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Barriers for Biogas implementation in Bulgaria

Deliverable 3.2



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1. Introduction

This report was written in the frame of the BIG>EAST project (EIE/07/214), which is supported by the European Commission within the framework of the Intelligent Energy for Europe Programme. It aims to give general information about existing non-technological barriers for implementation of biogas projects in Bulgaria. The main aim of the report is to point out the market, financial, economical, social and also other barriers, related to renewable energies and biogas, in order to make easier the improvements in this area and to support the future biogas projects implementations. Furthermore, this analysis could serve as guidelines to politicians, researchers, biogas stakeholders and decision makers, helping them to mitigate these barriers.

Some of the unclear points and obstacles, which were detected assessing Bulgarian RES policy in Bulgarian energy sector¹, are listed as follows:

- In spite of necessary legislative changes in Bulgaria have already been made (preferential prices for the purchase of electricity from RES have been introduced) there is still no clarity about whether the level of these prices will be sufficient to stimulate all different kinds of Renewables;
- Neither is it clear whether and when any incentives will be introduced for heat production from RES;
- The registration procedure required for selling electricity on the open market takes over one month;
- There is an absence of energy balancing groups, i.e. groups of electricity producers from which companies can buy electricity at a higher price during times of short supply;
- There is a lack of competitiveness between the various electrical energy producers.

Other barriers for biogas projects implementation in Bulgaria are identified and described in the next chapters.

¹ Deliverable 3.1: “Assessment of Biogas Policies in Bulgaria” – BIG>EAST

2. Market barriers for biogas implementation

2.1. Awareness about the use of biogas potential

In Bulgaria not only the farmers but also the industries and the general public have low awareness of the benefits and the potential of biogas use. The government is working for renewable energy sources (RES) penetration. Special allowances and incentives for the promotion of renewable energy projects are made. In recent years there have been a number of studies and conferences that highlight the potential of biomass availability. Unfortunately promotion of available technology of biogas utilization is insufficient.

2.2. Awareness about available biogas technologies

The lack of information about the experience in other European countries on biogas technologies, available at a sufficiently low cost and offering a return on invest rate short enough to meet the requirements of lenders, is a unanimously claimed barrier. Demonstration projects are an interesting mean to promote biogas technologies since it contributes to confidence in the technology on a real visible basis.

2.3. Waste management & supply (“fuel availability”)

The work so far has not resulted in a clear and reliable picture of the waste disposal sites in Bulgaria. Improvements in waste management could certainly contribute to enhanced feedstock availability for biogas production in Bulgaria.

There are large amounts of organic waste from agriculture, farming and households’ origin in Bulgaria, which could be used for biogas production (see the following tables).

Table 1: Municipal waste management (2001-2005)

Type	2001	2002	2003	2004	2005
Generated municipal waste (thousand tons)	4003	3945	3916	3673	3595
Generated municipal per capita (kg/year)	505	503	502	472	476
Collected municipal waste (thousand tons)	3211	3199	3209	3092	3237
Landfilled (thousand tons)	3198	3188	3194	3092	3144
Temporary storage (thousand tons)	-	-	-	-	93
Landfill sites - number	663	677	706	633	537
Settlements served by municipal waste collection system - number	1295	1361	1465	1801	2388

Source: Bulgarian statistical yearbook, 2006

Table 2: Wastewater in Bulgaria (thousand m³)

	2001	2002	2003	2004	2005
Waste water generated (total)²	556838	486254	938658	921958	537255
Agriculture, hunting and forestry (incl. fishing)	5090	3442	3172	3172	3282
Industry	274475	225023	666142	657812	276289
Domestic sector	277273	257789	269344	260973	257684
Households	245692	229870	241331	236564	232315
Treated waste water in IWWP[#]	124512	138570	561195	557838	200301
Agriculture, hunting and forestry (incl. fishing)	1787	1310	1111	1154	815
Industry	121677	136029	558201	555546	198586

² Without cooling water and reused waste water

[#] IWWP – Industrial Waste Water Plant

Domestic sector	1048	1230	1882	1137	900
Total waste water connected to public sewerage	494383	502205	508021	506150	510855
Connected to UWWTP ^{3*}	381968	394626	406707	404194	407668

