA	3-Phase	0.500	11.000	0.415	4.00	1.50	0	0	0	5.000	0	4.0000	Dyn	0.000
ZARIA ROAD 2	3-Phase	0.300	11.000	0.415	5.00	3.50	0	0	0	0	-5.000	5.0000	Dyn	0.000

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2-Winding Transformer Load Tap Changer (LTC) Settings

Transformer		Connected Buses ("*" LTC Side)		Transformer Load Tap Changer Setting					
ID	Primary Bus ID	Secondary Bus ID	% Min. Tap	% Max. Tap	% Step	Regulated Bus ID	% V	kV	
STS 2	* MV_BUS	Bus114	-10.00	18.00	0.625	Bus114	100.00	0.800	

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Impedance Input Data

Impedance	Positive Sequence Impedance			Unit
ID	R	X	Y	
Z5	0.001	0.001	0.001	
% in 0.415 kV base and 100.0 MVA base				

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Branch Connections

CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVA Base			
ID	Type	From Bus	To Bus	R	X	Z	Y
500KVA PRIMARY	2W XFMR	Bus26	Bus87	288.46	1009.60	1050.00	
AIRTEL BIRNIN YERO	2W XFMR	Bus64	Bus107	4437.60	6656.40	8000.00	
ALHAJI BALA	2W XFMR	Bus74	Bus108	739.60	1109.40	1333.33	
Aux TR	2W XFMR	MV_BUS	Bus115	824.16	2884.57	3000.00	
BABBAN GIDA	2W XFMR	Bus38	Bus83	446.42	1562.48	1625.00	
BIRNIN YERO 1	2W XFMR	Bus56	Bus96	739.60	1109.40	1333.33	
BIRNIN YERO 1 RELIEF	2W XFMR	Bus47	Bus97	739.60	1109.40	1333.33	
BIRNIN YERO 2	2W XFMR	Bus60	Bus100	739.60	1109.40	1333.33	
DANDAMI	2W XFMR	Bus54	Bus94	1373.61	4807.62	5000.00	
FIRST GATE	2W XFMR	Bus40	Bus90	267.85	937.49	975.00	
FOUNDATION	2W XFMR	Bus76	Bus112	739.60	1109.40	1333.33	
FRSC	2W XFMR	Bus72	Bus109	2218.80	3328.20	4000.00	
HAYIN SADAUKI	2W XFMR	Bus62	Bus99	739.60	1109.40	1333.33	
HAYIN UMMA	2W XFMR	Bus57	Bus103	739.60	1109.40	1333.33	
HYDRAF WATER	2W XFMR	Bus79	Bus110	739.60	1109.40	1333.33	
IHS BOOSTER STATION	2W XFMR	Bus32	Bus86	2678.53	9374.86	9750.00	
JAFI	2W XFMR	Bus68	Bus104	443.76	665.64	800.00	
KAHO VILLAGE	2W XFMR	Bus36	Bus82	434.98	1522.41	1583.33	
KAMPANIN PATE RELIEF	2W XFMR	Bus41	Bus92	446.42	1562.48	1625.00	
KAN ZAURE	2W XFMR	Bus52	Bus91	669.63	2343.71	2437.50	
KANGADA	2W XFMR	Bus39	Bus88	260.99	913.45	950.00	
KARGO DAM	2W XFMR	Bus35	Bus84	434.98	1522.41	1583.33	
MTN BIRNIN YERO	2W XFMR	Bus63	Bus102	4437.60	6656.40	8000.00	
POLICE DIVISION HG	2W XFMR	Bus65	Bus106	1109.40	1664.10	2000.00	
PROPOSED KWARAU VILLAGE R	2W XFMR	Bus59	Bus98	1109.40	1664.10	2000.00	
PULLO FARM	2W XFMR	Bus78	Bus111	2218.80	3328.20	4000.00	
SHEHU KARAWU	2W XFMR	Bus61	Bus101	739.60	1109.40	1333.33	
SKYPET	2W XFMR	Bus67	Bus105	1109.40	1664.10	2000.00	
STS	2W XFMR	MV_BUS	Bus8	32.78	114.73	119.32	
STS 2	2W XFMR	MV_BUS	Bus114	9.70	126.14	126.52	
T2	2W XFMR	MV_BUS	Bus3	17.93	152.39	153.44	
T10	2W XFMR	Bus43	Bus89	1304.93	4567.24	4750.00	
TSOHON BIRNIN YERO	2W XFMR	Bus49	Bus93	434.98	1522.41	1583.33	
U/ RIMI	2W XFMR	Bus34	Bus85	652.46	2283.62	2375.00	
URWA	2W XFMR	Bus55	Bus95	4437.60	6656.40	8000.00	
ZARIA ROAD 1 500KVA	2W XFMR	Bus29	Bus81	465.95	698.92	840.00	

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CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVA Base			
ID	Type	From Bus	To Bus	R	X	Z	Y
ZARIA ROAD 2	2W XFMR	Bus30	Bus45	434.98	1522.41	1583.33	
Cable3	Cable	Bus15	MV_BUS	0.03	0.08	0.09	0.0001107
Z5	Impedance	Bus115	Bus9	0.00	0.00	0.00	0.0010000
Line1	Line	Bus2	Bus26	4.28	3.97	5.84	0.0000819
Line2	Line	Bus26	Bus27	6.59	6.11	8.99	0.0001261
Line3	Line	Bus28	Bus30	10.20	9.45	13.91	0.0001951
Line4	Line	Bus27	Bus29	6.72	6.23	9.17	0.0001286
Line5	Line	Bus27	Bus32	19.85	18.40	27.07	0.0003797
Line6	Line	Bus32	Bus34	1.30	1.20	1.77	0.0000248
Line7	Line	Bus34	Bus35	67.48	62.55	92.01	0.0012906
Line8	Line	Bus32	Bus36	93.43	86.60	127.40	0.0017869
Line9	Line	Bus37	Bus38	85.65	79.38	116.78	0.0016380
Line10	Line	Bus27	Bus39	47.18	43.73	64.33	0.0009024
Line11	Line	Bus40	Bus41	9.34	8.66	12.74	0.0001787
Line12	Line	Bus39	Bus43	1.69	1.56	2.30	0.0000323
Line13	Line	Bus39	Bus40	15.81	14.65	21.55	0.0003023
Line14	Line	Bus48	Bus49	21.33	19.77	29.09	0.0004080
Line15	Line	Bus46	Bus64	5.19	4.81	7.08	0.0000993
Line16	Line	Bus56	Bus57	11.65	10.80	15.89	0.0002229
Line17	Line	Bus41	Bus48	43.08	39.93	58.74	0.0008240
Line18	Line	Bus48	Bus42	53.72	49.80	73.25	0.0010275
Line19	Line	Bus56	Bus51	15.81	14.65	21.55	0.0003023
Line20	Line	Bus42	Bus52	7.79	7.22	10.62	0.0001489
Line21	Line	Bus42	Bus54	17.75	16.45	24.21	0.0003395
Line22	Line	Bus54	Bus55	14.40	13.35	19.64	0.0002755
Line23	Line	Bus55	Bus56	28.55	26.46	38.93	0.0005460
Line24	Line	Bus56	Bus47	12.74	11.81	17.38	0.0002437
Line25	Line	Bus47	Bus59	5.19	4.81	7.08	0.0000993
Line26	Line	Bus56	Bus60	8.69	8.06	11.85	0.0001663
Line27	Line	Bus60	Bus61	3.87	3.58	5.27	0.0000740
Line28	Line	Bus51	Bus62	3.09	2.86	4.21	0.0000591
Line29	Line	Bus51	Bus50	7.79	7.22	10.62	0.0001489
Line30	Line	Bus50	Bus63	2.34	2.17	3.18	0.0000447
Line31	Line	Bus50	Bus46	3.89	3.61	5.31	0.0000745
Line32	Line	Bus46	Bus65	8.62	7.99	11.75	0.0001648
Line33	Line	Bus50	Bus66	5.19	4.81	7.08	0.0000993
Line34	Line	Bus66	Bus67	2.60	2.41	3.54	0.0000496
Line35	Line	Bus66	Bus68	3.43	3.18	4.67	0.0000655
Line36	Line	Bus66	Bus70	3.43	3.18	4.67	0.0000655

