



(Figure 1: Biogas plant Mirotin Energy in Vrbas, Serbia (Source: Photo GIZ 2014))

Biogas in Serbia - Agricultural Sector with Sleeping Commodity Potential

Despite a high incidence of renewable raw materials and residues from the agricultural industry, the biogas market in Serbia lies still in its infancy. Within the framework of the program "Promotion of Sustainable Bioenergy Market", the German Federal Enterprise for International Cooperation (GIZ) GmbH, supports, among other things, the private sector in the implementation of innovative bioenergy plants.

The Serbian heat and electricity production is currently based mainly on the use of fossil fuels in outdated and inefficient production facilities. Power generation is dominated by lignite, the production of district heating and industrial process heat is relying heavily on fuel oil, natural gas and lignite. The consequences are high CO₂ emissions and local pollution of the environment. Bioenergy is currently used mainly in the form of firewood. This is, however, done in a very inefficient way.

At the same time, Serbia has a very large potential for energy use of biomass from agriculture and forestry. Another important development topic for the local biogas market is the appropriate technology for the fermentation of highly liquid pig and cattle slurry (1-2% dry matter content) in conjunction with straw waste, raw materials that occur in the Serbian agricultural structures in large quantities and frequently remain unused.

Table 1: DBFZ 2014 (National assessment of actual biomass potentials for energetic use and capacity building for monitoring of the bioenergy market in Serbia)

Biomass	Theoretical potential in PJ	Electrical efficiency in %	Potential electrical energy in GWh/a
Manure	3.4	34	322.2
Wheat straw	21	29	1,691.6
Maize straw (without cob)	20.8	29	1,675

The Serbian government has the goal to utilize this potential and thus to contribute to an increase in the share of renewable energy. Thus, one of the commitments assumed in the EU approximation process shall be accomplished. In this context, feed-in tariffs for electricity from biogas and solid biomass were determined. These amount currently for biogas from 12.31 to 15.66 €Ct. per kilowatt hour (see Table 1) following the reform of the DECREE ON INCENTIVE MEASURES FOR PRIVILEGED POWER PRODUCERS from 2013.

Table 1: Feed-in tariff for biogas plants under the Energy Law of Serbia, as of 2009 and the status today (2013)

Feed-in tariffs in Serbia in 2009		Feed-in tariffs in Serbia in 2013	
Installed power [kW _{el.}]	Feed-in remuneration [c€/kWh]	Installed power [kW _{el.}]	Feed-in remuneration [c€/kWh]
$P_{el} \leq 200$	16.00	$P_{el} \leq 200$	15.66
$200 \leq P_{el} \leq 2,000$	$16.444 - 2.222 * P_{el} \text{ (MW)}$	$200 \leq P_{el} \leq 1,000$	$16.498 - 4.188 * P_{el} \text{ (MW)}$
$P_{el} \geq 2,000$	12.00	$P_{el} \geq 1,000$	12.31

Source: DECREE ON INCENTIVE MEASURES FOR PRIVILEGED POWER PRODUCERS Pursuant to the Article 59, paragraph 6 of the Energy Law ("RS Official Gazette", No. 57/11, 80/11 – corrigendum, 93/12 and 124/12)

All 6 plants that are in operation in Serbia were built after the first version of the statutory feed-in remuneration for biogas in 2009, whereby three of these plants are fermenting industrial wastewater and sewage sludge for their own power supply. The remaining three biogas plants are mainly charged with cattle manure and slurry, maize silage and beet pulp. The latter is a raw material that exists in high quantities in particular in the region of Vojvodina, because there are numerous sugar beet processing plants. According to the information provided by operators of these plants, whose installed electrical capacity ranges between 635 kW and 1.5 MW, they have a

capacity utilization rate of over 90%, which figure indicates solid plant technology paired with strong know-how of the operators. Also the profitability of biogas plants under the remuneration scheme from year 2009 seems to be convincing for the operators - so all three agricultural plants are planning to expand plant capacity plus to add as yet non-existing heat utilization through construction of new greenhouses and district heating networks. The German concept of bioenergy villages seems to be a promising model for operators and municipalities.

In addition to the feed-in tariffs, heat and steam generation with biogas and CHP waste heat will play a significant role for the profitability of biogas plants in Serbia. Although cheap energy sources, such as coal and firewood, are still in many regions and sectors the main fuels, approximately 40% of public buildings in Serbia are heated with fuel oil HEL, which is currently with a heat price in average of approximately 100 € per MWh of heat (approximately 1.05 € per litre net) exerting a massive impact on the budgets of the municipalities. Particularly in the agricultural and forestry regions of Serbia people are looking into reasonably priced and available bioenergy.

