

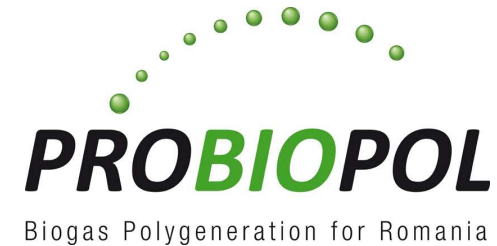
# ProBioPol

Promoting and Supporting Implementation of  
Biogas-Polygeneration:

A systematic Approach towards Sustainable  
Energy Consumption in Romania

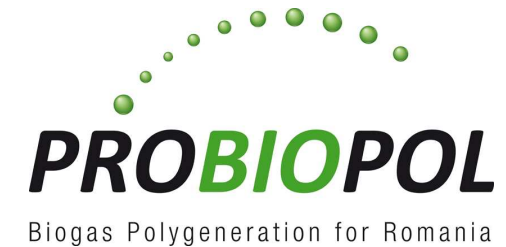
ProBioPol is an official Project of the EC, founded from the  
Community's Sixth Framework Programm  
(Contract No. TREN/07/FP6EN/S07.73851/038387)

# What is ProBioPol ?



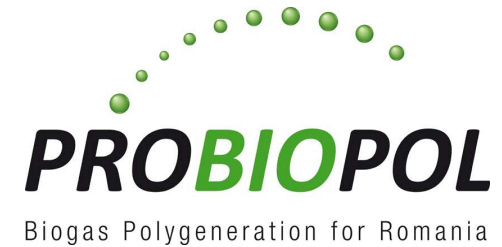
- ProBioPol is an official Project of the EC, founded from the Community's Sixth Framework Programm (Contract No. TREN/07/FP6EN/S07.73851/038387)
- The project will enable the implementation of industrial biogas polygeneration in Romania and demonstrate energy autarchic companies reusing fermentable wastes for polygeneration.
- ProBioPol will be a kick-start of the biogas market in Romania. This form of product-related environmental protection will be very well transferable to more companies.

# The ProBioPol Consortium



<b>Partic. No.</b>	<b>Participant name</b>	<b>Participant short name</b>	<b>Country</b>
<b>1</b>	AGIMUS GmbH (Dr. Ralf Utermöhlen)	AGIMUS <a href="http://www.agimus.de">www.agimus.de</a>	<b>Germany</b>
<b>2</b>	The Regional Environmental Center for Central and Eastern Europe – Country Office Romania	REC Romania	<b>Romania</b>
<b>3</b>	SC Project Developer SRL	ProDev	<b>Romania</b>
<b>4</b>	Asociației Generale a Inginerilor din Romania AGIR - filiala Cluj and filiala Sibiu Prof. Mircea Bejan Prof. Octavian Bologa	AGIR Cluj/Sibiu	<b>Romania</b>
<b>5</b>	Dragos Balan	Dragos Balan	<b>Germany</b>
<b>6</b>	target, Gesellschaft für Projektierung, Koordination und Öffentlichkeitsarbeit mbH	Target	<b>Germany</b>
<b>7</b>	BioKraft Karstädt GmbH & Co. KG	Biogas Brandenburg	<b>Germany</b>

# What can ProBioPol do for you?



- Co-digestion of liquid and solid organic wastes in biogas plants is an integrated process. On the background of renewable energy production, the process includes environmental and agricultural benefits. It helps:
  - industrial companies to decrease costs in energy supply
  - industrial companies to decrease waste treatment costs
  - agricultural & industrial companies to make money of their wastes
  - engineers to gain best possible know-how
  - to get business opportunities
  - investors to find attractive investment opportunities

**Romania has quite ideal conditions to develop biogas from waste to become an important column in the future infrastructure of the country.**  
**This is due to three facts:**

**1. There is enough potential feedstock**

As Romania has 0.7 hectares of agricultural land per capita (0.4 in EU-25) enough fermentable wastes do exist as potential feedstock for biogas plants. Moreover, the organic fraction in domestic waste is ranging from 50 to 65% in Romania. This is much higher than the European average. Up to 14 % of the Romanian power supply can be based on existing organic wastes without using any additional agricultural surface to produce feedstock for biogas plants.

