



**ELECTRICITY FROM WIND ENERGY**  
**FOR YOUR FAMILY**



# ELECTRICITY FROM WIND ENERGY

## FOR YOUR FAMILY

Do you want to save on utility bills? Do you dream of being independent of your electricity providers?

With your own wind power station (WPS), this is quite real.

With your own WPS you can:

- ✦ independently provide your house with clean renewable electricity;
- ✦ save on electricity bills;
- ✦ be autonomous;
- ✦ become more energy efficient and energy saving
- ✦ to have more incentives to consume energy wisely and increase energy efficiency of your house for the benefit of the family budget and comfort: to analyze energy consumption, conduct energy audits of the house, use electrical appliances of energy efficiency class A and above, carry out thermal modernization, replace lighting systems with energy-saving ones and introduce other state-of-the-art smart technologies.

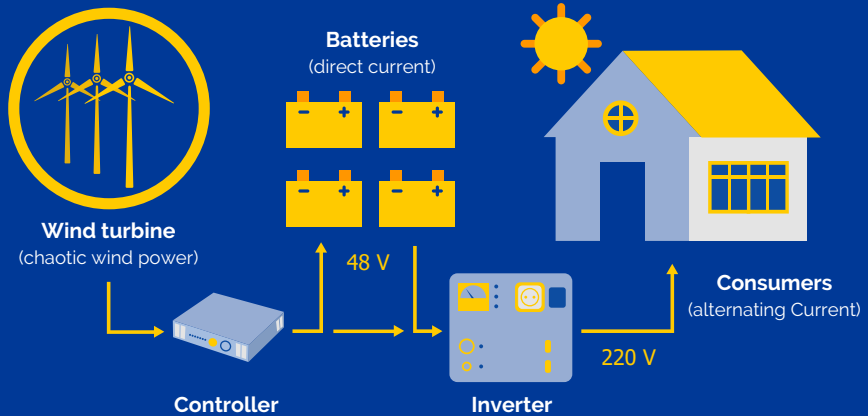
## RESOURCES DESCRIPTION

Wind is a natural phenomenon that occurs due to the air being heated by the sun. The heated air rises in the upper atmosphere, where it cools down and begins to fall. Thus, there are areas of different atmospheric pressure which causes air movements forming wind.

In recent years, wind energy has been increasingly used to generate electricity.

### A brief description of the operating principles of the technology

The principle of operation of this technology is to convert the kinetic energy of wind into electricity. The wind turbine has a wind wheel with blades which starts to move under the influence of wind along with the generator. The electric current produced by the generator goes to the batteries and then to the inverter where it is converted into necessary power for the operation of household appliances and electricity supply of the house.



Modern devices generate energy even with very light winds - from 3-4 m/sec.

It is advisable to make measurements of wind speed (potential) in order to select appropriate equipment and location for wind farms before construction starts on a potential site.

A peculiarity of modern models of wind turbines is the low speed of rotation. This significantly reduces the noise level and the risk of birds colliding with the blades. In suburban housing, low-power wind installations (up to 5 kW) are most commonly used.

The advantages of low-power wind turbines include:

- ✦ environmentally-friendly electricity production (no industrial emissions);
- ✦ stabilisation support for electricity supply via storage facilities
- ✦ energy supply throughout the year (production increases in winter period);
- ✦ works even with light wind, regardless of wind direction;
- ✦ low noise and electromagnetic effects due to the use of low power installations.



<https://www.subpng.com/png-4mh65c/download.htm>

But there are also some disadvantages, such as:

- dependence on weather and wind intensity: no wind - no production;
- quite a high cost of equipment, and therefore a long payback period (up to 10 years).

### ✦ **Option 1**

#### **A wind power station for self-consumption**

This station consists of network inverters, devices limiting generation to prevent energy flows into the grid.