Source: Bulgarian statistical yearbook, 2006

Table 3: Non-hazardous waste from industrial production by type in 2005 (in thousand tons)

Type	Generated
Waste from agriculture, horticulture, aquaculture, forestry, hunting and fishing, food preparation and processing	470.4
Waste from wood processing and the production of panels and furniture, pulp, paper and cardboard	149.9
Waste from organic chemical processes	6.1
Waste packaging: absorbents, wiping, cloths, filter materials and protective clothing	29.6
Waste from human or animal care and/or related research (except kitchen and restaurant waste not arising from immediate health care)	2.7
Waste from waste management facilities, off-site WWP and the preparation of water intended for human consumption and water for industrial use	206.9
Municipal waste (household waste and similar commercial, industrial and institutional waste) incl. separately collected fractions	82.1
Other non-hazardous waste	181 668

Source: Bulgarian statistical yearbook, 2006

³ Incl. run off rain water

* UWWTP – Urban Waste Water Treatment Plant

Table 4: Average amount of the different types of biowaste generated in Bulgaria

Type	Quantity
Organic household waste	70kg/person/a in areas type A 30kg/person/a in areas type C
“Green” waste from city parks and gardens	25-30kg/person/a
Paper and pasteboards waste	40-45 kg/person/a in areas type A 10 kg/person/a in areas type C
Agricultural waste	20-50kg/ha/a
Sludge from WWP	406 701tons/a
Manure from farming (from public and private farming)	23 500Mio tons/a

Source: National strategic plan for stepwise lowering of the amounts of organic waste disposal

Concrete study of the materials quantity and quality is needed, including study of the relevant parameters contained such as carbon, nitrogen etc. in order to define the necessary treatment and the appropriate technology to be used for biogas production.

2.4. Electricity Market Liberalization and transparency

1st July 2007 was a significant date for Bulgaria, because it was the final deadline date for full energy market opening (liberalization). On paper, this means that domestic as well as industrial consumers now have the opportunity to purchase electricity and gas from any licensed supplier, and to negotiate conditions for such contracts. At the moment there is no change in the actual situation of the market, despite of the fact that the market for energy allows choice between over 30 electrical energy traders licensed by the State Energy and Water Regulatory Commission (SEWRC). The only precondition for contracts is that clients do not have unpaid bills.

The following contracts are available on the free market:

- **Alternative I:** a contract with new supplier, covering payment not only for the electrical energy, but also for the distribution price.
- **Alternative II:** a contract with new supplier for electrical energy and a separate contract with electricity Distribution Company for the distribution price.

The Czech company CEZ, the German E.ON and the Austrian EVN purchased 67% of the seven electricity generating companies (EGC). At this initial stage in the work of the electrical energy market, the National Electricity Company (NEC) participates in the role of Public Supplier (PS) and Transmission Company. The functions of an Electrical Energy

Market Operator are part of the overall functions of the electrical energy system operator (ESO), which the law defines as a unit of the transmission company.

After the Republic of Bulgaria became a full member of the European Union, National Electrical Company (NEC) was restructured in order to meet the requirements of EC Directive 2003/54⁴.

In order to ensure equal access to the network to all participants in the free market for electrical energy, EC Directive 2003/54 requires the transmission system operator, which is part of a vertically integrated company, to be judicially, functionally and financially separated from all other activities not connected with transmission and which can compete on the market, especially in trade and generation.

In accordance with the requirements of the Energy Act and EC Directive 2003/54, at the beginning of 2007 NEC was restructured through the formation of a new company, Electrical Energy System Operator PLC (ESO PLC), of which the capital is owned by NEC. This company functions as an operator of the electrical energy system, administrator of load balancing energy market and as a company operating and maintaining the distribution network which remains the property of NEC⁵.

