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50 MW Marneuli Solar Power Project with Battery Storages Feasibility Study Parameters

Project Overview

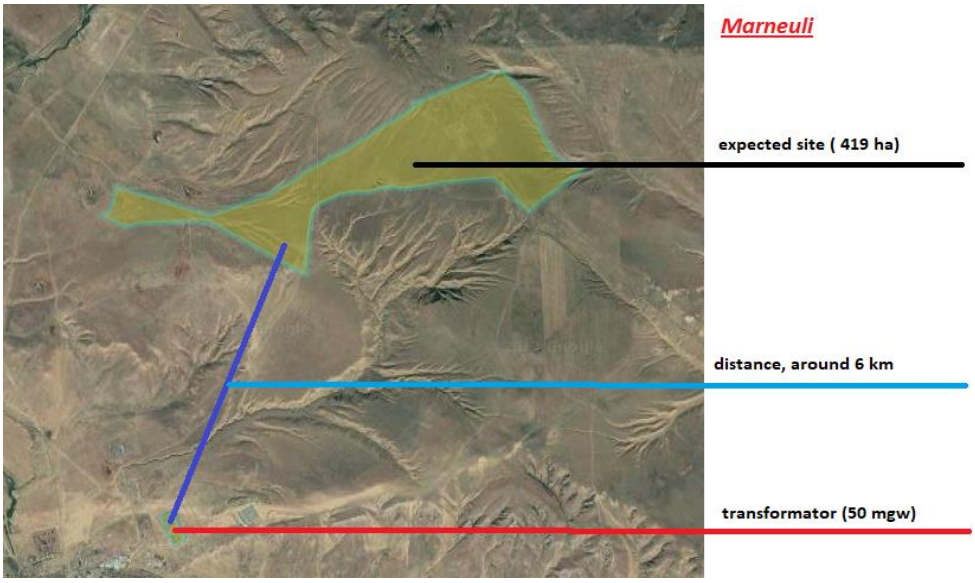
The project represents a USD 36 million renewable energy investment for 50 MW solar power station with battery storage backup in Marneuli municipality, Georgia.
Developer, LKS Solar LLC is Georgian resident company, established in 2018. It is jointly owned by Georgian and Polish entities, 50–50%, which are involved in the developing and operating of solar and wind power generation. The Polish shareholder company “Polwind” operates in more than 5 countries, has implemented more than 400 projects, with a total installed capacity of over 1000 MW.

Project Outline

Project Size:	50MW
Generation per year:	68.750,000 kWh/year
Tariff per kWh:	USD 0.067
Total Investment Cost:	USD 36 M

Project Location Details

Located in the surroundings of the city Marneuli, in Kvemo Kartli region of southern Georgia, 9.3 km to the northeast of the city (Coordinates: 41° 32' 38.92" N, 44° 52' 36.28" E), area is 100 ha. The transformer connected to the power grid is located in 6 km to the south.



Technical Details

The project involves 50 MW solar farm with battery storage backup. The estimated annual output is 68,750,000 kWh/Year. The estimated lifespan of the project is 25 years. The project includes Li-ion battery backup up to 10,000 kWp. The capacity factor of the project is expected to be 14.50%. The project envisages a standard connection to the 110 kV line. The initial interconnection conditions were proposed by the Georgian State Electrosystem.

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Environmental Impacts

Selected site is not within or immediate vicinity of protected area and/or emerald site and/or habitat for threatened or endangered species.
Main impacts of the project in the construction and operation phases include emissions of carbon monoxide, nitrogen oxide, particulate matter, also suspended dust due to transport, construction equipment and generators; land use change and land degradation, soil contamination with oils, petroleum; intensive water use and deterioration of surface water quality; waste generation, including hazardous; noise. All the stated impacts can be mitigated/ minimized with proper measures. The project will reduce carbon emission (CO^2 equivalent emission reduction) by 556,000 tons.

Permitting and Timing

Memorandum of Understanding is expected to be signed by 2022, planned date of commencement of operation is 2023.
Priority will be given to the employment of local workers during the construction phase. During the operation phase it is expected to employ up to 25 people.

