

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:	3	0	89	92

	XFMR2	XFMR3	Reactor	Line/Cable/ Busway	Impedance	Tie PD	Total
Number of Branches:	37	0	0	49	2	3	91

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\Steady-State Islanded.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	4	100.0	0.0								
Bus3	0.415	4	100.0	0.0								
Bus8	0.800	4	100.0	0.0								
Bus9	0.415	4	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	4	100.0	0.0								
Bus27	11.000	4	100.0	0.0								
Bus28	11.000	4	100.0	0.0								
Bus29	11.000	4	100.0	0.0								
Bus30	11.000	4	100.0	0.0								
Bus32	11.000	4	100.0	0.0								
Bus34	11.000	4	100.0	0.0								
Bus35	11.000	4	100.0	0.0								
Bus36	11.000	4	100.0	0.0								
Bus37	11.000	4	100.0	0.0								
Bus38	11.000	4	100.0	0.0								
Bus39	11.000	4	100.0	0.0								
Bus40	11.000	4	100.0	0.0								
Bus41	11.000	4	100.0	0.0								
Bus42	11.000	4	100.0	0.0								
Bus43	11.000	4	100.0	0.0								
Bus45	0.415	4	100.0	0.0			0.114	0.050				
Bus46	11.000	4	100.0	0.0								
Bus47	11.000	4	100.0	0.0								
Bus48	11.000	4	100.0	0.0								
Bus49	11.000	4	100.0	0.0								
Bus50	11.000	4	100.0	0.0								
Bus51	11.000	4	100.0	0.0								
Bus52	11.000	4	100.0	0.0								
Bus54	11.000	4	100.0	0.0								
Bus55	11.000	4	100.0	0.0								
Bus56	11.000	4	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	4	100.0	0.0								
Bus59	11.000	4	100.0	0.0								
Bus60	11.000	4	100.0	0.0								
Bus61	11.000	4	100.0	0.0								
Bus62	11.000	4	100.0	0.0								
Bus63	11.000	4	100.0	0.0								
Bus64	11.000	4	100.0	0.0								
Bus65	11.000	4	100.0	0.0								
Bus66	11.000	4	100.0	0.0								
Bus67	11.000	4	100.0	0.0								
Bus68	11.000	4	100.0	0.0								
Bus70	11.000	4	100.0	0.0								
Bus72	11.000	4	100.0	0.0								
Bus73	11.000	4	100.0	0.0								
Bus74	11.000	4	100.0	0.0								
Bus75	11.000	4	100.0	0.0								
Bus76	11.000	4	100.0	0.0								
Bus77	11.000	4	100.0	0.0								
Bus78	11.000	4	100.0	0.0								
Bus79	11.000	4	100.0	0.0								
Bus80	11.000	4	100.0	0.0								
Bus81	0.415	4	100.0	0.0			0.057	0.025				
Bus82	0.415	4	100.0	0.0			0.057	0.025				
Bus83	0.415	4	100.0	0.0			0.114	0.050				
Bus84	0.415	4	100.0	0.0			0.057	0.025				
Bus85	0.415	4	100.0	0.0			0.114	0.050				
Bus86	0.415	4	100.0	0.0			0.029	0.025				
Bus87	0.415	4	100.0	0.0	0.007	0.004	0.057	0.025				
Bus88	0.415	4	100.0	0.0			0.077	0.050				
Bus89	0.415	4	100.0	0.0			0.057	0.025				
Bus90	0.415	4	100.0	0.0			0.057	0.025				
Bus91	0.415	4	100.0	0.0			0.057	0.025				
Bus92	0.415	4	100.0	0.0			0.057	0.025				
Bus93	0.415	4	100.0	0.0			0.057	0.025				
Bus94	0.415	4	100.0	0.0			0.057	0.025				

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Bus					Load									
					Initial Voltage		Constant kVA		Constant Z		Constant I		Generic	
							MW	Mvar	MW	Mvar	MW	Mvar	MW	Mvar
ID	kV	Sub-sys	% Mag.	Ang.										
Bus95	0.415	4	100.0	0.0			0.035	0.025						
Bus96	0.415	4	100.0	0.0			0.057	0.025						
Bus97	0.415	4	100.0	0.0			0.114	0.050						
Bus98	0.415	4	100.0	0.0			0.057	0.025						
Bus99	0.415	4	100.0	0.0			0.057	0.025						
Bus100	0.415	4	100.0	0.0			0.057	0.025						
Bus101	0.415	4	100.0	0.0			0.057	0.025						
Bus102	0.415	4	100.0	0.0			0.025	0.025						
Bus103	0.415	4	100.0	0.0			0.057	0.025						
Bus104	0.415	4	100.0	0.0			0.057	0.025						
Bus105	0.415	4	100.0	0.0			0.057	0.025						
Bus106	0.415	4	100.0	0.0			0.057	0.025						
Bus107	0.415	4	100.0	0.0			0.025	0.025						
Bus108	0.415	4	100.0	0.0			0.057	0.025						
Bus109	0.415	4	100.0	0.0			0.057	0.025						
Bus110	0.415	4	100.0	0.0			0.057	0.025						
Bus111	0.415	4	100.0	0.0			0.057	0.025						
Bus112	0.415	4	100.0	0.0			0.057	0.025						
Bus113	0.800	4	100.0	0.0										
Bus114	0.800	4	100.0	0.0										
Bus115	0.415	4	100.0	0.0										
MV_BUS	11.000	4	105.0	0.0										
Cable3~	11.000	1	100.0	0.0										
PCS 1~	0.800	4	100.0	0.0										
Total Number of Buses: 92					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	4	100.0	0.0	1.817	0.597	95.0		
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	0.161	0.391	38.1		
PCS 1~	0.800	Swing	4	100.0	0.0					
						1.978	0.988			

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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
Line10_PAR		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
Line17_PAR		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
Line18_PAR		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