In the daytime when there is consumption as well as wind activity, a smart meter senses data on the power consumption of the facility, transmits this information to the inverter, which in turn increases or decreases its output power, which it is generating at the moment, to provide the required amount of energy that the facility needs now. If the facility begins to consume less, the inverter reduces capacity to the correspondent load.



### ADVANTAGES

1. Constant generation throughout the year with more activity during consumption period (autumn-winter-spring periods).
2. 2-3 times bigger generation than with 1 kW of installed capacity of a solar power station.
3. A small area to accommodate the station (up to 3-5 m diameter).



### DISADVANTAGES

1. A high cost of equipment (i.e. cost of 1 kW of capacity).
2. Sufficient wind indicators at the installation site are required.

### ✦ Option 2

#### A wind power station for self-consumption and possibility to sell electricity to the grid

It has the same technical characteristics as the WPS for self-consumption. In addition, it is possible to sell energy to the grid at a green tariff.



### ADVANTAGES

All-season coverage of own consumption and the possibility to further sell electricity to the grid.



### DISADVANTAGES

A WPS can switch off if power in the central grid goes off; you can only sell excess electricity to the grid (part of the electricity will be consumed by the facility).

### ✦ Option 3

#### A wind power station for autonomous electricity supply for a facility

It is advisable to use such a wind turbine if there is no electricity in a house at all or it occasionally goes off. A power station generates energy that charges storage batteries (usually lithium ones as they are more cost-effective for wind installations) as well as cover the daytime consumption of the facility. In the evening, the energy from batteries is converted by an inverter and feeds the power as long as there is residual charge in the batteries



### ADVANTAGES

Full autonomy and uninterrupted operation, a reliable power supply.



### DISADVANTAGES

More expensive than the first two types of stations; a longer payback period.

## ⚡ ENERGY PRODUCTION POTENTIAL IN REGIONS OF UKRAINE

Throughout the territory of Ukraine (with the right choice of a wind turbine, location and height) it is possible to get from 2,200 to 3,000 kWh of generation per year from a 1 kW WPS. A household wind turbine is located at a height of 10-30 m. The higher it is, the better the wind indicators are. When installing a WPS, you need to take into account the terrain, "wind shading" from houses and trees. An average annual wind speed of about 5 m/s is enough for a household wind turbine to work.

Let us take a look at the usage of WPS for a typical private **house of 150 m<sup>2</sup>** with a monthly electricity demand **of 250 kWh** in Kyiv

### OPTION 1

for self-consumption only.

### OPTION 2

for self-consumption and the possibility to sell electricity at a green tariff.

### OPTION 3

for autonomous electricity supply of the house.

INDICATORS	OPTION 1	OPTION 2	OPTION 3
<b>Technical parameters of the technology:</b>			
● Installed capacity (kW)	0,8	4	1,6
● height of the mast, m	14	20	26
● electricity production volume (kWh) per month	250	1 000	500
● volume of own consumption of electricity (kWh) per month	250	250	250
<b>Economic parameters for a year:</b>			
Total cost of installation, €:	4 100	14 280	9 370
● the cost of a wind power station;	3 480	12 140	6 870
● the cost of a rechargeable battery (48V/170Ah):	відсутня	відсутня	1 520
● the cost of connecting to the grid (replacement of the meter);	відсутня	270	відсутня
● cost of installation.	620	1 870	980
Electricity tariff:			
● average tariff for electricity consumption, UAH /kWh (€ ct / kWh)	1,32 (4,7)	відсутній	1,32 (4,7)
● green tariff, (€ ct/kWh)	відсутній	10,45	відсутній
● income (profit/savings)/year, \$	141	941	141

*The above-mentioned comparison of the use of equipment is for informational purposes only and should not be considered as an economic justification. The technical and economic parameters may differ from the actual operating conditions of the equipment*

# HOW TO INSTALL A WIND POWER STATION AND WHAT TO TAKE INTO CONSIDERATION IN THE FIRST PLACE?

No permits or licenses are required to install a wind power station in a household.

