USING OF GREEN ENERGY - IMPLEMENTATION OF A PHOTOVOLTAIC PARK

Adriana Tudorache [1], Josef Timmeberg[2], Daniela Cîrțînă[1]
[1]University "Constantin Brâncuşi", from Tg Jiu, Romania
[2]Jade University of Applied Science, Wilhelmshaven, Germany

ABSTRACT:
The paper proposes several scenarios regarding a photovoltaic park with a minimum installed capacity of 10 MW. Powerplant Rovinari benefit from green certificates for each MWh supplied to the system Rovinari. Also we have to keep in mind that solar energy captured by solar panels, as well as the wind is a clean energy source compared to that provided by power plants.Scenario simulation of the production of electricity was done for a module using PVGIS program.These scenarios using a multi-criteria analysis will choose the best option.

KEY WORDS: photovolthaic, energy, solar, simulation, scenarios.

1.INTRODUCTION

Rovinari power plants produce electricity and heat using fuel as lignite. This power plant include thermal plant with an installed capacity of 1,320 MW, with four groups of 330 MW.
Investment was intended to be carried out on the former ash and slag deposits currently closed. Surface clay deposit which is is 58,68 ha. There deposit of ash being covered completely with a layer of soil.
The proposal investment is to achieve a photovoltaic park with a minimum installed capacity of 10 MW.
Atmosphere can be affected by a variety of solid, liquid or gaseous substances. European Union level, there are unanimously accepted limit values that define air quality, which is one of the areas for which many legislative acts have been elaborated and adopted, transposed also in the national legislation with the obligation to implement them. The normative acts, at European and national level, the strategic objectives in the field of atmospheric protection are the following: the improvement and extension of national system of air quality monitoring, reduction of the noise and vibration level in the residential areas, prevention and control of industrial pollution.
Atmosphere is the largest and at the same time the most unpredictable vector of propagation of pollutants, the effects of which are directly and indirectly felt by man and the other components of the environment. Then is necessary that the prevention of air pollution is a problem of public, national and international interest.
By monitoring air quality involves monitoring the sources and emissions of atmospheric pollutants, transfer of pollutants into the atmosphere, level of concentrations of pollutants in the atmosphere and their spatial-temporal distribution as well as the effects of atmospheric pollutants on humans and environment.
Air contaminated by the emanations of pollution sources undergoes a series of processes which generally result in a gradual

reduction of their concentration, until their complete disappearance from the air, a process called air self-purification.
Self-purification of the air is accomplished by two basic mechanisms, namely: dilution of pollutants eliminated by the source; dilution becomes easier and in shorter time, the lower the concentration of impurities in the air, the deposition of pollutants on the soil by sedimentation.

2. OBJECTIVES OF THE INVESTMENT PROJECT

The solar cells can be classified according to several criteria, the most common criterion is after the thickness of the material. We distinguish cells with thick and thin layer cells.
Other criterion is by the material: it employs, combinations of semiconductor CdTe, GaAs or CuInSe, but most commonly used is silicon and after basic structure distinguish crystalline materials or amorphous. Photovaltaic cell manufacturing semiconductor newer, and there is the possibility of using organic materials or organic pigments.
Silicon cells
• thick layer:
- monocrystalline cells; high yield - in serial production can reach to over 20% power efficiency, manufacturing technique devised; however the process is energy intensive manufacturing, which has a negative influence on the periodic recovery.
- polycrystalline cells; serial production has already achieved an energy efficiency of over 16%, relatively low energy consumption in the manufacturing process, and thus far, the best price - performance.
• Slight
- cells with amorphous silicon : largest segment of the market with this film cells; the energy efficiency of the modules from 5 to 7%; there are no bottlenecks in supply even at a production order terawatt.
-crystalline silicon cells(microcrystals);
- GaAs cells; very stable to temperature changes in heating loss less power than crystalline silicon cells, ultraviolet radiation robust opposite, expensive technology, typically used in space industry;
- cells with CdTe;
- solar cells based on organic compounds;
- pigment cells;
- semiconductor electrolyte cells;
- cells based on polymers.
For now it is only in the research phase. Is recommend the use of photovoltaic cells, multicrystalline (mc-Si), the efficiency ratio price they find most effective.
Proposed investment is more technical-economic plans.
Plan 1 - Create a photovoltaic park with fixed panels, grouped strings, this plan assumes strings mounting fixed on a metal structure, which will be connected to a central inverter being connected to a power transformer.

