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**HEAT FROM SOLAR ENERGY**  
**FOR YOUR FAMILY AND COMMUNITY**



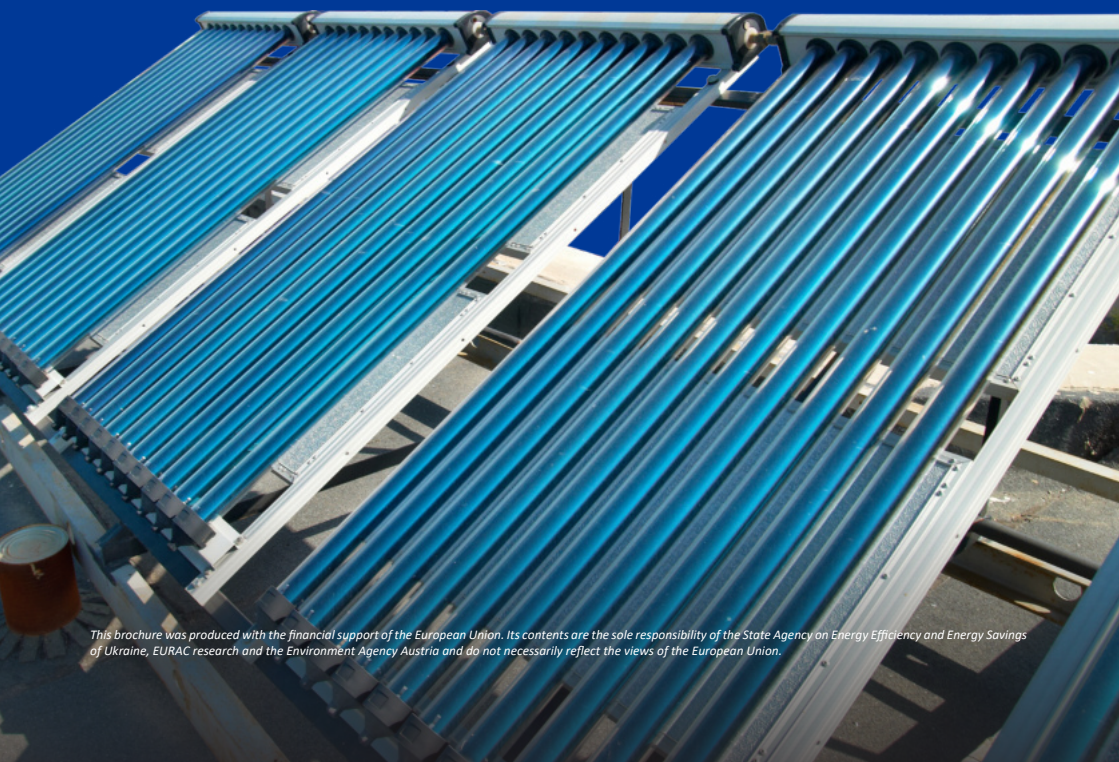
## SOLAR THERMAL ENERGY FOR YOUR FAMILY

A solar collector is a modern invention that makes it possible to use solar energy to heat your home or water.

A solar collector installed in your household will enable you:

- ◆ to have warm and hot water thanks to the renewable energy of the sun;
- ◆ to be independent of traditional fossil energy resources;
- ◆ to save considerable amount of money on utilities and hot water costs;
- ◆ to be an energy efficient family and share valuable experiences of using modern technologies with your friends.

Using clean innovative technologies allows 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 modern smart technologies.

