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Barriers for biogas implementation in Slovenia

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Contents

Introduction

The purpose of this document is to identify categories of non-technological barriers to the development and implementation of an Energy Exploitation scheme. This analysis assists in understanding how barriers affect the development and use of biogas in Slovenia. It can help to focus the efforts of stakeholders on coordinated initiatives to remove or reduce barriers.

The barriers identified are grouped into the following three general categories according to WP3.2 Template contents:

- Market Barriers
- Financial Barriers
- Other Barriers (e.g. Economic, Social, Legal & Administrative)

The list of barriers that follows is an extensive (not an exhaustive one), but illustrate the basic barriers that in many cases are common to many countries during the design, development or implementation of this type of actions. The main component for each partner is the identification of the range of barriers in each country and then the focus to each one of then individually. The following table is only a list and no weight or importance has given to each of the barriers identified.

1 Market barriers for biogas implementation

The following six principal components have been identified as the most important links for the development and financial viability of a biogas network:

1. Type / Raw material category - Feedstock (e.g. wastes, other organic substances).
2. Intermediate stages (e.g. collection, transportation to the plant).
3. Biogas Plant (type of technology).
4. Final products (e.g. Electricity & Heat, Compost).
5. Relevant substructures (e.g. Distribution, Compost promotion).
6. Final use (e.g. process heat, electrification, household heating).

1.1 Awareness about the use of biogas potential

There is somehow lack of knowledge and information not only to the farmers but also to the industries (owners) and the general public about the possible energy exploitation of wastes and their final uses (e.g. electricity, heat, injection to the grid, transport fuel). Generally, AD is used mainly as a waste treatment but not accompanied with biogas production and energy production at the moment. The general approach is the concept of the disposal as waste after some treatment than promoting a valuable technique as biogas production and a source of fertilizer or compost. There is a lack of official documents describing real technical potential for biogas, especially for biogas from agriculture. There are detailed studies for biomass and only few institutions have estimated the potential for different locations. ApE is preparing Energy GIS where potential will be calculated based on the location of bigger farms (more than 50 live stocks) and actual land use. Application will be used to prepare different strategies for future development based on the potential. Detailed information will be available to the Ministry and to some level to municipalities. General and generated potential will be for public.

1.2 Knowledge of available biogas technologies

Potential investors that are already thinking about biogas plant have made contact with domestic companies offering services (consultant or even building a whole plant) and also with foreign (especially from Austria, e.g. Agrinz GmbH). In general knowledge on biogas technology is relatively good concerning bigger investors and quite poor on the individual – farmer level.

1.3 Waste management & supply (“fuel availability”)

The Environmental Agency of the Republic of Slovenia is issuing decisions on the assessment of tax and exemption from taxes in the field of waste disposal. On the basis of issued administrative acts and provisions in the legislation regulating waste management, the Environmental Agency of the Republic of Slovenia keeps different registers, e.g. registers of, persons providing recovery, disposers, collectors, transport operators, dealers and brokers in waste management, and a register of suppliers of batteries and accumulators. The established registers are updated monthly on the website and are published annually in the Offi-

cial Journal of the Republic of Slovenia. Agency is collecting the data on waste management. Under the legislation in the field of waste management, persons liable are obliged to report annually (by 31 March) on waste management in for the previous calendar year. All the information about collected wastes and their management is available on http://www.arso.gov.si/varstvo%20okolja/odpadki/podatki/. There is also a list available of organic waste collectors.

In most of the cases Local and National Authorities are responsible for the treatment and final disposal of sludge and solid wastes in Slovenia. In these cases the "raw material flow" is relatively stable.

An option can be the delivery of wastes via long-term contracts between AD plant operators and feedstock suppliers. Under this perspective the raw material market is a fundamental key to success project implementation. Furthermore, in some cases the feedstock composition is fundamental for the Biogas production and the use of different waste (like agro-industrial waste with pig manure) is necessary (Co-fermentation with other raw material must be examined).