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CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVA Base			
ID	Type	From Bus	To Bus	R	X	Z	Y
Line37	Line	Bus70	Bus72	2.60	2.41	3.54	0.0000496
Line38	Line	Bus70	Bus73	3.69	3.42	5.03	0.0000705
Line39	Line	Bus73	Bus74	2.60	2.41	3.54	0.0000496
Line40	Line	Bus73	Bus75	18.17	16.84	24.77	0.0003475
Line41	Line	Bus75	Bus76	6.49	6.01	8.85	0.0001241
Line42	Line	Bus75	Bus77	37.63	34.88	51.31	0.0007197
Line43	Line	Bus77	Bus78	5.97	5.53	8.14	0.0001142
Line44	Line	Bus80	Bus79	20.17	18.69	27.50	0.0003857
Line45	Line	Bus77	Bus80	32.29	29.93	44.02	0.0006175
CB2	Tie Breakr	MV_BUS	Bus2				
CB32	Tie Breakr	Bus36	Bus37				
CB33	Tie Breakr	Bus29	Bus28				

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UPS Input Data

ID	AC Rating							DC Rating				
	MVA	kV		FLA		% EFF	% PF	kV	FLA	% I _{max}	Operating % PF	Bypass Switch
		Input	Output	Input	Output							
UPS1	0.020	0.415	0.415	30.92	27.82	90.00	85.00	0.050	362.441	150.0	85.00	No

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LOAD FLOW REPORT

Bus		Voltage		Generation		Load		Load Flow					XFMR	
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap	
Bus2	11.000	99.999	0.0	0.000	0.000	0.000	0.000	Bus26	1.857	0.895	108.2	90.1		
								MV_BUS	-1.857	-0.895	108.2	90.1		
Bus3	0.415	93.196	0.0	0.000	0.000	0.000	0.000	MV_BUS	0.000	0.000	0.0	0.0		
Bus8	0.800	95.807	1.2	1.817	0.000	0.000	0.000	MV_BUS	1.817	0.000	1368.5	100.0		
Bus9	0.415	99.766	-0.1	0.000	0.000	0.010	0.006	Bus115	-0.010	-0.006	16.4	85.0		
								UPS1	0.010	0.006	16.4	85.0		
* Bus15	11.000	100.000	0.0	0.061	0.940	0.000	0.000	MV_BUS	0.061	0.940	49.4	6.5		
Bus26	11.000	99.884	0.0	0.000	0.000	0.000	0.000	Bus2	-1.855	-0.894	108.2	90.1		
								Bus27	1.797	0.867	104.8	90.1		
								Bus87	0.058	0.027	3.4	90.8	5.000	
Bus27	11.000	99.713	-0.1	0.000	0.000	0.000	0.000	Bus26	-1.794	-0.865	104.8	90.1		
								Bus29	0.152	0.068	8.7	91.3		
								Bus32	0.332	0.157	19.3	90.4		
								Bus39	1.311	0.640	76.8	89.9		
Bus28	11.000	99.698	-0.1	0.000	0.000	0.000	0.000	Bus30	0.100	0.045	5.8	91.2		
								Bus29	-0.100	-0.045	5.8	91.2		
Bus29	11.000	99.698	-0.1	0.000	0.000	0.000	0.000	Bus27	-0.152	-0.068	8.7	91.3		
								Bus81	0.051	0.022	2.9	91.6	5.000	
								Bus28	0.100	0.045	5.8	91.2		
Bus30	11.000	99.684	-0.1	0.000	0.000	0.000	0.000	Bus28	-0.100	-0.045	5.8	91.1		
								Bus45	0.100	0.045	5.8	91.1		
Bus32	11.000	99.617	-0.1	0.000	0.000	0.000	0.000	Bus27	-0.332	-0.157	19.3	90.4		
								Bus34	0.150	0.067	8.7	91.3		
								Bus36	0.156	0.067	8.9	91.9		
								Bus86	0.026	0.023	1.8	74.7		
Bus34	11.000	99.615	-0.1	0.000	0.000	0.000	0.000	Bus32	-0.150	-0.067	8.7	91.3		
								Bus35	0.051	0.021	2.9	92.2		
								Bus85	0.099	0.046	5.8	90.8		
Bus35	11.000	99.567	-0.1	0.000	0.000	0.000	0.000	Bus34	-0.051	-0.022	2.9	91.4		
								Bus84	0.051	0.022	2.9	91.4		
Bus36	11.000	99.413	-0.1	0.000	0.000	0.000	0.000	Bus32	-0.155	-0.068	9.0	91.5		

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Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus37	11.000	99.413	-0.1	0.000	0.000	0.000	0.000	Bus82	0.050	0.022	2.9	91.4	-5.000
								Bus37	0.105	0.046	6.0	91.6	
								Bus38	0.105	0.046	6.0	91.6	
Bus38	11.000	99.285	-0.1	0.000	0.000	0.000	0.000	Bus36	-0.105	-0.046	6.0	91.6	
								Bus37	-0.105	-0.048	6.1	91.1	
								Bus83	0.105	0.048	6.1	91.1	
Bus39	11.000	98.812	-0.2	0.000	0.000	0.000	0.000	Bus27	-1.301	-0.631	76.8	90.0	
								Bus43	0.049	0.023	2.9	90.8	
								Bus40	1.185	0.565	69.7	90.3	
Bus40	11.000	98.539	-0.3	0.000	0.000	0.000	0.000	Bus88	0.067	0.044	4.3	83.7	
								Bus41	1.129	0.540	66.7	90.2	
								Bus39	-1.182	-0.563	69.7	90.3	
Bus41	11.000	98.384	-0.3	0.000	0.000	0.000	0.000	Bus90	0.052	0.023	3.0	91.5	
								Bus40	-1.128	-0.538	66.7	90.2	
								Bus48	1.076	0.515	63.6	90.2	
Bus42	11.000	96.893	-0.6	0.000	0.000	0.000	0.000	Bus92	0.052	0.023	3.0	91.4	
								Bus48	-1.014	-0.483	60.8	90.3	
								Bus52	0.050	0.022	3.0	91.3	
Bus43	11.000	98.811	-0.2	0.000	0.000	0.000	0.000	Bus54	0.964	0.461	57.9	90.2	
								Bus39	-0.049	-0.023	2.9	90.8	
								Bus89	0.049	0.023	2.9	90.8	
Bus45	0.415	93.576	-0.9	0.000	0.000	0.100	0.044	Bus30	-0.100	-0.044	161.9	91.7	
Bus46	11.000	95.889	-0.7	0.000	0.000	0.000	0.000	Bus64	0.022	0.022	1.7	70.7	
								Bus50	-0.074	-0.045	4.7	85.4	
								Bus65	0.052	0.023	3.1	91.5	
Bus47	11.000	96.041	-0.7	0.000	0.000	0.000	0.000	Bus56	-0.155	-0.069	9.3	91.4	
								Bus59	0.052	0.023	3.1	91.5	
								Bus97	0.103	0.046	6.2	91.3	
Bus48	11.000	97.704	-0.4	0.000	0.000	0.000	0.000	Bus49	0.049	0.021	2.9	91.6	
								Bus41	-1.070	-0.510	63.7	90.3	
								Bus42	1.021	0.489	60.8	90.2	
Bus49	11.000	97.689	-0.4	0.000	0.000	0.000	0.000	Bus48	-0.049	-0.022	2.9	91.4	
								Bus93	0.049	0.022	2.9	91.4	