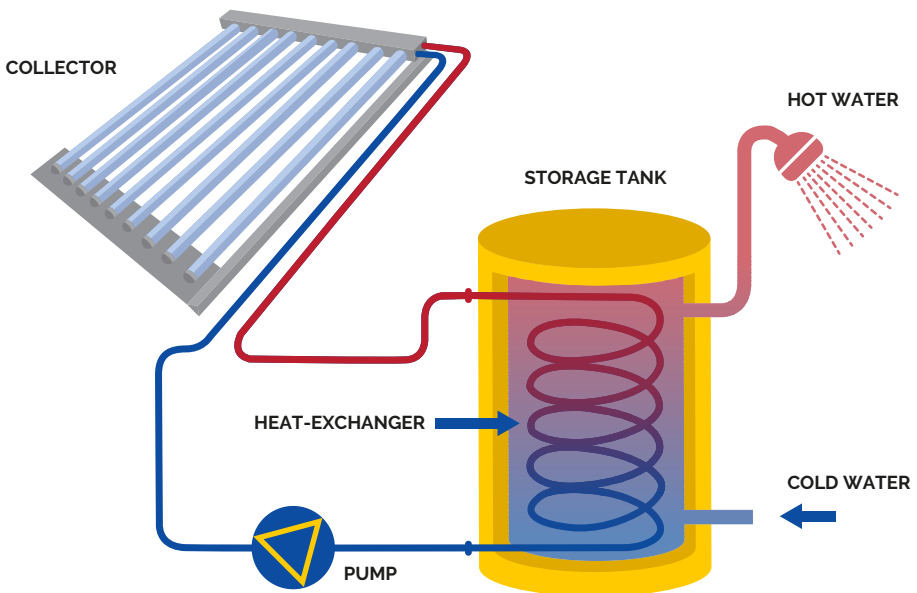


## RESOURCES DESCRIPTION

Solar energy is environmentally-friendly. It can be produced as long as the sun is shining. Use of solar radiation is expedient for generation of thermal and electric energy and is possible across the whole territory of Ukraine.

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

The collectors absorb direct and scattered radiation, the quantity and quality of which vary depending on the time of the year and the daylight hours. Solar radiation enters the surface of the collectors and heats the water inside. The collectors and the storage tank are connected by a pipeline through which the heated water is circulated by the pump, and the heat received from the collector is transferred to the tank of hot water through the heat-exchanger. Then this process is repeated again. This energy can be used both to provide hot water and maintain the heating system.



### ADVANTAGES

The main advantages of solar collectors for private households are energy savings, accessibility, absence of need to obtain a permit for installation and a lifetime of more than 15 years.



### DISADVANTAGES

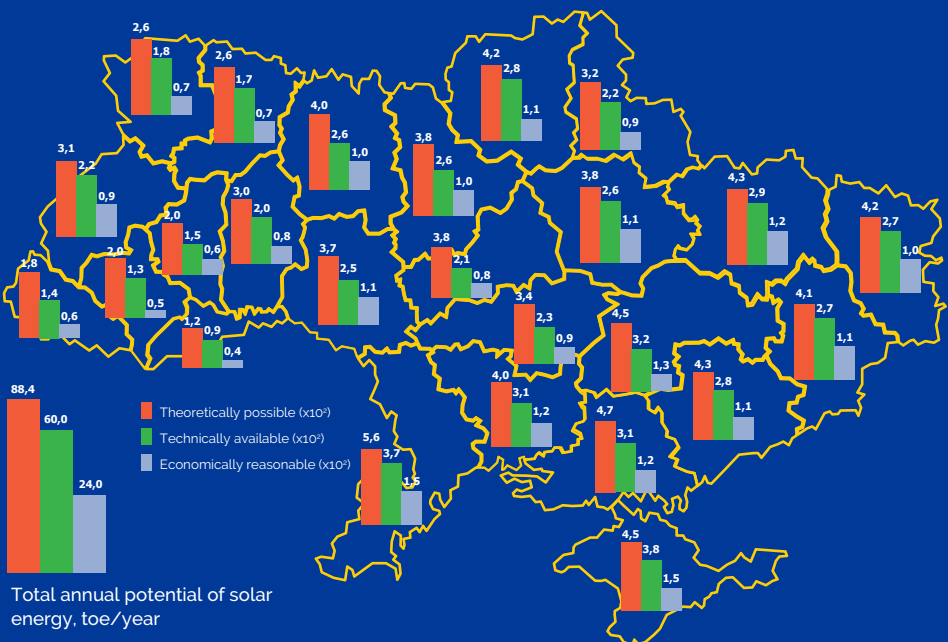
The main drawback of solar collector systems is the dependence of performance on solar insolation. Therefore, such systems cannot be a permanent source of heat supply. Therefore, during the winter period it is necessary to use additional heating systems.

## ENERGY PRODUCTION POTENTIAL IN REGIONS OF UKRAINE

Oblast (A-K)	Average annual productivity with 1 m <sup>2</sup> of collector, kWh
Autonomous Republic of Crimea	1079
Cherkasy	973
Chernihiv	882
Chernivtsi	957
Dnipropetrovsk	1000
Donetsk	997
Ivano-Frankivsk	987
Kharkiv	951
Kherson	1024
Khmelnyskyi	918
Kirovohrad	991
Kyiv	931

Oblast (L-Z)	Average annual productivity with 1 m <sup>2</sup> of collector, kWh
Luhansk	978
Lviv	890
Mykolaiv	1024
Odesa	1059
Poltava	941
Rivne	873
Sumy	919
Ternopil	901
Zakarpattia	877
Vinnysia	941
Volyn	877
Zaporizhia	1000
Zhytomyr	911

## SOLAR ENERGY POTENTIAL IN UKRAINE



Let's take a look at calculations behind options of solar collectors use at a typical **private house of 150 m<sup>2</sup>** in the city of Kyiv with 2-3 residents:

### OPTION 1

hot water supply with a flat collector system.