**Romania has quite ideal conditions to develop biogas from waste to become an important column in the future infrastructure of the country. This is due to three facts:**

**2. The necessary re-construction of the Romanian energy system is a good starting point to invest**

The upgrading of the national energy system in Romania requires large-scale investments, reconstruction, as well as expansion of the existing capacities and the construction of green capacities, in any case. In the ten years between 2006 and 2015, installations of 5.320 MW are installed completely new. On the other hand 2.185 MW old capacities will be shut down.

**Romania has quite ideal conditions to develop biogas from waste to become an important column in the future infrastructure of the country. This is due to three facts:**

- 3. Due to policy, there will be a large demand for energy from renewables**  
With the law 220/2008 Romania has a support regime, which is encouraging investments and will increase the demand for renewable energies. The new law, which came into force 2008, puts energy from renewable energy sources (RES) on a competitive basis compared to the average prices for fossil energy. According the law, electricity suppliers must demonstrate a proportion (5.26% in 2008, increasing each year and reaching 16.8% by 2020) of renewable electricity in their portfolio of supplied electricity through the ownership of Green Certificates (GC). Those GC must be bought from producers of renewable electricity. The required RES share cannot be achieved in the coming years. This situation is expected to remain for many years to come, which will probably result in a maximum level for the Green Certificates prices (55 EUR).

## **Engineers / Consultants**

Make yourself an expert, discover the possibilities and

### **2-Day Formation**

**18. –19. March 2009**

**in SIBIU**

### **Benefits:**

- ✓ Gain of state-of-the-art Know-how in Biogas Technology
- ✓ Receive an official Certificate of the EU-Project
- ✓ Learn to make feasibility-studies in biogas-technology
- ✓ Get new market opportunities as well formed consultant/engineer
- ✓ Become a member of an expert-and consultant-network



## **Industrial Companies / Agricultural Producers**

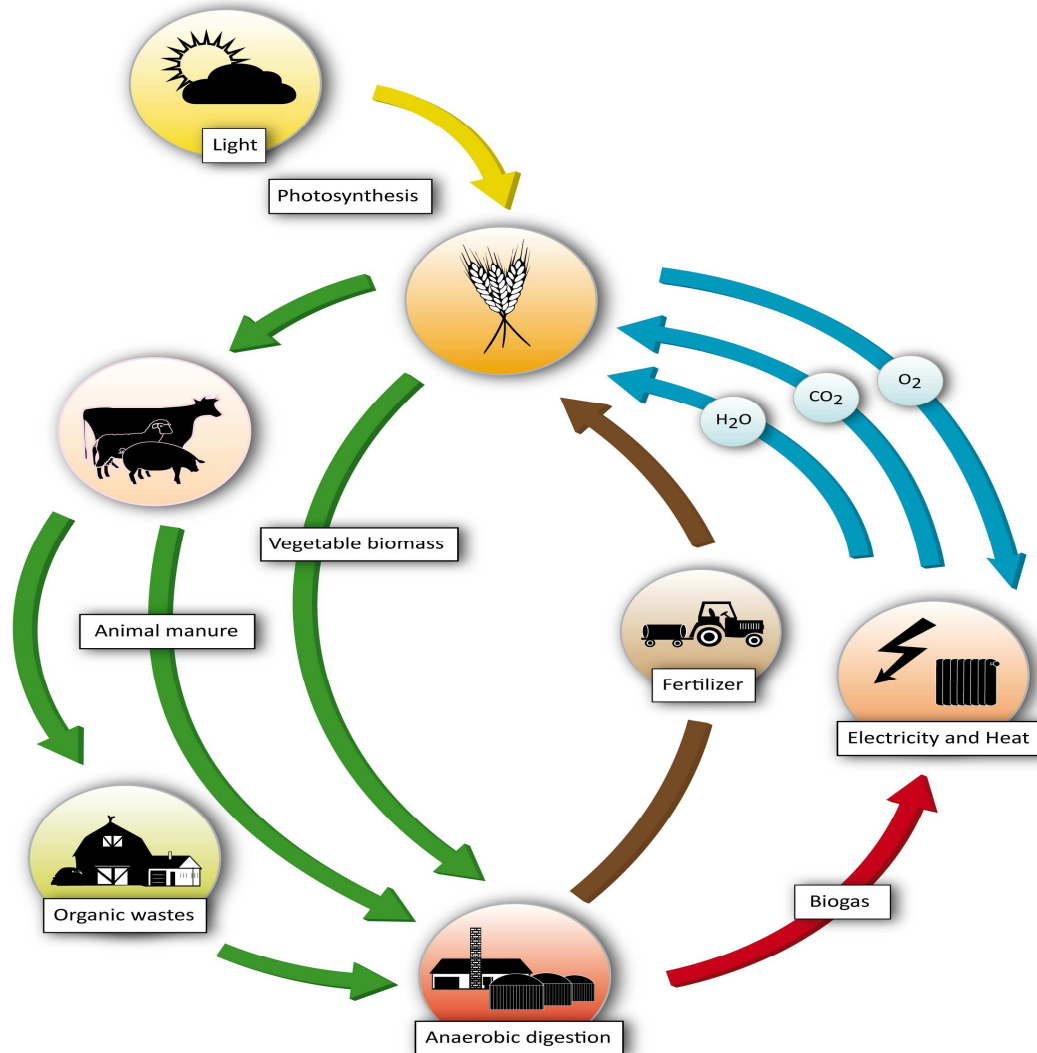
You pay too much for energy, make yourself independent!