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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
ID			Adj. (m)	% Tol.					
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
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	2.500	5.0000	Dyn	0.000
AIRTEL BIRNIN YERO	3-Phase	0.050	11.000	0.415	4.00	1.50	0	0	0	0	2.500	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	0	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	2.500	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	2.500	5.0000	Dyn	0.000
FIRST GATE	3-Phase	0.500	11.000	0.415	5.00	3.50	0	0	0	0	0	5.0000	Dyn	0.000
FOUNDATION	3-Phase	0.300	11.000	0.415	4.00	1.50	0	0	0	0	2.500	4.0000	Dyn	0.000
FRSC	3-Phase	0.100	11.000	0.415	4.00	1.50	0	0	0	0	2.500	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	2.500	4.0000	Dyn	0.000
IHS BOOSTER STATION	3-Phase	0.050	11.000	0.415	5.00	3.50	0	0	0	0	0	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	0	5.0000	Dyn	0.000
KAMPANIN PATE RELIEF	3-Phase	0.300	11.000	0.415	5.00	3.50	0	0	0	0	0	5.0000	Dyn	0.000
KAN ZAURE	3-Phase	0.200	11.000	0.415	5.00	3.50	0	0	0	0	0	5.0000	Dyn	0.000
KANGADA	3-Phase	0.500	11.000	0.415	5.00	3.50	0	0	0	0	0	5.0000	Dyn	0.000
KARGO DAM	3-Phase	0.300	11.000	0.415	5.00	3.50	0	0	0	0	0	5.0000	Dyn	0.000
MTN BIRNIN YERO	3-Phase	0.050	11.000	0.415	4.00	1.50	0	0	0	0	2.500	4.0000	Dyn	0.000
POLICE DIVISION HG	3-Phase	0.200	11.000	0.415	4.00	1.50	0	0	0	0	2.500	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	2.500	4.0000	Dyn	0.000
PULLO FARM	3-Phase	0.100	11.000	0.415	4.00	1.50	0	0	0	0	2.500	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	2.500	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	0	5.0000	Dyn	0.000
TSOHON BIRNIN YERO	3-Phase	0.300	11.000	0.415	4.00	1.50	0	0	0	0	0	4.0000	Dyn	0.000
U/ RIMI	3-Phase	0.200	11.000	0.415	5.00	3.50	0	0	0	0	0	5.0000	Dyn	0.000
URWA	3-Phase	0.050	11.000	0.415	4.00	1.50	0	0	0	0	2.500	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	2.500	4.0000	Dyn	0.000
ZARIA ROAD 2	3-Phase	0.300	11.000	0.415	5.00	3.50	0	0	0	0	0	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	
Z4	0.001	0.001	0	
Z5	0.001	0.001	0.001	
				% in 0.800 kV base and 100.0 MVA base
				% in 0.415 kV base and 100.0 MVA base

Project: MINI-GRID (IMG) 6.45MWp/10MWh
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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	295.67	1034.84	1076.25	
AIRTEL BIRNIN YERO	2W XFMR	Bus64	Bus107	4548.54	6822.81	8200.00	
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	457.87	1602.54	1666.67	
BIRNIN YERO 1	2W XFMR	Bus56	Bus96	739.60	1109.40	1333.33	
BIRNIN YERO 1 RELIEF	2W XFMR	Bus47	Bus97	758.09	1137.14	1366.67	
BIRNIN YERO 2	2W XFMR	Bus60	Bus100	739.60	1109.40	1333.33	
DANDAMI	2W XFMR	Bus54	Bus94	1407.95	4927.81	5125.00	
FIRST GATE	2W XFMR	Bus40	Bus90	274.72	961.52	1000.00	
FOUNDATION	2W XFMR	Bus76	Bus112	758.09	1137.14	1366.67	
FRSC	2W XFMR	Bus72	Bus109	2274.27	3411.41	4100.00	
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	758.09	1137.14	1366.67	
IHS BOOSTER STATION	2W XFMR	Bus32	Bus86	2747.21	9615.24	10000.00	
JAFI	2W XFMR	Bus68	Bus104	443.76	665.64	800.00	
KAHO VILLAGE	2W XFMR	Bus36	Bus82	457.87	1602.54	1666.67	
KAMPANIN PATE RELIEF	2W XFMR	Bus41	Bus92	457.87	1602.54	1666.67	
KAN ZAURE	2W XFMR	Bus52	Bus91	686.80	2403.81	2500.00	
KANGADA	2W XFMR	Bus39	Bus88	274.72	961.52	1000.00	
KARGO DAM	2W XFMR	Bus35	Bus84	457.87	1602.54	1666.67	
MTN BIRNIN YERO	2W XFMR	Bus63	Bus102	4548.54	6822.81	8200.00	
POLICE DIVISION HG	2W XFMR	Bus65	Bus106	1137.14	1705.70	2050.00	
PROPOSED KWARAU VILLAGE R	2W XFMR	Bus59	Bus98	1137.14	1705.70	2050.00	
PULLO FARM	2W XFMR	Bus78	Bus111	2274.27	3411.41	4100.00	
SHEHU KARAWU	2W XFMR	Bus61	Bus101	739.60	1109.40	1333.33	
SKYPET	2W XFMR	Bus67	Bus105	1137.14	1705.70	2050.00	
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	1373.61	4807.62	5000.00	
TSOHON BIRNIN YERO	2W XFMR	Bus49	Bus93	739.60	1109.40	1333.33	
U/ RIMI	2W XFMR	Bus34	Bus85	686.80	2403.81	2500.00	
URWA	2W XFMR	Bus55	Bus95	4548.54	6822.81	8200.00	
ZARIA ROAD 1 500KVA	2W XFMR	Bus29	Bus81	477.60	716.40	861.00	

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

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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	457.87	1602.54	1666.67	
Cable3	Cable	Bus15	Cable3~	0.03	0.08	0.09	0.0001107
Z4	Impedance	Bus114	Bus113	0.00	0.00	0.00	
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
Line10_PAR	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
Line17_PAR	Line	Bus41	Bus48	43.08	39.93	58.74	0.0008240
Line18	Line	Bus48	Bus42	53.72	49.80	73.25	0.0010275
Line18_PAR	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

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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
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
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	99.493	-0.1	0.000	0.000	0.000	0.000	Bus26	1.952	0.936	114.2	90.2		
								MV_BUS	-1.952	-0.936	114.2	90.2		
Bus3	0.415	92.724	-0.1	0.000	0.000	0.000	0.000	MV_BUS	0.000	0.000	0.0	0.0		
Bus8	0.800	96.007	1.0	1.817	0.597	0.000	0.000	MV_BUS	1.817	0.597	1437.6	95.0		
Bus9	0.415	99.258	-0.2	0.000	0.000	0.010	0.006	Bus115	-0.010	-0.006	16.5	85.0		
								UPS1	0.010	0.006	16.5	85.0		
* Bus15	11.000	100.000	0.0	0.000	0.000	0.000	0.000	Cable3~	0.000	0.000	0.0	0.0		
Bus26	11.000	99.372	-0.1	0.000	0.000	0.000	0.000	Bus2	-1.950	-0.935	114.2	90.2		
								Bus27	1.890	0.907	110.7	90.2		
								Bus87	0.060	0.028	3.5	90.8	5.000	
Bus27	11.000	99.191	-0.1	0.000	0.000	0.000	0.000	Bus26	-1.887	-0.904	110.7	90.2		
								Bus29	0.163	0.073	9.5	91.3		
								Bus32	0.356	0.169	20.8	90.3		
								Bus39	0.684	0.331	40.2	90.0		
								Bus39	0.684	0.331	40.2	90.0		
Bus28	11.000	99.175	-0.1	0.000	0.000	0.000	0.000	Bus30	0.110	0.050	6.4	91.1		
								Bus29	-0.110	-0.050	6.4	91.1		
Bus29	11.000	99.175	-0.1	0.000	0.000	0.000	0.000	Bus27	-0.163	-0.073	9.5	91.2		
								Bus81	0.053	0.023	3.1	91.6	5.000	
								Bus28	0.110	0.050	6.4	91.1		
Bus30	11.000	99.159	-0.2	0.000	0.000	0.000	0.000	Bus28	-0.110	-0.050	6.4	91.0		
								Bus45	0.110	0.050	6.4	91.0		
Bus32	11.000	99.088	-0.2	0.000	0.000	0.000	0.000	Bus27	-0.356	-0.169	20.9	90.3		
								Bus34	0.164	0.074	9.5	91.2		
								Bus36	0.165	0.071	9.5	91.8		
								Bus86	0.027	0.024	1.9	74.6		
Bus34	11.000	99.085	-0.2	0.000	0.000	0.000	0.000	Bus32	-0.164	-0.074	9.5	91.2		
								Bus35	0.055	0.023	3.2	92.1		
								Bus85	0.109	0.050	6.3	90.7		
Bus35	11.000	99.032	-0.2	0.000	0.000	0.000	0.000	Bus34	-0.055	-0.025	3.2	91.3		
								Bus84	0.055	0.025	3.2	91.3		