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Bus		Voltage		Generation		Load		Load Flow				XFMR	
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus50	11.000	95.894	-0.7	0.000	0.000	0.000	0.000	Bus51	-0.458	-0.225	27.9	89.7	
								Bus63	0.022	0.022	1.7	70.6	
								Bus46	0.074	0.045	4.7	85.4	
								Bus66	0.361	0.158	21.6	91.6	
Bus51	11.000	95.948	-0.7	0.000	0.000	0.000	0.000	Bus56	-0.510	-0.248	31.0	89.9	
								Bus62	0.052	0.023	3.1	91.5	
								Bus50	0.458	0.226	27.9	89.7	
Bus52	11.000	96.887	-0.6	0.000	0.000	0.000	0.000	Bus42	-0.050	-0.023	3.0	91.2	
								Bus91	0.050	0.023	3.0	91.2	
Bus54	11.000	96.638	-0.6	0.000	0.000	0.000	0.000	Bus42	-0.962	-0.459	57.9	90.2	
								Bus55	0.910	0.435	54.8	90.2	
								Bus94	0.052	0.024	3.1	90.7	
Bus55	11.000	96.443	-0.6	0.000	0.000	0.000	0.000	Bus54	-0.908	-0.434	54.8	90.2	
								Bus56	0.877	0.411	52.7	90.5	
								Bus95	0.031	0.023	2.1	80.8	
Bus56	11.000	96.070	-0.7	0.000	0.000	0.000	0.000	Bus57	0.052	0.023	3.1	91.6	
								Bus51	0.510	0.249	31.0	89.9	
								Bus55	-0.874	-0.409	52.7	90.6	
								Bus47	0.155	0.069	9.3	91.4	
								Bus60	0.104	0.046	6.2	91.6	
								Bus96	0.052	0.023	3.1	91.5	
Bus57	11.000	96.061	-0.7	0.000	0.000	0.000	0.000	Bus56	-0.052	-0.023	3.1	91.5	
								Bus103	0.052	0.023	3.1	91.5	
Bus59	11.000	96.037	-0.7	0.000	0.000	0.000	0.000	Bus47	-0.052	-0.023	3.1	91.4	
								Bus98	0.052	0.023	3.1	91.4	
Bus60	11.000	96.057	-0.7	0.000	0.000	0.000	0.000	Bus56	-0.104	-0.046	6.2	91.5	
								Bus61	0.052	0.023	3.1	91.5	
								Bus100	0.052	0.023	3.1	91.5	
Bus61	11.000	96.054	-0.7	0.000	0.000	0.000	0.000	Bus60	-0.052	-0.023	3.1	91.5	
								Bus101	0.052	0.023	3.1	91.5	
Bus62	11.000	95.946	-0.7	0.000	0.000	0.000	0.000	Bus51	-0.052	-0.023	3.1	91.5	
								Bus99	0.052	0.023	3.1	91.5	
Bus63	11.000	95.893	-0.7	0.000	0.000	0.000	0.000	Bus50	-0.022	-0.022	1.7	70.5	

Project: MINI-GRID (IMG) 6.45MWp/10MWh
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Bus		Voltage		Generation		Load		Load Flow				XFMR	
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus64	11.000	95.887	-0.7	0.000	0.000	0.000	0.000	Bus102	0.022	0.022	1.7	70.5	
								Bus46	-0.022	-0.022	1.7	70.5	
								Bus107	0.022	0.022	1.7	70.5	
Bus65	11.000	95.883	-0.7	0.000	0.000	0.000	0.000	Bus46	-0.052	-0.023	3.1	91.4	
Bus66	11.000	95.867	-0.7	0.000	0.000	0.000	0.000	Bus106	0.052	0.023	3.1	91.4	
								Bus50	-0.361	-0.158	21.6	91.6	
								Bus67	0.052	0.023	3.1	91.4	
Bus67	11.000	95.865	-0.7	0.000	0.000	0.000	0.000	Bus68	0.052	0.023	3.1	91.6	
								Bus70	0.258	0.112	15.4	91.6	
								Bus66	-0.052	-0.023	3.1	91.4	
Bus68	11.000	95.864	-0.7	0.000	0.000	0.000	0.000	Bus105	0.052	0.023	3.1	91.4	
								Bus66	-0.052	-0.023	3.1	91.6	
								Bus104	0.052	0.023	3.1	91.6	
Bus70	11.000	95.854	-0.8	0.000	0.000	0.000	0.000	Bus66	-0.258	-0.112	15.4	91.6	
Bus72	11.000	95.852	-0.8	0.000	0.000	0.000	0.000	Bus72	0.051	0.023	3.1	91.2	
								Bus73	0.207	0.089	12.3	91.8	
								Bus70	-0.051	-0.023	3.1	91.1	
Bus73	11.000	95.843	-0.8	0.000	0.000	0.000	0.000	Bus109	0.051	0.023	3.1	91.1	
								Bus70	-0.206	-0.090	12.3	91.7	
								Bus74	0.052	0.023	3.1	91.5	
Bus74	11.000	95.841	-0.8	0.000	0.000	0.000	0.000	Bus75	0.155	0.067	9.2	91.8	
								Bus73	-0.052	-0.023	3.1	91.5	
								Bus108	0.052	0.023	3.1	91.5	
Bus75	11.000	95.802	-0.8	0.000	0.000	0.000	0.000	Bus73	-0.155	-0.067	9.2	91.8	
								Bus76	0.052	0.023	3.1	91.6	
								Bus77	0.103	0.044	6.1	91.9	
Bus76	11.000	95.797	-0.8	0.000	0.000	0.000	0.000	Bus75	-0.052	-0.023	3.1	91.5	
								Bus112	0.052	0.023	3.1	91.5	
								Bus75	-0.103	-0.045	6.1	91.6	
Bus77	11.000	95.745	-0.8	0.000	0.000	0.000	0.000	Bus78	0.051	0.023	3.1	91.2	
								Bus80	0.052	0.022	3.1	92.1	
								Bus77	-0.051	-0.023	3.1	91.1	
Bus78	11.000	95.740	-0.8	0.000	0.000	0.000	0.000	Bus111	0.051	0.023	3.1	91.1	

