



RESEARCH ON ENERGY DEMAND IN THE HOTEL UNITS ISOLATED AND WAYS OF ENSURING ITS ENERGY FROM RENEWABLE SOURCES

S. Blaj Brezeanu¹, Gh. Br tucu¹

¹ Transilvania University of Brasov, Brasov, ROMANIA, blaj.sebastian@yahoo.com

Abstract: *The paper presents various renewable energy systems using solar, hydro, geothermal, biomass and wind energy. These types of renewable energy will replace conventional energy is used at the moment in most hotels. While reducing conventional energy consumption and use alternative sources of energy in the built environment will analyze the best options that will be used in isolated hotel units. Isolated hotel units having trouble finding ways to supply electricity to the national system because to their geographical positioning, an alternative to power these hotel units such as using renewable energy:*

- Photovoltaic panels for electricity generation;
- Solar collectors for domestic hot water;
- Geothermal pumps for heating surface;
- For small hydro electricity needs;
- Wind turbines for lighting.

Keywords: *Renewable energy, photovoltaic panels, conventional energy*

1. INTRODUCTION

Due to the uncontrolled development of the built environment, energy consumption increased considerably and the source is declining conventional energies is an exhaustible energy source, so trying to find alternatives to this problem. In energy subsystems of the built environment can be used as a primary source of renewable energy. The global tries to implement a plan of action to reduce energy consumption from conventional sources and encourages the use of renewable energy systems. Current requirements of environmental protection and the need to acquire energy independence is preponderant factor for the development of alternatives.

2. MATERIAL AND METHOD

Energy is defined as the ability of a physical system to produce work [1]

One of the effects of technological development of the entire human society, in the last century is more pronounced increase in energy consumption, but also the increasing dependence of human consumption of fossil fuels, especially oil, natural gas and coal. Due to the existence of the oil deficit for the next period it is estimated a steady reduction of oil production. Analyzing this data is observed that extremely short time remaining until the depletion of existing resources, at least in the case of oil and gas requires fast and effective solutions for replacing energy that will be produced before using these fuels.

These solutions are all the more necessary as world energy consumption is growing and is not expected to reduce this consumption in the near future. [1]

To solve this problem only foreseeable solution is the use of renewable energies.

- Solar energy;
- Geothermal energy;
- Wind Energy;
- Energy Water;
- Biomass

2.1 Solar Energy

The sun is an inexhaustible source of energy, with an estimated duration of solar radiation there are still about 5 billion years

The solar constant is uniform heat flow received from the Sun, measured in the upper terrestrial atmosphere perpendicular to the direction of sunlight.

Solar collector

Is the essential element of a solar installation that converts radiant energy into another form, useful energy. Solar collector works by heating a liquid (usually water, oil, air or glycol) which then releases the heat thermal system.

Schematic of solar installation for domestic hot water using solar collectors is shown in the following figure 1, 2.

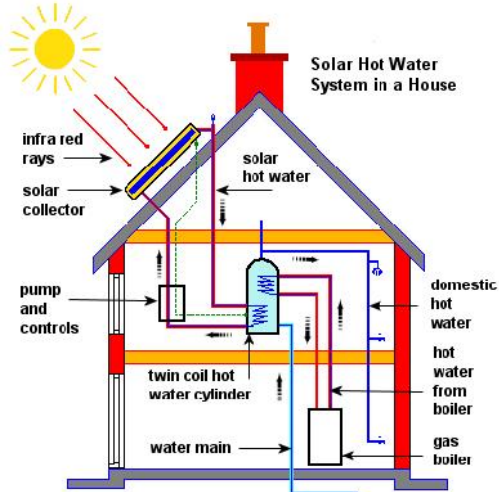


Figure 1. Solar heating system for domestic hot water
[www.lowenergyhouse.com]

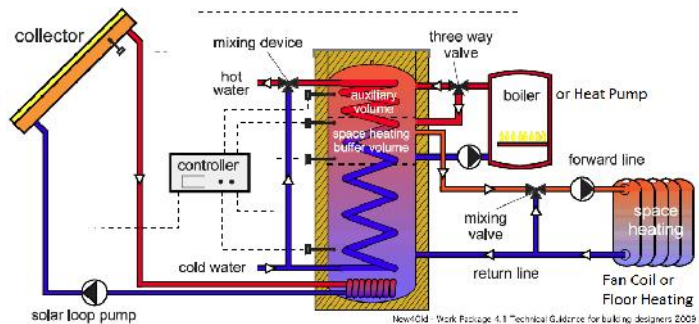


Figure 2. Schematic of solar installation
[www.netgreensolar.com]

Installation of solar collectors transform solar energy into thermal energy.

