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# Regional strategy and action plan for the development of biogas production in Slovenia

## (EXECUTIVE SUMMARY)

### 1 Introduction

The objective of the regional strategy is to determine the technical potential for the production of biogas, to identify the barriers and obstacles in a specific region and country and to elaborate a strategy for a successful development of biogas production.

The main objective of the strategy for development of biogas production in Slovenia is to increase the production or utilization of biogas in the agricultural sector.

### 2 Definition of the region

Slovenia (officially: the Republic of Slovenia) is a European country in the southern part of Central Europe and on the extreme northern part of the Mediterranean. The country borders on Italy in the west, on Austria in the north, on Hungary in the north-east and on Croatia in the east and south.

Slovenia has 2 million inhabitants and is divided in communes. Its surface measures 20.273 km<sup>2</sup>. It is situated on the cross-roads of Alpine, Mediterranean, Pannonian and Dinaric region. The average annual temperature lies between 12°C in the Mediterranean part and 0°C in the hilly (mountainous) part of the country.

The common consumption of primary energy in Slovenia was 7.318 Mtoe in 2006. The share of renewable energy sources (RES) in the primary energy was about 11 % and the share of electricity generated from RES in the gross consumption of electricity was 24,4%. This is a lower objective among the objectives and obligations of Slovenia in frame of which the RES

share in the primary energetic balance ought to be increased to 12% and the share of electricity generated from RES in the gross consumption of electricity to 36,6% in 2012.

### 3 Estimation of potential for biogas production

The production of biogas in Slovenia is available from the 80ties of the previous century. The production of biogas from anaerobic digestion systems is available for biomass from central wastewater treatments (CWWT), breeding farms, green wastes from agricultural, organic wastes from restaurants and households and industrial wastes. The utilization of landfill gas from municipal wastes is available on a few waste dumps.

The utilization of biogas for heat and electricity production is available in six central wastewater treatments (CWWT) with total electricity power of 2.1 MW<sub>e</sub>. The total electricity power of CHP systems fuelled by landfill gas is 4 MW<sub>e</sub>. In operation are several biogas plants fuelled by agricultural wastes with the total electricity power of 3.6 MW<sub>e</sub>.

The biogas potential in Slovenia will be divided as to the type of organic substances (substrates) and the way of production. There are following biogas potentials from the following sources:

- Organic wastes at municipal waste dumps,
- Bio-degradable wastes at central waste water treatment plants (sewage),
- Bio-degradable industrial wastes,
- Wastes from households, restaurants and grocery shops,
- Agricultural wastes: animal excrements and green agricultural wastes.

Biogas may also be generated from bio-degradable household and processing industry wastes.

In the long-term energetic balance of the Republic of Slovenia for the period 2006-2026, the entire potential of electricity production from bio-degradable wastes (households, industry, animal excrements, etc) until 2030 was evaluated as shown in Table 1.

Table 1: Estimation of installed power and electricity production from all biogas and landfill gas plants

Year	2010	2015	2020	2025	2030
<b>Conservative scenario</b>					
Average installed electricity power (MW)	15	21	26,25	28,5	30
Average yearly electricity production (GWh)	90	126	157,5	171	180
<b>Optimistic scenario</b>					
Average installed electricity power (MW)	25	35	48,13	58,9	70
Average yearly electricity production (GWh)	150	210	288,8	353,4	420

The estimation of electricity production from new biogas plants using bio-degradable wastes (households, animal excrements, industry, etc) until 2030 is shown in Table 2.

Table 2: Estimation of installed power and electricity production from new biogas plants

Year	2010	2015	2020	2025	2030
<b>Conservative scenario</b>					
Biogas-Average installed electricity power (MW)	8	14	18	21	22
Average yearly electricity production (GWh)	50	84	111	125	132
<b>Optimistic scenario</b>					
Biogas-Average installed electricity power (MW)	11	21	32	37	40
Average yearly electricity production (GWh)	66	131	192	227	240

The estimation of electricity production from landfill gas in new CHP plants until 2030 is shown in Table 3.

Table 3: Estimation of installed power and electricity production from new landfill gas plants

Year	2010	2015	2020	2025	2030
<b>Conservative scenario</b>					
Biogas-Average installed electricity power (MW)	3	3	3	1	0
Average yearly electricity production (GWh)	23	23	19	9	2
<b>Optimistic scenario</b>					
Biogas-Average installed electricity power (MW)	5	6	6	4	3
Average yearly electricity production (GWh)	37	44	40	30	23

One of the main potentials for the generation of biogas lies in agriculture. At present there are 20 biogas plants with the total installed electric power of 23 MW at the stage of development study, project preparation, acquisition of agreement or building permits.

