

## Chapter 20


# Utilization of Agricultural Biomass in Small and Medium-Scale Biogas Plants in Rural Areas: A Case Study in Serbia

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### **ABSTRACT**

*Serbia is a member of the Energy Community and for integrating its energy sector into the EU energy system the national strategic documents define a more efficient use of energy and an increased share of renewable energy in gross final energy consumption. Serbia has a significant agricultural biomass potential. However, agricultural biomass is still insufficiently or even inefficiently exploited for energy purposes. The authors of this chapter analyse the possibilities of a more efficient use of agricultural biomass for the production of biogas and electricity in Serbia, map small scale and medium biogas power plants on the domestic market, assess their economic sustainability and cost-effectiveness, and provide recommendations to farmers and potential investors which are interested in investing in this area, in the aim of generating new employment in rural areas in Serbia.*

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## **INTRODUCTION**

It is often misconceived that renewable energy is free and “should only be taken from the nature”. As most other sources of energy, RES are found in the nature, but in order to obtain a form of energy suitable for the use, we must convert them with the available technology into heat or electricity. Unfortunately, given today’s known technologies, this transformation is in most cases more expensive than in the case of non-renewable energy products. For instance, in most cases it is cheaper to obtain electricity from a coal-fired power plant or a nuclear power plant than from a wind power plant, a solar power plant, a geothermal power plant, a biogas plant, or a small hydroelectric power plant. The fact remains that the selling price of energy is limiting final users to use energy from renewable sources more, but in the same manner the dominant focus on conventional fuels is the issue of political influences and interests of multinational companies that exploit fossil fuels as limited and polluting sources of energy (coal, oil, natural gas) and at the same time generate high profits.

At the same time, fossil fuel resources are severely limited and their combustion is a major source of environmental pollution. As a result, scientists avidly seek alternatives to fossil fuels, and find biomass as a viable alternative source of energy, especially in the rural areas.

Agricultural activities generate large amounts of biomass residues. While most crop residues are left in the field to reduce erosion and recycle nutrients back into the soil, some could be used to produce energy without harming the soil. Other wastes such as whey from cheese production and manure from livestock operations can also be profitably used to produce energy while reducing disposal costs of waste and pollution.

In a global circular bio-economy livestock breeding among other, have valuable role to provide raw material for renewable energy (biogas from manure is an important resource for energy generation). Biomass power technology can generate electricity and heat energy and “waste-to-energy” conversion processes for energy generation can have good economic and market potential.

In view of previous, authors in this paper intend to investigate biogas production potential from animal manure in Serbia, as well as economic and market aspects of small and medium biogas power plants in rural area in the aim of examine the possibilities for new employment in rural areas, revitalizing and reinvigorate rural economies, and the stimulation of green economic growth and economic development.

Although there is no common definition of what is a small scale and medium biogas plant, authors in this paper understand medium scale biogas power plants with capacity of over 500 to 700 kW, and small scale plants with installed capacity to 500 kW.

This analysis was based on primary and secondary data. Primary data was obtained by market research of small scale and medium biogas power plants in Serbia. Survey was conducted by authors in the period January - March 2019 by interviews with managers of small and medium biogas plants and with experts in this field in the Association “Biogas”, Novi Sad, Vojvodina. Interviews were done by telephone. Secondary data were obtained by review of relevant domestic and foreign literature, publicly available documents, and by access to statistical data and data in the Register of Privileged Electricity Producers, Temporary Privileged Producers of Electricity and Producers from Renewable Energy (2019). Also, the legislation of the European Union together with legislation and development document of the Republic of Serbia has also been explored. The dominant statistical technique in the research is the descriptive analysis.

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