

## Prospects of Mapping Alternative Energy Resources Based on Foreign Experiences



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**ABSTRACT:** This article is based on foreign experiences of mapping alternative energy sources, developing a regional and local level database and maps on the use of alternative energy resources, collecting statistical data on wind, solar, small water flows, geothermal resources, natural and Schematization of socio-economic indicators is dedicated to the analysis of the results of scientists who are conducting certain scientific research works on the use of alternative energy resources in our country today.

**KEYWORDS:** alternative energy, GIS, NREL USA, electronic database, thematic layers and electric energy.

### INTRODUCTION

By the 21st century, natural hydrocarbon resources ( coal, oil, natural gas, uranium ) are the basis of the world energy balance. In the consumption of energy resources, the world's oil reserves can reach 45-50 years, natural gas - 70-75 years, coal - 165-170 years, lignite - 450-500 years. Therefore, the maximum use of environmentally safe alternative energy resources is one of the most urgent global problems of today.

The analysis of the use of alternative energy resources on a global scale shows that today the European Union countries, the USA, Japan, China and India have achieved high results in the use of non-traditional types of renewable energy. There are more than 2 million solar thermal systems in the world. Israel has more than 800,000 solar installations that provide 70% of its hot water supply. North and South America and some European countries (Denmark, Spain, Portugal, Ireland, Lithuania) widely use wind energy located mainly on the seashore.

Alternative energy resources are versatile and, therefore, their design, deployment, and continuous operation are diverse. However, there is no single opinion about the purpose of creating such technologies in order to evaluate their deployment options - how and where, in which areas and in what quantities. For example, English and Russian researchers have pointed out that wind turbines and devices that use low-level heat are not used for regions with low temperatures in the cold season.

It is necessary to take into account the nature of each place and its socio-economic potential in the use of alternative energy resources in energetic quality. The geographical features of alternative energy resources are clearly shown in the cartographic atlas of the Russian researcher O.S.Popel and S.E.Fr i d. It includes the region's natural resources (climatic indicators, terrain, natural resources, hydrological and hydrothermal resources) and economic status (energy infrastructure, energy balance, power transmission lines, energy-using production sectors, agriculture, etc.) and social indicators (population centers, population density, employment, etc.) are comprehensively reflected. On the other hand, these data must be collected, modernized and displayed, transformed and analyzed quickly. Based on this information, the estimated costs are planned by forecasting.

In recent years, comprehensive geographic assessment of alternative energy resources has become extremely important. Because it is urgent to start using wind or bioenergy sources without leaving energy tools idle on days without sun. The use of geoinformation technology tools, including the geographic information system, is very effective in solving the use of hybrid power plants from the territorial point of view. An example of this is the experience of using GIS technologies in the alternative energy resources stations located on the continental shelf of the Netherlands.