Project: MINI-GRID (IMG) 6.45MWp/10MWh

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Bus		Voltage		Generation		Load		Load Flow				XFMR	
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus79	11.000	95.705	-0.8	0.000	0.000	0.000	0.000	Bus80	-0.052	-0.023	3.1	91.5	
								Bus110	0.052	0.023	3.1	91.5	
Bus80	11.000	95.721	-0.8	0.000	0.000	0.000	0.000	Bus79	0.052	0.022	3.1	91.7	
								Bus77	-0.052	-0.022	3.1	91.7	
Bus81	0.415	94.555	-0.2	0.000	0.000	0.051	0.022	Bus29	-0.051	-0.022	81.8	91.7	
Bus82	0.415	93.881	-0.5	0.000	0.000	0.050	0.022	Bus36	-0.050	-0.022	81.2	91.7	-5.000
Bus83	0.415	95.594	-1.0	0.000	0.000	0.104	0.045	Bus38	-0.104	-0.045	165.4	91.7	-2.500
Bus84	0.415	94.027	-0.5	0.000	0.000	0.050	0.022	Bus35	-0.050	-0.022	81.3	91.7	-5.000
Bus85	0.415	92.954	-1.3	0.000	0.000	0.099	0.043	Bus34	-0.099	-0.043	160.8	91.7	-5.000
Bus86	0.415	94.254	-1.2	0.000	0.000	0.026	0.022	Bus32	-0.026	-0.022	50.1	75.9	-2.500
Bus87	0.415	94.688	-0.3	0.000	0.000	0.058	0.027	Bus26	-0.058	-0.027	93.9	91.0	
Bus88	0.415	93.289	-0.5	0.000	0.000	0.067	0.043	Bus39	-0.067	-0.043	118.9	84.0	-5.000
Bus89	0.415	92.203	-1.4	0.000	0.000	0.048	0.021	Bus43	-0.048	-0.021	79.8	91.7	-5.000
Bus90	0.415	95.714	-0.5	0.000	0.000	0.052	0.023	Bus40	-0.052	-0.023	82.8	91.7	-2.500
Bus91	0.415	93.580	-1.2	0.000	0.000	0.050	0.022	Bus52	-0.050	-0.022	81.0	91.7	-2.500
Bus92	0.415	95.324	-0.7	0.000	0.000	0.052	0.023	Bus41	-0.052	-0.023	82.5	91.7	-2.500
Bus93	0.415	92.253	-0.8	0.000	0.000	0.049	0.021	Bus49	-0.049	-0.021	79.8	91.7	-5.000
Bus94	0.415	94.738	-2.0	0.000	0.000	0.051	0.022	Bus54	-0.051	-0.022	82.0	91.7	
Bus95	0.415	93.439	-1.3	0.000	0.000	0.031	0.022	Bus55	-0.031	-0.022	55.8	81.5	
Bus96	0.415	95.404	-1.0	0.000	0.000	0.052	0.023	Bus56	-0.052	-0.023	82.5	91.7	
Bus97	0.415	94.717	-1.2	0.000	0.000	0.102	0.045	Bus47	-0.102	-0.045	163.9	91.7	
Bus98	0.415	95.041	-1.1	0.000	0.000	0.051	0.022	Bus59	-0.051	-0.022	82.2	91.7	
Bus99	0.415	95.281	-1.0	0.000	0.000	0.052	0.023	Bus62	-0.052	-0.023	82.4	91.7	
Bus100	0.415	95.391	-1.0	0.000	0.000	0.052	0.023	Bus60	-0.052	-0.023	82.5	91.7	
Bus101	0.415	95.388	-1.0	0.000	0.000	0.052	0.023	Bus61	-0.052	-0.023	82.5	91.7	
Bus102	0.415	93.313	-1.1	0.000	0.000	0.022	0.022	Bus63	-0.022	-0.022	45.8	70.9	
Bus103	0.415	95.395	-1.0	0.000	0.000	0.052	0.023	Bus57	-0.052	-0.023	82.5	91.7	
Bus104	0.415	95.464	-0.9	0.000	0.000	0.052	0.023	Bus68	-0.052	-0.023	82.6	91.7	
Bus105	0.415	94.870	-1.1	0.000	0.000	0.051	0.022	Bus67	-0.051	-0.022	82.1	91.7	
Bus106	0.415	94.888	-1.1	0.000	0.000	0.051	0.022	Bus65	-0.051	-0.022	82.1	91.7	
Bus107	0.415	93.307	-1.1	0.000	0.000	0.022	0.022	Bus64	-0.022	-0.022	45.8	70.9	
Bus108	0.415	95.176	-1.0	0.000	0.000	0.052	0.023	Bus74	-0.052	-0.023	82.3	91.7	
Bus109	0.415	93.880	-1.5	0.000	0.000	0.050	0.022	Bus72	-0.050	-0.022	81.2	91.7	

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Bus		Voltage		Generation		Load		Load Flow				XFMR	
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus110	0.415	95.042	-1.0	0.000	0.000	0.051	0.022	Bus79	-0.051	-0.022	82.2	91.7	
Bus111	0.415	93.771	-1.5	0.000	0.000	0.050	0.022	Bus78	-0.050	-0.022	81.1	91.7	
Bus112	0.415	95.132	-1.0	0.000	0.000	0.052	0.022	Bus76	-0.052	-0.022	82.3	91.7	
Bus113	0.800	100.001	0.0	0.295	0.029	0.000	0.000	PCS 1~	0.013	0.001	9.7	99.5	
Bus114	0.800	99.999	0.0	0.000	0.000	0.000	0.000	MV_BUS	0.000	0.000	0.0	0.0	
Bus115	0.415	99.766	-0.1	0.000	0.000	0.000	0.000	Bus9	0.010	0.005	15.7	88.7	
								MV_BUS	-0.010	-0.005	15.7	88.7	
MV_BUS	11.000	99.999	0.0	0.000	0.000	0.000	0.000	Bus15	-0.061	-0.940	49.4	6.5	
								Bus115	0.010	0.005	0.6	88.6	
								Bus8	-1.806	0.039	94.8	-100.0	5.000
								Bus114	0.000	0.000	0.0	0.0	
								Bus3	0.000	0.000	0.0	0.0	7.300
								Bus2	1.857	0.895	108.2	90.1	
* PCS 1~	0.800	100.000	0.0	-0.013	-0.001	0.000	0.000	Bus113	-0.013	-0.001	9.7	99.5	
* PCS 3~	0.800	100.000	0.0	-0.013	-0.001	0.000	0.000	Bus113	-0.013	-0.001	9.7	99.5	
* PCS 4~	0.800	100.000	0.0	-0.013	-0.001	0.000	0.000	Bus113	-0.013	-0.001	9.7	99.5	
* PCS 5~	0.800	100.000	0.0	-0.013	-0.001	0.000	0.000	Bus113	-0.013	-0.001	9.7	99.5	
* PCS 6~	0.800	100.000	0.0	-0.013	-0.001	0.000	0.000	Bus113	-0.013	-0.001	9.7	99.5	
* PCS 7~	0.800	100.000	0.0	-0.013	-0.001	0.000	0.000	Bus113	-0.013	-0.001	9.7	99.5	
* PCS 9~	0.800	100.000	0.0	-0.013	-0.001	0.000	0.000	Bus113	-0.013	-0.001	9.7	99.5	
* PCS 10~	0.800	100.000	0.0	-0.013	-0.001	0.000	0.000	Bus113	-0.013	-0.001	9.7	99.5	
* PCS 11~	0.800	100.000	0.0	-0.013	-0.001	0.000	0.000	Bus113	-0.013	-0.001	9.7	99.5	
* PCS 12~	0.800	100.000	0.0	-0.013	-0.001	0.000	0.000	Bus113	-0.013	-0.001	9.7	99.5	
* PCS 13~	0.800	100.000	0.0	-0.013	-0.001	0.000	0.000	Bus113	-0.013	-0.001	9.7	99.5	
* PCS 14~	0.800	100.000	0.0	-0.013	-0.001	0.000	0.000	Bus113	-0.013	-0.001	9.7	99.5	
* PCS 15~	0.800	100.000	0.0	-0.013	-0.001	0.000	0.000	Bus113	-0.013	-0.001	9.7	99.5	
* PCS 16~	0.800	100.000	0.0	-0.013	-0.001	0.000	0.000	Bus113	-0.013	-0.001	9.7	99.5	
* PCS 17~	0.800	100.000	0.0	-0.013	-0.001	0.000	0.000	Bus113	-0.013	-0.001	9.7	99.5	
* PCS 18~	0.800	100.000	0.0	-0.013	-0.001	0.000	0.000	Bus113	-0.013	-0.001	9.7	99.5	
* PCS 19~	0.800	100.000	0.0	-0.013	-0.001	0.000	0.000	Bus113	-0.013	-0.001	9.7	99.5	
* PCS 20~	0.800	100.000	0.0	-0.013	-0.001	0.000	0.000	Bus113	-0.013	-0.001	9.7	99.5	
* PCS 21~	0.800	100.000	0.0	-0.013	-0.001	0.000	0.000	Bus113	-0.013	-0.001	9.7	99.5	
* PCS 22~	0.800	100.000	0.0	-0.013	-0.001	0.000	0.000	Bus113	-0.013	-0.001	9.7	99.5	