Parameters for Feasibility Study

Technical, Economic and Environmental Parameters		
	General Information	
1	Project Name	Marneuli
2	Project Installed Capacity (MW)	50 MW
3	Project Location (Region)	Kvemo Kartli
4	Investor/Developer (Company Name)	LKS Solar, LLC
5	Estimated Total Initial Investment (USD)	35,720,000 USD
6	Distance to the Transformer (km)	6 km.
7	Project Development Stage	Initial
8	Status of Feasibility Study	Pre-feasibility
9	Date of signing MoU/Estimated Date	2022
10	Planned Date of Commencement of Operation	2023
	Technical Parameters	
1	Installed PV plant Capacity (kWp)	50,000 (kWp)
2	Type of PV modules	Same
2.1	Type 1	Monocrystalline Silicon (c-Si)
2.2	Type 2	N/A
3	Type of Mounting System	Fixed Mounting, Free Standing
4	Estimated Annual Output (kWh/Year)	68,750,000 kWh/Year
5	Estimated Lifespan (Years)	25 Years
6	Certification and Tests – Modules and Inverter	N/A
7	Module Warranty (Years)	10 Years
8	End-of-life Recycling	Yes
9	Type of Battery (if any)	Li-ion Battery

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9.1	Battery Storage Total Size (kWp)	10,000 kWp
10	Availability (%)	99%
11	Capacity Factor (%)	14.50%
12	PV modules Conversion Efficiency (Average)	Max 19.3 %
13	Performance Ratio (%)	80.7 %
14	Average Annual Irradiation (kWh/m²)	1,701 kWh/m²
15	Average Annual Sunlight (hours)	1,375 Hours
16	Type of Inverter	String
16.1	Inverter Euro Efficiency	97.5%
17	DC/AC Loss (%)	5.5% / 1.5%
18	Access to road (yes/no)	Yes
	Grid Connection	
1	Connection (New/Modification)	New
2	Preliminary Response of TSO/DSO on availability of free capacity for connection (Yes/No)	Yes
3	Preliminary Response of TSO/DSO on possibility for connection (Yes/No)	Yes
4	Connection to Distribution Network (yes/no)	No
4.1	Deep Connection to 110/ 35/ 6-10 kV Line (yes/no)	No
4.2	Overall Connection Route Length from Plant to Connection Point (km)	N/A
4.3	Cell Arrangement in 110/ 35/ 6-10 kV Substation	No
5	Connection to Transmission Network (yes/no)	Yes
5.1	Standard Connection (yes/no)	Yes
5.2	Deep Connection to 500/ 400/ 330/ 220/ 110/ 35/ 6-10 kV Line	110 kV
5.3	Cell Arrangement in 500/ 400/ 330/ 220/ 110/ 35/ 6-10 kV Substation	110 kV
5.4	Non-Standard Connection (yes/no)	No
6	Access to road (yes/no)	Yes
	Economic Parameters	
1	PV System Cost (USD/kW)	400 USD/kW
3	Total Cost of Grid Connection (USD)	859,000 USD
4	Battery Storage Cost (USD/kWh)	370 USD/kWh
5	Battery Storage Cost (USD/kW)	1,500 USD/kW
6	O&M Cost (% of total capital cost)	4%
7	Land Cost (USD/kW)	2 USD/kW
8	IRR (%)	10.07%
9	Type of Financing (Loan/Grant/Equity/etc.)	Debt and Equity
10	Financial Structure – Debt vs Equity (%)	30%/70%

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11	Debt Term (Years)	10 Years
12	Interest Rate (%)	7%
13	PPA Price (USc/kWh)	6.7 Usc/kWh
14	PPA Term (Years)	10 Years
15	PPA Term (Months in a Year)	12 Months
	Environmental Parameters	
1	Area of the project (m^2)	1,000,000 m^2 (100 ha)
2	GIS coordinates and description of the project area alternatives	83.10.02.877 83.10.02.901 83.10.02.874 83.10.02.889 Alternative sites not identified
3	Proximity to the Protected Area and/or Emerald Site and/or habitat for threatened or endangered species (Km.)	Selected site is not within or immediate vicinity of Protected Area and/or Emerald Site and/or habitat for threatened or endangered species
4	Water use (Yes/No)	Yes
4.1	If YES, Specify the Source of Water	Other
5	Environmental impacts for project phases - Construction, Operation and Maintenance and Demolition (Please provide your description)	Main impacts of the project in the construction and operation phases include emissions of carbon monoxide, nitrogen oxide, particulate matter, also suspended dust due to transport, construction equipment and generators; land use change and land degradation, soil contamination with oils, petroleum; intensive water use and deterioration of surface water quality; waste generation, including hazardous; noise. All the stated impacts can be mitigated/ minimized with proper measures.
6	Carbon emission reduction (CO2 equivalent emission reduction)	556,000 Tons
7	Screening decision	Not Submitted
8	Environmental decision	Not Submitted