### OPTION 2

hot water supply with a vacuum collector system.

INDICATORS	OPTION 1* Hot water supply with a flat collector system	OPTION 2* Hot water supply with a vacuum collector system
<b>Technical parameters of the technology:</b>		
● Installed capacity (kW)	1,5	2,2
● Hot water demand:		
– Per month, m <sup>3</sup>	4,5	4,5
– Per year, m <sup>3</sup>	54	54
<b>Economic parameters for a year:</b>		
● Total cost of installation, UAH:	52 415	59 885
– cost of equipment;	45 575	52 075
– assembly cost.	6 840	7 810
● Residential tariff for gas, UAH/m <sup>3</sup>	7,3	7,3
● Gas consumption for hot water supply (5,6 m <sup>3</sup> /1 m <sup>3</sup> of water) per year 300 m <sup>3</sup> /year, UAH	2 190	2 190
● Percentage of substitution of hot water supply by solar collectors	68%	73%
● Savings on gas consumption for water heating while using solar energy per year, UAH	1 490	1 600

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

*\*\* the price is set by NISC "Naftogaz of Ukraine" on a monthly basis for consumers (<http://www.naftogaz.com/www/3/nakweb.nsf/0/486E117B34CF13EEC2257BCE0041B995?OpenDocument&Expand=3&>)*

## PECULIARITIES OF SOLAR COLLECTORS INSTALLATION IN HOUSEHOLDS

For private households, solar collector installation work is not regulated, requires no certification or additional permits.



### How to choose a solar collector for your house?

#### Main choice criteria:

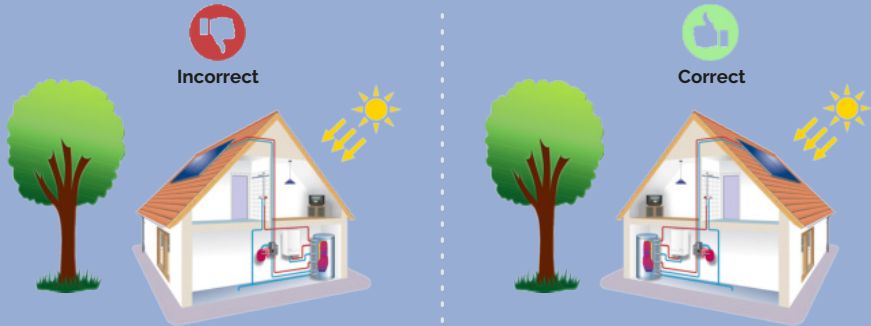
- ✦ A flat collector heats water in summer better than a vacuum one.
- ✦ Vacuum collectors can work even in below zero temperature.



### How to install a solar collector and what should you keep in mind in the first place?

It is best to install a collector on the roof. In doing so, it is important to provide access for maintenance of the equipment. The roof structure must support the weight of the collector. The collector should be positioned in such a way that its surface is perpendicular to the sun's radiation to receive maximum energy.

#### The direction solar collectors should face



#### Installation of a solar collector

Installation can be done independently or by a specialized company and will include the following steps:

- ✦ calculation of a household's demand for hot water and heating;
- ✦ purchase and preparation of equipment;
- ✦ choosing the best place for installation work, taking into account the distance between the devices, their angle of inclination and the angle of inclination of the sun;
- ✦ placement of a trunk for connection to the solar collector;
- ✦ fuelling of the collector with a heat conductor;
- ✦ connection and monitoring of the ready-to-use system.

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

## ← CO-FINANCING PROGRAMS FOR SUCH INSTALLATIONS

Effective support in the implementation of energy efficiency projects and solutions can be provided by a state/local program, fund, programs of international organizations, banking institutions, etc.

For example, the Energy Efficiency Fund has been established in Ukraine. The Fund (<https://eefund.org.ua>) provides grants and introduces comprehensive technical solutions for energy efficiency of buildings, taking into account the best European practices. As a result, the co-owners of such buildings will be able not only to save money on utilities but also increase the level of comfort and quality of life.

One can also ask local support programs when planning energy efficiency measures or using renewable sources. Does such a program work in your city, district, region? Find out the details here:



**IN OBLAST STATE ADMINISTRATIONS:**



**ON THE MAP OF LOCAL PROGRAMS:**



In addition, some banks in Ukraine also offer programs for financing energy-efficient equipment and RES technologies.







