

54 MW photovoltaic power plant 180 MW of storage batteries

Rozhnyativ village, Mochar tract, Ukraine



Project for the construction of a solar photovoltaic power plant with storage batteries

54 MW + 180 MW

This project envisages the construction and operation of a photovoltaic (solar) **power plant** (SPP) in Ivano-Frankivsk region with a total capacity of **54 MW** and **180 MW** of storage capacity. This project can be implemented and commissioned in 2025. Currently, the site is partially documented for construction: a 30-year land lease agreement, urban planning conditions and restrictions for the design of the construction object, urban planning calculation with technical and economic indicators, a working draft of the solar power plant construction (needs to be updated for new equipment), an agreement on non-standard connection to the power grid with the oblenergo and technical conditions for connection to the general grid (needs to be renewed), a calculation of the non-standard connection (needs to be recalculated), an expert report on the review of the project documentation for the working design, and a permit for construction work.

INDICATOR NAME	SIGNIFICANCE
Electric power, kW	54 000,00
Annual electricity production, thousand kWh.	61 506,00
Electricity consumption for own needs (including transportation, conversion and transformation costs), thousand kWh	1 356,38
Annual electricity supply, thousand kWh	60 149,62
Number of hours of peak power utilization, hours/year (SolarGis)	1 139



Annual electricity production by a solar power plant

What is clear is that the capacity of this power plant directly depends on the amount of solar energy that hits the batteries, and this amount depends on the time of year and time of day. If we take into account the number of sunny hours according to the Meteonorm 7 program **for Ivano-Frankivsk region** in this area and the power plant's capacity, we will get the data on electricity production during the calendar year



MONTH	IS THE EFFECTIVE OUTPUT OF THE MODULES, MWH.	VOLUMES OF SUPPLY TO THE GRID, MWH
January	1420,22	1377,59
February	2848,75	2763,29
March	4564,24	4450,08
April	7209,21	7065,11
May	8400,70	8218,13
June	8544,18	8373,25
July	8232,27	8067,58
August	7720,74	7566,24
September	5198,45	5068,49
October	3865,57	3803,19
November	2066,90	2004,94
December	1434,77	1391,73
Year	61 506,00	60 149,62

This project involves construction in two stages.

The first one is the construction of a **54 MW** solar power plant **+ 180 MW** of storage batteries. Connection to the Kalush PS-220/110 substation to sell electricity during peak hours. Obtaining technical conditions for connection for **60 MWh**.

Information about the land plot

Площа: 64.9961 га

Форма власності:

Комунальна власність

Цільове призначення:

Для розміщення, будівництва, експлуатації та обслуговування будівель і споруд об'єктів енергогенеруючих підприємств, установ і організацій

Вид використання:

14.01 Для розміщення, будівництва, експлуатації та обслуговування будівель і споруд об'єктів енергогенеруючих підприємств, установ і організацій





The second stage is to build a solar power plant and increase the capacity of the storage station. This is facilitated by the availability of substations PS-220/110 Kalush and PS-330/100 Perehinsk. There is also a possibility to increase the transmission capacity by reconstructing the power line for flows to the Stryi substation. The total area of the site for the construction of the SPP will be increased to **241 hectares**, which will allow the delivery of **200 MW** of SPP capacity and the required capacity of about **600 MW** of the battery storage station

Information about land plots

	Site 1	Site 2	Site 3	Site 4	
AREA (HA):	89.9907	35,3732	11,337	40,1649	
FORM OF OWNERSHIP:	Communal prop	perty			
INTENDED USE:	For the placement, construction, operation and maintenance of buildings and structures of energy generating enterprises, institutions and organizations - for the construction of a solar power plant				
TYPE OF USE:	14.01 For the placement, construction, operation and maintenance of buildings and structures of power generating enterprises, institutions and organizations				
CATEGORY:	Land for industry, transport, communications, energy, defense and other purposes				
ADDRESS:	Ivano-Frankivsk Mochar tract	region, Rozhniativ	<i>i</i> district, Svarychiv	village,	











An indicative financial model for the construction and operation of a **54 MW** solar power plant (SPP) and a **180 MW** battery storage plant (BSP) with electricity sales at a commercial tariff during peak consumption hours.

1. Capital expenditures (SAREH)

Construction of power plants:

N⁰	COMPONENT	CAPACITY, MW	COST, €/MW	TOTAL COST, €
1	Solar power plant	54	340 000	18 360 000
2	Battery station	180	180 000	32 400 000
3	Local substation (110/20 kW - 63 MW transformer, 20 kV switchgear)	1 pc.	2 654 897	2 654 897
	Total, excluding VAT			53 414 897

Connecting power plants to the general grid

N⁰	COMPONENT	QUANTITY	COST PER UNIT, €	TOTAL COST, €
1	Connection fee	54,000 kW	10	540 000
2	Design works: 110 kV transmission line, 220/110 substation, our 110/20 substation	1 pc.	424 783	424 783
3	Connection node (cell) of 110 kV SS - included in the connection fee	1 pc.	-	-
4	Power transmission line - 110 kV transmission line - 28 km.	28 km	212 392	5 946 976
	Total, excluding VAT			6 911 759



The total cost of construction and connection of the **54 MW** solar power plant and **180 MW** battery storage plant will be **€ 60,326,656** excluding VAT

2. Operating expenses (OPEX)

We estimate operating expenses at 1% of capital expenditures: 60 326 569 × 1% = 603 267 € per year.