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Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
* PCS 23~	0.800	100.000	0.0	-0.013	-0.001	0.000	0.000	Bus113	-0.013	-0.001	9.7	99.5	
* PCS 24~	0.800	100.000	0.0	-0.013	-0.001	0.000	0.000	Bus113	-0.013	-0.001	9.7	99.5	
* UPS1	0.415	100.000	0.0	0.009	0.004	0.000	0.000	Bus10	0.009	0.004	13.9	90.0	

* Indicates a voltage regulated bus (voltage controlled or swing type machine connected to it)
Indicates a bus with a load mismatch of more than 0.1 MVA

Project: MINI-GRID (IMG) 6.45MWp/10MWh
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Bus Loading Summary Report

Bus			Directly Connected Load								Total Bus Load			
			Constant kVA		Constant Z		Constant I		Generic		MVA	% PF	Amp	Percent Loading
ID	kV	Rated Amp	MW	Mvar	MW	Mvar	MW	Mvar	MW	Mvar				
Bus10	0.415										0.010	90.0	13.9	
Bus2	11.000										2.061	90.1	108.2	
Bus3	0.415													
Bus8	0.800										1.817	100.0	1368.5	
Bus9	0.415		0.010	0.006							0.012	85.0	16.4	
Bus15	11.000										0.942	6.5	49.4	
Bus26	11.000										2.059	90.1	108.2	
Bus27	11.000										1.992	90.1	104.8	
Bus28	11.000										0.110	91.2	5.8	
Bus29	11.000										0.166	91.3	8.7	
Bus30	11.000										0.110	91.1	5.8	
Bus32	11.000										0.367	90.4	19.3	
Bus34	11.000										0.164	91.3	8.7	
Bus35	11.000										0.055	91.4	2.9	
Bus36	11.000										0.170	91.5	9.0	
Bus37	11.000										0.115	91.6	6.0	
Bus38	11.000										0.115	91.1	6.1	
Bus39	11.000										1.446	90.0	76.8	
Bus40	11.000										1.309	90.3	69.7	
Bus41	11.000										1.250	90.2	66.7	
Bus42	11.000										1.123	90.3	60.8	
Bus43	11.000										0.054	90.8	2.9	
Bus45	0.415				0.100	0.044					0.109	91.7	161.9	
Bus46	11.000										0.087	85.4	4.7	
Bus47	11.000										0.170	91.4	9.3	
Bus48	11.000										1.185	90.3	63.7	
Bus49	11.000										0.053	91.4	2.9	
Bus50	11.000										0.510	89.7	27.9	
Bus51	11.000										0.567	89.9	31.0	
Bus52	11.000										0.055	91.2	3.0	
Bus54	11.000										1.066	90.2	57.9	
Bus55	11.000										1.007	90.2	54.8	
Bus56	11.000										0.965	90.6	52.7	
Bus57	11.000										0.057	91.5	3.1	
Bus59	11.000										0.057	91.4	3.1	
Bus60	11.000										0.114	91.5	6.2	
Bus61	11.000										0.057	91.5	3.1	
Bus62	11.000										0.057	91.5	3.1	
Bus63	11.000										0.032	70.5	1.7	

Project: MINI-GRID (IMG) 6.45MWp/10MWh

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Directly Connected Load												Total Bus Load			
Bus			Constant kVA		Constant Z		Constant I		Generic		Rated Amp	MVA	% PF	Amp	Percent Loading
ID	kV		MW	Mvar	MW	Mvar	MW	Mvar	MW	Mvar					
Bus64	11.000											0.032	70.5	1.7	
Bus65	11.000											0.057	91.4	3.1	
Bus66	11.000											0.394	91.6	21.6	
Bus67	11.000											0.057	91.4	3.1	
Bus68	11.000											0.057	91.6	3.1	
Bus70	11.000											0.281	91.6	15.4	
Bus72	11.000											0.056	91.1	3.1	
Bus73	11.000											0.225	91.7	12.3	
Bus74	11.000											0.057	91.5	3.1	
Bus75	11.000											0.168	91.8	9.2	
Bus76	11.000											0.057	91.5	3.1	
Bus77	11.000											0.112	91.6	6.1	
Bus78	11.000											0.056	91.1	3.1	
Bus79	11.000											0.057	91.5	3.1	
Bus80	11.000											0.056	91.7	3.1	
Bus81	0.415				0.051	0.022						0.056	91.7	81.8	
Bus82	0.415				0.050	0.022						0.055	91.7	81.2	
Bus83	0.415				0.104	0.045						0.114	91.7	165.4	
Bus84	0.415				0.050	0.022						0.055	91.7	81.3	
Bus85	0.415				0.099	0.043						0.107	91.7	160.8	
Bus86	0.415				0.026	0.022						0.034	75.9	50.1	
Bus87	0.415		0.007	0.004	0.051	0.022						0.064	91.0	93.9	
Bus88	0.415				0.067	0.043						0.080	84.0	118.9	
Bus89	0.415				0.048	0.021						0.053	91.7	79.8	
Bus90	0.415				0.052	0.023						0.057	91.7	82.8	
Bus91	0.415				0.050	0.022						0.054	91.7	81.0	
Bus92	0.415				0.052	0.023						0.057	91.7	82.5	
Bus93	0.415				0.049	0.021						0.053	91.7	79.8	
Bus94	0.415				0.051	0.022						0.056	91.7	82.0	
Bus95	0.415				0.031	0.022						0.037	81.5	55.8	
Bus96	0.415				0.052	0.023						0.057	91.7	82.5	
Bus97	0.415				0.102	0.045						0.112	91.7	163.9	
Bus98	0.415				0.051	0.022						0.056	91.7	82.2	
Bus99	0.415				0.052	0.023						0.056	91.7	82.4	
Bus100	0.415				0.052	0.023						0.057	91.7	82.5	
Bus101	0.415				0.052	0.023						0.057	91.7	82.5	
Bus102	0.415				0.022	0.022						0.031	70.9	45.8	
Bus103	0.415				0.052	0.023						0.057	91.7	82.5	
Bus104	0.415				0.052	0.023						0.057	91.7	82.6	
Bus105	0.415				0.051	0.022						0.056	91.7	82.1	
Bus106	0.415				0.051	0.022						0.056	91.7	82.1	
Bus107	0.415				0.022	0.022						0.031	70.9	45.8	

Project: MINI-GRID (IMG) 6.45MWp/10MWh
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Contract:
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Bus			Directly Connected Load								Total Bus Load			
			Constant kVA		Constant Z		Constant I		Generic		MVA	% PF	Amp	Percent Loading
			MW	Mvar	MW	Mvar	MW	Mvar	MW	Mvar				
ID	kV	Rated Amp												
Bus108	0.415				0.052	0.023					0.056	91.7	82.3	
Bus109	0.415				0.050	0.022					0.055	91.7	81.2	
Bus110	0.415				0.051	0.022					0.056	91.7	82.2	
Bus111	0.415				0.050	0.022					0.055	91.7	81.1	
Bus112	0.415				0.052	0.022					0.056	91.7	82.3	
Bus113	0.800										0.296	99.5	214.0	
Bus114	0.800													
Bus115	0.415										0.011	88.7	15.7	
MV_BUS	11.000										2.090	89.3	109.7	

* Indicates operating load of a bus exceeds the bus critical limit (100.0% of the Continuous Ampere rating).
Indicates operating load of a bus exceeds the bus marginal limit (95.0% of the Continuous Ampere rating).