*The procedure for sale, accounting and payments for electricity produced by WPS in private households is regulated by the resolution of the National Energy and Utilities Regulatory Commission dated 27.02.2014 № 170, registered in the Ministry of Justice of Ukraine on 26.05.2014 under № 539/25316.*

The procedure for installing a wind power station consists of the following steps:

## 01

**Consulting with engineers of a service company about the installation of wind power stations in households:**

- ✦ assessment of the parameters of the power system of a house;
- ✦ when installing on the ground, it is necessary to take into account proximity to other residential buildings as a wind turbine can create a slight noise; when installed on the roof - the roof structure of the house, size, type should be considered;
- ✦ choice of options for installation of a WPS (self-consumption; self-consumption and selling to the grid at a green tariff; autonomous energy supply) *(calculation of capacity, choice of equipment, approximate cost);*

## 02

**To further receive the green tariff, it is necessary to contact the Distribution System Operator (Oblenergo) to clarify the following questions:**

- ✦ capacity allowed under the agreement on the electricity use;
- ✦ conditions of capacity increase (up to 50 kW) (costs and terms of connection in case of capacity increase;

## 03

**Increasing the capacity envisaged by the contract with Distribution System Operator (Oblenergo) on electricity use - signing a new contract (if necessary);**

## 04

**Concluding a Contract with a service company for the installation and commissioning of the WPS, incl. supply of necessary equipment and supplements** *(purchase and installation of WPS equipment can be done independently but we recommend contacting a specialized service company).*

# 05



## A specialized company performs installation and commissioning of the WPS on the site.

By Ukrainian law it is allowed to install wind power stations (WPS) with a capacity of **up to 50 kW** in private households. A green tariff for electricity produced by WPS in a household, which was put into operation from 01.01.2020 to 31.12.2024, constitutes **10.45 € ct/kWh**. The low pace of installation of wind turbines has prompted the development and implementation of additional incentives.

Thus, the Law of Ukraine from 25.04.2019 N° 2712 on Ensuring Competitive Conditions for Generation of Electricity from Alternative Energy Sources introduced a new category of the green tariff for **combined** wind/solar installations of private households **up to 50 kW**.

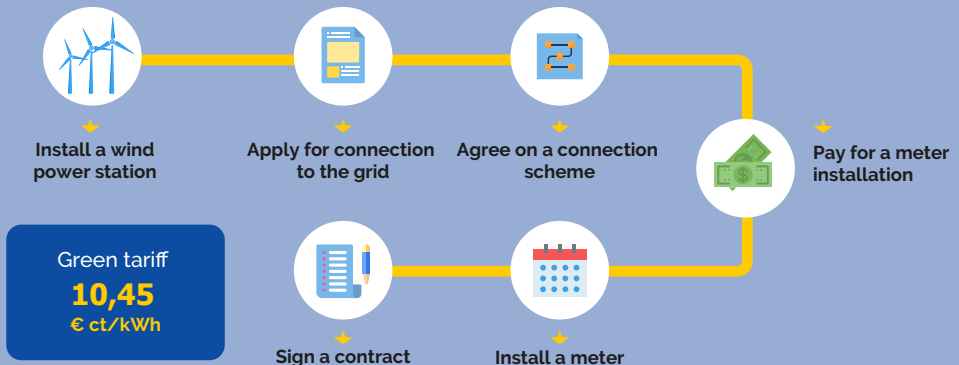
The green tariff for combined wind/solar power stations, which were put into operation **from 01.01.2020 to 31.12.2024**, is **12.28 € ct/kWh**, which is higher than the tariff for wind power stations, which is **10.45 € ct/kWh**. Combined wind/solar stations make it possible to generate electricity both in daylight, when there is a significant intensity of solar insolation, and at night, when the wind intensity increases significantly. Therefore, such a combination provides for the "round-the-clock" electricity production.