**20. March 2009  
in SIBIU**

### **Benefits:**

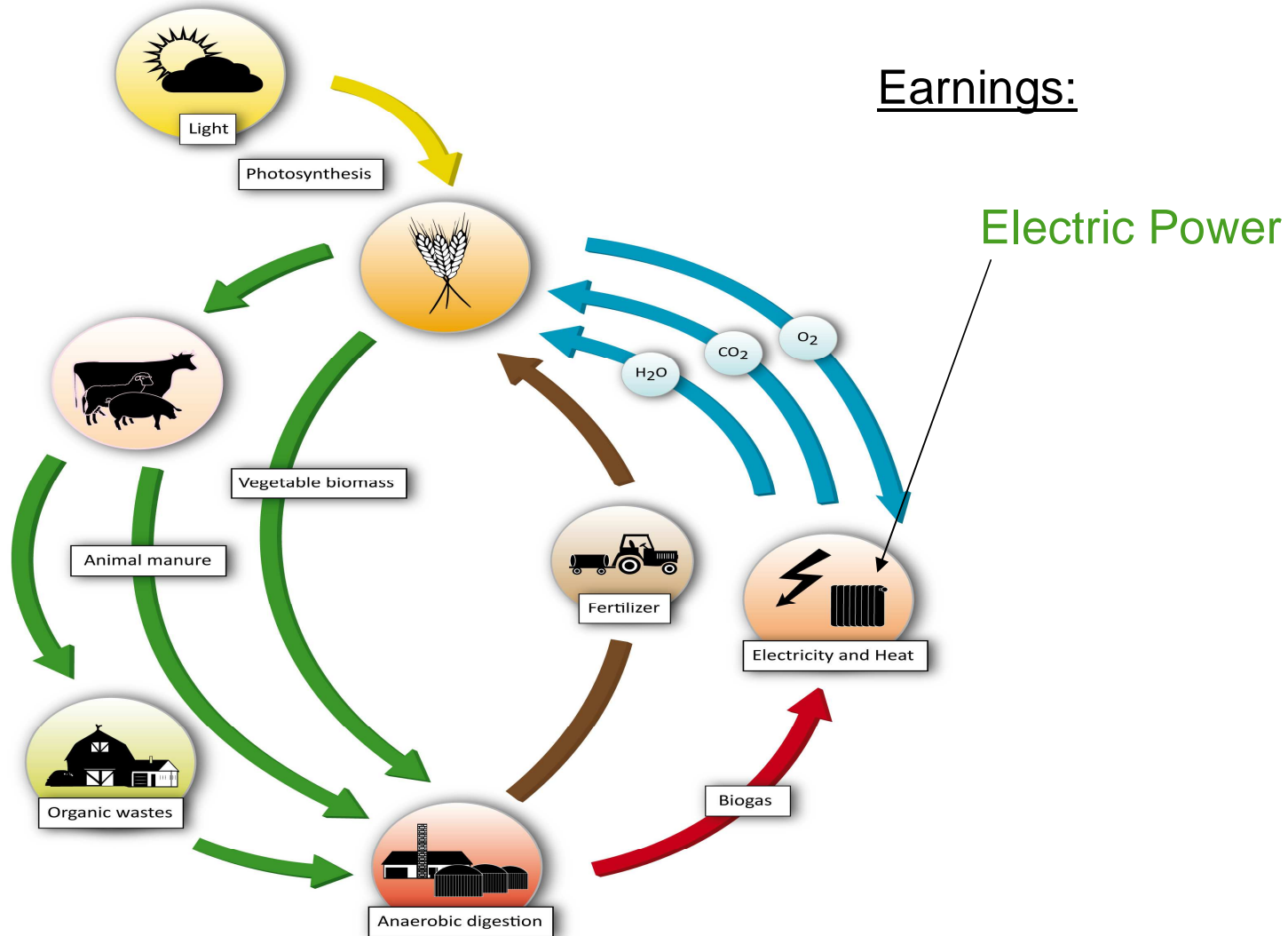
- ✓ Gain of state-of-the-art Know-how in Biogas Technology
- ✓ Transform your waste in earnings!
- ✓ Discover the advantages of combined production of useful electricity, heat and cold by polygeneration
- ✓ Decrease your costs of Energy Supply
- ✓ Become a member of an expert network.