The potential of agricultural raw material (substrates, plant biomass and animal manure) which will be used for biogas production was evaluated on the basis of analyses of 1707 animal production farms and 24 animal production companies and for 375 farms and 18 field crop production companies which cultivate together 15.701 ha fields.

The estimated potential or quantity of substrates and expected yields of biogas and electricity production from agricultural sector are shown in Table 2.

Table 2: Potential of biogas production from stockbreeding and agricultural small farms

Type of substrate	Total quantities of substrates [ton/year]	Total biogas production [m <sup>3</sup> /year]	Electricity production [MWh/year]	Electricity power [MW]
Animal manure	110.414	38.953.904	80.674	10,1
Energy plants	107.372	60.344.926	124.974	15,6
TOTAL	217.786	99.298.830	205.748	25.7

## 4 Strategy development of biogas production

The main objective of the development strategy for biogas production in Slovenia is to increase production and energy utilization of biogas in the agricultural sector. Big agricultural biogas plants are in operation or under construction on almost all big farms in the country.

The main unutilized potential for biogas production in Slovenia lies in the small stockbreeding and agricultural farms and companies.

The recommendation of the strategy is obligatory utilization of other technical and economic potential of biogas production from municipal wastes (from the separate waste collection), food and paper manufacturing industry), communal wastes on the centres for waste treatments and landfill gas.

The main principal types of the non-technical barriers and recommendation measures to overcome them are the following:

- legal (authorisation procedures),
- education and information,
- economic and financial,
- technical and organisation and
- public acceptability.

### 4.1 Legal

The objective of the measures is to improve the legalisation in order to simplify the procedures of permits for biogas plants.

The recommendation of legal measures is the following:

- To simplify the procedures of permits for biogas plants by decreasing the time of procedures.
- To define one location to cover all needs of permits for biogas plants.
- To adopt a suitable regulation for support of the investment and production of biogas.

### 4.2 Education and Information,

The objective of the measures is to overcome the lack of experiences of domestic experts and (agricultural and energetic) advisors on the local level and lack of information by agricultural population.

The recommended measures to overcome the lack of information are the following:

- qualification of a special group for public communication regarding the utilization of different types of biomass including biogas,
- leaflets and brochures about the benefits of the utilization of biogas potential in agricultural area (job creation, local development, reduction of odour and methane emissions, reduction of fertilizer...),
- publication of best practices of biogas plants, articles in local newspapers and local TV program and radio stations,

- publication of financial instruments supporting the investment in biogas plants,
- different events (seminars, workshops, short trip to installed biogas plant or pilot plants...),
- including of NGO on the national and local level in the information activities.

The recommended measures to improve the lack of technical education of the operators of biogas plants, consulting and advisor organisation are the following:

- education program for the operators of biogas plants,
- education program for the agricultural and energy advisors regarding the utilization of biogas,
- support to the special education programs within the education institutions in the country (second and high technical school, university study...),

### **4.3 Economic and financial obstacles**

The objective of the measures is to improve the conditions required for the investment in biogas plants and increase their competition. The recommendation measures are the following:

- establishment of special funds (within eco-fund of Slovenia) for the investment in small biogas plants in agricultural area,
- more soft loans for the consortium of small farmers for the investment in collective biogas plant,
- special conditions for collective biogas plants in the Feed-in Tariff scheme for electricity,
- new financial scheme supporting the useful energy use of heat from renewable energy sources (similar to the Feed-in tariff scheme for electricity).

### **4.4 Technical and organisational obstacles**

The objective of the measures is to improve the organization of operation of whole biogas plants regarding the transport of substrates and operation of anaerobic digestion process.

The recommended measure includes the increase of knowledge of owner and operators of biogas plants about the anaerobic digestion process and the organization of transport of substrates from and to the biogas collective plant

### **4.5 Public Acceptability**

The objective of the measures is to increase the information about the impacts and advantages of installation of biogas plant and to increase the public acceptability.

The recommended measures to increase the acceptability of biogas plant are the following:

- dissemination of information about the advantages of utilization of biogas on the local level,
- open discussion with the local authorities and local inhabitants about the planned biogas plant and about all its advantages and weaknesses,
- organization of trips and excursion to biogas plants in operation,
- including NGO on the local level in the information activities,

- invitation of political decision makers on the high level to discussion at selected location.