The introduction of the green tariff for combined wind/solar stations of private households has significantly simplified the mechanism of connecting such electrical installations to the grid. After all, with a single tariff, it has become possible to use only one electricity converter (inverter) and one metering unit. This significantly reduced the investment in electrical installations and, in turn, reduced their payback period.

Green tariff for private households	
Installations with the capacity of up to <b>50 kW</b>	
<b>WPS</b>	
Tariff	
<b>10,45</b>	
€ ct/kWh	
<b>WPS Combined WPS+SPS</b>	
Tariff	
<b>12,28</b>	
€ ct/kWh	

No license is required to sell the electricity at the green tariff.

## How to get the green tariff?



# 06

In order to receive income under the green tariff, it is necessary to open a current account at a bank for crediting the funds, and submit the following documents to the Distribution System Operator (Oblenergo):

- ✦ application notifying about the WPS installation
- ✦ one-line connection scheme with information on equipment elements installed, their nominal capacity and the installation location;

# 07

Oblenergo verifies the information (3 working days) and provides the customer with an invoice to pay for the services of a metering unit installation (3 working days).

# 08

Oblenergo installs the metering unit (3-5 days from the date of the payment)

# 09

Oblenergo (within 3-5 working days) transmits information on the installation of the WPS in the household to the Universal Services Provider.

# 10

The Universal Services Provider and the consumer conclude a Contract on the purchase and sale of electricity at the green tariff, which is Annex 2 to the Contract on the supply of electricity by the Universal Services Provider.

The date when the WPS is commissioned is fixed in the application notifying Oblenergo about the WPS installation in a household.

Payments to the household for excess electricity produced by the WPS and sold at the green tariff are made from the date of the conclusion of the Contract on the purchase and sale of electricity at the green tariff.



<https://www.pngwing.com/en/free-png-njhdk>

It should also be noted that the greatest effect from the use of renewable energy sources can be achieved undertaking energy efficiency measures in the house.





### Ruslana Lyzhychko

a singer, Global Ambassador of Renewable Energy in the World

*«My house is a fully energy-efficient house, where all rooms are 100% supplied with energy from the sun, wind and earth.*

*The house is conceptually designed as an example of an innovative eco-philosophy that leads from consumption to the renewing of eco-resources, additional generation and production of energy and, as a result, maximum energy independence.*

*From the beginning, when we were just planning our house, we designed it not only as energy independent but also energy self-sufficient, so that it produces as much energy as it consumes, and ideally even more so that the balance is positive.*

*From the very beginning, we planned to use all types of renewable energy within our possibilities.*

*We constructed a big "solar roof" which is a roof completely covered with solar photovoltaic which generates electricity. Total rated power is 25 kW.*

*We also installed a large storage system with 192 OPzS batteries (manufactured by Vldar, Kharkiv). Thus, when there is no sun, no wind, no electricity in the grid, we can use energy from batteries for almost 2 days.*

*That is, in addition to having our own backup power supply system for the house, we also perform a certain balancing function: when consumption is high, we are able to generate energy, and when consumption is low on the contrary, we can consume energy from the grid.*

*There are 10 wind turbines installed near the house, which we have located in the windiest zone of our area - near the ravine, where the wind always blows from the north.*

*In fact, our wind turbines provide much more electricity than solar panels in the cold season and off-season. Although, there are some issues, of course. In particular, the neighbours who live next to us complain about the sounds made by wind turbines. This must be kept in mind and taken into account.*

*I am convinced that renewable energy sources can ensure real independence and they are the future of every person and humanity in general».*





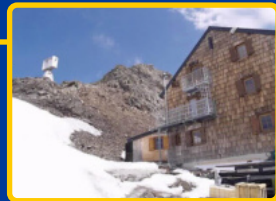
## Lukas Lantschner

manager of the mountain lodge Mueller Huetten in South Tyrol (Italy)

