

## JinkoSolar Provides PV+DG+ESS Complete Solution to Nigeria

JinkoSolar has delivered solar panels with Lithium Io Battery storage off-grid site in Abuja Nigeria.

The project is located in a resort with no grid power supply but needs a year-round reliable and cost-effective off-grid system that can run in tandem with diesel generators. The site management was looking for a reliable and flexible solution where most of its power requirements can be met using solar power and reduce its dependency on diesel generators.



Figure 1: Project Photos

### Solar

The solar panels are from JinkoSolar's Tiger Neo with n-type TOPCon technology.

### **Energy storage**

The system is provided with a 1.2 MWh energy storage system, consisting of Li-Ion batteries.

### **Diesel Generators**

The system works in tandem with a diesel generator. A solar PV DG and ESS controller have been designed to control the system.

The system consisting of JinkoSolar's 1 MWp N-type solar hybrid diesel generator with JinkoSolar's 1.2MWh li-Ion battery ESS, is fully integrated and controlled solar PV+ESS+DG integration. CAN Multi protocol has been used for the communication module ?

Solar panels generate electricity right from the morning and feed electricity to the resort loads directly. If the resort has low energy demand, the power is fed to the battery for charging the batteries. When the solar PV generation is low or at night the loads are powered through the batteries. If the batteries are drained out the diesel generators automatically start and feed the power to the loads. The surplus power of the diesel generators is also used to charge the batteries. This way the diesel generator running hours are reduced significantly and about 70% of diesel savings are realized.

Thanks to the scalable and flexibility of the system, once the resort loads have increased, additional panels and battery capacities could be added to make the system fully independent of the diesel generators. There are a lot of areas in Nigeria that continuously run on diesel generators. This case study is an example of how these remote facilities can migrate towards green solutions.

"For this kind of Solar hybrid ESS project which is highly complex and depends on multiple technologies, working with JinkoSolar can save customers trouble to be exposed to larger supply chain risk. When issues occur with product performance and safety, sometimes the end customers don't have clarity on who is directly responsible, the panel or ESS suppliers," said Dany Qian, VP of JinkoSolar, "customers have greater confidence in JinkoSolar's manufacturer performance guarantees and warranties, as it has the best understanding of technology with strong R&D teams."

# JKS540~1620K-500H



## **Key Features**

- Highly integrated system with various working modes
- Pre-populated transportation enables faster in-site installation
- LFP battery ensures longer battery life and higher safety
- Integrated and optimized fire protection design, higher security