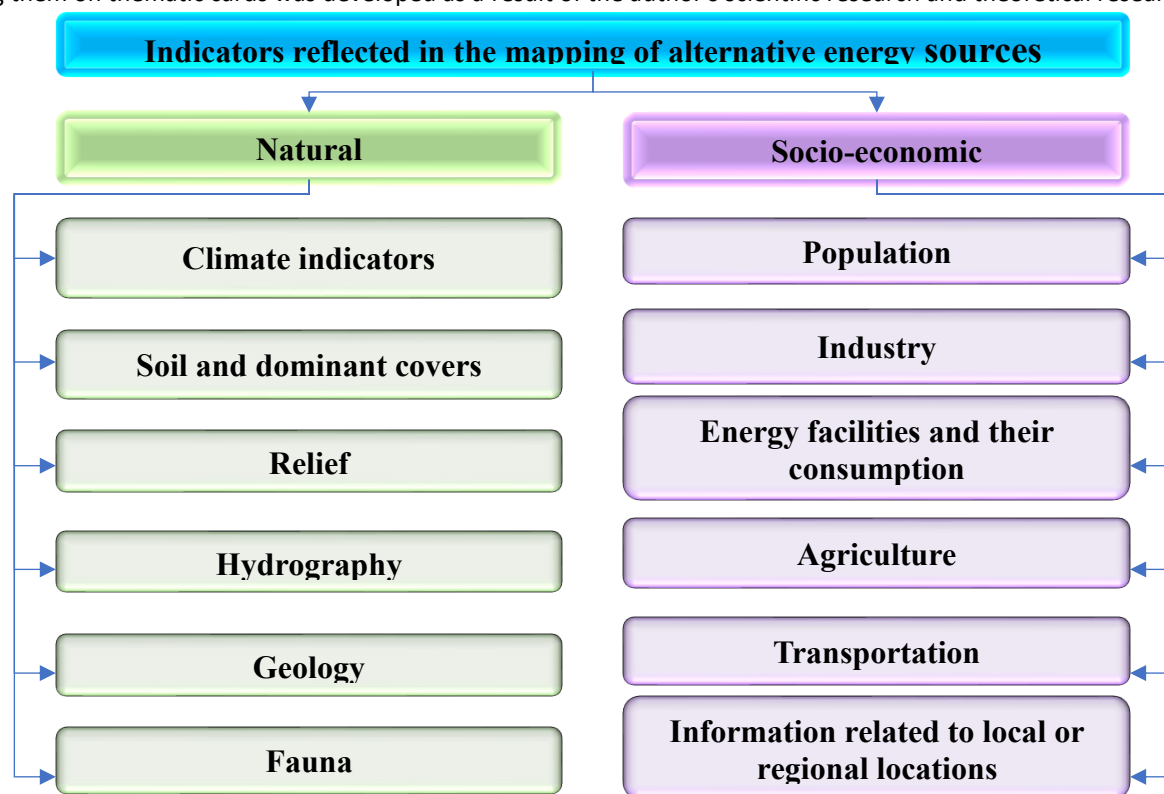
Individual and complex consideration and assessment of various factors through GIS made it possible to forecast not only socio-economic, but also environmental aspects of the placement, construction and operation of electric power facilities.

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Territorial classification through GIS or its consideration and assessment by area: local, regional, national, global scale. In addition, single and multi-component assessment methods are used through GIS.

Examples of alternative energy resource mapping, data visualization, and visualization software products produced by the National GIS include the Vermont Renewable Energy Atlas. The Atlas was created at the US National Renewable Energy Laboratory (NREL USA). It contains maps of natural resource assessment, i.e. alternative energy resources such as bioenergy, geothermal energy, small hydropower, solar and wind energy. But the atlas focuses more on statistics on Vermont's renewable energy facilities and resource components. Therefore, this atlas is aimed at the general public and not for specialists. The shortcoming of US national atlases that reveal possibilities of using alternative energy resources is that they do not fully cover the aspects of environmental safety and limitation of natural resources, and does not make it possible to make relevant local decisions.

In the development of regional and local level databases and maps on the use of alternative energy resources through GIS, first of all, there is the development of its structure, the nomenclature of databases is selected and analyzed. The database of using alternative energy resources with the help of GIS collects statistical data on resources such as wind, sun, small water flows, geothermal; their characteristics, i.e. wind speed, blowing and seasonality by height layers, solar radiation, hydrodynamic indicators of streams and rivers, indicators describing geothermal waters; theoretical modeling is carried out as additional data. In its second stage, the model of creating a database of natural and socio-economic indicators on a local or regional scale and displaying them on thematic cards was developed as a result of the author's scientific research and theoretical research (Fig. 1).