3. Production and sale of electricity

Solar generation: 61,506 MWh/year.

- Solar generation including losses: **60,149.62 MWh/year.**

- Rechargeable delivery:

a) the optimal operation of electricity supply to the grid during peak hours is 6 hours per day.b) the effective technically possible output during peak hours can be about 3 hours:

60 MW × 3 hours × 365 days = 65700 MWh/year.



4. Expenses for the purchase of electricity

The required volume of electricity purchases:

65700 MWh/year - 60 150 MWh/year = 5 550 MWh/year.

We estimate the cost of purchasing electricity:

a) according to the Market Operator, the hourly price at the time of lowest consumption ranges from 42 UAH/MWh to 5467 UAH/MWh. We assume the average value among the average values at the time of least consumption in the amount of 1847.81 UAH/MWh.

b) the cost of purchasing cheap electricity to fully recharge the batteries at the time of lowest consumption is: UAH 1,847.81/MWh × 5,550 MWh/year. = UAH 10,255,345. Which, according to the interbank exchange rate, is: UAH 10,255,345 / 47.0828 = €217,815.

5. Revenue from electricity sales

a) According to the Market Operator, the hourly price during the peak period ranges from **7506.65 UAH/MWh** to **8999.33 UAH/MWh**. We take the average value among the 6 average values during the peak hour in the amount of **7669.37 UAH/MWh**.

b) the cost of selling electricity during the peak hour is: UAH 7669.37/MWh × 65,700 MWh/year. = UAH 503,877,609. Which, according to the interbank exchange rate, amounts to: UAH 503,877,609 / 47.0828 = €10,701,947.



6. Cash Flow

	Articles	2026	2027	2028	2029	2030	2031	2032	2033
	Receipt of funds								
1	Availability of funds at the beginning of the year	-	9 880 864	19 761 728	29 642 592	39 523 456	49 404 320	59 285 184	69 166 048
2	Revenues from sales, (\in)	10 701 946	10 701 946	10 701 946	10 701 946	21 338 984	10 701 946	10 701 946	10 701 946
	Total receipts	10 701 946	20 582 810	30 463 674	40 344 538	50 225 402	60 106 266	69 987 130	79 867 994
					39 460 976				
3	Operating expenses, OPEX (€)	603 267	603 267	603 267	603 267	603 267	603 267	603 267	603 267
4	Electricity purchase costs, (€)	217 815	217 815	217 815	217 815	217 815	217 815	217 815	217 815
5	Total expenditures EURO	821 082	821 082	821 082	821 082	821 082	821 082	821 082	821 082
6	Availability of funds at the end of the year	9 880 864	19 761 728	29 642 592	39 523 456	49 404 320	59 285 184	69 166 048	79 046 912

Cost of construction: **60 326 656** € excluding VAT. <u>Profitability:</u> **16,38** % <u>Payback period of the project:</u> **6 years and 2 months.**

Given that large enterprises currently purchase electricity at a tariff of more than **UAH 12 per 1 kW** and the trend of rising electricity prices, the projected payback period will be lower. It is also possible to increase the capacity - **200 MW + 600 MW**, which is described in detail in the second stage of construction.



Extract from the master development plan



Rozhnyativ village for the placement, construction, operation and maintenance of buildings and structures of power generating enterprises, institutions and organizations with an area of **65 hectares**





Technological needs and technical and economic indicators

Technologically driven resource requirements

- The area of land plots is 65.00 hectares;
- Electricity supply power of lighting and electrical equipment, including heating for own administrative and business premises up to approximately 10 kW;
- Heating is provided by electric heating;
- Existing off-site power grids the need to connect to existing 110 kV power grids;
- Domestic water supply is provided by an artesian well, water consumption is 1 liter per day.
- Domestic sewage is a bio-toilet, and in the future, local treatment facilities.

The main technical and economic indicators of an urban development object that characterize the intention of development:

- Type of facility (residential, healthcare, educational, etc.) non-residential, electricity facility.
- The total area of the land plot is **65.00 hectares;**
- The height of equipment and structures (maximum) is 15 m.
- The estimated total capacity of the grid is 60.14
 MW.
- Estimated peak capacity of PV modules 54 MW



Urban planning calculation with technical and economic indicators

Data from urban planning calculations

Nº S/N	NAMING	OD.VIM	TOTAL NUMBER
1	Maximum building height on the site	М	15
2	Maximum percentage of land development	%	36
3	The maximum permissible population density within a residential development corresponding to a residential unit	-	-
4	Maximum permissible distances from the projected object to - red lines - building regulation lines - existing buildings and structures	М	1 1 -
5	Planning restrictions (protection zones of heritage cultural monuments, boundaries of historical areas, zones of development regulation, zones of landscape, archaeological and cultural layer protection zones, within which a special regime of their use is in force, protected areas of the nature reserve fund, and sanitary protection zones.		missing
6	Protection zones of communication and transport facilities and utilities. Distance from the projected facility to existing utility networks	М	missing



Urban planning conditions and restrictions for the design of the construction object

Urban planning conditions and restrictions:



