Use of Solar Energy in Power Equipment

Ioan Lucian DIODIU[1)], Daniel Alexandru DRAGOMIR[1)], Aronel MATEI[2)], Roxana Claudia HERBEI[2)]

[1)] SC ENERGOCONSULT SRL
[2)] University of Petrosani, "Dorin Pavel" Technical Colleage, Alba Iulia

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Abstract

A clean environment is essential for people's health and quality of life. Developing sectors that help to meet the needs and comfort, have a negative impact on the quality of the environment we live in.
The use of natural resources without care to meet the needs of humans leads to the destruction of the environment. Climate change, erosion, increasing the amount of carbon dioxide in the air we breathe, are the result of meeting other needs such as food, heat, transport, comfort in our own home, etc.

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Three major polluting directions can be identified, namely:

- power generation,
- transport and
- food.

Unfortunately, the electricity industry is the most polluting. The production and consumption of electricity has negative effects on the environment.

The old power energy production generates a large environmental pollution. In 2010 kWh of electricity for obtaining a (mix of wind, and h dro, coal, nuclear and gas) to generate 0.406 kg of CO_2 (Fig. 2. Connection point with internal services fed from a photovoltaic panel contains all other greenhouse gases – the remainder of the gases being converted to CO_2 equivalent for easier calculation). With the development of wind farms, the CO_2 level for producing a kwh decreased.

Thus, for the summer of 2018 the CO_2 level generated by the production of a kwh is 0.282 kg CO_2/kwh, and for winter it is estimated to be 0.329 kg CO_2/kwh.

The energy produced by solar panels is an energy we can enjoy without polluting the environment. They work on light and not on heat. Panels can also work in winter. Regarding the number of photovoltaic parks in Romania, there is no institution to centralize the information about these, but from the sources we can say that in the last 4–5 years there were built about 960 photovoltaic parks.

The tendencies of adapting photovoltaic panels , along with the development of new ones technologies for power generation, brought major changes t distribution of electrical characteristics ie. The energy produced by photovoltaic panels is a small part of the network injected in it, but their numbers increase and growth will have an effect on network distribution and use of electricity, and if their share will increase significantly and you will influence and transport networks.

The prospect of implementing widespread in electrical distribution networks as well as the users of distributed power sources based on photovoltaic panels, causes transformation network passive, networks active in the transfer of energy is two-way and level and which raise new safety issues t in service and quality and efficiency of energy.

Generating electricity using low-power distributed power sources enabling the delivery of electricity near users, and so a supplement for energy produced centrally benefits by reducing electricity losses during transportation and costs arising from the modernization of distribution networks.

As regards to you on users, low cost, high reliability, good quality of electrical energy and a certain autonomy reserves of energy are topics that interest when adopting the solution take the production of energy by the distributed energy sources, but this is possible only with additional investment.

By using distributed generation in the field of renewable energy technologies, such as are the solar ones ensure a beneficial effect on the environment.

The base unit of the photovoltaic plant is the photovoltaic cell. Typically, a photovoltaic cell has an electric power between 1 and 2 W.

To increase power, photovoltaic cells are electrically connected to return united to form larger, called modules (panels). Basically, a photovoltaic module consists of photovoltaic cells connected in series.

The modules (panels), in turn, may be connected in series and/or parallel to form united and higher, called strings (and rows).

Photovoltaic panel strings connected in series and/or parallel is an area of photovoltaic whose Definitions ie was adopted in ANSI/IEEE Std.928-1986.

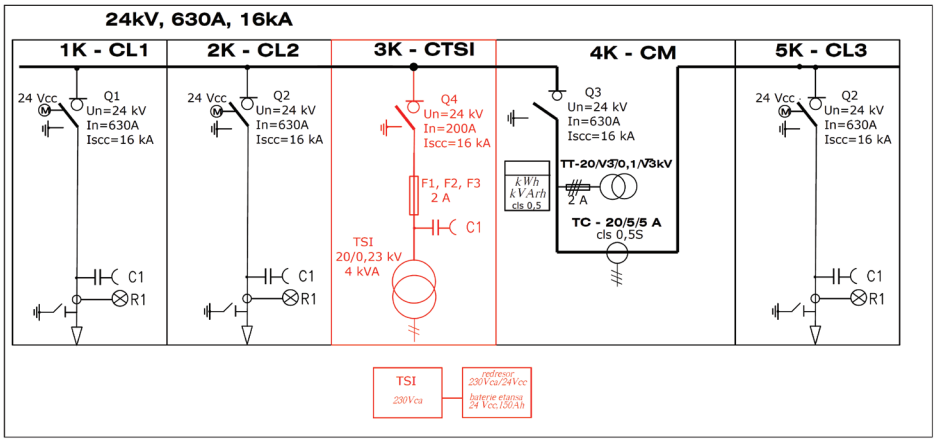

Fig. 1. The general scheme of a connection point
Rys. 1. Ogólny schemat punktu przyłączenia