### Ruslana Lyzhychko

singer, Global Ambassador of Renewable Energy in the World

*"The pure energy of the sun and wind belongs to every person, it is free and peaceful, it leads us into the future without wars and environmental disasters! Everyone who chooses to benefit from Renewable Energy contributes to the global mission and protects the planet and peace.*

*We have vacuum solar collectors - a so-called vacuum tube. We have 2 fields - upper and lower one: the upper field is directed exactly to the south; the lower field is positioned in a circle on the roof of a round house. This is designed to work evenly throughout the day. That is, they start their work at sunrise. And with the movement of the sun along the ecliptic, the solar collectors begin to heat the water.*

*They fully cover our hot water needs throughout the warm season (from mid-March to the end of October). Unfortunately, their capacity is not enough to heat our particular house. For heating we only use them sporadically between seasons - when there is no sense to switch on the heating system and the heat of solar collectors is enough to heat small rooms and heat water.*

*I am convinced that in the future people will be able to "grow the energy crops" themselves and harvest them from clean energy sources. Everyone will be able to independently support their energy, produce it and make money on it. Technology will change in the future. And I want to be a promoter of these innovative technologies."*





## Roman Oleksiichuk

OSBB "My Home", Rivne city

*"The co-owners of the house had an idea to use the sun for their own benefit. We had free space on the roof of the building for that. Then we started to learn more about solar collectors and heat pumps. Eventually, we decided to install 18 solar panels, and later a heat pump with an evaporator. The amount of thermal energy for hot water supply provided by solar collectors is 23.4 kW (20 124 Kcal/h).*

*Thanks to the implemented measures, we managed to significantly reduce gas consumption.*

*The goals set by the community while implementing the project: promotion of energy-efficient measures among OSBB in multi-family buildings by serving as an example; reduction of emissions into the environment; reduction of imported gas consumption; saving of public funds paid under hot water supply bills».*



## USEFUL SOURCES OF INFORMATION

If you are interested in the use of clean energy sources and energy efficient technologies, you can also contact the following agencies and organizations:



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

State Agency on Energy Efficiency and Energy Saving of Ukraine

Contacts: +38 (044) 590 54 09 +38 (044) 590 59 60

E-mail: saee@sae.gov.ua vde@sae.gov.ua

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 respective oblast state administrations in your region:

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

### → Energy Efficiency Fund

+38 044 222-95-90 [info@eefund.org.ua](mailto:info@eefund.org.ua)  
<https://eefund.org.ua>

### → Solar Energy Association of Ukraine

+38 (044) 206-28-09 <http://aseu.org.ua>  
<https://www.facebook.com/aseuofficial>

### → Renewables Association of Ukraine

<https://uare.com.ua>

### → Renewable Energy Institute of the National Academy of Sciences of Ukraine

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

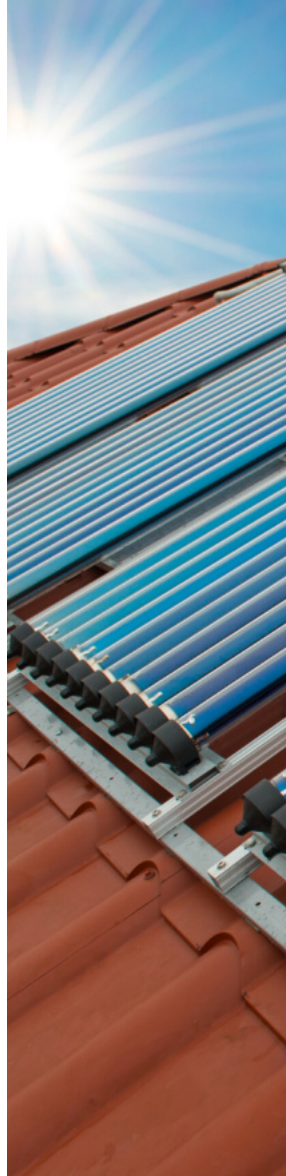
There are numerous portals on the Internet where you can also find relevant information, including:

- «Solar collector. Hot water heating by the sun»:  
<https://www.youtube.com/watch?v=QWUR67sKZQM>
- «A Lviv citizen has a solution that allows to significantly save on utilities»:  
[https://www.youtube.com/watch?v=L\\_pokFbZ3AA](https://www.youtube.com/watch?v=L_pokFbZ3AA)
- «HOW TO MAKE MONEY OFF THE SUN? Your House 2. Episode # 7»:  
<https://www.youtube.com/watch?v=iMzu8jDliqU>
- "What is a solar collector and how does it work?"  
<https://www.youtube.com/watch?v=E7WlSkFyL8o>
- Up-to-date news on clean energy sources - on the "Eco Town" website:  
<https://ecotown.com.ua>



Be energy efficient and energy independent!

Use **CLEAN** energy!



**MOVING FORWARD  
TOGETHER**

← THIS PROJECT IS FUNDED BY THE EUROPEAN UNION



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



**eurac**  
research



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ENERGY  
ASSOCIATION  
of UKRAINE**

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