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ALTERNATIVE FUEL FROM ARGICULTURE AND FARMS

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Abstract: *One of the drivingforcesfor integrating biogas production into the national energy systetm is the necessity of solving environmental and sanitation problem". Biogas must not only be seen as a renewable energy source, but even more as one of the promising solution to the huge environmentalproblenu concerning waste and manure handling, waterpollution, CO2 emission etc. The establishment of all centralized and decentralized biogas plants is directly or indirectly a consequence of a strengthening of environmental policies in fitose countries*
Key words: *alternative fuels,energy,agricultural policies,digestor*

INTRODUCTION

The growing awareness of the pollution problems, associated with inadequate management of animal manure and organic waste, emphasizes the need for appropriate solutions to deal with the problem. A strengthening of the overall policy on environmental protection, as regards waste as well as manure handling, with well defined enforcement measures, will stimulate the dissemination of the appropriate biogas technologies. The application of animal manure, organic waste and other types of biomass as energy sources will depend to a large extent on availability. Availability and implementation is strictly dependent on governments and EU agricultural, environmental and energy policies.

EFFECT AND DISSCUTION

Co-digestion of animal manure and other types of suitable organic waste in biogas plants is an integrated process. On the background of renewable energy production, the process includes intertwined environmental and agricultural benefits, such as:

- savings for the farmers,
- improved fertilisation efficiency,
- less greenhouse gas emission,
- cheap and environmentally sound waste recycling,
- reduced nuisance from odours and flies
- possibilities of pathogen reduction through sanitation, all this connected to renewable energy production.

Table presents the status of animal manure, organic fraction of municipal waste and sewage sludge in the 15 EU countries. Table 5 presents the estimated potential of energy produced on biogas, considering biomass data in table 4 and a minimum gas yield of 25 Nm^3 biogas per ton biomass

	Animal manure			**Population (humans)** (2003)	**Municipal waste generation**		**Sewage sludge** (2000)	**Industrial oragnic waste** disgestible < 35 % DM (100 kg/cap)*
	Total cattle manure (2003)	**Total ping manure** (2003)	**Total manure** (2003)		Total waste (450 kg/capita)	Organic waste (30% of total)		
	mill. t	mill. t	mill. t	mill. t	mill. t	mill. t	mill. t	mill. t
Austria	25	8	32	7.7	3.5	1	2.3**	0.8
Belgium	35	14	49	9.9	4.5	1.3	0.7	1
Denmark	22	22	44	5.1	2.3	0.7	1.3	0.5
Finland	14	3	17	5.1***	3.1***	0.7	0.1	0.5
France	211	26	238	56.5	25.5	7.6	0.6	5.7
Germany	167	51	218	62.7	28.2	8.5	1.8	6.3
Greece	6	3	9	10	4.7	1.4	-	1
Ireland	66	3	69	3.5	1.6	0.5	0.6	0.4
I taly	80	15	95	57.6	25.9	7.8	3.4**	5.8
Luxembourg	2	0.2	2	0.4	0.2	0.02	0.02	0.04
Netherlands	48	28	77	14.9	6.7	2.0	0.3	1.5
Portugal	14	6	20	10.3	3.4***	1.0	-	1
Spain	53	37	89	38.9	17.5	5.3	10	3.9
Sweden	19	5	24	8.6	3.9	1.2	0.2	0.9
U. Kingdom	125	16	141	57.3	25.8	7.7	1	5.7
Total EU :	**887**	**237**	**1124**	**348.5**	**156.8**	**46.9**	**22.32**	**35.04**

	Total biomass mill. tonnes	**Total energy from biogas TWh/year**	**Total energy biogas PJ**
Austria	36.1	6.1	22.0
Belgium	52.0	8.8	31.7
Denmark	52.5	8.9	32.0
Finland	18.5	3.1	11.3
France	251.9	42.7	153.7
Germany	234.6	39.8	143.2
Greece	11.4	1.9	7.0
Ireland	70.5	11.9	43.0
Italy	112.0	19.0	68.3
Luxemburg	2.08	0.4	1.3
Netherlands	80.8	13.7	49.3
Portugal	22.0	3.7	13.4
Spain	108.2	18.3	66.0
Sweden	26.3	4.4	16.0
U. Kingdom	155.4	26.3	94.8
Total EU :	**1 234.3**	**209**	**753.0**

The digester

The technology of biogas production is a complex one, since biological processes need to be optimized taking individual structural and hydraulic requirements into account. Perfect thermostatization, continuous blending, homogenization, reduction and injection of the substrate are all vital preconditions.