Project: MINI-GRID (IMG) 6.45MWp/10MWh

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Location: JAJI, KADUNA

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Contract:

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Engineer: A. ADEFEMI

Study Case: LF

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Filename: AES RENEWABLES

Config.: Normal

Branch Loading Summary Report

CKT / Branch		Busway / Cable & Reactor			Transformer				
ID	Type	Ampacity (Amp)	Loading Amp	%	Capability (MVA)	Loading (input)		Loading (output)	
						MVA	%	MVA	%
Cable3	Cable	450.71	49.44	10.97					
500KVA PRIMARY	Transformer				0.500	0.064	12.8	0.064	12.8
AIRTEL BIRNIN YERO	Transformer				0.050	0.032	63.1	0.031	61.4
ALHAJI BALA	Transformer				0.300	0.057	18.9	0.056	18.8
Aux TR	Transformer				0.250	0.011	4.5	0.011	4.5
BABBAN GIDA	Transformer				0.300	0.115	38.4	0.114	37.9
BIRNIN YERO 1	Transformer				0.300	0.057	19.0	0.057	18.9
BIRNIN YERO 1 RELIEF	Transformer				0.300	0.113	37.7	0.112	37.2
BIRNIN YERO 2	Transformer				0.300	0.057	19.0	0.057	18.9
DANDAMI	Transformer				0.100	0.057	56.9	0.056	55.8
FIRST GATE	Transformer				0.500	0.057	11.4	0.057	11.4
FOUNDATION	Transformer				0.300	0.057	18.9	0.056	18.8
FRSC	Transformer				0.100	0.056	56.0	0.055	54.8
HAYIN SADAUKI	Transformer				0.300	0.057	18.9	0.056	18.8
HAYIN UMMA	Transformer				0.300	0.057	19.0	0.057	18.9
HYDRAF WATER	Transformer				0.300	0.057	18.9	0.056	18.7
IHS BOOSTER STATION	Transformer				0.050	0.035	69.9	0.034	67.9
JAFI	Transformer				0.500	0.057	11.4	0.057	11.3
KAHO VILLAGE	Transformer				0.300	0.055	18.4	0.055	18.3
KAMPANIN PATE RELIEF	Transformer				0.300	0.057	19.0	0.057	18.8
KAN ZAURE	Transformer				0.200	0.055	27.5	0.054	27.2
KANGADA	Transformer				0.500	0.080	16.1	0.080	16.0
KARGO DAM	Transformer				0.300	0.055	18.4	0.055	18.3
MTN BIRNIN YERO	Transformer				0.050	0.032	63.1	0.031	61.4
POLICE DIVISION HG	Transformer				0.200	0.057	28.3	0.056	28.0
PROPOSED KWARAU VILLAGE R	Transformer				0.200	0.057	28.4	0.056	28.1
PULLO FARM	Transformer				0.100	0.056	55.8	0.055	54.7
SHEHU KARAWU	Transformer				0.300	0.057	19.0	0.057	18.9
SKYPET	Transformer				0.200	0.057	28.3	0.056	28.0
STS	Transformer				6.600	1.817	27.5	1.806	27.4
STS 2	Transformer				6.600				
T2	Transformer				5.000				

Project: MINI-GRID (IMG) 6.45MWp/10MWh
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CKT / Branch		Busway / Cable & Reactor			Transformer				
ID	Type	Ampacity (Amp)	Loading Amp	%	Capability (MVA)	Loading (input)		Loading (output)	
						MVA	%	MVA	%
T10	Transformer				0.100	0.054	53.8	0.053	52.9
TSOHON BIRNIN YERO	Transformer				0.300	0.053	17.7	0.053	17.6
U/ RIMI	Transformer				0.200	0.109	54.7	0.107	53.7
URWA	Transformer				0.050	0.039	77.4	0.037	74.9
ZARIA ROAD 1 500KVA	Transformer				0.500	0.056	11.2	0.056	11.1
ZARIA ROAD 2	Transformer				0.300	0.110	36.7	0.109	36.3

* Indicates a branch with operating load exceeding the branch capability.

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Branch Losses Summary Report

Branch ID	From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd % Drop in Vmag
	MW	Mvar	MW	Mvar	kW	kvar	From	To	
500KVA PRIMARY	0.058	0.027	-0.058	-0.027	0.1	0.4	99.9	94.7	5.20
AIRTEL BIRNIN YERO	0.022	0.022	-0.022	-0.022	0.5	0.7	95.9	93.3	2.58
ALHAJI BALA	0.052	0.023	-0.052	-0.023	0.3	0.4	95.8	95.2	0.66
Aux TR	-0.010	-0.005	0.010	0.005	0.0	0.0	99.8	100.0	0.23
BABBAN GIDA	0.105	0.048	-0.104	-0.045	0.6	2.2	99.3	95.6	3.69
BIRNIN YERO 1	0.052	0.023	-0.052	-0.023	0.3	0.4	96.1	95.4	0.67
BIRNIN YERO 1 RELIEF	0.103	0.046	-0.102	-0.045	1.0	1.5	96.0	94.7	1.32
BIRNIN YERO 2	0.052	0.023	-0.052	-0.023	0.3	0.4	96.1	95.4	0.67
Cable3	0.061	0.940	-0.061	-0.940	0.0	-0.1	100.0	100.0	0.00
DANDAMI	0.052	0.024	-0.051	-0.022	0.5	1.7	96.6	94.7	1.90
FIRST GATE	0.052	0.023	-0.052	-0.023	0.1	0.3	98.5	95.7	2.82
FOUNDATION	0.052	0.023	-0.052	-0.022	0.3	0.4	95.8	95.1	0.66
FRSC	0.051	0.023	-0.050	-0.022	0.8	1.1	95.9	93.9	1.97
HAYIN SADAUKI	0.052	0.023	-0.052	-0.023	0.3	0.4	95.9	95.3	0.67
HAYIN UMMA	0.052	0.023	-0.052	-0.023	0.3	0.4	96.1	95.4	0.67
HYDRAF WATER	0.052	0.023	-0.051	-0.022	0.3	0.4	95.7	95.0	0.66
IHS BOOSTER STATION	0.026	0.023	-0.026	-0.022	0.3	1.2	99.6	94.3	5.36
JAFI	0.052	0.023	-0.052	-0.023	0.2	0.2	95.9	95.5	0.40
KAHO VILLAGE	0.050	0.022	-0.050	-0.022	0.1	0.5	99.4	93.9	5.53
KAMPANIN PATE RELIEF	0.052	0.023	-0.052	-0.023	0.2	0.5	98.4	95.3	3.06
KAN ZAURE	0.050	0.023	-0.050	-0.022	0.2	0.8	96.9	93.6	3.31
KANGADA	0.067	0.044	-0.067	-0.043	0.2	0.6	98.8	93.3	5.52
KARGO DAM	0.051	0.022	-0.050	-0.022	0.1	0.5	99.6	94.0	5.54
Line1	1.857	0.895	-1.855	-0.894	1.8	1.6	100.0	99.9	0.12
Line10	1.311	0.640	-1.301	-0.631	10.1	8.5	99.7	98.8	0.90
Line11	1.129	0.540	-1.128	-0.538	1.5	1.2	98.5	98.4	0.15
Line12	0.049	0.023	-0.049	-0.023	0.0	0.0	98.8	98.8	0.00
Line13	1.185	0.565	-1.182	-0.563	2.8	2.3	98.8	98.5	0.27
Line14	0.049	0.021	-0.049	-0.022	0.0	-0.4	97.7	97.7	0.01
Line15	0.022	0.022	-0.022	-0.022	0.0	-0.1	95.9	95.9	0.00
Line16	0.052	0.023	-0.052	-0.023	0.0	-0.2	96.1	96.1	0.01
Line17	1.076	0.515	-1.070	-0.510	6.3	5.1	98.4	97.7	0.68
Line18	-1.014	-0.483	1.021	0.489	7.2	5.7	96.9	97.7	0.81
Line19	-0.510	-0.248	0.510	0.249	0.6	0.2	95.9	96.1	0.12

