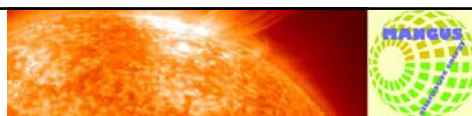


Biogas in Romania

Mangus Sol

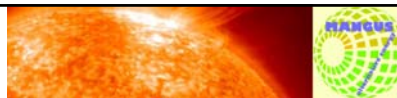
Munich
October 2007

Content



1. Short presentation - Mangus Sol
2. Biogas situation in a larger context:
 - a) energy- renewable energies
 - b) environment – Kyoto protocol
3. History of the biogas production in Romania
4. Types of installations used (or still in use)
5. Constrains (barriers)

Mangus Sol



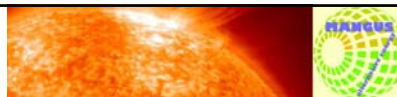
Mangus Sol SRL – started his activity as an informational organisation, running a **web-portal for ecology and sustainable development**, being one of the first integrated approach voices in the field in Romania.

On the commercial part, **Mangus is the representative of Ageratec** (biodiesel equipments) and has experience in bio-processors and ancillary equipments, being also unique distributor in Romania of Sammler thermo solar appliances and Conergy photovoltaic solutions.

One of the most important projects of the group is the **development of an integrated agricultural platform** for biodiesel production and assurance of energetic independency (scientific approach that aims to impose sustainable development models in agriculture).

Based on the research activity of the team members (all of the key members have PhD research experience in relevant domains: ecology, biochemistry, economy), Mangus **developed a consultancy group that acts as project management body for solar, wind and biomass energy development projects** (resource evaluation and monitoring, market studies, business plans and promotion of new technologies).

Mangus Sol



The company sustain a **series of web sites** with rankings over 4 (with a sum traffic of near 10.000 visitors per month), dedicated to the subject.

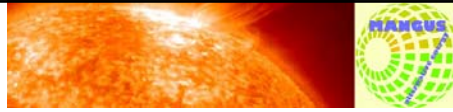
<http://www.mangus.ro>

<http://www.bursabiodiesel.ro>

A public **Internet database/stock market** is also run by Mangus, containing data about producers of biomass and related alternative energy fields.

A **good network** in the **research national institutes assure** the potential of involvement in virtually any project related to sustainable development.

Biogas situation in a larger context



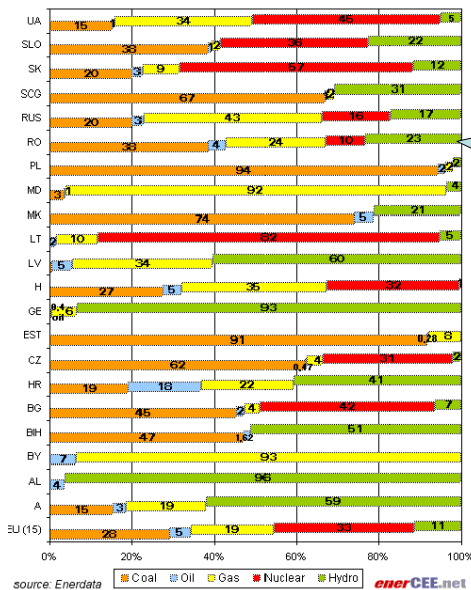
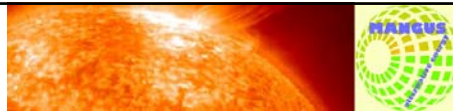
- Two main aspects need special attention:
- a) **energy**- renewable energies
 - b) **environment** – Kyoto protocol

In 2003 from the total gas need of the EU 49% was based on internal production and 51 % was coming from abroad (manly Russia).

In 2030 the net import of gas will reach as much as 80 % of the total need. This is in fact the basis for the development of the a common energy policy at European level.

Romania has transposed many of the European directives including those on efficient energy use and promotion of renewable energies (GO 63/1998, Electricity Law no. 318/2003, Energy Efficiency Law no. 199/2000).

