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Some Aspects Concerning Programmes Targeting the Utilisation of the Recoverable Power in Caras Severin County

In the present, Romania aims at living up to the principles promoted by the European Union, in terms of effective power utilisation, of exploitation of clean energy sources and environment protection. As a consequence, the recoverable power sources will be granted increased interest. The paper is a presentation of the case study structured of fields micro-wind power station and solar in Caras Severin county.

Keywords: recoverable, power sources, solar-wind equipment

1. Introduction

Starting with 1970, in Romania several research programmes targeting the utilisation of the recoverable power sources have been carried on. The centralised development of the Romania economy until 1990 did not allow for the efficient use of currently only a part of them are being exploited.

All these applications require updating and re-equipment procedures in order to turn effective. From an economic point of view Romania's power policy has been targeting the setting up of large production facilities based on fossil sources (coal, gas, schist), on hydro- power macropotential and nuclear fuel.

Under these circumstances, the recoverable power sources have been neglected. A first step in this regard has already been taken by issuing certain simulative legislation (for example, Law no 199/200) regarding the efficient use of energy.

a) Micro-Hydro power station

Romania's hydroelectric potential is of about TWk/year, which is equivalent of an installed power of approximately 15,000 MW. The macropotential, corresponding to the water sectors with a unitary theoretical potential of over 20

KW/km, has an average output of about TWh/year, which means an installed power in hydro-electric power station of around 14,000 MW.

The hydroelectric micropotential, corresponding to the water sectors with a unitary theoretical potential of under 200 KW/km, sums up to about 2 TWh/year, which means an installed power of 1,000 MW in facilities with powers under 3,9 MW.

Out of the 1,000 MW of possibility installed power in hydroelectric plants of small power, currently around 400 MW are installed in over 500 standard hydro-assemblies.

b) Wind sources

The activity in this field started through university research. There are studies regarding the wind powered assemblies with horizontal axis; two small power facilities of 25 KW, a station for checking out the blades at overspending and vibrations, as well as 4 experimental assemblies of 30 KW each, located in the Semenic Mountain, which would include around 250 units of 500 KW each.

Currently, for the south –western mountainous part of Romania, 15 locations for wind stations have identified. Another area of interest in the Black Sea coast, for which at present only research procedures have been carried on.

c) Geothermal

The geothermal resources that have been used correspond to low temperatures (55-105n degree's Celsius) and , as a consequence, could provide only thermal energy. They are located primarily in the Western Field, with a potential production of a 4,300 TJ/year, the curve area of the Carpathians, with a potential production of 270 TJ/year and the Romanian Field, with a potential of 720 TJ/year.

d) Solar

The use of the solar energy for concrete applications is better known since 1980. Around the whole country, the exploitation conditions are favorable, with average values raging between 1,300 and 1,500 KWh/square meters/year.

The most spectacular evolution goes back to 1985, when 250 installations and a total 1,000,00 square meters of solar collectors were recorded.

In the field of photovoltaic energy the activities were limited to some small power outfits (demonstrative) designed within certain projects.

e) Biomass

Romania has a rich forest fund, summing up about 6,4 million hectares of the forest (around 27% of the country's total area), of which, according to evaluation, the total volume raw wood is of 1,560 million cubic meters, with an annual rate of growth of 33 million cubic meters. The average wooden mass, yearly exploited, is of 16 million cubic meters, of which 50% is used as firewood and for heating purposes in households.

Romania's total agricultural area is of around 14,800 thousand hectares, of which approx.9,420 thousand hectares are arable areas and around 290 thousand hectares are vineyards. Currently, in Romania biomass represents over 6,5% of the

primary energy resources consumption, in 1997 the wooden and agricultural biomass consumption being of around 3,370 thousand tons.

2.Small households equipment's

In the area of Moldova Noua from the county, a hybrid equipment can be used in which the electric energy can be produced in a combined way, both from solar and wind energy. The hybrid equipment requires a rigorous dimensioning related to the consumers' needs. In order to ensure the consumers with electric energy all around the year, it is necessary to know the sunstroke conditions of the place where the solar photovoltaic equipment is placed, as well as the wind frequency of the place where the wind equipment is placed, establishing the peculiarities regarding the winter-summer cycle. Hybrid equipment has the components seen in fig.1.

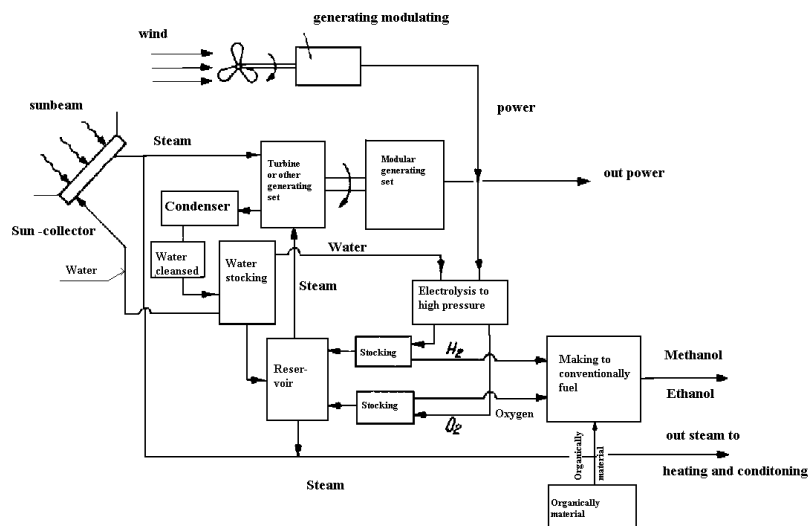


Figure 1. Hybrid equipment diagram

To assure the necessary inclination regarding the season, the solar panels should be adjustable on topside, being fixed in a joint at the bottom side. For isolated consumers the electric energy should be stored in continuous current batteries. The equipment has a voltage regulator in two points, mainly functioning as connection resistor; if both solar and wind energy are supplied at the same time it will work as an adjustment contactor, as well. When functioning in system the wind equipment will be supplied with a rotor of the turbine which will allow a

direct connection of the blades designed in accordance to the wind speed (in the area blows Cosava at a speed of 70km/h) and which is rigidly connected to the electric generator. The power limitation of this small equipment will be obtained with the help of some mechanic regulators of adjusting the angle of the blades that keep their revolutions constant as well as that of the generator. This is a synchronous generator, either mono-phased or three-phased with permanent magnets. The generator with permanent magnets supplies an electric energy of alternative current with variable voltage and frequency on a large scale that through rectification will reach the supply voltage from the storage batteries. If the number of the consumers is bigger, and the characteristics of 220V, 50Hz are imposed by the household items in use, an adequate inverter/reversor will be used. In the county wind equipment is being run on the Semenic Mountain.

3. Conclusions

For the local conditions, the solar-wind hybrid equipment is profitable due to a greater safety in the continuous supply of the consumers, the storage of the energy being done in accumulators. When small powers are in view (up to 1KW) the solutions are simple, but it is possible to obtain bigger powers by increasing the complexity of this equipment

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