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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
Bus36	11.000	98.870	-0.2	0.000	0.000	0.000	0.000	Bus32	-0.164	-0.073	9.5	91.5	
								Bus82	0.055	0.025	3.2	91.3	
								Bus37	0.109	0.048	6.3	91.5	
Bus37	11.000	98.870	-0.2	0.000	0.000	0.000	0.000	Bus38	0.109	0.048	6.3	91.5	
								Bus36	-0.109	-0.048	6.3	91.5	
Bus38	11.000	98.736	-0.2	0.000	0.000	0.000	0.000	Bus37	-0.109	-0.050	6.4	91.0	
								Bus83	0.109	0.050	6.4	91.0	
Bus39	11.000	98.719	-0.2	0.000	0.000	0.000	0.000	Bus27	-0.681	-0.329	40.2	90.0	
								Bus27	-0.681	-0.329	40.2	90.0	
								Bus43	0.054	0.025	3.2	90.7	
								Bus40	1.234	0.585	72.6	90.4	
								Bus88	0.074	0.049	4.7	83.7	
Bus40	11.000	98.435	-0.3	0.000	0.000	0.000	0.000	Bus41	1.176	0.558	69.4	90.3	
								Bus39	-1.231	-0.583	72.6	90.4	
								Bus90	0.055	0.024	3.2	91.5	
Bus41	11.000	98.274	-0.3	0.000	0.000	0.000	0.000	Bus40	-1.175	-0.557	69.4	90.4	
								Bus48	0.560	0.266	33.1	90.3	
								Bus48	0.560	0.266	33.1	90.3	
								Bus92	0.054	0.024	3.2	91.3	
Bus42	11.000	97.499	-0.5	0.000	0.000	0.000	0.000	Bus48	-0.529	-0.253	31.6	90.2	
								Bus48	-0.529	-0.253	31.6	90.2	
								Bus52	0.053	0.024	3.1	91.3	
								Bus54	1.005	0.482	60.0	90.2	
Bus43	11.000	98.718	-0.2	0.000	0.000	0.000	0.000	Bus39	-0.054	-0.025	3.2	90.7	
								Bus89	0.054	0.025	3.2	90.7	
Bus45	0.415	97.857	-1.1	0.000	0.000	0.109	0.048	Bus30	-0.109	-0.048	169.3	91.7	
Bus46	11.000	96.458	-0.6	0.000	0.000	0.000	0.000	Bus64	0.024	0.024	1.8	70.7	
								Bus50	-0.079	-0.048	5.0	85.4	
								Bus65	0.055	0.024	3.3	91.5	
Bus47	11.000	96.616	-0.6	0.000	0.000	0.000	0.000	Bus56	-0.165	-0.073	9.8	91.3	
								Bus59	0.055	0.024	3.3	91.4	
								Bus97	0.110	0.049	6.5	91.3	
Bus48	11.000	97.920	-0.4	0.000	0.000	0.000	0.000	Bus49	0.054	0.024	3.2	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
Bus49	11.000	97.904	-0.4	0.000	0.000	0.000	0.000	Bus41	-0.558	-0.266	33.1	90.3	
								Bus41	-0.558	-0.266	33.1	90.3	
								Bus42	0.531	0.254	31.6	90.2	
								Bus42	0.531	0.254	31.6	90.2	
Bus50	11.000	96.463	-0.6	0.000	0.000	0.000	0.000	Bus48	-0.054	-0.024	3.2	91.5	
								Bus93	0.054	0.024	3.2	91.5	
								Bus51	-0.481	-0.237	29.2	89.7	
								Bus63	0.024	0.024	1.8	70.6	
Bus51	11.000	96.519	-0.6	0.000	0.000	0.000	0.000	Bus46	0.079	0.048	5.0	85.4	
								Bus66	0.379	0.166	22.5	91.6	
								Bus56	-0.534	-0.261	32.3	89.9	
								Bus62	0.053	0.023	3.1	91.5	
Bus52	11.000	97.493	-0.5	0.000	0.000	0.000	0.000	Bus50	0.481	0.238	29.2	89.7	
								Bus42	-0.053	-0.024	3.2	91.2	
								Bus91	0.053	0.024	3.2	91.2	
								Bus42	-1.003	-0.480	60.0	90.2	
Bus54	11.000	97.235	-0.5	0.000	0.000	0.000	0.000	Bus55	0.948	0.455	56.8	90.2	
								Bus94	0.055	0.026	3.3	90.7	
								Bus54	-0.947	-0.453	56.8	90.2	
								Bus56	0.913	0.429	54.6	90.5	
Bus55	11.000	97.032	-0.5	0.000	0.000	0.000	0.000	Bus95	0.033	0.024	2.2	80.8	
								Bus57	0.053	0.023	3.1	91.6	
								Bus51	0.534	0.261	32.3	89.9	
								Bus55	-0.910	-0.427	54.6	90.5	
Bus56	11.000	96.646	-0.6	0.000	0.000	0.000	0.000	Bus47	0.165	0.073	9.8	91.4	
								Bus60	0.106	0.046	6.3	91.6	
								Bus96	0.053	0.023	3.1	91.5	
								Bus56	-0.053	-0.023	3.1	91.5	
Bus57	11.000	96.637	-0.6	0.000	0.000	0.000	0.000	Bus103	0.053	0.023	3.1	91.5	
								Bus59	-0.055	-0.024	3.3	91.4	
								Bus98	0.055	0.024	3.3	91.4	
								Bus56	-0.106	-0.046	6.3	91.5	
Bus59	11.000	96.611	-0.6	0.000	0.000	0.000	0.000	Bus61	0.053	0.023	3.1	91.5	
Bus60	11.000	96.633	-0.6	0.000	0.000	0.000	0.000						