# System Topology



### SYSTEM TECHNICAL SPECIFICATIONS

<table-container>Bettery ChemistryLithuin non Non-Quebic LUPPCell Life Cycle5,000 Cycles IC Q2ST: V9NDOD5,000 Cycles IC Q2ST: V9NDODCell Specification4P1158P115129115DC Rule Origonation4P1158P11512020WhDC Rule Origonation540Wh040000W1620WhCellarge Age610/~737V704VValtage Alange510/~737V1000VRMS Communication InteriorKoddus RTU, Modulus TCVVMSC Communication Protocol4000210002VMSC Communication Protocol200 S30VVStarder / Max PV Prover5005WVMSPT Votage ange Will Low200 S30VVMSC Communication Interior5005WVMaximum A Chower5000VVRader Of Comert5000VVRader Of Comert5000VVRader Of Comert5000VVRader Of Comert5000VVRader Of Comert5000VVStrawer Conton5000VVStrawer Conton5000VVStrawer Conton5000VVStrawer Conton5000VVStrawer Conton5000VVStrawer Conton5000VVStrawer Conton5000VVStrawer Conton5000VVStrawer Conton5000VVStrawer Conton6000VVStrawer Conton5000VVStrawer Conton6000VVStrawer Conton6000V<td< th=""><th>DC Data</th><th>JKS540K-500H</th><th>JKS1080K-500H</th><th>JKS1620K-500H</th></td<></table-container>	DC Data	JKS540K-500H	JKS1080K-500H	JKS1620K-500H
Cell Specification     3.2V/96Ah       Battery System Configuration     4P115     8P115     12P115       DC Rated Energy Capacity     540/Wh     1080/Wh     1620/Wh       Rated Voltage     704/         Voltage Range     616/-792/         BMS Communication Interface     RS4SE, Ethernet, CRRS         BMS Communication Protocol     Modbus RTU, Modbus TCP         Max PV Power     660/720/W          Standard/Max PV Power     660/720/W           MPT voltage range of full load     450-850/V	Battery Chemistry	Lithium Iron Phosphate (LFP)		
Battery System Configuration4P1158P11512P115DC Rated Energy Capacity5404/th10804/th16204/thRated Voltage764/764/Voltage Range616/-792/Y85455 Ethernet, GPN5BMS Communication Interface7640/ts764/BMS Communication ProtocolModbus RTU, Modbus TCPMaxPV Input Voltage1000/760/7304/tsStandard/Max PV Power600/7304/ts760/7304/tsAMPT Voltage range full load350-850/ts760/7304/tsMPT Voltage range full load5004/ts760/tsAC Data5004/ts760/tsRated AC Power5004/ts760/tsAct Data5050/ts760/tsRated AC Power5004/ts760/tsAC Rate of Current722/ts760/tsAC Rate of Current722/ts760/tsAC Granection39/tt H/E760/tsSTS Power5006/ts760/tsAC Granection39/tt H/E760/tsGreener Data720/ts760/tsGreener Data720/ts	Cell Life Cycle	5,000 Cycles 1C@25°C 90%DOD 5,000 Cycles 0.5C@25°C 90%DOD		
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MaxPV Input Voltage1000VStandard/Max PV Power600/720kWMPPT voltage range250-850VMPPT voltage range@full.load450-850VAC Data500kWRated AC Power500kWMasimum AC Power500kWAdaduum AC Power500kWAdaduum AC Power500kWRated Voltage400VAC Rate of Current722ATHDi<3%	BMS Communication Interface	RS485, Ethernet, GPRS		
Standard/Max PV Power   600/720kW     MPPT voltage range   250-850V     MPPT voltage range\full load   450-850V     AC Data   500kW     Rated AC Power   500kW     Maximum AC Power   550kW     Rated AC Power   500kW     Adde Yoltage   400V     Atada Yoltage   400V     Atada Yoltage   400V     Atada Yoltage   722A     THDi   ≤3%     Power Factor   1(leading) -1 (lagging)     Rated Frequency (Hz)   50/60H2     Atc Connection   3W+N+PE     STS Power   500kW     STS Power   500kW     STS Power   500kW     STS Shtching Time   ≤20mS     General Data   12/192*Z,591mm     Meight   <20T	BMS Communication Protocol	Modbus RTU,Modbus TCP		
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MPPT voltage range@full load 450-850V   At Data 500kW   Rated AC Power 500kW   Maximum AC Power 550kW   Rated Voltage 400V   Rated Voltage 400V   At Rate of Current 722A   THDi <3%	Standard/Max PV Power	600/720kW		
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Rated AC Power     500kW       Maximum AC Power     550kW       Rated Voltage     400V       Rated Voltage     400V       AC Rate of Current     722A       THDi     \$3%       Power Factor     1(leading)~1(lagging)       Rated Frequency (Hz)     50/60Hz       AC Connection     3W+N+PE       STS Power     500kW       STS Switching Time     \$20ms       General Data     12,192*       Dimension (W*D*H)     6,058*2,438*2,591mm     12,192*       Veight     <20T	MPPT voltage range@full load	450-850V		
Maximum AC Power     550kW       Rated Voltage     400V       AC Rate of Current     722A       THDI     ≤3%       Power Factor     1(leading)~1(laging)       Rated Frequency (Hz)     50/60Hz       AC Connection     3W+N+PE       STS Power     500kW       STS Power     500kW       STS Switching Time     ≤20ms       General Data     <22T	AC Data			
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AC Rate of Current   722A     THDi   53%     Power Factor   1(leading)1(lagging)     Rated Frequency (Hz)   50/60Hz     AC Connection   3W+N+PE     STS Power   500kW     STS Switching Time   <20ms	Maximum AC Power	550kW		
THDI   ≤3%     Power Factor   1(leading)~1(lagging)     Rated Frequency (Hz)   50/60Hz     AC Connection   3W+N+PE     STS Power   500kW     STS Power   500kW     STS Switching Time   ≤20ms     General Data      Dimension (W*D*H)   6,058*2,438*2,591mm     Meight   <20T	Rated Voltage	400V		
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AC Connection   3W+N+PE     STS Power   500kW     STS Switching Time   ≤20ms     General Data   12,192*Z,591mm     Dimension (W*D*H)   6,058*2,438*2,591mm   12,192*Z,591mm     Weight   <20T	Power Factor	1(leading) ~1(lagging)		
STS Power   500kW     STS Switching Time   ≤20ms     General Data   12,192*2,591mm     Dimension (W*D*H)   6,058*2,438*2,591mm   12,192*2,591mm     Weight   <20T	Rated Frequency (Hz)	50/60Hz		
STS Switching Time   ≤20ms     General Data	AC Connection	3W+N+PE		
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Weight<20T<30T<40TDegree of ProtectionIP54Operating Temperature Range-20~40°CRelative Humidity0~95% (non-condensing)Max. Working Altitude3,000mCooling Concept of DC hatchHVACCommunication InterfacesRS485, Ethernet, GPRS	General Data			
Degree of ProtectionIP54Operating Temperature Range-20~40°CRelative Humidity0~95% (non-condensing)Max. Working Altitude3,000mCooling Concept of DC hatchHVACCommunication InterfacesRS485, Ethernet, GPRS	Dimension (W*D*H)	6,058*2,438*2,591mm 12,192*2,438*2,591mm		
Operating Temperature Range-20~40°CRelative Humidity0~95% (non-condensing)Max. Working Altitude3,000mCooling Concept of DC hatchHVACCommunication InterfacesRS485, Ethernet, GPRS	Weight	<20T	<30T	<40T
Relative Humidity 0~95% (non-condensing)   Max. Working Altitude 3,000m   Cooling Concept of DC hatch HVAC   Communication Interfaces RS485, Ethernet, GPRS	Degree of Protection		IP54	
Max. Working Altitude 3,000m   Cooling Concept of DC hatch HVAC   Communication Interfaces RS485, Ethernet, GPRS	Operating Temperature Range	-20~40°C		
Cooling Concept of DC hatch HVAC   Communication Interfaces RS485, Ethernet, GPRS	Relative Humidity	0~95% (non-condensing)		
Communication Interfaces RS485, Ethernet, GPRS	Max. Working Altitude	3,000m		
	Cooling Concept of DC hatch	HVAC		
Certifications UL9540A, IEC62619, CE, UN38.3	Communication Interfaces	RS485, Ethernet, GPRS		
	Certifications	UL9540A, IEC62619, CE, UN38.3		

CAUTION: READ SAFETY AND INSTALLATION INSTRUCTIONS BEFORE USING THE PRODUCT.

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