Investors and future operators are thus still in the starting positions, similar to Germany in the years 2008 and 2011, in anticipation of an adjustment of the feed-in tariffs in the coming year 2015. The concepts include, after research carried out by GIZ, mainly the use of renewable raw materials, such as maize silage, the prices of which currently amount to 20-35 € /t, which is even lower than in Germany, but the sole use for electricity production at the current remuneration situation without heat utilization seems in many cases uneconomical. According to the calculations of GIZ DKTI program in Serbia, even the current compensation scheme poses an attractive cost-effectiveness, especially for pure manure and slurry biogas plants up to 250 kW of electric power, which due to higher specific remuneration and low cost of biomass can survive even without an additional heating concept. The existing slurry technology of the often huge cattle farms can be cost-effectively integrated into the new biogas concept.

Figure 1 shows to this end results from a study of the German Biomass Research Centre (DBFZ), which has estimated the energetic potential of biogas plants from economic manure (slurry and manure) in Serbia at about 3.4 PJ per year, on the basis of available substrates in the respective radius of 15 km.

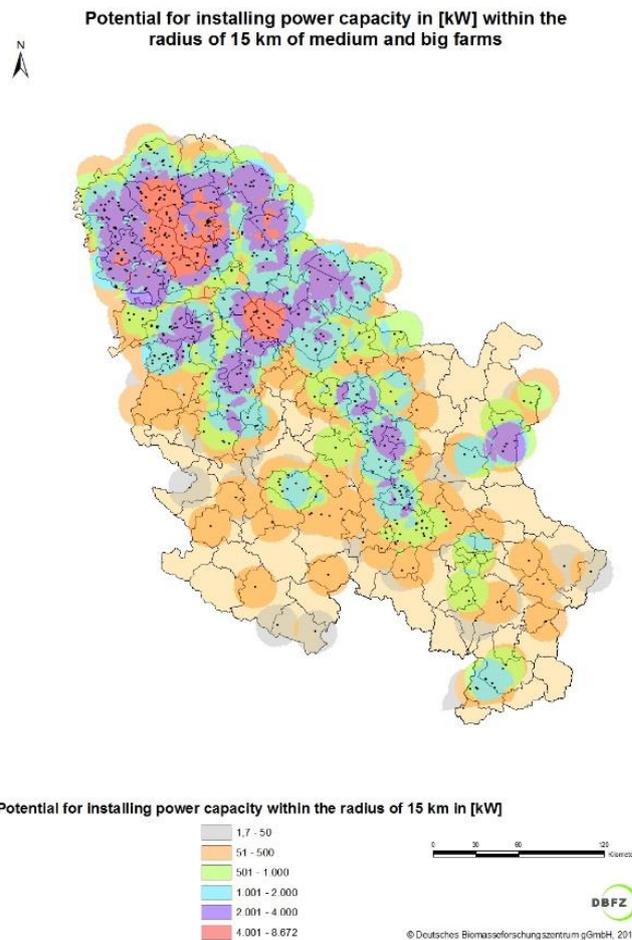


Figure 1: Biogas potential from slurry and manure in Serbia (Source: DBFZ 2014)

However, those who opt for financing with external funds in Serbia still need to have a long breath. Commercial banks are financing only such projects that can hedge their substrate supply via long-term supply contracts over at least 12 years or via own surface area available for cultivation. An attractive financing option is currently offered by the European Bank for Reconstruction and Development (EBRD). Via the program webseff (<http://www.webseff.com>) EE projects are funded with low-interest loans up to a maximum of 2 million euros, which have the opportunity to get reimbursed after commissioning a repayment bonus of 20% of the loan, if reduction in CO₂ emissions in excess of 20% can be proven.

On the other side, the permit law situation for the construction and operation of biogas plants in Serbia is regulated, however, the path to commissioning and feed-in is currently still cumbersome and often very slow to pull through little informed

authorities. Thus, the final feed-in licence to the "Privileged Power Producer" is being issued only after the first feed-in and following the takeover of the plant, whereby an investor-friendly optimization of this process is expected to be introduced with the upcoming reform in year 2015. Future operators are therefore well advised to study in detail the precise legal framework and process. Assistance is available in a guide in English language: CONSTRUCTION OF PLANTS AND ELECTRICITY / HEAT GENERATION FROM BIOMASS IN THE REPUBLIC OF SERBIA - Guide for Investors, which is available for download at the following link:

http://www.rs.undp.org/content/dam/serbia/Publications%20and%20reports/UNDP_SRB_Biomass_Plants_Detailed_Guide.pdf

For investors and local operators, the Serbian biogas market has, in terms of biomass potential and gas use, a rather attractive long-term perspective. Joint ventures with local firms can be used to secure substrate supply in the long run on favourable terms, for utilising local specialist expertise in planning permissions and grid feeding directives and also for adaption of proven plant technology to the existing situation in the substrate market.

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