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ELECTRICITY GENERATION USING SOLAR POWER IN INDUSTRIAL APPLICATION – CASE STUDY

Astrit Marjola Alfred BARDHI PUKA PJETRI In this article, we will analyze a case study of electricity production through photovoltaic panels in industrial applications. Based on the data obtained from the measurements in the object, the electricity produced by the PV panels covers the company's energy demands, and sometimes the pieces of energy production penetrate the power grid. Furthermore, solar energy is one of the ways of renewable energy, due to the incremental rate of environmental concern, provides a significant interest.

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- 1. A brief history of the development of solar energy in Albania.
- 2. Installation of photovoltaic panels at a plastic manufacturing company (Atearjo company).
- 3. Analysis of the impact of solar energy on the power system.
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A BRIEF HISTORY OF THE DEVELOPMENT OF SOLAR ENERGY IN ALBANIA

Production of energy in 2021

Type of generation	Yearly energy production [MWH]	
PPE/ hydropower connection at OSSH	877,726	
PPE/ hydropower connection at OST	951,505	
Private hydropower connection at OST	1,425,989	
Lanabregas hydropower	27,504	
Ashta hydropower	295,245	
PHOTOVOLTAIC PLANT	40,756	
Hydropower menage by KESH	5,343,974	
TOTAL	8,962,699	

A BRIEF HISTORY OF THE DEVELOPMENT OF SOLAR ENERGY IN ALBANIA

yearly radiation (kWh/m² per day)

Solar plant	Installed capacity	Grid connection	Energy production
	MW	kV	MWH
"seman2sun"	2	35	4,021
"Sonne"	2	35	4,001
"aed solar"	2	35	4,001
"age Sunpower"	2	35	3,950
"Seman Sunpower"	2	35	4,049
"Semanisolar"	2	35	3,950
ES 2019	2	35	4,304
"Smart watt	2	35	4,290
RTS	2	35	3,668
Statkraft	2	35	13
AEE	2	10	4,469

A BRIEF HISTORY OF THE DEVELOPMENT OF SOLAR ENERGY IN ALBANIA

yearly radiation (kWh/m² per day)

Region	Shkoder	Diber	Tirana	Vlora	Korça	Saranda
January	1.70	1.55	1.80	2.15	1.90	1.90
February	2.30	2.30	2.50	2.85	2.70	2.40
Marty	3.35	3.25	3.40	3.90	3.40	3.60
April	4.50	4.15	4.20	5.00	4.40	4.80
May	5.45	5.25	5.55	6.05	5.60	5.80
June	6.10	5.85	6.40	6.80	6.40	6.80
July	6.50	6.25	6.70	7.20	6.80	6.10
August	5.55	5.45	6.05	6.40	5.90	4.80
September	4.45	4.35	4.70	5.15	4.70	3.60
October	2.90	2.90	3.20	3.50	3.10	3.20
November	2.10	1.85	2.15	2.40	2.10	2.10
December	1.70	1.50	1.75	1.85	1.80	1.80



month	Active energy billing [KWH]	Invoice value [Euro]
January	100,700	20,140
February	98,720	19,744
Marty	112,340	22,468
April	120,370	24,074
May	105,750	21,150
June	123,475	24,695
July	120,450	24,090
August	122,370	24,474
September	110,430	22,086
October	99,390	19,878
November	107,890	21,578
December	115,740	23,148







Month	Energy consumption	Energy production by PV	energy billing [KWH]	Invoice value [Euro]
April	110,420	61,810	48,610	9,722
Мау	99,120	90,600	8,520	1,704
June	109,370	97,750	11,620	2,324
July	118,700	107,770	10,930	2,186
August	119,700	88,140	31,560	6,312
September	100,760	67,720	33,040	6,608

- Solar plants during operation mode cause power system overvoltage.
- Except for the fundamental harmonic, the voltage and current spectrum of the inverter output contain high-order harmonics.
- The transmission or distribution lines, in most cases, do not support the injected energy production by solar panels.
- Also, another problem of energy production with photovoltaic elements is the sudden change of energy due to weather conditions.

Summary

From	6/23/2021 12:43:00 AM
То	7/27/2021 4:26:22 AM
Maximum value	249.48
At	6/26/2021 8:06:00 AM
Minimum value	0.02
At	6/29/2021 5:01:00 AM
μ	231.826
s	8.71005
5% percentile	222.4
95% percentile	245.1
% [85% - 110%]	99.93%
% [90% - 110%]	99.93 %

Upper extreme values

Date / Time	Value
6/26/2021 8:06:00 AM	249.48
6/28/2021 4:08:00 PM	249.45
6/27/2021 4:17:00 PM	249.41
6/27/2021 3:39:00 PM	249.36
6/28/2021 4:09:00 PM	249.34

Lower extreme values

Date / Time	Value	
7/21/2021 8:17:00 PM	0.02	
7/21/2021 8:15:00 PM	0.02	
7/21/2021 8:14:00 PM	0.02	
7/21/2021 8:13:00 PM	0.02	
7/21/2021 8:12:00 PM	0.02	







Current spectrum





Phase voltage value during solar panel working.

CONCLUSIONS

- The energy from the sun is free and unlimited.
- Solar power is non-polluting.
- The production of electricity through solar plants would make possible the more efficient use of water resources in the country.
- Solar power usage does not emit any greenhouse gases or harmful waste.
- Solar panels, due to their simple construction and low maintenance cost, are mainly used for generation purposes.

RECOMMENDATIONS

- It is necessary to construct new power lines and substations in order to penetrate into the system the energy produced by the solar plants.
- The energy market should be liberalized, especially the granting of licenses for the installation of photovoltaic plants for residential and industrial applications.
- It is necessary to study the electrical system's ability to absorb the energy produced by solar panels.