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
Bus61	11.000	96.630	-0.6	0.000	0.000	0.000	0.000	Bus100	0.053	0.023	3.1	91.5	
								Bus60	-0.053	-0.023	3.1	91.5	
								Bus101	0.053	0.023	3.1	91.5	
Bus62	11.000	96.517	-0.6	0.000	0.000	0.000	0.000	Bus51	-0.053	-0.023	3.1	91.5	
Bus63	11.000	96.462	-0.6	0.000	0.000	0.000	0.000	Bus99	0.053	0.023	3.1	91.5	
								Bus50	-0.024	-0.024	1.8	70.5	
								Bus102	0.024	0.024	1.8	70.5	
Bus64	11.000	96.455	-0.6	0.000	0.000	0.000	0.000	Bus46	-0.024	-0.024	1.8	70.5	
Bus65	11.000	96.451	-0.6	0.000	0.000	0.000	0.000	Bus107	0.024	0.024	1.8	70.5	
								Bus46	-0.055	-0.024	3.3	91.4	
								Bus106	0.055	0.024	3.3	91.4	
Bus66	11.000	96.434	-0.6	0.000	0.000	0.000	0.000	Bus50	-0.379	-0.166	22.5	91.6	
Bus67	11.000	96.432	-0.6	0.000	0.000	0.000	0.000	Bus67	0.055	0.024	3.3	91.4	
								Bus68	0.053	0.023	3.1	91.6	
								Bus70	0.271	0.119	16.1	91.6	
								Bus66	-0.055	-0.024	3.3	91.4	
Bus68	11.000	96.432	-0.6	0.000	0.000	0.000	0.000	Bus105	0.055	0.024	3.3	91.4	
								Bus66	-0.053	-0.023	3.1	91.6	
								Bus104	0.053	0.023	3.1	91.6	
Bus70	11.000	96.421	-0.7	0.000	0.000	0.000	0.000	Bus66	-0.271	-0.119	16.1	91.6	
Bus72	11.000	96.419	-0.7	0.000	0.000	0.000	0.000	Bus72	0.054	0.024	3.2	91.1	
								Bus73	0.217	0.094	12.9	91.7	
								Bus70	-0.054	-0.024	3.2	91.1	
								Bus109	0.054	0.024	3.2	91.1	
Bus73	11.000	96.409	-0.7	0.000	0.000	0.000	0.000	Bus70	-0.217	-0.094	12.9	91.7	
Bus74	11.000	96.407	-0.7	0.000	0.000	0.000	0.000	Bus74	0.053	0.023	3.1	91.5	
								Bus75	0.164	0.071	9.7	91.8	
								Bus73	-0.053	-0.023	3.1	91.5	
								Bus108	0.053	0.023	3.1	91.5	
Bus75	11.000	96.366	-0.7	0.000	0.000	0.000	0.000	Bus73	-0.164	-0.071	9.7	91.7	
Bus76	11.000	96.360	-0.7	0.000	0.000	0.000	0.000	Bus76	0.055	0.024	3.3	91.6	
								Bus77	0.109	0.047	6.5	91.8	
								Bus75	-0.055	-0.024	3.3	91.5	

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

Location: JAJI, KADUNA

Contract:

Engineer: A. ADEFEMI

Filename: AES RENEWABLES

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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
Bus77	11.000	96.306	-0.7	0.000	0.000	0.000	0.000	Bus112	0.055	0.024	3.3	91.5	
								Bus75	-0.109	-0.048	6.5	91.6	
								Bus78	0.054	0.024	3.2	91.2	
Bus78	11.000	96.301	-0.7	0.000	0.000	0.000	0.000	Bus80	0.055	0.023	3.3	92.0	
								Bus77	-0.054	-0.024	3.2	91.1	
								Bus111	0.054	0.024	3.2	91.1	
Bus79	11.000	96.264	-0.7	0.000	0.000	0.000	0.000	Bus80	-0.055	-0.024	3.3	91.5	
								Bus110	0.055	0.024	3.3	91.5	
Bus80	11.000	96.280	-0.7	0.000	0.000	0.000	0.000	Bus79	0.055	0.024	3.3	91.7	
								Bus77	-0.055	-0.024	3.3	91.7	
Bus81	0.415	96.390	-0.3	0.000	0.000	0.053	0.023	Bus29	-0.053	-0.023	83.4	91.7	2.500
Bus82	0.415	98.220	-0.7	0.000	0.000	0.055	0.024	Bus36	-0.055	-0.024	85.0	91.7	
Bus83	0.415	97.440	-1.1	0.000	0.000	0.108	0.047	Bus38	-0.108	-0.047	168.6	91.7	
Bus84	0.415	98.381	-0.6	0.000	0.000	0.055	0.024	Bus35	-0.055	-0.024	85.1	91.7	
Bus85	0.415	97.137	-1.5	0.000	0.000	0.108	0.047	Bus34	-0.108	-0.047	168.1	91.7	
Bus86	0.415	96.008	-1.3	0.000	0.000	0.027	0.023	Bus32	-0.027	-0.023	51.0	75.9	
Bus87	0.415	96.538	-0.4	0.000	0.000	0.060	0.027	Bus26	-0.060	-0.027	95.3	91.0	2.500
Bus88	0.415	98.042	-0.6	0.000	0.000	0.074	0.048	Bus39	-0.074	-0.048	125.0	84.0	
Bus89	0.415	96.777	-1.6	0.000	0.000	0.053	0.023	Bus43	-0.053	-0.023	83.7	91.7	
Bus90	0.415	98.046	-0.6	0.000	0.000	0.055	0.024	Bus40	-0.055	-0.024	84.8	91.7	
Bus91	0.415	96.532	-1.1	0.000	0.000	0.053	0.023	Bus52	-0.053	-0.023	83.5	91.7	
Bus92	0.415	97.628	-0.8	0.000	0.000	0.054	0.024	Bus41	-0.054	-0.024	84.5	91.7	
Bus93	0.415	97.225	-0.6	0.000	0.000	0.054	0.023	Bus49	-0.054	-0.023	84.1	91.7	
Bus94	0.415	97.608	-1.9	0.000	0.000	0.054	0.024	Bus54	-0.054	-0.024	84.4	91.7	2.500
Bus95	0.415	96.209	-1.3	0.000	0.000	0.032	0.023	Bus55	-0.032	-0.023	57.4	81.5	2.500
Bus96	0.415	95.976	-0.9	0.000	0.000	0.053	0.023	Bus56	-0.053	-0.023	83.0	91.7	
Bus97	0.415	97.597	-1.1	0.000	0.000	0.109	0.047	Bus47	-0.109	-0.047	168.9	91.7	2.500
Bus98	0.415	97.948	-1.0	0.000	0.000	0.055	0.024	Bus59	-0.055	-0.024	84.7	91.7	2.500
Bus99	0.415	95.848	-0.9	0.000	0.000	0.052	0.023	Bus62	-0.052	-0.023	82.9	91.7	
Bus100	0.415	95.963	-0.9	0.000	0.000	0.052	0.023	Bus60	-0.052	-0.023	83.0	91.7	
Bus101	0.415	95.960	-0.9	0.000	0.000	0.052	0.023	Bus61	-0.052	-0.023	83.0	91.7	
Bus102	0.415	96.082	-1.0	0.000	0.000	0.023	0.023	Bus63	-0.023	-0.023	47.1	70.9	2.500
Bus103	0.415	95.967	-0.9	0.000	0.000	0.052	0.023	Bus57	-0.052	-0.023	83.0	91.7	