Farmers' involvement in biogas project is important for the success of AD schemes (supply of the raw material, receive the fertilizer, operate the biogas plant). Their involvement in AD schemes depends on the waste management alternatives.

1.4 Electricity Market Liberalization, transparency, dominant players

The electricity and gas market was fully opened also for household on July 1st in 2007. The public company Elektro-Slovenija, d.o.o. (Eles) carries out the tasks of the transmission system operator. The high-voltage network, including the facilities for 400, 220 and 110 kV, allows a reliable and high-quality electricity supply to large customers and distribution companies. Eles carries out the tasks in the field of the maintenance, the development or the building of the transmission network; it also manages and operates the transmission network, provides ancillary services, and makes sure that the imbalances between the forecast and real consumption of electricity are balanced.

The tasks of the distribution system operator are carried out by the public company of the SODO, the distribution system operator of the electricity network that has signed contracts on leasing the electricity-distribution infrastructure with the following owners:

- Elektro Celje, d.d.,
- Elektro Gorenjska, d.d.,
- Elektro Ljubljana, d.d.,
- Elektro Maribor, d.d.,
- Elektro Primorska, d.d.

Based on the contracts, the above companies provide services for the SODO, using their own infrastructure. The distribution networks include electric power lines and facilities for low voltage (0.4 kV), mid voltage (10, 20, and 35 kV), and in some cases also for high voltage (110kV).

In Slovenia all forms of primary raw materials, or energy sources, are used for the production of electricity. The predominant share of electricity production is carried out in conventional power stations (thermoelectric power stations, hydroelectric power stations, and the nuclear power station), while the production share at the distribution level is still very small. The following eight companies operating in large facilities with a capacity of over 10 MW are active in the electricity-production market:

- Drava Power Stations, Maribor, d.o.o. (DPSM),
- Sava Power Stations, Ljubljana, d.o.o. (SPSL),
- Soča Power Stations, Nova Gorica, d.o.o. (SPSNG),
- Nuclear Power Station, Krško, d.o.o. (NPSK),
- Thermoelectric Power Station, Šoštanj, d.o.o. (TPSŠ),
- Thermoelectric Power Station, Trbovlje, d.o.o. (TPST),
- Combined Heat-and-Power Station, Ljubljana, d.o.o. (CHPSL),
- Thermoelectric Power Station, Brestanica, d.o.o. (TPSB).

Three companies, the DPSM, the SPSL and the SPSNG, generate electricity in hydroelectric power stations, the NPSK in a nuclear power station, the TPSŠ and the TPST in thermoelectric power stations running on coal, the TPSB produces electricity from liquid and gaseous fuels, and the CHPSL cogenerates heat and electricity in a cogeneration process using coal.

1.5 End user related barriers

1.5.2 Electricity and combined heat and power (CHP) production

Electricity production with all RE producing electricity is supported trough the feed-in tariff system. This system is foreseen for independent qualified producers[1] from which distribution companies[2] have to buy electricity on fixed prices electricity from qualified producers of electricity (Official Gazette RS, no. 25/02) and with Decree on prices and premiums for purchase of electricity from qualified producers (Official Gazette RS, no. 75/06).

Uniform annual prices for the purchase of electricity from qualified producers and uniform annual premiums (when independent qualified producer sells at uniform annual premium he get paid a sum of adequate premium and market price, which is not necessary higher as uniform annual price) for electricity that the producers are selling individually to the end consumer or via distributor are shown in the table below.

1 Independent qualified producer is a producer which in single object of production produces electrical energy with above average exploitation of cogeneration of heat and power or if he in economically and environmentally adequate way exploits wastes or RES.
2 Prices of electricity sold to the industrial consumers are set in individuals contracts with them and are market oriented. Prices for household and small consumers are set fixed and set from the government.

Type of QPP regarding the primary energy source	Uniform annual price (cent€/kWh)	Uniform annual premium (cent€/kWh)
Other QPP	**12,09**	**8,33**

Uniform annual price for biogas power plant from animal waste is 12,09 c€/kWh.