Power station

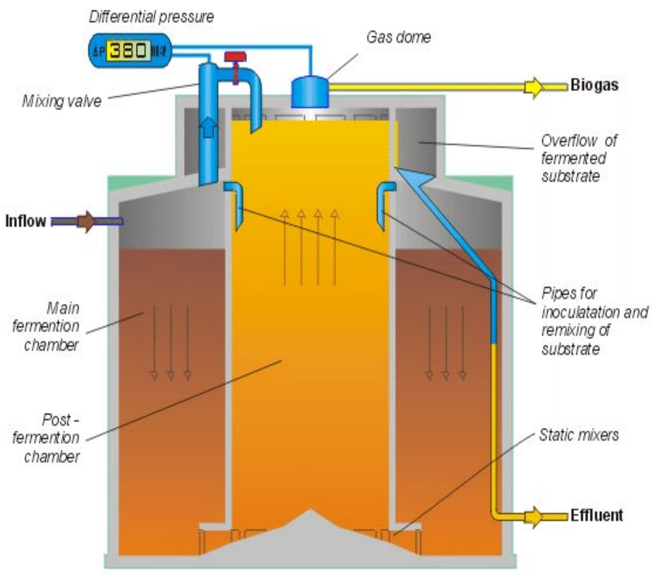
Biogas from liquid manure can be used to provide hot water, electricity and automotive energy without äny further processing (desulphurization). The energy is provided by methane gas (CH4) which is produced by highly special ized bacteria when organic material decomposes in an oxygen-free atmosphere. During this process, the solar energy stored by the plant in the form of an organic substance is bacterially converted into a directly utilizable form.

Biogas contains ca. 65 to 70% methane, which corresponds to an energy content of 5.5 to 6 kW per m³. In modern heat recovery generation sets (gas motor), an efficiency factor of more than 90% is achieved in conversion to hot water and electricity. (In comparison: modern calorific and atomic power stations operate with an efficiency factor of around 40%). Since there is no opportunity for transmission or transport loss from high-voltage power cables, it is possible to make virtually full use of theprimary energy available.During combustion in heat recovery generation sets, the energy contained in the methane gas is converted into electricity (or automotive energy) and hot water at a ratio of 1:3. The waste gases mainly cosist of $C0_2$ and water (catalytic mode). The C02released is a product of plant photosynthesis, is extracted from the air during the - process of plant biomass production and is released again when the biogas burns. This completes the $C0_2$ cycle so that energy won from biogas does not contribute to the controversial „greenhouse effect".

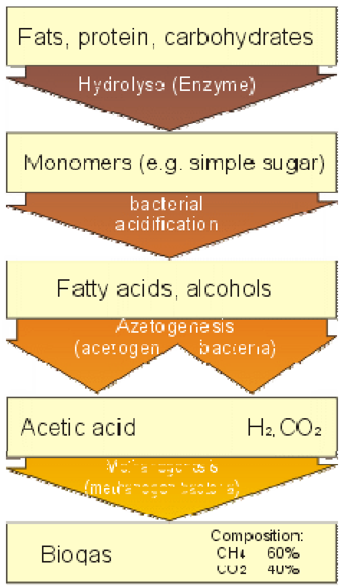
System of hydraulic mixed digester

The GBU system reactor perform's all these functions, featuring optimum substrate management and blending without moving parts or additional energy. The gas produced causes the pressure in the main fermenting chamber to rise, which in turn leads to a drop in the fluid level combined with a rise in the levei in the secondary fermenting chamber. Once the two chambers have reached a certain predetermined level, the. gas mixing flap opens, causing instantaneous pressure equalization. The returning substrate is guided in such a way that it destroys both surface scum and sediment layers and ensures thatthe mixture is reliably blended.