Project: MINI-GRID (IMG) 6.45MWp/10MWh
Location: JAJI, KADUNA
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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
Bus104	0.415	96.029	-0.8	0.000	0.000	0.053	0.023	Bus68	-0.053	-0.023	83.1	91.7	
Bus105	0.415	97.766	-1.1	0.000	0.000	0.054	0.024	Bus67	-0.054	-0.024	84.6	91.7	2.500
Bus106	0.415	97.785	-1.0	0.000	0.000	0.055	0.024	Bus65	-0.055	-0.024	84.6	91.7	2.500
Bus107	0.415	96.076	-1.0	0.000	0.000	0.023	0.023	Bus64	-0.023	-0.023	47.1	70.9	2.500
Bus108	0.415	95.739	-0.9	0.000	0.000	0.052	0.023	Bus74	-0.052	-0.023	82.8	91.7	
Bus109	0.415	96.695	-1.4	0.000	0.000	0.053	0.023	Bus72	-0.053	-0.023	83.6	91.7	2.500
Bus110	0.415	97.952	-1.0	0.000	0.000	0.055	0.024	Bus79	-0.055	-0.024	84.7	91.7	2.500
Bus111	0.415	96.577	-1.5	0.000	0.000	0.053	0.023	Bus78	-0.053	-0.023	83.5	91.7	2.500
Bus112	0.415	98.050	-0.9	0.000	0.000	0.055	0.024	Bus76	-0.055	-0.024	84.8	91.7	2.500
Bus113	0.800	100.000	0.0	0.161	0.391	0.000	0.000	Bus114	0.158	0.390	303.7	37.5	
Bus114	0.800	100.000	0.0	0.000	0.000	0.000	0.000	Bus113	-0.158	-0.390	303.7	37.5	
								MV_BUS	0.158	0.390	303.7	37.5	
Bus115	0.415	99.258	-0.2	0.000	0.000	0.000	0.000	Bus9	0.010	0.005	15.8	88.7	
								MV_BUS	-0.010	-0.005	15.8	88.7	
MV_BUS	11.000	99.493	-0.1	0.000	0.000	0.000	0.000	Bus115	0.010	0.005	0.6	88.6	
								Bus8	-1.804	-0.554	99.6	95.6	5.000
								Bus114	-0.158	-0.388	22.1	37.7	
								Bus3	0.000	0.000	0.0	0.0	7.300
								Bus2	1.952	0.936	114.2	90.2	
Cable3~	11.000	100.000	0.0	0.000	0.000	0.000	0.000	Bus15	0.000	0.000	0.0	0.0	
* PCS 1~	0.800	100.000	0.0	-0.003	-0.001	0.000	0.000	Bus113	-0.003	-0.001	2.4	95.8	
* 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										2.165	90.2	114.2	
Bus3	0.415												-	
Bus8	0.800										1.912	95.0	1437.6	
Bus9	0.415		0.010	0.006							0.012	85.0	16.5	
Bus15	11.000										0.000		-	
Bus26	11.000										2.162	90.2	114.2	
Bus27	11.000										2.092	90.2	110.7	
Bus28	11.000										0.121	91.1	6.4	
Bus29	11.000										0.179	91.2	9.5	
Bus30	11.000										0.121	91.0	6.4	
Bus32	11.000										0.394	90.3	20.9	
Bus34	11.000										0.180	91.2	9.5	
Bus35	11.000										0.061	91.3	3.2	
Bus36	11.000										0.180	91.5	9.5	
Bus37	11.000										0.119	91.5	6.3	
Bus38	11.000										0.120	91.0	6.4	
Bus39	11.000										1.513	90.0	80.5	
Bus40	11.000										1.362	90.4	72.6	
Bus41	11.000										1.300	90.4	69.4	
Bus42	11.000										1.173	90.2	63.2	
Bus43	11.000										0.059	90.7	3.2	
Bus45	0.415				0.109	0.048					0.119	91.7	169.3	
Bus46	11.000										0.092	85.4	5.0	
Bus47	11.000										0.180	91.3	9.8	
Bus48	11.000										1.237	90.3	66.3	
Bus49	11.000										0.059	91.5	3.2	
Bus50	11.000										0.536	89.7	29.2	
Bus51	11.000										0.594	89.9	32.3	
Bus52	11.000										0.059	91.2	3.2	
Bus54	11.000										1.112	90.2	60.0	
Bus55	11.000										1.050	90.2	56.8	
Bus56	11.000										1.005	90.5	54.6	
Bus57	11.000										0.058	91.5	3.1	
Bus59	11.000										0.060	91.4	3.3	
Bus60	11.000										0.115	91.5	6.3	
Bus61	11.000										0.058	91.5	3.1	
Bus62	11.000										0.058	91.5	3.1	
Bus63	11.000										0.033	70.5	1.8	

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

Location: JAJI, KADUNA

Contract:

Engineer: A. ADEFEMI

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Directly Connected Load												Total Bus Load			
Bus			Constant kVA		Constant Z		Constant I		Generic			MVA	% PF	Amp	Percent
ID	kV	Rated Amp	MW	Mvar	MW	Mvar	MW	Mvar	MW	Mvar					Loading
Bus64	11.000											0.033	70.5	1.8	
Bus65	11.000											0.060	91.4	3.3	
Bus66	11.000											0.413	91.6	22.5	
Bus67	11.000											0.060	91.4	3.3	
Bus68	11.000											0.058	91.6	3.1	
Bus70	11.000											0.296	91.6	16.1	
Bus72	11.000											0.059	91.1	3.2	
Bus73	11.000											0.236	91.7	12.9	
Bus74	11.000											0.057	91.5	3.1	
Bus75	11.000											0.179	91.7	9.7	
Bus76	11.000											0.060	91.5	3.3	
Bus77	11.000											0.119	91.6	6.5	
Bus78	11.000											0.059	91.1	3.2	
Bus79	11.000											0.060	91.5	3.3	
Bus80	11.000											0.060	91.7	3.3	
Bus81	0.415				0.053	0.023						0.058	91.7	83.4	
Bus82	0.415				0.055	0.024						0.060	91.7	85.0	
Bus83	0.415				0.108	0.047						0.118	91.7	168.6	
Bus84	0.415				0.055	0.024						0.060	91.7	85.1	
Bus85	0.415				0.108	0.047						0.117	91.7	168.1	
Bus86	0.415				0.027	0.023						0.035	75.9	51.0	
Bus87	0.415		0.007	0.004	0.053	0.023						0.066	91.0	95.3	
Bus88	0.415				0.074	0.048						0.088	84.0	125.0	
Bus89	0.415				0.053	0.023						0.058	91.7	83.7	
Bus90	0.415				0.055	0.024						0.060	91.7	84.8	
Bus91	0.415				0.053	0.023						0.058	91.7	83.5	
Bus92	0.415				0.054	0.024						0.059	91.7	84.5	
Bus93	0.415				0.054	0.023						0.059	91.7	84.1	
Bus94	0.415				0.054	0.024						0.059	91.7	84.4	
Bus95	0.415				0.032	0.023						0.040	81.5	57.4	
Bus96	0.415				0.053	0.023						0.057	91.7	83.0	
Bus97	0.415				0.109	0.047						0.118	91.7	168.9	
Bus98	0.415				0.055	0.024						0.060	91.7	84.7	
Bus99	0.415				0.052	0.023						0.057	91.7	82.9	
Bus100	0.415				0.052	0.023						0.057	91.7	83.0	
Bus101	0.415				0.052	0.023						0.057	91.7	83.0	
Bus102	0.415				0.023	0.023						0.033	70.9	47.1	
Bus103	0.415				0.052	0.023						0.057	91.7	83.0	
Bus104	0.415				0.053	0.023						0.057	91.7	83.1	
Bus105	0.415				0.054	0.024						0.059	91.7	84.6	
Bus106	0.415				0.055	0.024						0.059	91.7	84.6	
Bus107	0.415				0.023	0.023						0.033	70.9	47.1	

Project: MINI-GRID (IMG) 6.45MWp/10MWh
Location: JAJI, KADUNA
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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				
Bus108	0.415				0.052	0.023					0.057	91.7	82.8	
Bus109	0.415				0.053	0.023					0.058	91.7	83.6	
Bus110	0.415				0.055	0.024					0.060	91.7	84.7	
Bus111	0.415				0.053	0.023					0.058	91.7	83.5	
Bus112	0.415				0.055	0.024					0.060	91.7	84.8	
Bus113	0.800										0.423	38.1	305.2	
Bus114	0.800										0.421	37.5	303.7	
Bus115	0.415										0.011	88.7	15.8	
MV_BUS	11.000										2.176	90.2	114.8	

* 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).

