



Assessment of Energy Potential of Renewable Energy Sources in Kaunas Region *Kaunas Regional Energy Agency, Lithuania*

Summary

Lithuania does not have any major sources of fossil fuels and have to import more than 90 % of primary energy. Currently when the energy demands constantly increase and traditional ways of energy generation impact on the environment, the development of renewable energy sources consumption is very important. According to the Lithuanian National Energy Strategy the efforts will be directed to increasing share of RES in the primary energy balance by 2010 to 12 % in order to implement the international commitments and to meet the requirements of EU directives. The aim of this study is to estimate the RES (wind, solar, biofuel, hydro) potential in Kaunas region, the ways of their utilization, technical and economical possibilities of consumption and the barriers of the use as well. The results of this study are included in "The Plan of Rational Energy Use in Kaunas City", which is prepared for Kaunas city municipality. The data of this study can be very useful for the municipal energy planning and for the preparation of investment programs of the region development.

End-user area

- New buildings
- Refurbishment of buildings
- Transport and mobility
- Financial instruments
- Industry
- Legal initiatives (regulations, directives, etc)
- Planning issues
- Sustainable communities
- User behaviour
- Education
- Other

Target Audience

- Citizens
- Households
- Property owners
- Schools and universities
- Decision makers
- Local and regional authorities
- Transport companies
- Utilities
- ESCOs
- Architects and engineers
- Financial institutions
- Other

Technical

- Energy efficiency
- Heating
- Cooling
- Appliances
- Lighting
- CHP
- District Heating
- Solar energy
- Biomass
- Wind
- Geothermal
- Hydro power
- Other

Context

Currently the share of RES in the Lithuanian primary energy balance is about 8 %. In order to ensure better use of renewable energy sources and at the same time to reduce the dependence on usually imported fossil fuels as well as create new jobs and improve the ecological conditions of environment, the efforts is directed to increasing share of RES in the primary energy balance by 2010 to 12 %. The available RES potential has so far not been sufficiently used. The RES are hardly used in the energy generation sources dependant on Kaunas city administrative control. The major share of RES falls on the wood fuel which is used for individual house heating and in the boilers houses of the district heating and of the industry enterprises. However the utilization of the other types of RES for energy generation is very viable as well. It is essential to make the technical-economical assessment of RES potential in the particular region for encouragement and promotion of the RES consumption.

Objectives

The main aim of this study is to show that Kaunas region has greater RES potential and can cover the region energy needs in the future as well as to create new jobs and improve the environment. The results of this study are included in "The Plan of Rational Energy Use in Kaunas City ", which is prepared by Kaunas Regional

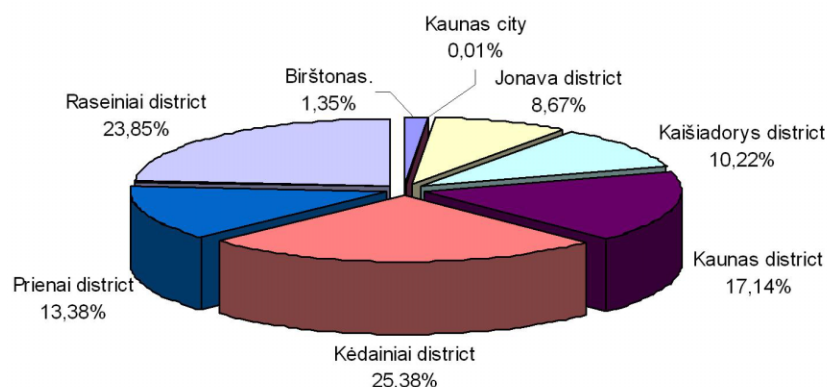


Energy Agency. This plan can be used as a planning tool for the municipal energy planning and for the preparation of investment programmes and plans of the region development.

Process

The calculations of possibilities of RES (wind, solar, biofuel and hydro energy) consumption in Kaunas region were made in this study. Calculating the wind energy potential, the various ways of wind energy use were estimated as well as the technical-economical and socio-economical analyses were performed. For estimating solar energy potential – the possibilities of solar collector's installation in Kaunas region were analyzed. Also the analysis of possibilities of consumptions of various types of biofuel (biogas from cattle waste, straw, wood, energy-purpose plants) was made. The hydro potential of Kaunas region was determined. The strengths, weakness, opportunities and problems of utilization of different types of RES were presented. Estimating theoretical and technical possible use of RES energy potentials, the RES potential of separate districts was calculated as well as the total RES potential in Kaunas region. The conclusions and recommendations were presented.