2.5. Barriers related to end users of biogas

Electricity and combined heat and power (CHP) production

In a system of green certificates in Bulgaria (introduced from July 2006), producers of renewable electricity receive a certificate for each predefined unit of electricity produced. The objective of green certificates is to stimulate the penetration of green electricity into the electricity market. Demand for green certificates can originate from several sources. There might be a voluntary demand of consumers (e.g. by green pricing). Demand can also be imposed by the government on consumers or other actors in the electricity supply chain (generators, distributors, suppliers) via an obligation to generate, transmit, deliver or buy a certain amount of green certificates. The government itself can also act as a buyer of green certificates, e.g. by securing a minimum price or by a tendering procedure. In practice demand might come from a combination of these sources. Consumers pay a price for the certificates in order to meet their target. The price of certificate depends on the market, i.e. on demand and supply. With low supply of green certificates, the price will be high, which will be an incentive for new producers to provide renewable electricity. The situation with feed-in tariffs is still under discussion. At present there are no tax benefits for RES producers in the country and no local or regional support.

⁴ Source: DIRECTIVE 2003/54/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 June 2003 concerning common rules for the internal market in electricity and repealing Directive 96/92/EC

⁵ Source: “**Liberalization of the energy sector-Bulgaria**” – Environmental Association “Za Zemiata”, December 2007.

Grid connection is one of the most problematic issues in the investment projects. According to the Bulgarian Energy Act⁶, “the transmission and the distribution companies shall be obliged to give priority to connecting all power plants generating electricity from RES, including hydroelectric plants with a total installed capacity of up to 10MW, to the transmission network and the distribution network respectively”. The costs of connecting the power plant to the respective network up to the property boundary of electrical installations are to be covered by the producer. After the investor pays the price for connecting to the grid, the expansion and reconstruction of the transmission and/or the distribution network involved in connecting the power plant should be the responsibility of the transmission and distribution company⁷.

Heat production (finding the heat user, heat transfer network)

Bulgaria does not provide financial incentives for the production of heat from RES, which is the first barrier for production of heat from biogas. Compulsory connection to the electricity transfer and distribution network currently applies only to combined thermoelectric energy production units of up to 10MW on biomass, biogas or other bio-fuels. But even this incentive, which relates to the general case of co-generation rather than to the production of thermal energy from renewable sources, only applies to the preferential purchase of electrical energy, not thermal energy.

Biomethane production (purification, possible connection to natural gas grid)

Since biomethane production is still not occurring in Bulgaria, no procedure exists for entering agreement on supplying the biomethane into distribution pipeline, and for establishing parameters of this process. No information is provided on possibilities of using the biomethane in gas distribution pipelines.

Production of transport fuel (logistics, existing transport infrastructure)

The main barrier for the production of transport fuel from biogas in Bulgaria will be the fact that the list of vehicle models available from the factory with CNG (Compressed Natural Gas) is still very limited. Light duty vehicles are usually multi fuel (CNG and gasoline). The costs for these vehicles are higher than conventional vehicles due to fuel system. For urban buses 10 - 20% higher prices are estimated. Also a problem is the limited number of filling stations which makes sense on radius of action.

2.6. Market barriers for agricultural biogas projects

The main barrier for agricultural biogas projects is the lack of information about biogas potential. The farmers don't know about the possibilities that the biogas technologies can provide them. Currently the suitable feedstock for biogas production is used for domestic purposes (for the stock, domestic heat). The sorting and collection of the agricultural waste stream could prove to be a valuable feedstock source, although little research has been done. Another area of consideration should be directed to the use of energy crop farms.

⁶ Source: Energy Law of the Republic Bulgaria, published in SG 107/ December 09, 2003

⁷ Source: “Energy for Sustainable Development” - Bulgaria Ltd: <http://www.esdb.bg/services.pl?l=1&t=8>

Trough the planting and harvesting of dedicated energy crops, of high caloric value which are suitable in Bulgaria's climatic environment, a significant potential for energy generation exists.

2.7. Market barriers for waste water treatment biogas projects

The insufficient sewage systems development, including waste water treatment is a serious problem for the environment as for the human health. The share of the population with access to sewage infrastructure is 69% and only 41% of the population use of waste water treatment facilities⁸. The main problem for producing biogas from wastewater is the lack of well established system of sewage treatment plants (STP) in Bulgaria. The existing ones need renovation and upgrading, and construction of new sewerage is needed. Also a problem is that waste water treatment plants (WWTP) are treating domestic waste waters together with industrial waste waters. Because of that reason, the possibilities for recycling of sludge in the agriculture are limited.