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Engineer: A. ADEFEMI

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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	0.01	0.00					
500KVA PRIMARY	Transformer				0.500	0.066	13.3	0.066	13.2
AIRTEL BIRNIN YERO	Transformer				0.050	0.033	67.0	0.033	65.1
ALHAJI BALA	Transformer				0.300	0.057	19.1	0.057	19.0
Aux TR	Transformer				0.250	0.011	4.5	0.011	4.5
BABBAN GIDA	Transformer				0.300	0.120	39.9	0.118	39.4
BIRNIN YERO 1	Transformer				0.300	0.058	19.2	0.057	19.1
BIRNIN YERO 1 RELIEF	Transformer				0.300	0.120	40.1	0.118	39.5
BIRNIN YERO 2	Transformer				0.300	0.058	19.2	0.057	19.1
DANDAMI	Transformer				0.100	0.060	60.5	0.059	59.2
FIRST GATE	Transformer				0.500	0.060	12.0	0.060	12.0
FOUNDATION	Transformer				0.300	0.060	20.1	0.060	19.9
FRSC	Transformer				0.100	0.059	59.4	0.058	58.1
HAYIN SADAUKI	Transformer				0.300	0.058	19.2	0.057	19.0
HAYIN UMMA	Transformer				0.300	0.058	19.2	0.057	19.1
HYDRAF WATER	Transformer				0.300	0.060	20.0	0.060	19.9
IHS BOOSTER STATION	Transformer				0.050	0.036	72.7	0.035	70.4
JAFI	Transformer				0.500	0.058	11.5	0.057	11.5
KAHO VILLAGE	Transformer				0.300	0.060	20.1	0.060	20.0
KAMPANIN PATE RELIEF	Transformer				0.300	0.060	19.9	0.059	19.8
KAN ZAURE	Transformer				0.200	0.059	29.3	0.058	29.0
KANGADA	Transformer				0.500	0.089	17.7	0.088	17.6
KARGO DAM	Transformer				0.300	0.061	20.2	0.060	20.1
MTN BIRNIN YERO	Transformer				0.050	0.033	67.0	0.033	65.1
POLICE DIVISION HG	Transformer				0.200	0.060	30.1	0.059	29.7
PROPOSED KWARAU VILLAGE R	Transformer				0.200	0.060	30.2	0.060	29.8
PULLO FARM	Transformer				0.100	0.059	59.3	0.058	58.0
SHEHU KARAWU	Transformer				0.300	0.058	19.2	0.057	19.1
SKYPET	Transformer				0.200	0.060	30.0	0.059	29.7
STS	Transformer				6.600	1.912	29.0	1.887	28.6
STS 2	Transformer				6.600	0.421	6.4	0.419	6.3
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	0.059	59.4	0.058	58.2
TSOHON BIRNIN YERO	Transformer				0.300	0.059	19.7	0.059	19.6
U/ RIMI	Transformer				0.200	0.120	59.8	0.117	58.7
URWA	Transformer				0.050	0.041	82.1	0.040	79.5
ZARIA ROAD 1 500KVA	Transformer				0.500	0.058	11.6	0.058	11.6
ZARIA ROAD 2	Transformer				0.300	0.121	40.2	0.119	39.7

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

Project: MINI-GRID (IMG) 6.45MWp/10MWh
Location: JAJI, KADUNA
Contract:
Engineer: A. ADEFEMI
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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	0.060	0.028	-0.060	-0.027	0.1	0.5	99.4	96.5	2.83
AIRTEL BIRNIN YERO	0.024	0.024	-0.023	-0.023	0.5	0.8	96.5	96.1	0.38
ALHAJI BALA	0.053	0.023	-0.052	-0.023	0.3	0.4	96.4	95.7	0.67
Aux TR	-0.010	-0.005	0.010	0.005	0.0	0.0	99.3	99.5	0.23
BABBAN GIDA	0.109	0.050	-0.108	-0.047	0.7	2.4	98.7	97.4	1.30
BIRNIN YERO 1	0.053	0.023	-0.053	-0.023	0.3	0.4	96.6	96.0	0.67
BIRNIN YERO 1 RELIEF	0.110	0.049	-0.109	-0.047	1.1	1.7	96.6	97.6	0.98
BIRNIN YERO 2	0.053	0.023	-0.052	-0.023	0.3	0.4	96.6	96.0	0.67
Cable3	0.000	0.000	0.000	0.000		-0.1	100.0	100.0	0.00
DANDAMI	0.055	0.026	-0.054	-0.024	0.5	1.9	97.2	97.6	0.37
FIRST GATE	0.055	0.024	-0.055	-0.024	0.1	0.4	98.4	98.0	0.39
FOUNDATION	0.055	0.024	-0.055	-0.024	0.3	0.4	96.4	98.1	1.69
FRSC	0.054	0.024	-0.053	-0.023	0.8	1.3	96.4	96.7	0.28
HAYIN SADAUKI	0.053	0.023	-0.052	-0.023	0.3	0.4	96.5	95.8	0.67
HAYIN UMMA	0.053	0.023	-0.052	-0.023	0.3	0.4	96.6	96.0	0.67
HYDRAF WATER	0.055	0.024	-0.055	-0.024	0.3	0.4	96.3	98.0	1.69
IHS BOOSTER STATION	0.027	0.024	-0.027	-0.023	0.4	1.3	99.1	96.0	3.08
JAFI	0.053	0.023	-0.053	-0.023	0.2	0.2	96.4	96.0	0.40
KAHO VILLAGE	0.055	0.025	-0.055	-0.024	0.2	0.6	98.9	98.2	0.65
KAMPANIN PATE RELIEF	0.054	0.024	-0.054	-0.024	0.2	0.6	98.3	97.6	0.65
KAN ZAURE	0.053	0.024	-0.053	-0.023	0.2	0.9	97.5	96.5	0.96
KANGADA	0.074	0.049	-0.074	-0.048	0.2	0.8	98.7	98.0	0.68
KARGO DAM	0.055	0.025	-0.055	-0.024	0.2	0.6	99.0	98.4	0.65
Line1	1.952	0.936	-1.950	-0.935	2.0	1.8	99.5	99.4	0.12
Line10	0.684	0.331	-0.681	-0.329	2.8	1.7	99.2	98.7	0.47
Line10_PAR	0.684	0.331	-0.681	-0.329	2.8	1.7	99.2	98.7	0.47
Line11	1.176	0.558	-1.175	-0.557	1.6	1.3	98.4	98.3	0.16
Line12	0.054	0.025	-0.054	-0.025	0.0	0.0	98.7	98.7	0.00
Line13	1.234	0.585	-1.231	-0.583	3.0	2.5	98.7	98.4	0.28
Line14	0.054	0.024	-0.054	-0.024	0.0	-0.4	97.9	97.9	0.02
Line15	0.024	0.024	-0.024	-0.024	0.0	-0.1	96.5	96.5	0.00
Line16	0.053	0.023	-0.053	-0.023	0.0	-0.2	96.6	96.6	0.01
Line17	0.560	0.266	-0.558	-0.266	1.7	0.8	98.3	97.9	0.35
Line17_PAR	0.560	0.266	-0.558	-0.266	1.7	0.8	98.3	97.9	0.35

