

## The solar energy industries in the world and in Ukraine

Vinnitsia National Technical University

Faculty of Power Engineering and Electromechanics

### **Annotation:**

*The solar power is the conversion of renewable energy from sunlight into electricity, indirectly using concentrated solar power, or a combination. Pros and cons of the solar energy sources are given. Analytical study of the solar energy source is shown.*

**Keywords:** The solar energy industries in the world and in Ukraine; the solar energy works well.

### **Анотація:**

*Сонячна енергія - це перетворення відновлюваної енергії сонячного світла в електрику, безпосередньо за допомогою сконцентрованої сонячної енергії або їх комбінації. Наведено плюси і мінуси сонячних джерел енергії. Показано аналітичне дослідження джерел сонячної енергії.*

**Ключові слова:** Промисловість сонячної енергії у світі та в Україні; робота сонячної енергії

### **Introduction**

The solar power is the conversion of renewable energy from sunlight into electricity, either directly using photovoltaics (PV), indirectly using concentrated solar power, or a combination. Photovoltaic cells convert light into an electric current using the photovoltaic effect. Concentrated solar power systems use lenses or mirrors and solar tracking systems to focus a large area of sunlight to a hot spot, often to drive a steam turbine.

### **Research**

In the summer of 1979, President Jimmy Carter had 32 solar panels installed on the roof of the White House. They set a goal to collect 20% of the power for the White House from those panels. Sadly, one of the first acts of President Ronald Reagan was to remove those panels. Americans were never given a chance to accept solar power or to see what they were capable of because of this act. Big oil and the fossil fuel industry have worked very hard to keep solar power from winning favor with the majority of Americans by taking every opportunity to discredit and mock it. Those opponents of solar have done all that they can to discredit the solar industry by poking fun of the way panels look and by spreading disinformation about the way the panels work. Many people believe that a cloudy sky will have you unable to watch television or turn on your kitchen stove.

## Solar power benefits

1. It can power your entire home If you live in a warm climate that receives regular sunshine, solar will potentially be able to power your entire home. This depends on the type of system you install and the amount of energy that you need to power all of the systems in your home.

### 2. Tax Benefits

Many states offer tax benefits for installing solar on new builds. Federal programs for solar have existed and will likely become more incentivized as the government leans toward green energy in the future. The Federal Solar Tax Credit, known as ITC, will allow you to deduct as much as 30% of the initial cost of installing solar power in your home. This applies to both commercial and residential applications. This tax credit is scheduled to begin dropping each year until in 2022 and beyond it will only be 10%. This is, of course, unless there are any new incentive plans that are passed before then.

### 3. Solar is great for living off the grid

Solar can power homes that are far from the electrical grid, making living in faraway locations more possible. Countries that have inadequate grid accessibility are able to bring power to more locations in rural areas, helping to raise families out of poverty situations in third-world countries.

### 4. Solar is better for the environment

Solar power is a totally renewable and sustainable way of powering our lives. There is no off-gassing or pollutants as a result of using solar power.

### 5. Solar can lead to more jobs

Solar energy could lead to more industrial jobs in America, both in production and installation.

### 6. Requires little upkeep

The maintenance costs of solar are very minimal. Once you install solar panels, you can expect them to need very little upkeep. It is important to keep your panels clean so they draw sunlight efficiently. But if something like snow covers your panels, simply dust it off and you'll be good to go. The panels that are made today carry manufacturer's warranties of as long as 20-25 years. This makes solar an investment that is likely to outlast your other home appliances.

### 7. Solar energy is essentially free

Once the installation costs are recuperated, energy is available as you need it and you will never receive a bill in the mail.

### 8. You can still connect to the grid

You can tie to the power grid and create a system that collects power for your needs but can also draw from the grid to cover you when you are having several days of bad weather, lowering your solar collection.

When you collect more than you need, your power company will take the excess power you collect and credit you for this on your power bill. It's possible to get a bill with credits for power most months.