Power plant using as input other kind of RES, which is not fossil or nuclear. QPP using biogas from animal waste belongs to this group. Biogas plants from waste water treatment plants and on landfills have lower purchase price.

1.5.3 Heat production

Heat consumption is not covered in total. Normally, excess heat is partly used for heating own object and the rest is released into the air. Biogas plants are usually located on bigger farms, which are isolated. However the idea is that there is only a biogas production located on the farm (an maybe smaller CHP unit) and the rest of the gas is transported with pipelines to the industry center where central boiler room in located.

1.5.4 Biomethane production

Biogas could be feed into the natural gas grid satisfying grid requirements where there are two possibilities: a) connection to the national grid operated by company Geoplin or b) to the distribution grids operated by several distribution companies. These grids have different characteristics. In both cases it is necessary to get the approval from the company for connection and become gas supplier. Then the station is set and gas controlled.

1.5.5 Production of transport fuel

There is little knowledge and infrastructure in this field. The use of biogas as vehicle fuel needs strong promotion from the gas companies (e.g. build new filling stations) and the state support (e.g. taxes, reduced taxes to car owners, etc.). Additional, municipalities or major enterprises can play an important role promoting biogas to their buss fleets (e.g., using local regulations, public awareness, corporate social responsibility).

2 Financial barriers for biogas implementation

Financing investments of renewable energy systems remains a major concern. It will improve as costs fall and Renewable Energy Technologies (RET) become more competitive because many investors are willing and anxious to enter the energy sector. They are supported by new financial instruments that use private-sector banks to create green investment funds with lower interest in commercially viable technologies. What is needed is clear and stable financial conditions and environment.

2.1 Joint Implementation for biogas projects

In principle this is possible. However, there seems to be no interest from the stakeholders. No projects were made that way, to our knowledge.

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

Barrier to use TPF or PPP lies in people themselves. In practice it is in many cases impossible to reach an agreement between two (or more) farmers to build a common biogas plant. Reaching an agreement with public entity (for example municipality) is even harder. However, there are several farmers that are interested in the TPF and are searching for investors since they are not able to invest on their own.

2.3 Specific financial products from commercial banks

Commercial banks do not offer special financial services for environmental investments. As already mentioned, one of the supporting possibilities is a soft loan from Eco fund. However, investors with good credit standing get approval from commercial banks for loan with similar or better conditions as from Eco fund.

2.4 State support for biogas projects

RES power plants are stimulated through feed in tariff system and therefore there are no additional subsidies available. There is only one exception for farmers who have the possibility to obtain subsidy up to 50% of investment costs. In this example the uniform purchase priced is decreased for each 10% of received subsidy by 5%. Subsidies exclude soft loans and there is also “The minimum” rule on the possible amount of grants and soft loans from the state.

2.5 Financial size & low return rates

The environmental development fund of Slovenia is a public fund offering within calls attractive credits for environmental and RES investments for companies and households. Its main mission is to encourage development in the area of environmental safety.

Eco fund will publish a call for financing environmental investments in next months where investments in biogas plants are also foreseen. It is expected that the interest rate will be EURIBOR + 0.3% and it will be possible to obtain 90% of the investment.

2.6 EC support – Operational Programs related to biogas projects

Currently only farmers have the possibility to apply for these funds by the Agency of Republic of Slovenia for agricultural market. The agency has published a tender for diversification of the activities on farms where energy production for RES is one of the foreseen measures. It is possible to obtain subsidy up to 50 % of the investment costs. In this example the uniform purchase priced is decreased (for each 10 % of received subsidy the price is decreased by 5%, etc.).

3 Other barriers for the biogas implementation

3.1 Economic barriers

3.1.1 Price of energy

When talking about biogas from manure and organic waste, investment costs are relatively high and therefore already represent the first barrier to the potential investor. Average specific investment cost for standard biogas plants in Slovenia is: 4.500 €/kWe for plants up to 1 MW and 4.000 €/kWe for plants over 1 MW. For using biogas from landfill or sewage gas than the investment is much lower.