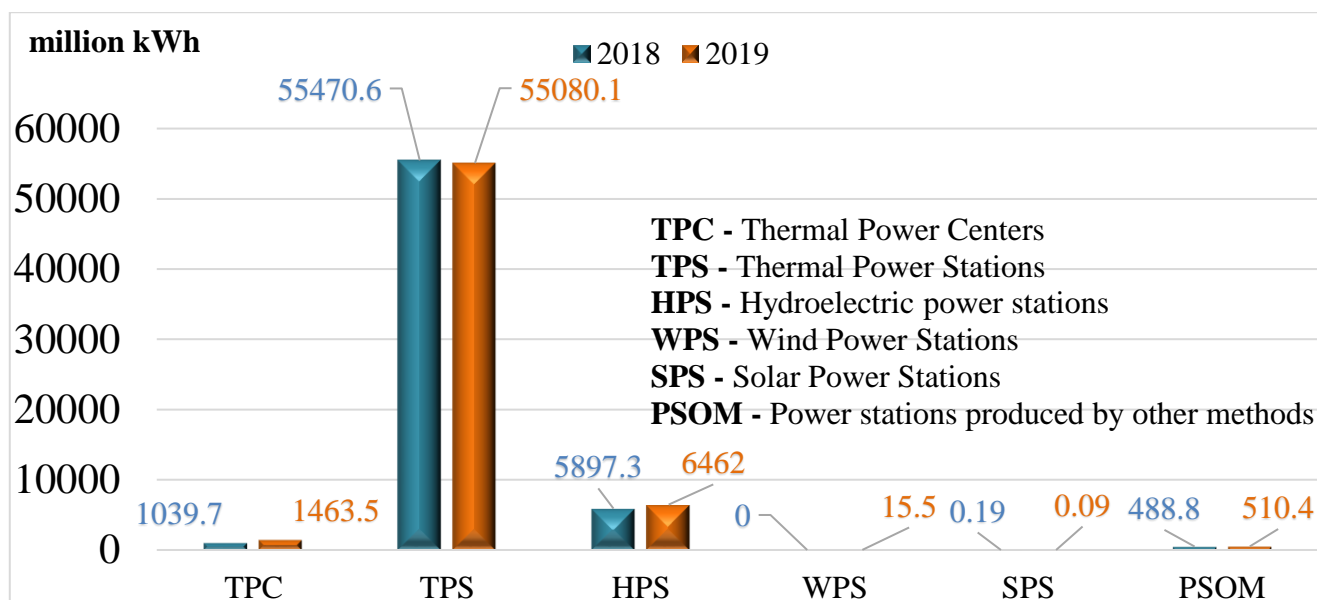
### 1. Natural and Socio-Economic Indicators in Thematic Cards on the Use of Alternative Energy Resources

For effective use of alternative energy resources, first of all, modern geodetic and cartographic methods based on it is required to reveal the characteristics of the geographical distribution of renewable energy facilities.

In the Republic of Uzbekistan, the development of electricity and its use in all spheres of social life at the level of modern requirements has become a priority of our state's policy. After all, there is no sector of the economy that can function without electricity.

However, the amount of electricity production in our republic is only 20-30 % of the domestic demand. Although Uzbekistan is one of the ten countries with the largest oil and gas production potential in the world. 50 billion m<sup>3</sup> in the country every year since 1997 gas and 8 mln. tons of oil are being produced. But their stock may decrease sharply by the 50-60s of the 21st century. In the energy balance of Uzbekistan, the share of thermal power plants and thermal power centers specializing in coal and natural gas is 90%, and the use of alternative energy resources is somewhat less ( Fig. 2 ).

In our republic, the annual increase of the population by 550-600 thousand people and the growth of industry by 7-8% increased energy consumption by 25% in 20 years. This indicates the need to use alternative energy resources in the production of electricity.



### 2 . The Role of Alternative Energy Resources in the Production of Electricity in Uzbekistan

In our country today, certain scientific research works on the use of alternative energy resources have been carried out and research is being carried out continuously. For example, M.S. Rudak evaluated the wind and solar energy resources of Uzbekistan and the possibilities of their use. Professor H.T. Egamberdiev In Uzbekistan, he studied the influence of atmospheric clarity on solar energy resources, taking into account anthropogenic factors and showed regional characteristics of solar radiation in national geographical atlases. Sh.E.Zokirov and other scientists covered the scientific and practical aspects of renewable energy development in Uzbekistan. Professor Q. Allaev is conducting research on the technological possibilities of solar and wind energy. Researchers under the leadership of Professor A.A. Azizov evaluated the dynamic state of the natural and ecological properties of atmospheric air. A group of researchers of the National University of Uzbekistan under the leadership of Professor Yu.V.Petrov highlighted the possibilities of solar energy resources for some regional production complexes.

They put special emphasis on the cartographic principles of using helioresources. The creative group headed by G.K. Saidova focused on the economic possibilities of using alternative energy resources in Uzbekistan. S.L. Lutpullaev and H.K. Zaynutdinova are conducting research on the technical and technological possibilities of using solar energy in our country.

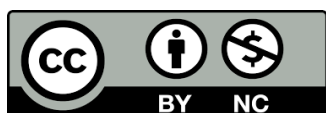
In short, the international and national experience of using alternative energy resources at the regional and local level shows that in order to provide electricity to all sectors of the economy requires rational use of alternative energy resources . For this, not only solving technological problems, but also bringing the legislation to the level of international requirements, providing financial support from the state for relevant projects, analyzing the territorial distribution of various alternative energy resources, first of all, evaluating the possibility of alternative energy resources and determining the rules of deployment is required to carry out geodetic and cartographic research.

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