#### 9. The technology is always improving

Solar power has come a very long way and the panels made now are far more efficient than the panels installed on the White House in 1979. Thanks to research and advances in things like nanotechnology, the industry continues to advance. Some panels have tripled in efficiency since the early days of solar panel production. Many of the newer panels are so efficient that they will continue to collect energy even on days that are cloudy. As long as we have the sun in our solar system, you will be able to use solar energy.

#### 10. Solar has many different applications

You may use solar in many different applications and do not necessarily have to power your entire home with it. You may have, for example, a solar propane tankless water heater that works simply by heating the water in a tank designed to heat using the sun's rays. These can heat water to the point that it will burn you in the summer months. In winter months, if you live in a cold climate, you can expect water heating capacity to drop by as much as 20% to 30%.

#### 11. Solar power keeps decreasing in cost

The cost of solar has dropped by 99% since the 1970s. When President Carter installed panels at the White House, it cost roughly \$77 per watt to make a solar cell. The solar cells of today are far more efficient and only cost an average of \$0.39 per watt to manufacture. Currently, China is the leading manufacturer and exporter of solar panels around the world

#### 12. Solar saves money in the long-term

When you install solar you are not just saving yourself money in the long-term. You are also doing your part in helping the planet. Solar energy is the cleanest form of energy for the planet.

#### Disadvantages of solar power

##### 1. Big initial investment

The cost of solar installation can be a large initial investment and is not cost-effective for everyone yet.

##### 2. The weather plays a factor

Solar energy is somewhat weather dependent. If you live farther from the equator in a place that doesn't receive a lot of sunshine, your ability to power your home is far less. It isn't an efficient choice in locations that are cloudy and snow-covered.

### 3. Solar panels take up a lot of space

Panels haven't been exceedingly efficient, and the industry has made many upgrades, but the number of panels required to power a large home is not only costly, but takes a lot of space as well. Many people aren't keen to have a setup of 20 flexible solar panels in the yard or on their roof.

### 4. Energy is used to create solar panels

Some people point to the fact that the way panels are made can create some pollution, as well as the shipping and transporting them. That said, it is still far less pollution than other types of consumption and production.

### 5. Solar batteries can be expensive

Storing your collected power is paramount. This is also very costly because the batteries that are required are very costly. Specialized deep-cycle batteries are connected to your solar array, with a regulator installed between them. The regulator ensures that the batteries are not overcharged and also that they are never drained too low, which could damage the cells. It will sound an alarm if you are in danger of draining batteries too low. The more batteries you install, the more power you can collect and "save" for the days when you have inclement weather with less sunshine. People who have a large battery "bank" rarely notice a decline in power unless they have more than 3 or 4 days of no sunlight. A battery bank allows you to operate lights at night or any other times when there is no sunlight, as long as they are charged.

## Conclusions

World science and technology are constantly evolving. The world needs new types of energy sources that do not harm the environment and man. "New" types of energy must replace "old" energy sources, which are limited on the planet Earth. Every year the percentage of use of renewable sources becomes higher. This means that this industry is developing rapidly, and therefore will be necessary and widespread. Since renewable sources include solar energy, its development will also become large-scale.

## REFERENCES

1. Optimization of the functioning of the renewable energy sources in the local electrical systems: monograph / O. Burykin, P. Lezhniuk, V. Kulyk and others. – Vinnytsia: VNTU, 2018.
2. 2. Tomashevskiy, Yu., Burykin, O, Kulyk, V., Malogulko, Yu. Estimation of the dynamics of power grid operating parameters based on standard load curves // Easten-European journal of enterprise technologies. - 2019.
3. 3. Kulik VV Research of efficiency of joint operation of local electric networks with RES and centralized power supply systems [Text] / Kulik VV, Burikin OB, Malogulko Yu.V. // Bulletin of NTU of Ukraine "KPI". Mining series. Electrification and automation of mining operations ". - 2014.

**Struzhko I.G.**- student of group 2ESM-21b, faculty of Power Engineering and

Electromechanics, Vinnytsia National Technical University, Vinnytsia, email:  
irastruzhko11@gmail.com

Supervisor: **Nadiya Valeriivna Herasymenko**- English teacher, Department of Foreign  
Languages,

Vinnytsia National Technical University