This structural principle guarantees reliable function, a long service 1 ife and practically maintenance-free operation



the anaerobic process a fourstage process



substrates and the typical gas production

"Biogas" is a water saturated gas mixture containing about 65-75% methane, 20-30% carbondioxyd and small quantities of hydrogen sulphide and ammonia. The average energy content of the biogas is about 6 kWh/Nm³. A typical analysis of biogas is shown in the following table

Methan (CH_4)	**40 - 75 Vol.-%**
Kohlendioxid (CO_2)	25 - 60 Vol.-%
Stickstoff (N_2)	0 - 7 Vol.-%
Sauerstoff (O_2)	0 - 2 Vol.-%
Wasserstoff (H_2)	0 - 1 Vol.-%
Schwefelwasserstoff (H_2S)	0 - 1 Vol.-%

TABLE :Substrate /biogas/manure

Substrate	**Biogas / Manure**
Manure cow 7,5%-DM	24,5 Nm³/m³
Manure cow 9,0%-DM	29,0 Nm³/m³
Manure pig 6,0%-DM	22,1 Nm³/m³

The public perception of biogas is generally positive, especially concerning the decentralized concept and small scale projects. It differs from country to country, according to previous experiences with biogas systems, and according to the level of information about biogas, energy and environmental issues There is scepticism concerning large scale projects because of logistic and fear of odour problems and because of large investment costs of the new integrated technologies.The public awareness will increase, as more restrictive the environmental laws become as more information about it is disseminated. The best way to overcome public epticism is to implement successfully full scale operation of different sizes in each country, regarding optimisation of aspects concerning energy production, environmental and agricultural benefits, pathogen reduction etc.

CONCLUSION

The main strategy concerning the promotion of biogas production in particular and of energy production from renewable sources in general, as well as overcoming of the existing barriers on an overall level, could be directed as:

- Programmes to stimulate recycling of organic waste/ organic resources, especially wet organic waste containing less than 35 % dry matter.
- Harmonisation of animal manure storage and handling requirements throughout EU 15. Focus on industrialised animal production, such as large scale big production, with no or little land area to recycle organic waste through crop production.
- An overall strategy of mandatory harmony between animal stoking rate and farmland area, or demands for maximum limits of nitrogen and phosphate fertilisation, following EU environmental strategies, exemplified as the nitrate directive.
- Improvement of the present technologies.

- The need to reduce costs of advanced technologies.
- Concentration on developing suitable scale systems.
- - R&D on small systems.
- Improved post treatment/separation technologies, due to the need to overcome transport and processing constraints. Finding and implementing new post treatment technologies.

- Concentration on finding solutions to avoiding the odour in the vicinity of plants.

• An overall policy to stimulate electricity production from renewable sources. Clearer energy policy and strategy for encouraging use of renewables in combined heat and power systems.

• Stimulation of wider use of district heating networks or heat recovery to processing industries, converting heat to cooling, especially in the Mediterranean areas.However, the rate at which biogas can enter the market is often dictated by significant subsidies. And even though environmentalists are positive about this kind of energy, there are still a lot of opposition an barriers that must be overcome throughout Europe. It is only by everybody's continuously joint forces that progress can be made year by year in this direction.

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АЛТЕРНАТИВНИ ГОРИВА ОТ СЕЛСКОТО СТОПАНСТВО И ФЕРМЕРСТВОТО

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***Ключови думи**: алтернативни горива, енергия, селскостопански политики, автоклав*

***Анотация**: Една от основните причини за интеграцията на производството на биогаз в националната енергийна система е необходимостта от разрешаването на проблемите на околната среда и здравеопазването. Биогазът трябва да се третира не само като източник на възобновяема енергия, но нещо повече, като едно от перспективните решения на сериозния екологичен проблем, свързан с обработката на отпадъците и тора, замърсяването на водата, емисиите на CO2 и т.н. Построяването на централизирани или децентрализирани производства за биогаз е пряко или непряко следствие от консолидирането на екологичните политики.*