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	
Line18	-0.529	-0.253	0.531	0.254	1.9	0.8	97.5	97.9	0.42
Line18_PAR	-0.529	-0.253	0.531	0.254	1.9	0.8	97.5	97.9	0.42
Line19	-0.534	-0.261	0.534	0.261	0.6	0.3	96.5	96.6	0.13
Line2	1.890	0.907	-1.887	-0.904	2.9	2.6	99.4	99.2	0.18
Line20	0.053	0.024	-0.053	-0.024	0.0	-0.1	97.5	97.5	0.01
Line21	1.005	0.482	-1.003	-0.480	2.3	1.8	97.5	97.2	0.26
Line22	0.948	0.455	-0.947	-0.453	1.7	1.3	97.2	97.0	0.20
Line23	0.913	0.429	-0.910	-0.427	3.1	2.4	97.0	96.6	0.39
Line24	-0.165	-0.073	0.165	0.073	0.0	-0.2	96.6	96.6	0.03
Line25	0.055	0.024	-0.055	-0.024	0.0	-0.1	96.6	96.6	0.00
Line26	0.106	0.046	-0.106	-0.046	0.0	-0.1	96.6	96.6	0.01
Line27	0.053	0.023	-0.053	-0.023	0.0	-0.1	96.6	96.6	0.00
Line28	0.053	0.023	-0.053	-0.023	0.0	-0.1	96.5	96.5	0.00
Line29	-0.481	-0.237	0.481	0.238	0.2	0.1	96.5	96.5	0.06
Line3	0.110	0.050	-0.110	-0.050	0.0	-0.2	99.2	99.2	0.02
Line30	0.024	0.024	-0.024	-0.024	0.0	0.0	96.5	96.5	0.00
Line31	-0.079	-0.048	0.079	0.048	0.0	-0.1	96.5	96.5	0.00
Line32	0.055	0.024	-0.055	-0.024	0.0	-0.2	96.5	96.5	0.01
Line33	0.379	0.166	-0.379	-0.166	0.1	0.0	96.5	96.4	0.03
Line34	0.055	0.024	-0.055	-0.024	0.0	0.0	96.4	96.4	0.00
Line35	0.053	0.023	-0.053	-0.023	0.0	-0.1	96.4	96.4	0.00
Line36	0.271	0.119	-0.271	-0.119	0.0	0.0	96.4	96.4	0.01
Line37	0.054	0.024	-0.054	-0.024	0.0	0.0	96.4	96.4	0.00
Line38	0.217	0.094	-0.217	-0.094	0.0	0.0	96.4	96.4	0.01
Line39	0.053	0.023	-0.053	-0.023	0.0	0.0	96.4	96.4	0.00
Line4	0.163	0.073	-0.163	-0.073	0.0	-0.1	99.2	99.2	0.02
Line40	0.164	0.071	-0.164	-0.071	0.1	-0.3	96.4	96.4	0.04
Line41	0.055	0.024	-0.055	-0.024	0.0	-0.1	96.4	96.4	0.01
Line42	0.109	0.047	-0.109	-0.048	0.1	-0.6	96.4	96.3	0.06
Line43	0.054	0.024	-0.054	-0.024	0.0	-0.1	96.3	96.3	0.00
Line44	-0.055	-0.024	0.055	0.024	0.0	-0.4	96.3	96.3	0.02
Line45	0.055	0.023	-0.055	-0.024	0.0	-0.6	96.3	96.3	0.03
Line5	0.356	0.169	-0.356	-0.169	0.3	-0.1	99.2	99.1	0.10
Line6	0.164	0.074	-0.164	-0.074	0.0	0.0	99.1	99.1	0.00
Line7	0.055	0.023	-0.055	-0.025	0.0	-1.2	99.1	99.0	0.05
Line8	0.165	0.071	-0.164	-0.073	0.3	-1.5	99.1	98.9	0.22
Line9	0.109	0.048	-0.109	-0.050	0.1	-1.5	98.9	98.7	0.13

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	
MTN BIRNIN YERO	0.024	0.024	-0.023	-0.023	0.5	0.8	96.5	96.1	0.38
POLICE DIVISION HG	0.055	0.024	-0.055	-0.024	0.4	0.6	96.5	97.8	1.33
PROPOSED KWARAU VILLAG	0.055	0.024	-0.055	-0.024	0.4	0.6	96.6	97.9	1.34
PULLO FARM	0.054	0.024	-0.053	-0.023	0.8	1.3	96.3	96.6	0.28
SHEHU KARAWU	0.053	0.023	-0.052	-0.023	0.3	0.4	96.6	96.0	0.67
SKYPET	0.055	0.024	-0.054	-0.024	0.4	0.6	96.4	97.8	1.33
STS	1.817	0.597	-1.804	-0.554	12.4	43.4	96.0	99.5	3.49
STS 2	0.158	0.390	-0.158	-0.388	0.2	2.2	100.0	99.5	0.51
T10	0.054	0.025	-0.053	-0.023	0.5	1.7	98.7	96.8	1.94
T2	0.000	0.000	0.000	0.000			92.7	99.5	6.77
TSOHON BIRNIN YERO	0.054	0.024	-0.054	-0.023	0.3	0.4	97.9	97.2	0.68
U/ RIMI	0.109	0.050	-0.108	-0.047	1.0	3.5	99.1	97.1	1.95
URWA	0.033	0.024	-0.032	-0.023	0.8	1.2	97.0	96.2	0.82
Z4	0.158	0.390	-0.158	-0.390	0.0	0.0	100.0	100.0	0.00
Z5	-0.010	-0.006	0.010	0.005	0.0	-1.0	99.3	99.3	0.00
ZARIA ROAD 1 500KVA	0.053	0.023	-0.053	-0.023	0.2	0.3	99.2	96.4	2.79
ZARIA ROAD 2	0.110	0.050	-0.109	-0.048	0.7	2.4	99.2	97.9	1.30
					57.9	87.2			

* This Transmission Line includes Series Capacitor.

