

**Table S1.** Solar Energy System Materials

<p><b>Monocrystalline Solar Panel (330 Wp)</b></p>	<p>System voltage: 1000V-1500V            Number of cells: 60 cells            Efficiency of PV modules (module efficiency): 19.96% under Standard Test Conditions (Standard Test Conditions: 1000W/m<sup>2</sup> irradiance, 25°C module temperature and AM=1.5 spectrum)            Ambient temperature range of PV modules: -20 °C / +40 °C,            PV modules operating temperature range: -40°C /+85°C,            PV modules relative humidity range: 0% to 95%            Diode maximum current rating: 15 Amps            Maximum wind load: 2400 Pa            Maximum snow load: 5400 Pa            Solar panel size: 1670 mm x 1005 mm x 35 mm            Solar panel weight: 18.4 kg            Rated power voltage: 34.3 V            Rated power current: 9.78 Amps            Open circuit voltage: 41.54 V            Short circuit current: 10.4 Amps</p>
<p><b>Battery</b></p>	<p>The energy range: 5.1-12.8 kWh            Maximum output current: 25 Amps            Rated voltage value: 204 V            Operating voltage range: 160-230 V            Dimensions: 712x585x298 mm            Weight: 91 kg            Operating temperature range: -10 °C / +50 °C            Battery cell technology: lithium iron phosphate            Communication module: CAN/RS 485            Protection class: IP 55            Efficiency: at least 96%            Connection types: ON Grid / ON Grid + Backup / OFF Grid            Warranty period: 10 years</p>
<p><b>Inverter (5 kWp)</b></p>	<p>Maximum power point tracking: two            DC input voltage range: 80-1000V            Rated input voltage: 610 V            Supply start input voltage: 80 V            Maximum usable input current: 12.5 Amps            Maximum short-circuit current: 18.75 Amps            Maximum PV generator output power: 7.5 kWp            Rated AC output current: (220/230 V) 7.2 Amps            Operating frequency value: 50/60 (45-65) Hz            Total harmonic distortion rate: Less than 3.5%            Power factor (cos fi): between 0.7-1            Dimensions: 530x474x165 mm            Weight 15.6kg            Protection class: IP 66</p>

	<p>Active cooling system: yes  Operating temperature range: -25 °C / +60 °C  Operating humidity range: 0-100%  Maximum altitude range: 3000-4000 m  Maximum efficiency: 98.2%</p>
<b>DC Cable</b>	<p>Maximum rated voltage: 1800 VDC  Operating temperature range: -40°C to +90°C  Maximum conductor temperature: +120° C</p>
<b>AC Cable</b>	<p>Size :17 mm  Net weight: 517 kg/km  Conductor resistance: maximum 3.08 ohms/km  Current carrying capacity: 55 A in soil, 43 A in air  Conductor type: copper  Maximum operating temperature: +70° C  Operating ambient temperature: -20° C to +60° C</p>
<b>Construction</b>	<p>Material: Aluminum  Pressure: Resistant to wind, storm, snow load (minimum 5400 Pascal if not specified in the project)  Life: 10 years  Rust/corrosion resistant: yes  All connections are waterproof and shockproof</p>
<b>Connector</b>	<p>Waterproof, UV-insulated, resistant to abrasion, ozone, decay and corrosion, the negative effects of the atmosphere and hydrolysis, natural oils, chemicals and rodents  Works with high performance even at high temperatures</p>
<b>Irradiation Sensor</b>	<p>Supply voltage 12 V  Measuring range: -25° C to +75° C  Sensor dimensions: 140x100x26 mm  Protection class: IP20  Irradiation sensor device interface: RS422</p>