# Biogas : The Principle



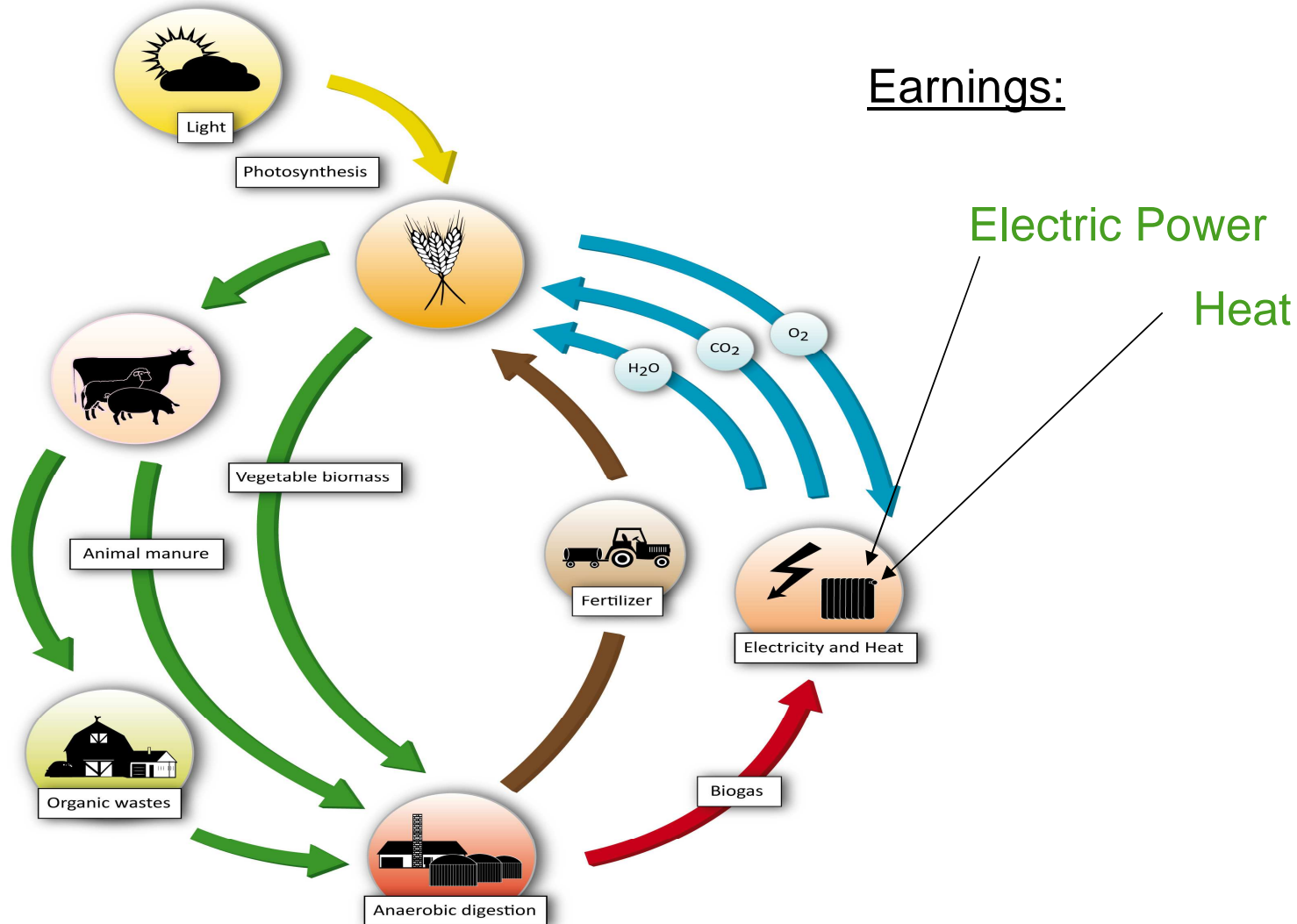