Photovoltaic technology has become a major player in the global electricity production and is now one of the most advanced technologies, the scale of essential residence applied up to the applied to industrial use.

Depending on the electronic power converter component, photovoltaic power plants may be:

- Simple photovoltaic power stage, which has a single converter of conversion DC-AC
- Many photovoltaic power stage, which has more converse converter and DC-DC-AC

Photovoltaic plant consists of:

- photovoltaic generator;
- electronic power converter;
- interface with electrical network supply distribution.

In literature, various converters and topologies condition of the environment was studied and determined. Operation of the points corresponding to maximum power at different levels of solar radiation and the temperature.

The relationship of current and voltage of the PV generator to vary during the day depending laid environmental condition. To find the maximum power points that the photovoltaic panel can generate , it is important to match the characteristic I = f (U) as close to the real values as it is very important to choose the characteristic I = f (U) of the photovoltaic panel in accordance with the characteristic I = f (U) a electric charge.

A general approach to reaction control t take power is to measure and maximize power across the load was applied and considers that maximum power of photovoltaic panel is equal to the maximum power load. This method, called s and direct connection method is applicable if direct connection of the load to the panel s and thus maximizes actually applied load and power and not the maximum power that the photovoltaic panel is charging.

Because power generated by the PV panel depends on the level of radiation and temperature it problem DEPA major need is to extract the maximum power available to change the condition DISCLOSURES environment in which it operates.

This effect is called and implemented a maximum power point tracker (MPPT) is a follow-up device and extracting the maximum power of the photovoltaic panel. This device is a cc-cc converter inserted between the panel s and its electric charge. This converter is controlled by the types of algorithms, trying to find the most efficient solutions for extracting maximum power.

An application of these photovoltaic panels to support CO_2 reduction is to give up the internal service cell present at all connection points and replace it with a photovoltaic panel that generates energy for charging the battery of batteries needed for internal services as well as lighting the connection point tire.

A connection point has a general scheme shown in Figure 1.

Figure 1 shows that the internal services of the connection point are provided by a 3K-CTSI medium-voltage cell, connected to the medium voltage bars.

This cell has its component in medium voltage load separator, medium voltage fuses and an internal 20/0.23 kV internal power transformer of 4 kVA.

The internal service cell is mainly used to provide the 24 volt DC operating voltage required to power the drive motors of the load separators, command, protection and signaling voltage.

This voltage is permanently provided by a battery of 24V 150 Ah. Charging the battery is done by means of a buffer rectifier that ensures the current is up to 15A.

Considering that energy is consumed by charging storage battery is 500 W h/day, we can extrapolate a month at electricity consumed by 1,5 kWh per month.

Considering that there may be a large number of such cells on the territory of a city that provide operative voltage to power points or transformer stations, replacing them with renewable sources could reduce CO_2 levels.

For 100 transformer stations the electricity consumed would be 150 kWh/month.

The CO_2 emission for a mixed electricity product, equivalent to 150 kWh, calculated with a CO_2=0,6170 factor, will be 0,9255 kg CO_2.

Replacing the medium voltage of internal services with a photovoltaic panel capped to produce enough electrical energy to ensure operating voltage would reduce CO_2.

The connection or transformation point, in addition to the advantages associated with the reliability of the so-called system, could under certain conditions also deliver voltage to the network.