Operation & Maintenance costs are in existing biogas plants in the range of 40-55 €/MWh of produced electricity.

3.1.2 Project profitability

Profitability of the agricultural biogas plants at current price is just over zero due to the increase of the corn silage prices. Besides, for the new power plants farmers expect a payment for using their manure in case of manure collection in nearby farms. CHP plant on landfill sites or sewage gas in very good (return period from 6 - 6 years)

Current electricity price for biogas plants using manure and other biomass is 12.09 c€/kWh and premium is 8.33. For CHP plants on landfill site or waste water treatment plants is for plants up to 1 MW 5.32 c€/kWh and for over 1 MW 4.95c€/kWh.

3.2 Social barriers

3.2.1 Relations between project parties

As already described, it is rather hard to reach an agreement among neighbors to work together in building a common biogas plant. They would rather build one for each.

Cooperation among farm owners and potential investors is more likely but in these cases farmers' profits are much lower.

Farmers are no longer interested in giving the manure for biogas plant for having a final output as better fertilizer. They expect getting a payment for their manure.

3.2.2 Experiences

One bad experience is in one smaller town or better village where potential investor is still planning to build bigger 1.5 MW_{el} biogas plants in the center of this village. Although, the new location is on old farm it is located in the city center and people are strongly against building huge digesters and having lots of trucks driving the input into the plants. This is an example where biogas plant should be located in the margin of the village. It is also a problem in the size of the biogas plant. Smaller, located in farms bled in with the existing infrastructure and in this cases local people is satisfied with the solution for bad small.

3.2.3 Project preparation procedure

Whole preparation procedure before starting building is long lasting. Whole procedure normally takes from 8 month to 1 year and a half. Therefore, public bodies should participate in one way or another from the early stages of the project planning.

3.2.4 Public acceptance

Communities often are not supportive of the use of innovative technologies because they are unwilling to assume risks associated with testing and use of these schemes in their neighbourhoods. Strengthening of social acceptance (sensitisation, information, participation, etc.) is needed.

Public acceptance and of such schemes are relatively poor. Environmental awareness taking into account the global change and the reduction of land and water pollution is still weak.

3.3 Legal & Administrative barriers

3.3.1 Authorities involved

A Strategic biogas Plan must be incorporated within the National and Regional Energy and Environmental Policy. The Agricultural Policy (Ministry of Agricultural, Forestry and Food), Environmental Protection (Ministry of Environment and Spatial Planning) and Energy Investments (Ministry of Economy) should be properly coordinated.

The lack of coherent Energy and Environmental Policy affect biogas exploitation projects.

The regulatory framework for the promotion of biogas must further be improved taking into consideration the needs for environmental protection and the promotion of energy exploitation and efficiency (e.g. Kyoto Protocol, EU Directives, like 2001/7/EC).

3.3.2 Permit procedure

Permitting processes for implementing biogas technologies involve numerous levels and are time intensive.

3.3.3 Spatial Planning

The "Spatial Planning Development Strategy of Slovenia" cites: "The Spatial Strategy is based on the consideration of social, economic, and environmental factors of spatial development. In line with the principle of sustainable development, which is its basic principle, the Spatial Strategy enforces prudent land use and provides for the safety of life and natural resources. It emphasizes endeavors to preserve spatial identity and to enhance the Slovenian identity as well as its local and/or regional identities. In the context of European competition, this offers comparative advantages. The Spatial Strategy is composed of a textual and a cartographic part."

In many cases, however, the capital prevails over public interest. In some cases this is true also with RES projects. However in majority is the other way around. Spatial planning many times overlooks possibilities and opportunities for use of the RES. This is true in both national and local level, maybe is the situation better at the national level.

3.3.4 Procurement processes

This is not that much true for the households, but holds true very much for the companies. There was normally just one call in a year, and the exit of the application was not clear, neither was the amount of funding. This created many problems in planning investment and lead to abolition of quite a few otherwise firm projects.

3.3.5 Regulators

Regulators may lack knowledge about innovative technologies and involved parties with cleanups have conflicting priorities. Incorporating the specific wastes within the regional planning is necessary based on "Integrated Environmental Management".

