

# ProBioPol

Promoting and Supporting Implementation of Biogas-Polygeneration:

A systematic Approach towards Sustainable Energy Consumption in Romania

ProBioPol is an official Project of the EC, founded from the Community's Sixth Framework Programm (Contract No. TREN/07/FP6EN/S07.73851/038387)



The Biogas can be used in four different ways:

•a) Biogas may be used in a gas-engine at the biogas plant, generating electric power and heat and/or cold (Polygeneration). Compared to other forms of energy generation with renewable energy sources, biogas polygeneration sets have the advantage of very stable operating conditions. Runtimes between 7.500 and 8.200 hours a year are achievable when plants are managed, operated and maintained in a professional way.

•b) Another option is to supply an isolated network with biogas in order to be nearer to potential users of the occurring heat. (near-site polygeneration and district heating)

•c) Biogas can be added to the natural gas network after expensive and comprehensive gas treatment to meet natural gas quality standards.

•d) Biogas can also be compressed and used as fuel for public transport (busses)

### **Biogas Technology (2): Biogas utilization PROBIOPOL** Biogas Polygeneration for Romania BHKW Strom Warme Biogas ARABARRANNA A Gasnetz Reinigung Kraftstoff Gasaufbereitung Gastransport Biogaserzeugung Gasverwertung



Electric current is fed simply into the net. The market for heat is dependent on housing and/or industries, which can be connected to a district heating system. The economic viability of a district-heating project is dependent on the location, the distance from the incinerator to the consumers, tariff structures and the heat prices of the actual market. Depending on location, housing for 200 people and office complexes and shops with 180 employees could represent a heat market of more than 1.000 MWh per year.



District heating may be a main product, provided that there is a sufficient heat market and an existing district-heating scheme. For new plants it is necessary to establish a district heating network, central peak load and back-up boilers. Existing supply with natural gas may inhibit the development of a district-heating scheme. If a new district-heating network has to be established the income from selling heat to the network is normally very low due to the capital cost for the network.

District heating temperatures are normally 90/45°C flow and return temperature in winter and 70/50°C during summer. District heating can also drive absorption chilling machines for cooling purposes during summer months or for industrial use and cold stores (not freezing). Waste heat in excess of demand, for example, in the summer, must be discharged using a nearby water stream or aircooled coils. Waste heat may to some extend also be used to dry incoming waste, for example, sewage sludge, in cases where the moisture content is high.



# The biogas collected from the top of the reactor will require a clean up for most external sales uses.

In fact biogas produced in an anaerobic digester comprises the following constituents:

•Methane (60 to 70 %),

•Carbon dioxide (30 to 40 %),

•Various toxic gases in trace quantities, including hydrogen sulphide, ammonia, siloxanes, BTX and sulphur-derived mercaptans (which are also highly odorous),

•1 to 2% water vapour

The benefit from carrying an additional cleaning stage is a premium energy product, which has the same quality as natural gas.



#### Gas-Treatment to Bio-Methane

1 = Mist Eliminator

4 = Absorption

6 = Desorption

8 = Exhaust air treatment

2 = compressor

5 = Decompression

7 = Chiller

9 = Dryer

3 = Chiller

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**The Digestate** can be used as soil improver and fertilizer. This offers agronomic benefits such as improvement of soil structure, moisture infiltration, water-holding capacity, soil microorganisms and supply with nutrients (on average, digestate from kitchen waste contains about 1% N, 0.7%  $P_2O_5$  and 6.5%  $K_2O$ ). In particular the recycling of phosphorous can reduce the need to import mineral fertilizer while replacement of peat shall reduce damage to wetland eco-systems.

The use of natural fertilizers in agriculture in Romania is a general characteristic (around 17 ml. tones are used annually for fertilization). In comparison, only 450.000 tones of chemical fertilizers are used annually. This makes the utilization of biogas slurry in agriculture particularly feasible.





# Thank you for your attention !





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