2.8. Market barriers for landfill biogas projects

Currently the Bulgarian population does not have a solid attitude for the separate collection and composting of Organic Waste (OW). In some cases the containers for separate waste collecting are far away from the living buildings, which make it difficult for people to use them.

The Law on Reduction of adverse Environmental Effects of Wastes, which was introduced in 1997, includes migration measures for the reduction of methane and other Green House Gas (GHG) emissions from landfills. This may soon be an instrument in the utilization of landfill gas for energy generation. It has been calculated that the number of legal landfills is approximately 720 with the country generating over 3 million tons of Municipal Solid Waste (MSW) per annum⁹. While there has not been significant research performed on the exploitation of landfill biogas as an energy source, there has been initial research performed on 44 organized municipal landfills regard to the reduction of GHG's¹⁰. Further investigation of the result of such studies would serve as a good starting point in the preliminary evaluation of the landfill biogas. The preliminary of this study suggest that the potential for landfill biogas utilization does exist and is an area that could be further evaluated.

⁸ Source: "National Strategy plan for Rural Development 2007-2013", http://www.mzgar.government.bg/mz_eng/officialdocuments/programs/nsrdp_draft.pdf

⁹ Source: "Renewable Energy Country Profile, Resource Assessment: Stage 1" - European Bank for Reconstruction and Development, Renewable Energy –Bulgaria, 2003

¹⁰ Source: US Department of Energy, Bulgaria Climate Change Country Study. Sofia: Bulgarian Academy of Sciences, 1997. http://www.gcrio.org/CSP/pdf/bulgaria_snap.pdf

3. Economical barriers

3.1. Price of energy

In Bulgaria, the price of energy which is produced from biogas will be considerably higher than the price of energy produced from any other resource. As a result of the higher costs, profit-oriented working capital is not interested in investment into the operation of biogas facilities. An efficient system of direct or indirect subsidy is needed to balance the price difference described above. At the moment no expedient system of subsidy promoting biogas in Bulgaria exists.

3.2. Operation & Maintenance costs

The operation and maintenance costs for a biogas project are considerably high. They consist of labour and hardware cost for:

- acquisition (purchase, collection and transportation) of the feedstock;
- water supply for cleaning the stable and mixing the feedstock;
- feeding and operating of the plant;
- supervision and maintenance of the plant;
- storage and disposal of the slurry;
- gas distribution and utilization;
- administration.

The running costs of a biogas plant with a professional management are just as important as the construction costs. Currently, it exists very limited experience in sound cost calculation for biogas plants in Bulgaria.

4. Financial barriers for biogas implementation

A universal barrier to the development of biogas projects is the difficulty to access financing, especially for small structures like SMEs. Some possibilities for finance support exist, they are listed below. However, application procedures are difficult and the use of these financial support schemes was rarely implemented in the biogas sector, so far.

4.1. Joint Implementation for Biogas projects

Dutch scheme – Emission Reduction Unit Procurement Tender (EruPT)

The Republic of Bulgaria and the Kingdom of the Netherlands have signed a Memorandum of Understanding (MoU) on co-operation in reducing emissions of greenhouse gases under article 6 of the Kyoto Protocol. The co-operation under this memorandum aims at transfer of emission reduction units of an average of 3 Mt CO₂-equivalent per year during the commitment period 2008-2012. Decisions on the transfer are taken on a project-by-project basis by means of international Emission Reduction Unit Procurement Tender (ERUPT). Until now two Tenders were carried out. Bulgaria participated with 6 projects in the second tender, unfortunately none of them were selected. The financial viability of the foreign investors for some of the projects was assessed to be unsatisfactory. A “Joint Implementation Unit – Bulgaria” (JIU) was established on 1 July 2000. The JIU – Bulgaria is part of the Ministry of Environment and Water (MoEW) and consists of two persons. The staff of the JI-Unit assists in the JI policy development, coordinates the Joint implementation activities with the MoEW, performs negotiations on credit sharing, and maintains close communications with the project developers. Memoranda of Understanding are to be signed with Austria in the beginning of September, and with different countries in near future.