Energy production



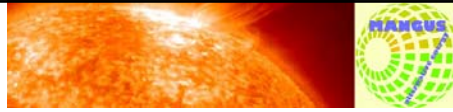
Production of Electricity in 2003 (main energy sources) in Romania and other European countries, for 2005

In 2005, a draught year, the majority was produced in thermal power plant (about 66%), 23 % by hydro power plants and 10% by nuclear power plant.

Trends:
During the period 1999-2003, electric energy production has increased with 10.7%.

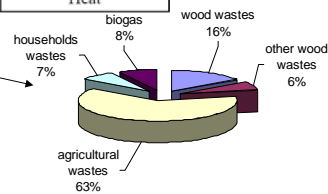
source: Enerdata | Coal | Oil | Gas | Nuclear | Hydro | enerCEE.net

Renewable energy potential

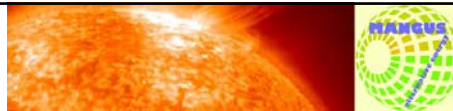


The Romanian potential in the field of renewable energy is important. Five areas are important: hydro-electric power, biomass, solar and wind energy and geothermal energy.

Source	Annual potential		End use
		ktoe	
Solar energy			
• thermal	60×10^6 GJ	1 433	Heat
• photovoltaics	1 200 GWh	103	Electricity
Wind energy	23 000 GWh	1 978	Electricity
Hydro energy	40,000 GWh		Electricity
<i>Of which small HPPs < 10 MW</i>	<i>6 000 GWh</i>	<i>516</i>	
Biomass	318×10^6 GJ	7 595	Heat
Geothermal energy	7×10^6 GJ	167	Heat

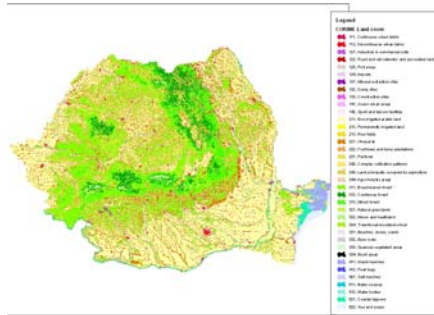


Biomass potential



C u r r e n t S t a t u s
Romania is covered by 40% of agricultural land and 27% of forest.

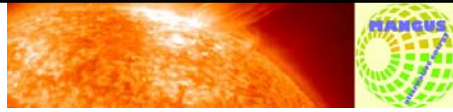
The share of biomass in the total energy of the country is almost 10%. Currently, biomass is used only for heating purposes, direct burning for cooking and hot water preparation consuming the largest share. About 95% of the biomass currently used is firewood and agricultural waste, the rest is wood waste from industrial processes.



Biomass resource type	Total production	Production density
Animal units, number	(number)	(number / 1000 Ha)
Cattle	3,097,000	134
Poultry	69,312,000	3,009
Pigs	6,521,000	283
Equivalent animal units	6,398,520	278

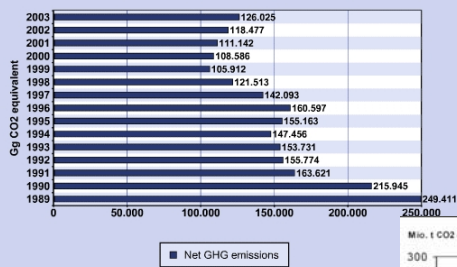
Biomass production (only secondary production)

Renewable energy potential



b) environment – Kyoto protocol

Net GHG emissions



Kyoto Protocol

– signed in 1999

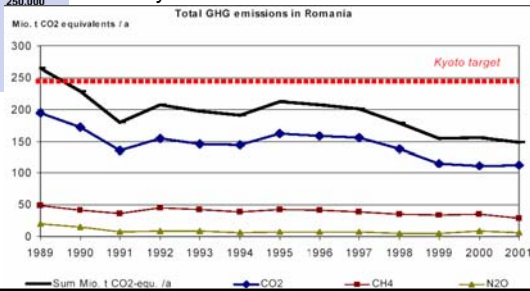
– ratified in 2001
by Law 3

Romania – first Annex I country to ratify the Kyoto Protocol

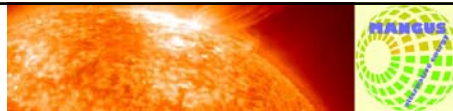
Target – 8% reduction of GHG emissions

Base year – 1989

Tendency is linked with the economic development and it will increase to the base year.
New means of keeping the GHG emissions within limits must be developed.