*In summer of 1997 I installed a 3-kW wind turbine in my Müller Hütte. Since that time, it covered about 50% of our energy needs. The rotor is extremely robust, works reliably independent of the direction and power of the wind. Gusts of wind or storms, not even snow or temperatures minus 25 degrees Celsius damage it, it works best with a constant wind. The recovered energy is stored in batteries, or if possible, immediately used.*

*The technological philosophy of the lodge is very simple: good weather – we use solar energy, bad weather (with almost always wind) – we use wind energy.*

*Apart from wind our lodge uses also other renewable energy technologies like photovoltaic, solar thermal panels, pellets or wood, so we strive to be self-sufficient to a best possible extent. Our experience on renewables is the experience we live every day.*



## USEFUL SOURCES OF INFORMATION

In different regions of Ukraine, programs have been introduced to stimulate the installation of wind power stations in households. Under the terms of these programs, you can get a partial refund of part of the cost or loan for a wind farm.

Do such programs work in your city, district, region? Find out the details:



IN OBLAST STATE ADMINISTRATIONS:



ON THE MAP OF LOCAL PROGRAMS:





## State Agency on Energy Efficiency and Energy Saving of Ukraine

State Agency on Energy Efficiency and Energy Saving of Ukraine

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We are in social media: <https://www.facebook.com/saeUA>  
[https://twitter.com/SAEE\\_Ukraine](https://twitter.com/SAEE_Ukraine)  
[https://t.me/SAEE\\_UA](https://t.me/SAEE_UA)



### → UA MAP



an Interactive Investment Map of Renewable Energy and Energy Efficiency Projects in Ukraine

<https://uamap.org.ua>  
[uamap@sae.gov.ua](mailto:uamap@sae.gov.ua)

→ Learn more information on clean energy use contacting relevant oblast state administrations:

<http://sae.gov.ua/uk/content/regional-contacts>

→ The National Commission for State Regulation of Energy and Public Utilities

<https://www.nerc.gov.ua> [box@nerc.gov.ua](mailto:box@nerc.gov.ua)  
[www.facebook.com/nerc.gov.ua](http://www.facebook.com/nerc.gov.ua)

→ Renewables Association of Ukraine

+38 (044) 379 12 95 [info@uare.com.ua](mailto:info@uare.com.ua)  
<https://uare.com.ua>

→ Institute of Renewable Energy of National Academy of Science of Ukraine

+38 (044) 206-28-09 [info@ive.org.ua](mailto:info@ive.org.ua)  
<http://www.ive.org.ua/renewable@ukr.net>

→ Organization of «Global 100% RE Ukraine»

<https://100re.org.ua> [info@100re.org.ua](mailto:info@100re.org.ua)  
<https://www.facebook.com/100REUA>

→ European Wind Energy Association

<https://windeurope.org>

→ World Wind Energy Association

<https://wwindea.org>

→ Ukrainian Wind Energy Association

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<https://www.facebook.com/ukrwindenergysociation>

There are numerous portals on the Internet where you can also find some necessary information, including:

→ Up-to-date news on clean energy sources - on the "Eco Town" website»:

<https://ecotown.com.ua>

→ «An 80-year-old Prykarpattia resident built a windmill to save on energy carriers»:

<https://www.youtube.com/watch?v=boEtj13HNzo>

→ «Solar and wind energy: a resident of Lviv region supplies his house with electricity from solar panels and a windmill»:

<https://www.youtube.com/watch?v=MRquUplEfzA>

→ «A Ukrainian citizen built an energy-independent house in Kyiv region, which uses wind and solar energy only»:

<https://ecotown.com.ua/news/Ukrayinets-zviv-na-Kyivshchyni-enerhonezalezhnyy-budynok-yakyy-zhyvytsya-lyshe-enerhiyeyu-vitru-ta/>



← THIS PROJECT IS FUNDED BY THE EUROPEAN UNION



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