Another financing mechanism which has been introduced to boost RES projects in Bulgaria is the Prototype Carbon Fund (PCF) of the World Bank. Host country umbrella agreement between the Republic of Bulgaria and the International Bank for Reconstruction and Development, as trustee of the Prototype Carbon Fund, was drafted and will be signed during the second half of this year (2008)¹¹.

¹¹ Source: <http://www.iea.org/textbase/work/2002/emissions/summary/BULGARIA.pdf>

4.2. Third Party Financing (TPF) and Public-Private Partnership (PPP)

Financial barriers require special attention. Third Party financing has been promoted for several years by the Commission in both the SAVE and THERMIE Programmes as a means of removing such barriers. Model contracts have been prepared for all Member States and several projects have been carried out. Council Directive 93/76¹² requires Member States to develop actions related to third party financing in the public sector. While this has been reasonably successful, the full potential of this instrument has not yet been achieved. The instrument needs to be strengthened by use in larger public sector undertakings and expanded to cover private sector needs.

Therefore, new ways must be sought to promote the instrument and to increase the interest of commercial banks in assuming the role of guarantor for energy service companies (ESCOs) considering third party contracting. In addition to increased commercial bank participation, new contract forms may need to be developed, such as the guarantee of results procedure, which has been successfully used by the ALTENER Programme. Energy efficiency investment project clearing houses will also need to be tested as a means of providing commercial banks with independent evaluations of the viability of proposed investments. Studies and pilot actions in these specified areas need to be carried out.

4.3. Specific financial products from commercial banks

Bulgarian commercial banks have a very prudent crediting policy – high interest rate (usually over 15%) and credit guarantee more than 125%. They abstain from granting long – term credits.

There are some banks, however, (e.g. DSK bank, member of the OTP Group) which have a special policy to grant loans to support entrepreneurs in the early stage of developing projects for the EC Programmes in general (Structural and Cohesion Funds, FP7, IEE), including RES and EE projects. With the purpose to facilitate the process of European fund's resources absorption, DSK Bank established a new subsidiary – DSK Bul-Project Ltd. The company offers highly qualified consultations to the applicants for operative programs financing from preliminary researches and preparation of the project proposal to its final phase, through entire management of the activities that are approved in the project.

¹² Directive 93/76/EEC of 13 September 1993 to limit carbon dioxide emissions by improving energy efficiency (SAVE)

4.4. State support for biogas projects

Full or partial support for investment Programmes may be provided through national or external funds and international Programmes. The more significant funds and Programmes, which provide opportunities for credits or grants for RES projects, are as follows:

International Kozloduy Fund

In November 1999, the Bulgarian Government and the European Commission signed a support agreement to overcome the negative consequences of the decommissioning of reactors 3 and 4 of the Kozloduy nuclear power plant. The international Kozloduy Fund was created, administered by the EBRD. This fund supports individual profit – making projects including the private sector. Draft proposals were accepted from investors until end of August 2006, including for renewable energy projects and co – generation. Project applications to a total value of € 1.5 million each were accepted.

Environmental Protection Activity Management Company (EPAMC)

EPAMC is a state owned company taking part in renewable energy projects. Funding is either in the form of grants or of interest – free loans. The loans may cover up to 70% of the total budget of the project, the remaining 30% be required as the applicant's own contribution. Funding is provided both to state and municipal projects and to private initiatives with an environmental emphasis.

National Trust Ecofund

The activities of the National Trust Ecofund are similar to those of the EPAMC. It requires 50% co - financing from other sources for loan applications and 70% for grants. Projects are required to result in significant environmental benefits.

National Action Plan for the implementation of significant investment projects in RES from the National Programme on Renewable energy Sources (NPRES) – for the period 2004 – 2014

NPRES was linked to an action plan for the development of 83 real projects by 2010 costing a total of USD 156.7 million. Most of them are various small and medium sized RES projects planned for implementation by 2010 in state – owned and municipal building and enterprises. It is logical that implementation will be covered by state financial support, mainly from the green funds.