The solar plane has a metal frame, a network of tubes, aluminum mounted coil, equipped with fins sheet plates, painted in matt black absorber plate is inserted in the aluminum can and is insulated with rockwool in panel surface is provided an insulating glass which aims to achieve a greenhouse. [1]

Photovoltaic panels

Photovoltaic panels convert solar energy into electricity

The photovoltaic effect is due to the release of negative electric charges (electrons) and positive (goals) in a solid material when its surface interacts with light.

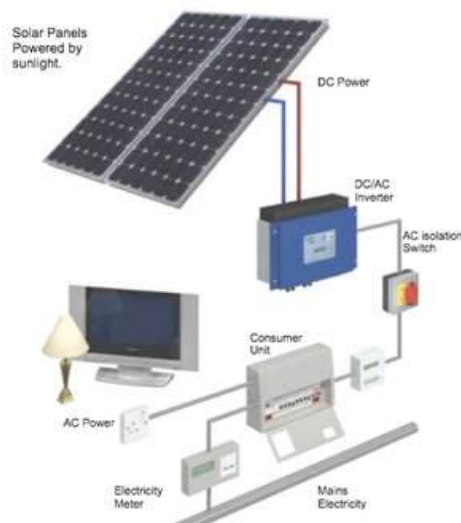


Figure 3. Photovoltaic installation,
[www.solartech-installations.com]

Due to the electrical polarization of that material, which is produced by light, there is an electromotive force that can generate electric current in a closed circuit. Devices that operate on the basis of this phenomenon are called photovoltaics, or solar electric cells, to enable the provision of reasonable electric power, photovoltaic cells but not individual works in series in a higher, forming photovoltaic panels.

Photovoltaic cells can be made from different semiconductor materials, but more than 95% the solar cells are made from silica (Si), processes processing this material are not aggressive to the environment.

Electrical energy is accumulated in the panel provided by one or more batteries to be used as needed. Between the photovoltaic panel and battery is sandwiched charge controller as the parameters of electric current out of the panel are variable, based at least on the intensity of solar radiation and the parameters of electric current used to charge the battery must be constant current produced by the photovoltaic panel is a current, so the installation is provided with an inverter, which converts direct current into alternating current.

2.2 Geothermal energy

Geothermal energy is heat various individual categories, it contains the crust.

In terms of potential thermal, geothermal energy can be classified into two category:

- Geothermal potential high heat,
- Low thermal Geothermal Potential

High heat geothermal energy potential is characterized by high temperatures which is available and can be converted directly into electricity or heat.

Low thermal Geothermal potential is characterized by relatively low temperatures is available and can be used only for heating. Nuclear power is available even at the surface crust is much easier to operate.

Geothermal energy requires special equipment used to raise the temperature to levels that allow heating or hot water this equipment called heat pumps and principle of operation as the refrigeration equipment running on electricity.

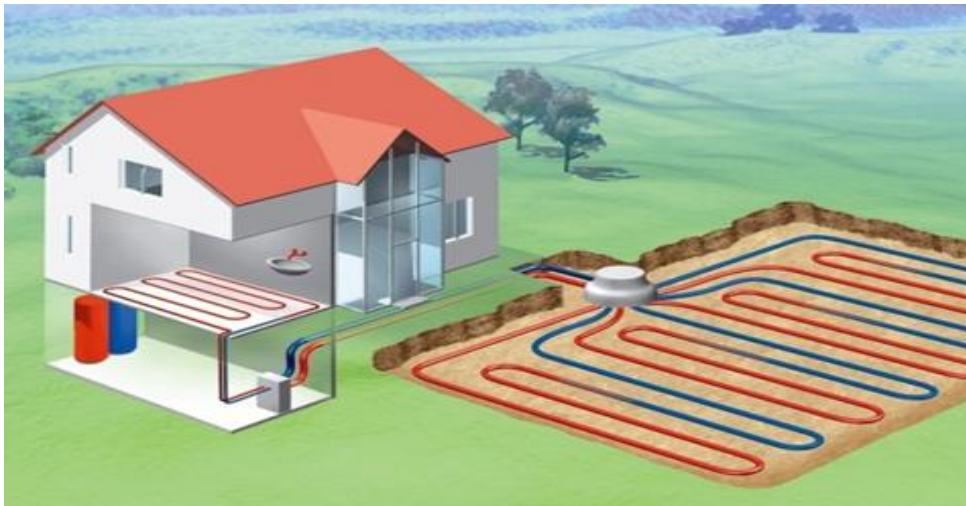


Figure 4. Heat pump heat exchanger horizontal
[www.termo.md]

The heat pump can absorb heat from the soil at different depths of groundwater from surface water or air. Heat pumps using indirect solar energy stored in the ground, water or air.