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

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Alert Summary Report

% Alert Settings

Loading

	<u>Critical</u>	<u>Marginal</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

Bus Voltage

OverVoltage	105.0	102.0
UnderVoltage	95.0	98.0

Generator Excitation

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
Bus3	Bus	Under Voltage	0.415	kV	0.385	92.7	3-Phase
PVA15	PV Array	Overload	238.157	Amp	239.594	100.6	3-Phase
PVA16	PV Array	Overload	238.157	Amp	239.594	100.6	3-Phase
PVA17	PV Array	Overload	238.157	Amp	239.594	100.6	3-Phase
PVA18	PV Array	Overload	238.157	Amp	239.594	100.6	3-Phase
PVA20	PV Array	Overload	238.157	Amp	239.594	100.6	3-Phase
PVA21	PV Array	Overload	238.157	Amp	239.594	100.6	3-Phase

Marginal Report

Device ID	Type	Condition	Rating/Limit	Unit	Operating	% Operating	Phase Type
Bus100	Bus	Under Voltage	0.415	kV	0.398	96.0	3-Phase
Bus101	Bus	Under Voltage	0.415	kV	0.398	96.0	3-Phase
Bus102	Bus	Under Voltage	0.415	kV	0.399	96.1	3-Phase
Bus103	Bus	Under Voltage	0.415	kV	0.398	96.0	3-Phase
Bus104	Bus	Under Voltage	0.415	kV	0.399	96.0	3-Phase

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Marginal Report

Device ID	Type	Condition	Rating/Limit	Unit	Operating	% Operating	Phase Type
Bus105	Bus	Under Voltage	0.415	kV	0.406	97.8	3-Phase
Bus106	Bus	Under Voltage	0.415	kV	0.406	97.8	3-Phase
Bus107	Bus	Under Voltage	0.415	kV	0.399	96.1	3-Phase
Bus108	Bus	Under Voltage	0.415	kV	0.397	95.7	3-Phase
Bus109	Bus	Under Voltage	0.415	kV	0.401	96.7	3-Phase
Bus110	Bus	Under Voltage	0.415	kV	0.407	98.0	3-Phase
Bus111	Bus	Under Voltage	0.415	kV	0.401	96.6	3-Phase
Bus42	Bus	Under Voltage	11.000	kV	10.725	97.5	3-Phase
Bus45	Bus	Under Voltage	0.415	kV	0.406	97.9	3-Phase
Bus46	Bus	Under Voltage	11.000	kV	10.610	96.5	3-Phase
Bus47	Bus	Under Voltage	11.000	kV	10.628	96.6	3-Phase
Bus48	Bus	Under Voltage	11.000	kV	10.771	97.9	3-Phase
Bus49	Bus	Under Voltage	11.000	kV	10.769	97.9	3-Phase
Bus50	Bus	Under Voltage	11.000	kV	10.611	96.5	3-Phase
Bus51	Bus	Under Voltage	11.000	kV	10.617	96.5	3-Phase
Bus52	Bus	Under Voltage	11.000	kV	10.724	97.5	3-Phase
Bus54	Bus	Under Voltage	11.000	kV	10.696	97.2	3-Phase
Bus55	Bus	Under Voltage	11.000	kV	10.674	97.0	3-Phase
Bus56	Bus	Under Voltage	11.000	kV	10.631	96.6	3-Phase
Bus57	Bus	Under Voltage	11.000	kV	10.630	96.6	3-Phase
Bus59	Bus	Under Voltage	11.000	kV	10.627	96.6	3-Phase
Bus60	Bus	Under Voltage	11.000	kV	10.630	96.6	3-Phase
Bus61	Bus	Under Voltage	11.000	kV	10.629	96.6	3-Phase
Bus62	Bus	Under Voltage	11.000	kV	10.617	96.5	3-Phase
Bus63	Bus	Under Voltage	11.000	kV	10.611	96.5	3-Phase
Bus64	Bus	Under Voltage	11.000	kV	10.610	96.5	3-Phase
Bus65	Bus	Under Voltage	11.000	kV	10.610	96.5	3-Phase
Bus66	Bus	Under Voltage	11.000	kV	10.608	96.4	3-Phase
Bus67	Bus	Under Voltage	11.000	kV	10.608	96.4	3-Phase
Bus68	Bus	Under Voltage	11.000	kV	10.607	96.4	3-Phase
Bus70	Bus	Under Voltage	11.000	kV	10.606	96.4	3-Phase
Bus72	Bus	Under Voltage	11.000	kV	10.606	96.4	3-Phase
Bus73	Bus	Under Voltage	11.000	kV	10.605	96.4	3-Phase
Bus74	Bus	Under Voltage	11.000	kV	10.605	96.4	3-Phase
Bus75	Bus	Under Voltage	11.000	kV	10.600	96.4	3-Phase
Bus76	Bus	Under Voltage	11.000	kV	10.600	96.4	3-Phase

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

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Engineer: A. ADEFEMI

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Marginal Report

Device ID	Type	Condition	Rating/Limit	Unit	Operating	% Operating	Phase Type
Bus77	Bus	Under Voltage	11.000	kV	10.594	96.3	3-Phase
Bus78	Bus	Under Voltage	11.000	kV	10.593	96.3	3-Phase
Bus79	Bus	Under Voltage	11.000	kV	10.589	96.3	3-Phase
Bus8	Bus	Under Voltage	0.800	kV	0.768	96.0	3-Phase
Bus80	Bus	Under Voltage	11.000	kV	10.591	96.3	3-Phase
Bus81	Bus	Under Voltage	0.415	kV	0.400	96.4	3-Phase
Bus83	Bus	Under Voltage	0.415	kV	0.404	97.4	3-Phase
Bus85	Bus	Under Voltage	0.415	kV	0.403	97.1	3-Phase
Bus86	Bus	Under Voltage	0.415	kV	0.398	96.0	3-Phase
Bus87	Bus	Under Voltage	0.415	kV	0.401	96.5	3-Phase
Bus89	Bus	Under Voltage	0.415	kV	0.402	96.8	3-Phase
Bus91	Bus	Under Voltage	0.415	kV	0.401	96.5	3-Phase
Bus92	Bus	Under Voltage	0.415	kV	0.405	97.6	3-Phase
Bus93	Bus	Under Voltage	0.415	kV	0.403	97.2	3-Phase
Bus94	Bus	Under Voltage	0.415	kV	0.405	97.6	3-Phase
Bus95	Bus	Under Voltage	0.415	kV	0.399	96.2	3-Phase
Bus96	Bus	Under Voltage	0.415	kV	0.398	96.0	3-Phase
Bus97	Bus	Under Voltage	0.415	kV	0.405	97.6	3-Phase
Bus98	Bus	Under Voltage	0.415	kV	0.406	97.9	3-Phase
Bus99	Bus	Under Voltage	0.415	kV	0.398	95.8	3-Phase

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SUMMARY OF TOTAL GENERATION , LOADING & DEMAND

	MW	Mvar	MVA	% PF
Source (Swing Buses):	-0.003	-0.001	0.003	94.86 Lagging
Source (Non-Swing Buses):	1.978	0.988	2.211	89.46 Lagging
Total Demand:	1.975	0.987	2.208	89.45 Lagging
Total Motor Load:	0.007	0.004	0.008	85.69 Lagging
Total Static Load:	1.909	0.894	2.108	90.56 Lagging
Total Constant I Load:	0.000	0.000	0.000	
Total Generic Load:	0.000	0.000	0.000	
Apparent Losses:	0.059	0.087		
System Mismatch:	0.000	0.000		

Number of Iterations: 1