Project: MINI-GRID (IMG) 6.45MWp/10MWh
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Branch ID	From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd % Drop in Vmag
	MW	Mvar	MW	Mvar	kW	kvar	From	To	
Line2	1.797	0.867	-1.794	-0.865	2.6	2.3	99.9	99.7	0.17
Line20	0.050	0.022	-0.050	-0.023	0.0	-0.1	96.9	96.9	0.01
Line21	0.964	0.461	-0.962	-0.459	2.2	1.7	96.9	96.6	0.25
Line22	0.910	0.435	-0.908	-0.434	1.6	1.2	96.6	96.4	0.20
Line23	0.877	0.411	-0.874	-0.409	2.9	2.2	96.4	96.1	0.37
Line24	-0.155	-0.069	0.155	0.069	0.0	-0.2	96.0	96.1	0.03
Line25	0.052	0.023	-0.052	-0.023	0.0	-0.1	96.0	96.0	0.00
Line26	0.104	0.046	-0.104	-0.046	0.0	-0.1	96.1	96.1	0.01
Line27	0.052	0.023	-0.052	-0.023	0.0	-0.1	96.1	96.1	0.00
Line28	0.052	0.023	-0.052	-0.023	0.0	-0.1	95.9	95.9	0.00
Line29	-0.458	-0.225	0.458	0.226	0.2	0.1	95.9	95.9	0.05
Line3	0.100	0.045	-0.100	-0.045	0.0	-0.2	99.7	99.7	0.01
Line30	0.022	0.022	-0.022	-0.022	0.0	0.0	95.9	95.9	0.00
Line31	-0.074	-0.045	0.074	0.045	0.0	-0.1	95.9	95.9	0.00
Line32	0.052	0.023	-0.052	-0.023	0.0	-0.1	95.9	95.9	0.01
Line33	0.361	0.158	-0.361	-0.158	0.1	0.0	95.9	95.9	0.03
Line34	0.052	0.023	-0.052	-0.023	0.0	0.0	95.9	95.9	0.00
Line35	0.052	0.023	-0.052	-0.023	0.0	-0.1	95.9	95.9	0.00
Line36	0.258	0.112	-0.258	-0.112	0.0	0.0	95.9	95.9	0.01
Line37	0.051	0.023	-0.051	-0.023	0.0	0.0	95.9	95.9	0.00
Line38	0.207	0.089	-0.206	-0.090	0.0	0.0	95.9	95.8	0.01
Line39	0.052	0.023	-0.052	-0.023	0.0	0.0	95.8	95.8	0.00
Line4	0.152	0.068	-0.152	-0.068	0.0	-0.1	99.7	99.7	0.01
Line40	0.155	0.067	-0.155	-0.067	0.1	-0.3	95.8	95.8	0.04
Line41	0.052	0.023	-0.052	-0.023	0.0	-0.1	95.8	95.8	0.00
Line42	0.103	0.044	-0.103	-0.045	0.1	-0.6	95.8	95.7	0.06
Line43	0.051	0.023	-0.051	-0.023	0.0	-0.1	95.7	95.7	0.00
Line44	-0.052	-0.023	0.052	0.022	0.0	-0.3	95.7	95.7	0.02
Line45	0.052	0.022	-0.052	-0.022	0.0	-0.6	95.7	95.7	0.02
Line5	0.332	0.157	-0.332	-0.157	0.3	-0.1	99.7	99.6	0.10
Line6	0.150	0.067	-0.150	-0.067	0.0	0.0	99.6	99.6	0.00
Line7	0.051	0.021	-0.051	-0.022	0.0	-1.3	99.6	99.6	0.05
Line8	0.156	0.067	-0.155	-0.068	0.3	-1.5	99.6	99.4	0.20
Line9	0.105	0.046	-0.105	-0.048	0.1	-1.5	99.4	99.3	0.13
MTN BIRNIN YER0	0.022	0.022	-0.022	-0.022	0.5	0.7	95.9	93.3	2.58
POLICE DIVISION HG	0.052	0.023	-0.051	-0.022	0.4	0.6	95.9	94.9	0.99
PROPOSED KWARAU VILLAG	0.052	0.023	-0.051	-0.022	0.4	0.6	96.0	95.0	1.00

Project: MINI-GRID (IMG) 6.45MWp/10MWh
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Branch ID	From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd % Drop in Vmag
	MW	Mvar	MW	Mvar	kW	kvar	From	To	
PULLO FARM	0.051	0.023	-0.050	-0.022	0.8	1.1	95.7	93.8	1.97
SHEHU KARAWU	0.052	0.023	-0.052	-0.023	0.3	0.4	96.1	95.4	0.67
SKYPET	0.052	0.023	-0.051	-0.022	0.4	0.6	95.9	94.9	0.99
STS	1.817	0.000	-1.806	0.039	11.2	39.3	95.8	100.0	4.19
STS 2	0.000	0.000	0.000	0.000			100.0	100.0	0.00
T10	0.049	0.023	-0.048	-0.021	0.4	1.4	98.8	92.2	6.61
T2	0.000	0.000	0.000	0.000			93.2	100.0	6.80
TSOHON BIRNIN YERO	0.049	0.022	-0.049	-0.021	0.1	0.5	97.7	92.3	5.44
U/ RIMI	0.099	0.046	-0.099	-0.043	0.8	2.9	99.6	93.0	6.66
URWA	0.031	0.023	-0.031	-0.022	0.7	1.1	96.4	93.4	3.00
Z5	-0.010	-0.006	0.010	0.005	0.0	-1.0	99.8	99.8	0.00
ZARIA ROAD 1 500KVA	0.051	0.022	-0.051	-0.022	0.2	0.2	99.7	94.6	5.14
ZARIA ROAD 2	0.100	0.045	-0.100	-0.044	0.6	2.0	99.7	93.6	6.11
					64.2	88.7			

* This Transmission Line includes Series Capacitor.

Project: MINI-GRID (IMG) 6.45MWp/10MWh
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Alert Summary Report

% Alert Settings

	<u>Critical</u>	<u>Marginal</u>
<u>Loading</u>		
Bus	100.0	95.0
Cable / Busway	100.0	95.0
Reactor	100.0	95.0
Line	100.0	95.0
Transformer	100.0	95.0
Panel	100.0	95.0
Protective Device	100.0	95.0
Generator	100.0	95.0
Inverter/Charger	100.0	95.0
<u>Bus Voltage</u>		
OverVoltage	105.0	102.0
UnderVoltage	95.0	98.0
<u>Generator Excitation</u>		
OverExcited (Q Max.)	100.0	95.0
UnderExcited (Q Min.)	100.0	

Critical Report

Device ID	Type	Condition	Rating/Limit	Unit	Operating	% Operating	Phase Type
Bus102	Bus	Under Voltage	0.415	kV	0.387	93.3	3-Phase
Bus105	Bus	Under Voltage	0.415	kV	0.394	94.9	3-Phase
Bus106	Bus	Under Voltage	0.415	kV	0.394	94.9	3-Phase
Bus107	Bus	Under Voltage	0.415	kV	0.387	93.3	3-Phase
Bus109	Bus	Under Voltage	0.415	kV	0.390	93.9	3-Phase
Bus111	Bus	Under Voltage	0.415	kV	0.389	93.8	3-Phase
Bus3	Bus	Under Voltage	0.415	kV	0.387	93.2	3-Phase
Bus45	Bus	Under Voltage	0.415	kV	0.388	93.6	3-Phase
Bus81	Bus	Under Voltage	0.415	kV	0.392	94.6	3-Phase
Bus82	Bus	Under Voltage	0.415	kV	0.390	93.9	3-Phase
Bus84	Bus	Under Voltage	0.415	kV	0.390	94.0	3-Phase
Bus85	Bus	Under Voltage	0.415	kV	0.386	93.0	3-Phase
Bus86	Bus	Under Voltage	0.415	kV	0.391	94.3	3-Phase
Bus87	Bus	Under Voltage	0.415	kV	0.393	94.7	3-Phase
Bus88	Bus	Under Voltage	0.415	kV	0.387	93.3	3-Phase