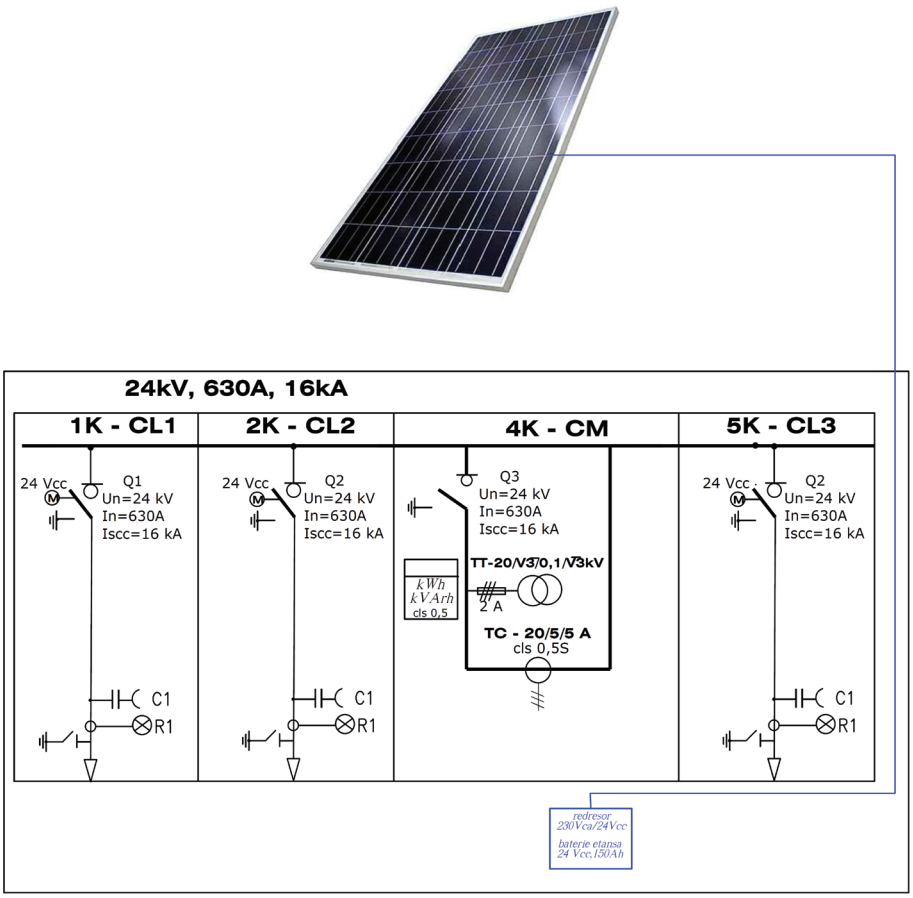

Fig. 2. Connection point with internal services fed from a photovoltaic panel
Rys. 2. Punkt połączenia z instalacją wewnętrzną zasilaną z panelu fotowoltaicznego

The features of a photovoltaic panel that could be used in such a configuration can be:

Maximum power, Pmax = 245 [W];
The voltage at Pmax, Ump = 30,3 [V];
Current at Pmax, I = 8,09 [A];
Short-circuit current, Isc = 8,34 [A];
Circuit voltage open, Uoc = 37,3 [V];
Temperature coefficient for Isc, a = 0.003/°C;
Coefficient of temperature for Uoc, ß = -0,32/°C.

Due to ability to generate "clean electricity" from the sun – without CO_2 emission – photovoltaic systems are part of the solution to current energy and environmental problem.

Solar photovoltaic power can contribute to the gradual reduction of fossil fuel consumption, contributing significantly to reducing greenhouse gas emissions in the electricity sector.

Photovoltaic modules contain materials that can be recovered and reused. Industrial recycling processes exist for both thin film modules and silicon modules. Materials such as glass, aluminum, and a variety of semiconductor materials are valuable when recovered.

Recycling brings benefits not only to the environment by reducing the amount of waste but also helps to reduce the amount of energy needed to supply raw materials and thereby reduce the cost and environmental impact of photovoltaic modules production.

Photovoltaic modules are designed to generate clean energy from renewable sources, a type of technology that has accumulated over 25 years of experience.

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Wykorzystanie energii słonecznej w urządzeniach energetycznych

Czyste środowisko jest niezbędne dla zdrowia ludzi i jakości życia. Rozwijające się sektory, które pomagają zaspokoić potrzeby i komfort, mają negatywny wpływ na jakość środowiska, w którym żyjemy. Wykorzystywanie zasobów naturalnych bez troski o potrzeby ludzi prowadzi do niszczenia środowiska. Zmiany klimatu, erozja, zwiększenie ilości dwutlenku węgla w powietrzu, którym oddychamy, są wynikiem zaspokojenia innych potrzeb, takich jak jedzenie, ciepło, transport, komfort w naszym domu.

Słowa kluczowe: *poziom CO_2, energia słoneczna, panele fotowoltaiczne, sieć dystrybucyjna*