Figure 1 Photovoltaic park with fixed panels

At 55,31 ha park area, they were placed strings, resulting in a total of 6.120 strings, polycrystalline panels 20 thus follows that the studied area can accommodate.
This plan simulation was done, the production of electricity for a module is presented below, simulation made by PVGIS © European Communities.
Database sunlight used: PVGIS-CMSAF PV system rated power: 5.2 kW (crystalline silicon); estimated losses due to low temperature and irradiation 9,4%; estimated loss due to angular reflectance effects: 3,0%. Other losses: 14% loss photovoltaic system combined: 24,4%.
Resulting energy production for the entire cancel park: 6,160 kWh / year / string x 6.120 strings = 37,699.2 MWh / year / park.

Plan 2 - Establish a panel photovoltaic park in traking system with tracking of the sun on a single axis.

Figure 2.Photovoltaic park in traking system with one axis

This involves making strings that have the possibility to rotate the axis vertical, so can track the sun (suntraker).
The production of electricity for a module is presented below:
Nominal power of the PV system: 20 kW. Estimated Losses due to temperature and low irradiance: 9,4%; estimated loss due to angular reflectance effects: 3%; other Losses: 14%; combined PV system Losses: 24,4%.
Thus resulting energy production for the entire cancel park: 28.600 kWh / year / string x 442 strings = 12.64 MWh / year / park
Plan 3 - Create a panel photovoltaic park in traking system with 2-axis sun tracking.
Involves making strings that have the opportunity to rotate at a vertical-axis and after the horizontal, so can track the sun on two axes (suntraker).

Figure 3. photovoltaic park in traking system with 2 axis

When this was done a simulation script writers, the production of electricity for a module is presented below: Database sunlight used: PVGIS-CMSAF PV system rated power: 20 kW.
Estimated losses due to low temperature and irradiation 9,4%; estimated loss due to angular reflectance effects: 3%; other losses: 14%; photovoltaic system combined losses: 24,4%
Resulting energy production for the entire cancel park: 32,500 kWh / year / string x 442 strings = 14.37 MWh / year / park.
Recommendation optimal scenario was performed using a multi-criteria analysis. Criteria presented in the table above were determined using PVGIS surfaces resulting from topographic measurements and dimensions of solar panels. Simulations conducted for a single string or proposed for each alternative, then to extrapolate the number of strings that can be placed on the surface again.The alternative with the highest utility is A1.

Table 1 Alternatives considered

Object			Criteria					
			Energy produced/ string / year	Percentage of hired land	Energy produced / sqm / year	Energy produced / sqm / year Cost of maintenance/ anmMW installed	Energy produced MWp / year	Installed power MWp park
Alternative	***A1***	Fixed-String	6,16	*42%*	*68,16*	*25*	*37.699*	31,82
	A2	Strings Suntraker 1 axis	28,6	*16%*	*22,86*	*27*	*12.641*	12,06
	A3	Strings Suntraker 2 axis	32,5	*16%*	*25,97*	*30*	*14.365*	12,06

CONCLUSION

Investing proposes 3 phases of three photovoltaic parks as follows:
- Photovoltaic Park I - with the following characteristics:
• nominal power of 9.6 MW;
• a total of 2,040 modules (strings) each with 20 panels each, 40,800 photovoltaic panels with a rated power of 260 Wp;
• will be made of a galvanized steel structure that will be installed solar panels.
- Photovoltaic Park II:
• nominal power of 9.6 MW;
• total of 2,040 modules (strings) each with 20 panels each, 40,800 photovoltaic panels with a rated power of 260 Wp;
• will be made of a galvanized steel structure that will be mounted solar panels.
- Photovoltaic Park III:
• nominal power of 9.6 MW;
• total of 2,040 modules (strings) each with 20 panels each, ie 40,800 photovoltaic panels with a rated power of 260 Wp;
• made of a galvanized steel structure that will be mounted solar panels.

All these parks are the same constructive and functional characteristics and we see that the alternative with the highest utility is A1.

In conclusion photovoltaic park is a new alternative with a good impact to the air, healthand not only, new way to produce green energy.

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