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Critical Report

Device ID	Type	Condition	Rating/Limit	Unit	Operating	% Operating	Phase Type
Bus89	Bus	Under Voltage	0.415	kV	0.383	92.2	3-Phase
Bus91	Bus	Under Voltage	0.415	kV	0.388	93.6	3-Phase
Bus93	Bus	Under Voltage	0.415	kV	0.383	92.3	3-Phase
Bus94	Bus	Under Voltage	0.415	kV	0.393	94.7	3-Phase
Bus95	Bus	Under Voltage	0.415	kV	0.388	93.4	3-Phase
Bus97	Bus	Under Voltage	0.415	kV	0.393	94.7	3-Phase

Marginal Report

Device ID	Type	Condition	Rating/Limit	Unit	Operating	% Operating	Phase Type
Bus100	Bus	Under Voltage	0.415	kV	0.396	95.4	3-Phase
Bus101	Bus	Under Voltage	0.415	kV	0.396	95.4	3-Phase
Bus103	Bus	Under Voltage	0.415	kV	0.396	95.4	3-Phase
Bus104	Bus	Under Voltage	0.415	kV	0.396	95.5	3-Phase
Bus108	Bus	Under Voltage	0.415	kV	0.395	95.2	3-Phase
Bus110	Bus	Under Voltage	0.415	kV	0.394	95.0	3-Phase
Bus112	Bus	Under Voltage	0.415	kV	0.395	95.1	3-Phase
Bus42	Bus	Under Voltage	11.000	kV	10.658	96.9	3-Phase
Bus46	Bus	Under Voltage	11.000	kV	10.548	95.9	3-Phase
Bus47	Bus	Under Voltage	11.000	kV	10.565	96.0	3-Phase
Bus48	Bus	Under Voltage	11.000	kV	10.747	97.7	3-Phase
Bus49	Bus	Under Voltage	11.000	kV	10.746	97.7	3-Phase
Bus50	Bus	Under Voltage	11.000	kV	10.548	95.9	3-Phase
Bus51	Bus	Under Voltage	11.000	kV	10.554	95.9	3-Phase
Bus52	Bus	Under Voltage	11.000	kV	10.658	96.9	3-Phase
Bus54	Bus	Under Voltage	11.000	kV	10.630	96.6	3-Phase
Bus55	Bus	Under Voltage	11.000	kV	10.609	96.4	3-Phase
Bus56	Bus	Under Voltage	11.000	kV	10.568	96.1	3-Phase
Bus57	Bus	Under Voltage	11.000	kV	10.567	96.1	3-Phase
Bus59	Bus	Under Voltage	11.000	kV	10.564	96.0	3-Phase
Bus60	Bus	Under Voltage	11.000	kV	10.566	96.1	3-Phase
Bus61	Bus	Under Voltage	11.000	kV	10.566	96.1	3-Phase
Bus62	Bus	Under Voltage	11.000	kV	10.554	95.9	3-Phase
Bus63	Bus	Under Voltage	11.000	kV	10.548	95.9	3-Phase
Bus64	Bus	Under Voltage	11.000	kV	10.548	95.9	3-Phase
Bus65	Bus	Under Voltage	11.000	kV	10.547	95.9	3-Phase
Bus66	Bus	Under Voltage	11.000	kV	10.545	95.9	3-Phase

Project: MINI-GRID (IMG) 6.45MWp/10MWh

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Location: JAJI, KADUNA

24.0.1N

Date: 27-09-2026

Contract:

SN: DNDLYIR

Engineer: A. ADEFEMI

Study Case: LF

Revision: Base

Filename: AES RENEWABLES

Config.: Normal

Marginal Report

Device ID	Type	Condition	Rating/Limit	Unit	Operating	% Operating	Phase Type
Bus67	Bus	Under Voltage	11.000	kV	10.545	95.9	3-Phase
Bus68	Bus	Under Voltage	11.000	kV	10.545	95.9	3-Phase
Bus70	Bus	Under Voltage	11.000	kV	10.544	95.9	3-Phase
Bus72	Bus	Under Voltage	11.000	kV	10.544	95.9	3-Phase
Bus73	Bus	Under Voltage	11.000	kV	10.543	95.8	3-Phase
Bus74	Bus	Under Voltage	11.000	kV	10.542	95.8	3-Phase
Bus75	Bus	Under Voltage	11.000	kV	10.538	95.8	3-Phase
Bus76	Bus	Under Voltage	11.000	kV	10.538	95.8	3-Phase
Bus77	Bus	Under Voltage	11.000	kV	10.532	95.7	3-Phase
Bus78	Bus	Under Voltage	11.000	kV	10.531	95.7	3-Phase
Bus79	Bus	Under Voltage	11.000	kV	10.528	95.7	3-Phase
Bus8	Bus	Under Voltage	0.800	kV	0.766	95.8	3-Phase
Bus80	Bus	Under Voltage	11.000	kV	10.529	95.7	3-Phase
Bus83	Bus	Under Voltage	0.415	kV	0.397	95.6	3-Phase
Bus90	Bus	Under Voltage	0.415	kV	0.397	95.7	3-Phase
Bus92	Bus	Under Voltage	0.415	kV	0.396	95.3	3-Phase
Bus96	Bus	Under Voltage	0.415	kV	0.396	95.4	3-Phase
Bus98	Bus	Under Voltage	0.415	kV	0.394	95.0	3-Phase
Bus99	Bus	Under Voltage	0.415	kV	0.395	95.3	3-Phase
PVA15	PV Array	Overload	238.157	Amp	228.091	95.8	3-Phase
PVA16	PV Array	Overload	238.157	Amp	228.091	95.8	3-Phase
PVA17	PV Array	Overload	238.157	Amp	228.091	95.8	3-Phase
PVA18	PV Array	Overload	238.157	Amp	228.091	95.8	3-Phase
PVA20	PV Array	Overload	238.157	Amp	228.091	95.8	3-Phase
PVA21	PV Array	Overload	238.157	Amp	228.091	95.8	3-Phase

Project: MINI-GRID (IMG) 6.45MWp/10MWh
Location: JAJI, KADUNA
Contract:
Engineer: A. ADEFEMI
Filename: AES RENEWABLES

ETAP
24.0.1N

Study Case: LF

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Date: 27-09-2026
SN: DNDLYIR
Revision: Base
Config.: Normal

SUMMARY OF TOTAL GENERATION , LOADING & DEMAND

	MW	Mvar	MVA	% PF
Source (Swing Buses):	-0.234	0.910	0.940	24.87 Leading
Source (Non-Swing Buses):	2.112	0.029	2.112	99.99 Lagging
Total Demand:	1.878	0.940	2.100	89.43 Lagging
Total Motor Load:	0.007	0.004	0.008	85.69 Lagging
Total Static Load:	1.806	0.845	1.994	90.57 Lagging
Total Constant I Load:	0.000	0.000	0.000	
Total Generic Load:	0.000	0.000	0.000	
Apparent Losses:	0.065	0.089		
System Mismatch:	0.000	0.000		

Number of Iterations: 1