The soil is a source of high heat because it accumulates solar radiation both directly and indirectly from the rain and from the air. The amount of heat stored in the ground is taken using circuits placed in the ground, which absorb heat and transmit heat pump evaporator. Intermediate circuit of taking heat from the soil is composed of a heat exchanger, pump circulates the intermediate circuit, agent distribution system heat exchanger, expansion vessel. [1]

2.3 Wind energy

Wind energy is wind energy produced by wind turbines.

The conversion of wind energy into mechanical energy and then into electricity is done with *wind turbines*

Classification of wind turbines:

- Vertical axis wind turbines (wind direction are parallel to the axis);
- Horizontal axis wind turbines (wind direction perpendicular to the axis have)

Classification by electric power supplied turbines

- Turbine low power under 100kW
- Turbine High power over 100kW

The components of a wind turbine: nacelle, pylon, blades, rotor hub, amplifier speed, braking system, electrical generator, yaw system, anemometer control system [2]

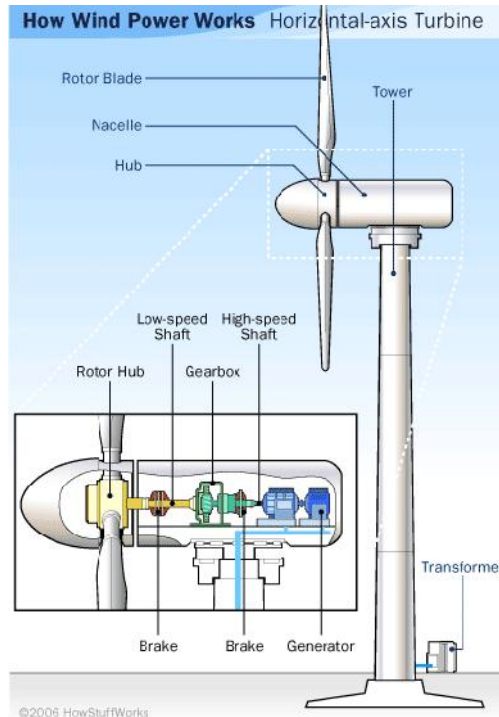


Figure 5. Horizontal axis turbine
[www.4-h.org]

The wind turbine uses wind to produce electricity so turns rotating wind blades which are fixed to the turbine shaft, shaft rotational mechanical energy obtained is converted into electricity by the power generator.

2.4 Micro hydro energy

Electricity generated from hydro micro turbine is based on a very simple concept. Flowing water spins a turbine which in turn drives a generator that produces electricity

Micro-hydro plants are usually have an installed capacity of up to 100 users kW. Multe small hydro units are used for isolated hotel

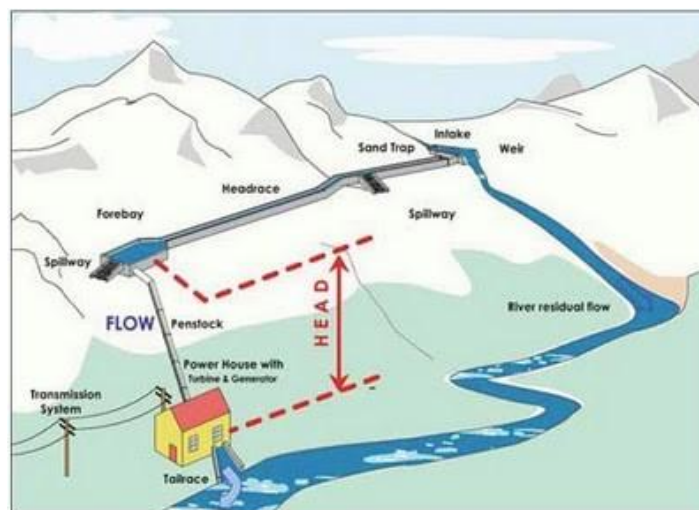


Figure 6. The layout of a micro hydro
[pixhder.com]

Micro hydropower to work on a river, some of the river water is diverted through a canal, pipeline and delivered a turbine or paddle wheel. The movement thus obtained can be used in mechanical processes, such as pumping water, or pate be used as an energy source to a generator or electric alternator. Through an inverter to the consumer standard operating voltage of 220 V, 50 Hz, or stored in a storage battery via a charge controller. Adjustable single installed power may be delivered directly to consumers.