Renewable energy potential in municipalities of Kaunas region



Financial resources and partners

The main financial resources for the RES projects implementation are the EU Structural Funds support. For 2007-2013 programming period one of the suggested priority support direction is the enhancement of energy supply and consumptions efficiency and RES utilization. The Lithuanian Environmental Investment Fund support the investment projects related with the RES utilization and reduction the negative impact of economic activities on environment in the form of soft loans and subsidies. Also the RES projects are financially supported under the “National Energy Efficiency Programme” and the special programme “Energy saving projects implementation”. The cooperation with other countries and the participation in the international programmes (for example “Intelligent Energy-Europe”) allow implementing the RES projects as well.

Results

Estimating theoretical and technical possible use of RES energy potentials, the total RES potential in Kaunas region was calculated. The total technical potential of RES consumption in Kaunas region is:

Wind 2,7 GWh/year

Solar 260 Gwh/year

Biogas 34,5 GWh/year

Straw 34,5 GWh/year

Wood 257,3 GWh/year

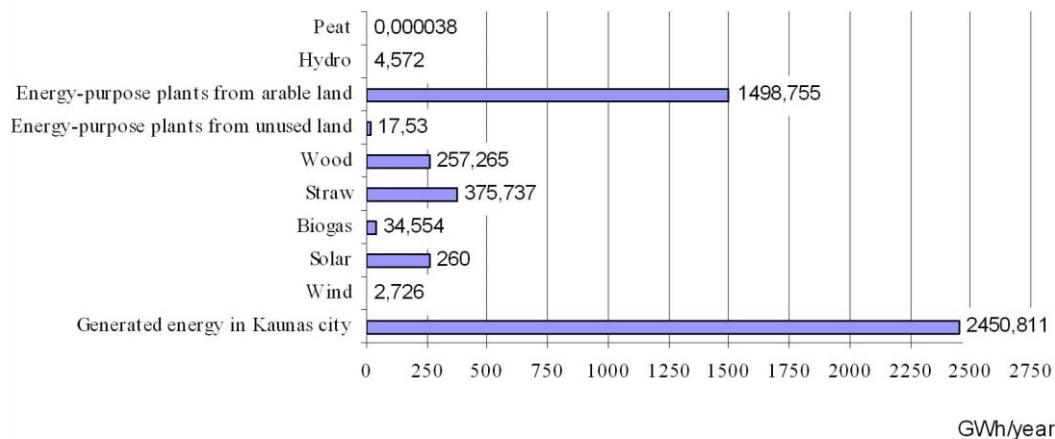
Energy purpose plants from unused territories 17,5 GWh/year

Energy purpose plants from arable territories 1498,8 GWh/year

Peat 0,000038 Gwh/year



Energy potential in Kaunas region



Lessons learned and repeatability

On the base of calculations, the greater energy potential of RES in Kaunas region is seen. However there are technical and economical obstacles for their consumption. For example the theoretical solar energy potential is considerable but the duration of solar emissions is comparatively short and the utilization of small size solar collectors for the individual consumers is not economical feasible due the long payback time. The calculations show that it is economical feasible to install the solar collectors of large area (20m² and more) on the roofs of the multi-apartment residential buildings.

The main obstacle of the consumption of wind energy in Kaunas region is the comparatively low wind speed and consequently the long time of payback. Economically the possibilities of the straw consumption are limited for the big investments not only for the straw burning boilers but also for the straw pickup equipments. For this reason it is more reasonable to use wood, but in recent years the price of wood has been increasing. Therefore it can be forecasted that in the upcoming year the straw energy will be used more widely because this type of RES can be burnt both with wood in the wood burning boilers.

The one of biggest energy potential has the consumptions of energy-purpose plants. The cultivation of energy-purpose plants can replace the traditional prospect-less agriculture sectors. It allows solving 2 problems at the same time – the agriculture farms conversion from the traditional agriculture which production is limited due the EU agreements and the enhancement of RES consumption, retaining the occupation of the population in the agriculture sector.

In the big cattle farms the energy generation from cattle waste would be very viable. It is not a very big potential but it could cover the energy needs of local enterprises.

The determination of RES potential depends on a number of interrelated factors as well as on assumptions used in calculations, conditions and constraints. Therefore the data presented in this study are tentative, quantities reflecting the recent situation. It is very important to encourage the local authorities preparing the energy sector and regional development plans and programmes to utilize RES on the largest possible scale.

The results of this study manifest the technical and economical possibilities of consumption of different types of RES in Kaunas region and that their contribution to the region energy can be more significant than it had been thought before.

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