History of the biogas production in Romania (1)



Two main phases:

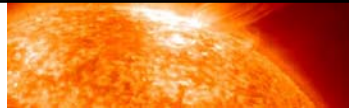
- Research activities
- Implementation (large scale use of biogas facilities)

Two main directions:

- Large capacities coupled with water treatment plant
- Development of facilities for use in the farming sector (including small units)

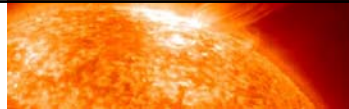
- 1958 → Research for the identification of methanogenic bacteria for animal and household waste
- 1964 → Research for obtaining biogas from organic mud
- 1978 → Biogas industrial type facilities developed at waste water treatment plans
Usual capacity 2000m³*day⁻¹
- 1980 → In almost all major cities have been implemented the developed technology
The total biogas production capacity from this sector was estimated at 85000m³ biogas *day⁻¹ (30 million m³ per year).

History of the biogas production in Romania (2)



- 1974 → National program: **Research and implementation of new energy resources.**
- 1975 → Pilot facility for animal waste with a capacity of 30 m³*day⁻¹
- 1979 → Pilot semi industrial capacity for biogas production from pig farms with a capacity of 580 m³ *day⁻¹
- 1979 → Development of small capacities (households) for biogas production. Capacity 5-10 m³ but also 20, 30, 40 and 50 m³*day⁻¹
- 1982 → Anaerobic digestion of biodegradable wastes from pig farms
Typical capacities around 7000-8000 m³*day⁻¹
- Results: over 400 facilities developed with a total energy production of 0,18 TWh*year⁻¹.

Actual situation



No major investment in the sector after 1990.

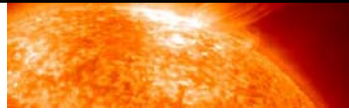
No maintenance work done on the existing facilities.

The energy produced from biogas decreased already to the level of 0,06 TWh*year⁻¹ by the year 1994.

Very few research projects done after 1990 on this field. Very few reports on the still functioning capacities.

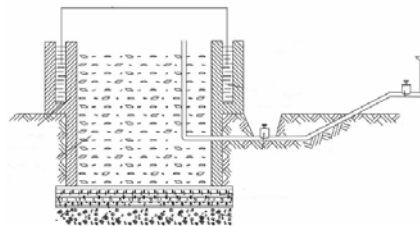
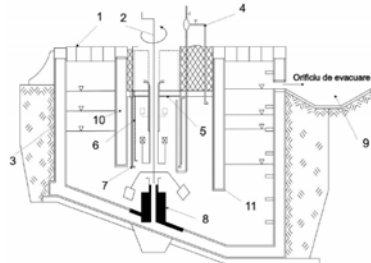
Despite this they are studies that estimates that by 2010 biogas may supply 2,2 TWh*year⁻¹.

Types of installations used (or still in use) (1)

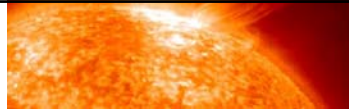


a) Small facilities

Capacity: 14 m³
 Simple design
 Biogas production: 3 m³ per day

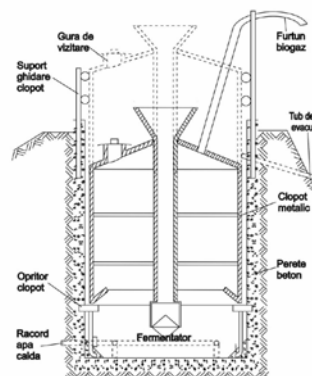


Types of installations used (or still in use) (2)



Medium capacities

Capacity: 30-50 m³
 Simple design



Large capacities

Capacities: From 500 cubic meters up.

Obstacles and barriers



1. Limited availability of domestic financial resources for investment.
2. Disputes over the land property.
3. Weak supported research sector.
4. Competition from conventional domestic resources.