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Agricultural By-products and Waste Biomass Energy Potential in Latvia 2005-2009

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Abstract

Different kinds of biomass are important renewable energy sources in Latvia. Of course firewood, wood chips and pellets are the main part of biomass, because 54,7 % of the state area is covered by forests. But also other kinds of biomass can play a significant role in the heat and electricity production, especially at municipal heating facilities. Such kinds of biomass are various agricultural and food production residues, livestock breeding by-products, sewage sludge, organic part of household and industrial wastes, etc.

In the present paper, changes of amount and distribution of variety of biomass forms in five year period are analysed. The biomass energy potential for different regions of Latvia for this period is calculated and discussed. The energy potential of agricultural by-products and organic waste are shown on the map of Latvia.

Key words

Renewable energy, agricultural by-products, biomass, sewage sludge, municipal and industrial bio waste, energy potential.

Introduction

The investigations of the most prevalent types of biomass detected, that the content of carbon in biomass organic matter modifies from 40 to 70 % and that such biomass can be used for energy production. Content of hydrogen is not so variable, it is about 1.5 %. As biomass in the natural form has low energy density, it arises logistic problems with biomass transporting and using as an energy source. It means that local amount of biomass and its distribution plays significant role for biomass utilisation.

The present report contains evaluation of various agricultural and food production residues, livestock breeding by-products, sewage sludge, combustible (organic) part of household and industrial wastes, etc. and their estimation as energy source in different planning regions of Latvia during the period 2005–2009.

1. Agricultural residues and by-products

The evaluation of herbage biomass resources in Latvia

demonstrates that total potential of such biomass according to the sown area and production in 2006 was 1228 th. tonnes of straw and 187.6 tonnes of grain dryers [1]. Part of special energetic crops here is small, and main part is wheat, ray, barley, oats and rape straw and different residues from grains treatment. Figure 1 shows distribution of the amount and energy potential of this type of biomass in Latvia. Presented distribution regions correspond to statistical and planning regions of the state. Energy potential is calculated for direct combustion technology, fuel calorific value estimated as 3500 kcal/kg for dry mass.

Figure 2 shows the same distribution of herbage biomass and its energy potential in 2009. Comparison shows, that both distribution and energy potential changed very slowly.

Figure 3 shows evaluated biomass potential during five years for this type of biomass and appropriate energy content. Differences between years are small and we can state that this type of biomass can be used as determinate renewable energy resource.

There is only question, what type of technology for energy production can be used. Different technologies has various advantages, but also disadvantages, and what technology in concrete case can be used, must be calculated from economic, logistic, infrastructure, social, local governmental and other aspects. One of simplest is direct combustion of such biomass separately or in mixture with wood in pellet form. Second more popular technology is fermentation and gas production.

It is possible in Latvia substantially to increase amount of herbage biomass by growing special energy crops.

2. Livestock breeding by-products

Figure 4 shows energy potential, which can be produced as fermentation result of animal manure, and other livestock breeding by-products and residues, using different biogas production technologies [2]. While the dislocation of largest farms is fixed, the changes of distribution for such kind of biomass are slow, but changes of animal totality does not exceed 10÷15 % in 5 year period. Biogas production technologies are the best for energy production from animals and birds manure, together with different herbage silage.