3.3.6 Regulatory structures

Regulatory structures do not provide incentives.Regulatory structures do not consider market forces and therefore do not provide incentives for cleanup contractors and site managers to use innovative technologies.

Enforcement of regulations that govern cleanup activities is inconsistent. Review of the legislation framework, strict application of waste Management Legislation and strict control concerning its implementation is needed.

4 Conclusions

After Slovenia joined the European Union a lot has changed on biogas production in the country. Import of the technology, equipment and materials is a simple task now. (However, also export of raw material, this fact has to be taken into account as already plays an important role on biogas market!) Because of the new (EU) regulation on the waste, food production and environmental protection also the number and quantity of substrates is raising considerably. In the last years we are facing a rapid development of the biogas plants, which allow for more efficient biogas production and the raising price of fossil fuels is only another supporting factor for increased use.

This, however, means also new challenges for the investors. They are confronted with a real administrative jungle of various environmental-sanitary-veterinary-electro-technical regulations and permits. The situation is slowly getting better, though.

Biogas plants that would use only manure and slurry from animal farms are practically not built any more. Agricultural, food processing and catering industry products and byproducts are used as a feedstock or co-substrates. For treating various types of waste various regimes apply, which need to be taken into account seriously.

However, prudence is not needed just for the sake of environment and people health but also from the economical point of view. Biogas plant can not be seen as a device that is capable of quick adaption to market changes in feed stock. It can be rather compared with a sensitive stomach that reacts to too rapid changes in quantity, sort and food temperature with indigestion, which can be also longstanding and even fatal. Therefore a thoughtful feasibility study has to be made prior to make a decision for building a biogas plant. It should not rest on just a simple payback calculation based on investment costs and income from electricity sold to the network. It has to take into account also the possible gains from the waste management, from the use of the digestate (as a fertilizer) as well as the possibility to sell the surplus of heat. It is of extreme importance to consider also the risks of changes related to production and market of feedstock.

Without any doubt one would get into trouble if decided to build a biogas plant using a do-it-yourself approach and just copying a blueprint of an existent and successfully running facility. At designing of every single plant there are a number of uncertainties popping up that demand for not standardized answers and take into account specific circumstances.

In spite of raising interest for biogas plant building in Slovenia there is still a considerable lack (or it is not widespread enough) of knowledge about factors that influence the process of biogas production. The same is true also for the economical part of biogas plants and with environmental-veterinary-sanitary regulation on treating of input and output substances of the biogas process. One needs to understand that it is extremely difficult to provide the kind of the general cost estimates for the investment or for the operating cost. Therefore, the detail planning of the process, the costs and revenues estimation with all due respect to the local circumstances is a must before the final decision about the project realization is made.

Therefore raising of awareness among broader public and education of all the stakeholders is very important.

A public awareness campaign should be continued and perhaps designed specially for each stakeholder group. More or less the same topics as elsewhere should be addressed:

- Local/regional authorities – how to incorporate biogas projects in current activities of utility companies; how to make profit and/or save costs in the budget from biogas plants from landfill gas, waste water treatment plants; what are the benefits to the local community of having a biogas plant; possibilities of public-private partnerships in biogas projects; incorporation of biogas plants in spatial planning

- Food processing industry – how is possible to diversify business portfolio with biogas production, how to save on energy consumption costs, what are the general features of a biogas plant (guidelines on costs of investment, operation and maintenance, feedstock characteristics etc.)

- Farmers – necessary steps to a biogas plant, how much and which feedstock is needed, what are the steps to become a biogas producer, possibility of having a centralized biogas plant, what are the general features of a biogas plant (guidelines on costs of investment, operation and maintenance, feedstock characteristics etc.)

- Development agencies – general information on biogas properties, best practice technologies, examples, externalities on biogas projects, contacts for further development of biogas projects, basic information on the properties of a biogas investment

- Existing services/institutions related to agriculture – introduction of possibilities of biogas project implementations in existing agriculture systems.