## 5 Action plan

The actions proposed in the Action plan take in consideration the set of proposed measures to achieve the objectives of the strategy development of biogas production in Slovenia.

The proposed actions are:

1. influencing policy makers,
2. establishment of professional association for biogas operators and/or owners,
3. increasing information in agricultural sector,
4. programme promotion of biogas technologies,
5. dissemination of information,
6. identification of location of biogas plants in agriculture for more farmers,
7. education Programme for the operators of biogas plants, energy and agricultural advisors,
8. creation of special education programmes.

The description of the proposed action will be in the next part.

<b>5.1 Action : Influencing policy makers</b>	
Description	Government has a big impact on the increasing or utilization of biogas potential through the financial support (e.g. feed-in-tariff, financial conditions...) and legal requirements (permits, operation conditions...). The corrected information from the main actors about the advantage of biogas (AD) utilization as a sustainable energy sources can influence national or local decision makers to adopt suitable legal acts. The Ministry responsible for energy will adopt every year the price and premium for purchase of electricity from RES (including biogas).
Duration	From January 2009 and every October-November of the following years
Actors	Research institutions, Biogas owners and operators
Target group	Ministry responsible for energy and other Ministries (agricultural, environmental) and local authorities

<b>5.2 Action : Establishment of professional association for biogas operators and/or owners</b>	
Description	Establishment of professional association for biogas operators and/or owners is one of the organization tools to improve the performance of the whole biogas sector utilization. The “Association of biogas plants” will have an impact on all activities about biogas production.
Duration	From November 2008 to April 2009
Actors	All biogas owners and operators, Biogas experts
Target group	All biogas owners and operators, potential investors in biogas production

<b>5.3 Action : Increasing information in agricultural sector</b>	
Description	The unutilized potential of biogas production in Slovenia is mainly in the agricultural sector. There are many small agricultural farms and companies. We need a special action programme to increase information and awareness of wide agricultural population. This action will help investors to instal biogas plants using agricultural wastes (substrate) from more farmers.
Duration	From January do December 2009
Actors	Research institutions, NGO, Biogas owners and operators, local authorities
Target group	Agricultural farmers/population and companies

<b>5.4 Action : Promotion programme of biogas technologies</b>	
Description	The extension of information about the biogas technologies and utilization of biogas for electricity, heat production and other uses (motor fuel) is one of the actions in supporting the acceptability and extension of biogas technology and increasing investments.
Duration	From November 2008 to December 2009
Actors	Research institutions, NGO, Biogas owners and operators,
Target group	Investors, Agricultural population, waste managements.

<b>5.5 Action : Dissemination of information</b>	
Description	<p>The dissemination of knowledge and information about the biogas production, utilization for energy purposes, reduction of GHG emissions, improvement of agricultural and local economy, creation of jobs will improve the condition for increasing utilization of biogas in all sectors.</p> <p>The objective of the action is to disseminate information in forms of leaflets, brochures, publication of best practices of biogas plants, articles in local newspapers and local TV programme and radio stations.</p>
Duration	From November 2008 to December 2009
Actors	Research institutions, NGO, Biogas owners and operators,
Target group	All potential stakeholders.

<b>5.6 Action : Identification of location of biogas plants in agriculture for several farmers</b>	
Description	<p>The objective of the action is to identify locations for biogas plants using agricultural wastes (substrates) from several suppliers (small agricultural farmers or companies). There are a large number of small agricultural farmers and companies in all communities in Slovenia.</p> <p>Identification of locations for biogas plants requires evaluation of all available potential of agricultural wastes within defined location or rural area. The results of the action will be based on decisions of local authorities and potential investors.</p>
Duration	From March 2009 to December 2009
Actors	Local authorities, Research institutions, Government or some ministries
Target group	Agricultural farmers or companies, local communities.

<b>5.7 Action : Education Programme for operators of biogas plants, energy and agricultural advisors</b>	
Description	<p>The objective of the action is to improve the operation of biogas plants and avoid the problems connected to the use of different input substrates in the digesters and to optimization of AD process.</p> <p>The education programme will be divided into two programmes. The first programme will be for biogas operators and the second for agricultural and energy advisors.</p>
Duration	From March 2009 to December 2009
Actors	Research and education institutions
Target group	All operators of biogas plants, energy and agricultural advisors

<b>5.8 Action : Creation of special education programmes</b>	
Description	The objective of the action is to create a new education programme on the level of technical schools.
Duration	Start in January 2009 to December 2009
Actors	Ministry of Education, education and research institutions
Target group	Technical schools