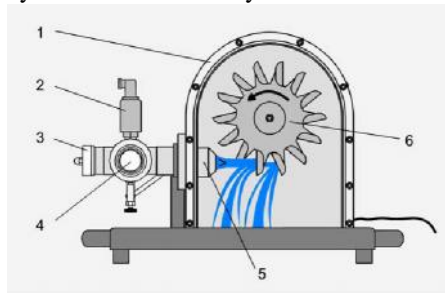


Figure 7. Micro hydro turbine elements

1. housing, 2. pressure sensor, 3. handwheel to adjust nozzle, 4. connection to HM 450C, 5. nozzle, 6. impeller

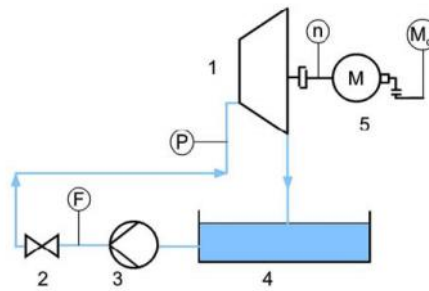


Figure 8. Micro hydro power scheme

1 Pelton turbine, 2 valve, 3 pump, 4 tank, 5 brake; F flow rate sensor, P pressure sensor, n speed, Md torque

Hydropower is a renewable energy source because it is replenished by snow and rainfall. As long as the rain falls, we won't run out of this energy source.

2.5 Biomass

Biomass is a mass of organic material of biological origin. Biomass is the organic component of nature. Biomass is considered one of the main forms of renewable energy.

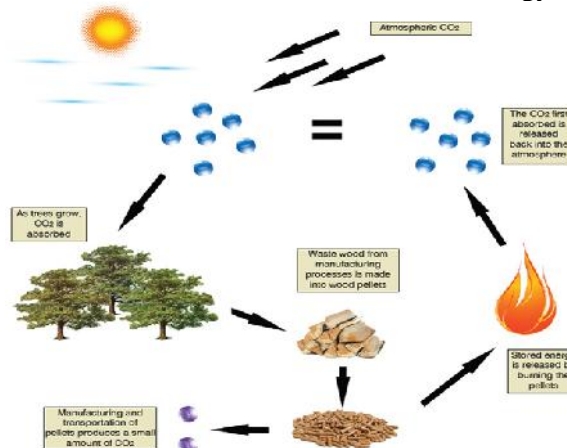


Figure 9. Biomass [www.greenhomeenergysolutions.co.uk]

Biomass is the biodegradable fraction of products, waste and residues from agriculture including vegetal and animal substances, forestry and related industries, as well as the biodegradable fraction of industrial and municipal waste.

3 CONCLUSIONS

1. Geographical position, climate and topography Romania is good motivation for the provision of facilities using renewable energy to the hotels in isolated mountain areas.

2. Energy needs of hotel units in isolated mountain areas always grow from the need to offer tourists the highest standard conditions similar to those in countries with the best achievements in these areas.

3. In mountain areas can be valued as a renewable source of energy almost all known sources: solar, wind, hydropower, geothermal energy, biomass. It is understood that investments in renewable energy sources must be proportional to the size hotel units, meaning that in a hostel small to justify the investment in solar and wind power, while for a large hotel complex becomes profitable even a micro hydropower.

4. In mountain areas in Romania, the hotel units can be mounted and heat pumps to achieve the necessary energy to heat it. Also in these areas there are very large amount of plant mass of waste could be used as biomass.

REFERENCES

- [1] Mugur B. Renewable energy, Cluj Napoca editura U.T. Press 2007, ISBN 978-973-350-9
- [2] Late M.T, Wind turbines, Editura Universit ții Transilvania Brașov 2012, ISBN 978-606-19-0089-3
- [3] *** www.lowenergyhouse.com
- [4] *** www.netgreensolar.com
- [5] *** www.solartech-installations.com
- [6] *** www.termo.md
- [7] *** www.4-h.org
- [8] *** pixhder.com
- [9] *** www.greenhomeenergysolutions.co.uk