4.5. EC support: Structural and Cohesion Funding

The Bulgarian Energy Efficiency and Renewable Energy Credit Line (BEERECL) has been developed by the European Bank for Reconstruction and Development (EBRD) in 2004 in close co-operation with the Bulgarian Government and the European Union. The facility extends loans to participating banks for on-lending to private sector companies for industrial energy efficiency and small renewable projects, including biogas projects. However, only one project of the total 124 projects approved for grants since the beginning of the BEERECL operation is related to biogas production.

4.6. Financial size & low return rates

The lack of experience with biogas projects in Bulgaria makes it difficult to plan the financial size and return rates. This barrier has to be overcome by the implementation of best practice examples and by training of government staff, bank employees, and future biogas plant operators.

5. Social barriers

5.1. Cooperation between project parties

The importance of agriculture and forestry for employment in rural areas is very high. In the predominantly rural regions 33% of the employment is in agriculture and forestry, and in the intermediary rural regions it is 27%¹³. Thus, enough workforces for large-scale biogas production in Bulgaria would be available. However, until now, no study exists if there is willingness of different stakeholders to cooperate in a joint biogas project. This willingness would be necessary to guarantee a successful biogas plant implementation.

5.2. Public acceptance, lack of knowledge, experience and awareness

Social acceptance of additional electricity generation such as from biogas represents an important parameter influencing the penetration of different technologies. In general, decreasing social acceptance can be observed if penetration of a specific technology increases. For all generation options social acceptance is considered technology specific as constraint on national level. Since currently no biogas plant exists in Bulgaria, it is difficult to assess the acceptance of biogas plants in the public. There is no study available on the acceptance of biogas in Bulgaria, but certainly, knowledge transfer and capacity building among the large public would increase the acceptance from the beginning of biogas development in Bulgaria.

¹³ Source: “National Strategy plan for Rural Development 2007-2013”,
http://www.mzgar.government.bg/mz_eng/officialdocuments/programs/nsrdp_draft.pdf

6. Legal & Administrative barriers

6.1. Large number of Authorities involved

Licensing procedures and authorities in Bulgaria vary on a certain degree with the type of energy source. Despite this, all investors undertake certain procedures to acquire and licenses. The first obstacle that the investor comes up against is at the level of project design. The investor must clarify the ownership of the site earmarked for the investment project and must acquire the right of ownership or the right to use the land. If the land is agricultural or forest land, it is necessary to change its status or to replace it with similar land, so that it can be used for other purposes. This requires permission from the Mayor and planning permission for construction. The next step is receipt of a license from the State Energy and Water Regulatory Commission (SEWRC), application for an assessment of the conditions and a manner of connection to the electricity transmission network, planning commission, a connection to the electrical network, etc.

A number of associations and investors find the procedure excessively complicated and consider that they should be simplified. In addition, no real experience for the involvement of authorities in the biogas planning process in Bulgaria exists.

6.2. Permit procedure (long time and effort)

The legislation process is too slow and time consuming. There is a lack of correlation of energy policy with other EU countries. The system of permissions and licensing is heavy bureaucratic. There is a need for standardized application procedures for bankable renewable projects. Currently, there is no experience on the permission procedure for a biogas plant due to the lack of demonstration projects.

7. Conclusions

Some of the main barriers for implementation of biogas projects in Bulgaria could be summarized as follows:

- Lack of legislative framework on biogas and support mechanisms;
- Low educational level and inadequate qualification of the stakeholders;
- Lack of information campaigns, training programs, consensus conferences, and regional dissemination networks;
- Lack of own capital and difficult access to credit of SME's.

Possible ways to overcome some of the main barriers are to introduce a legislative vision for the future of Renewable Energies (including biogas), based on the EU “Sustainable development” policy, which could include long-term qualitative and quantitative objectives and targets, and more opportunities for innovation. Furthermore, targeted trainings and education Programmes for industries and farmers should be implemented, showing the benefits of environmental technologies. It is also necessary to identify new ways for financing credit access.

In summary, biogas demonstration projects could significantly contribute to reduce the barriers in Bulgaria. Until today, no biogas demonstration project exists, and the appropriate reduction of barriers has just started.