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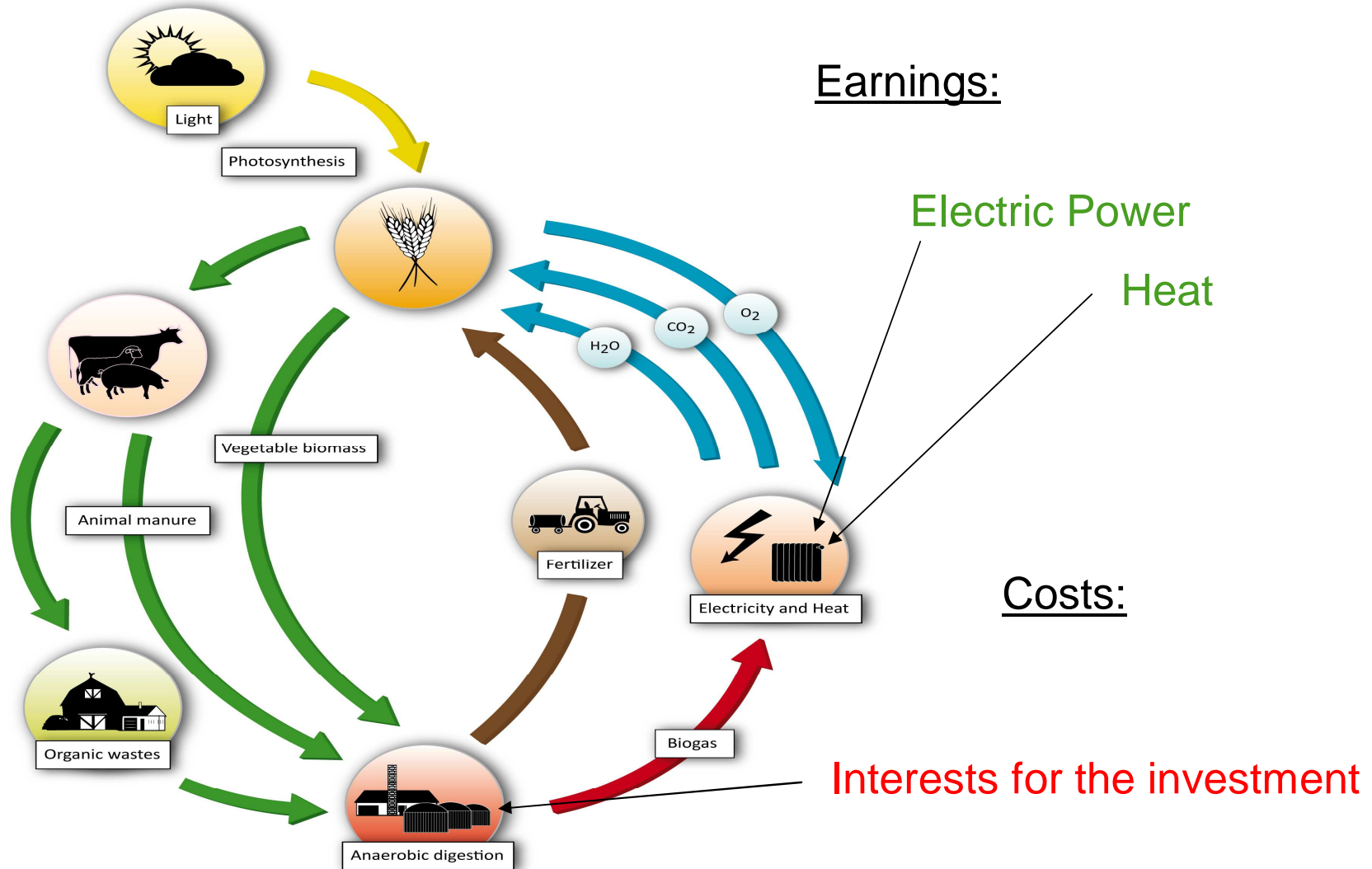
Earnings:

Electric Power

Heat

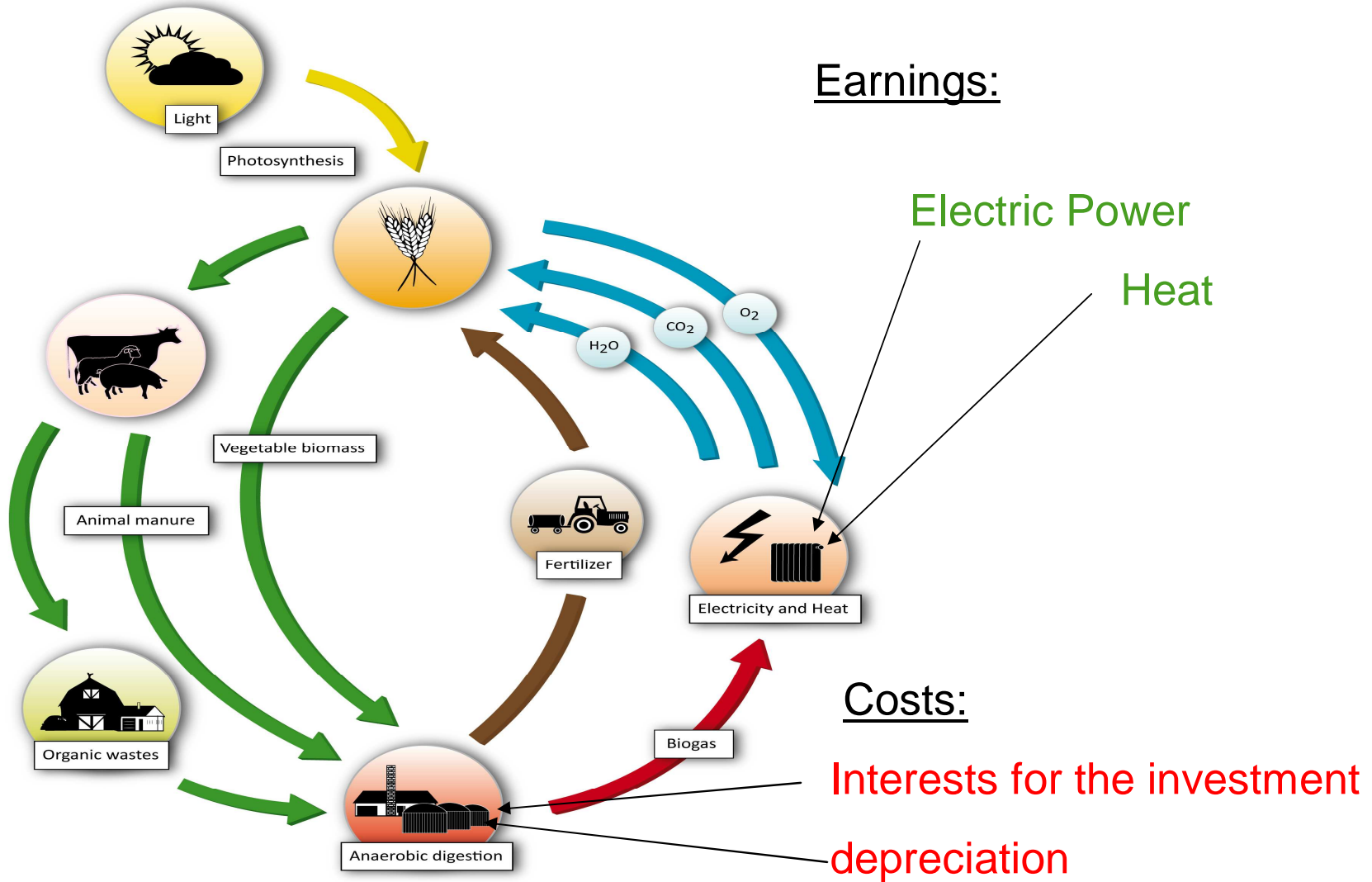
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# Biogas : The Principle



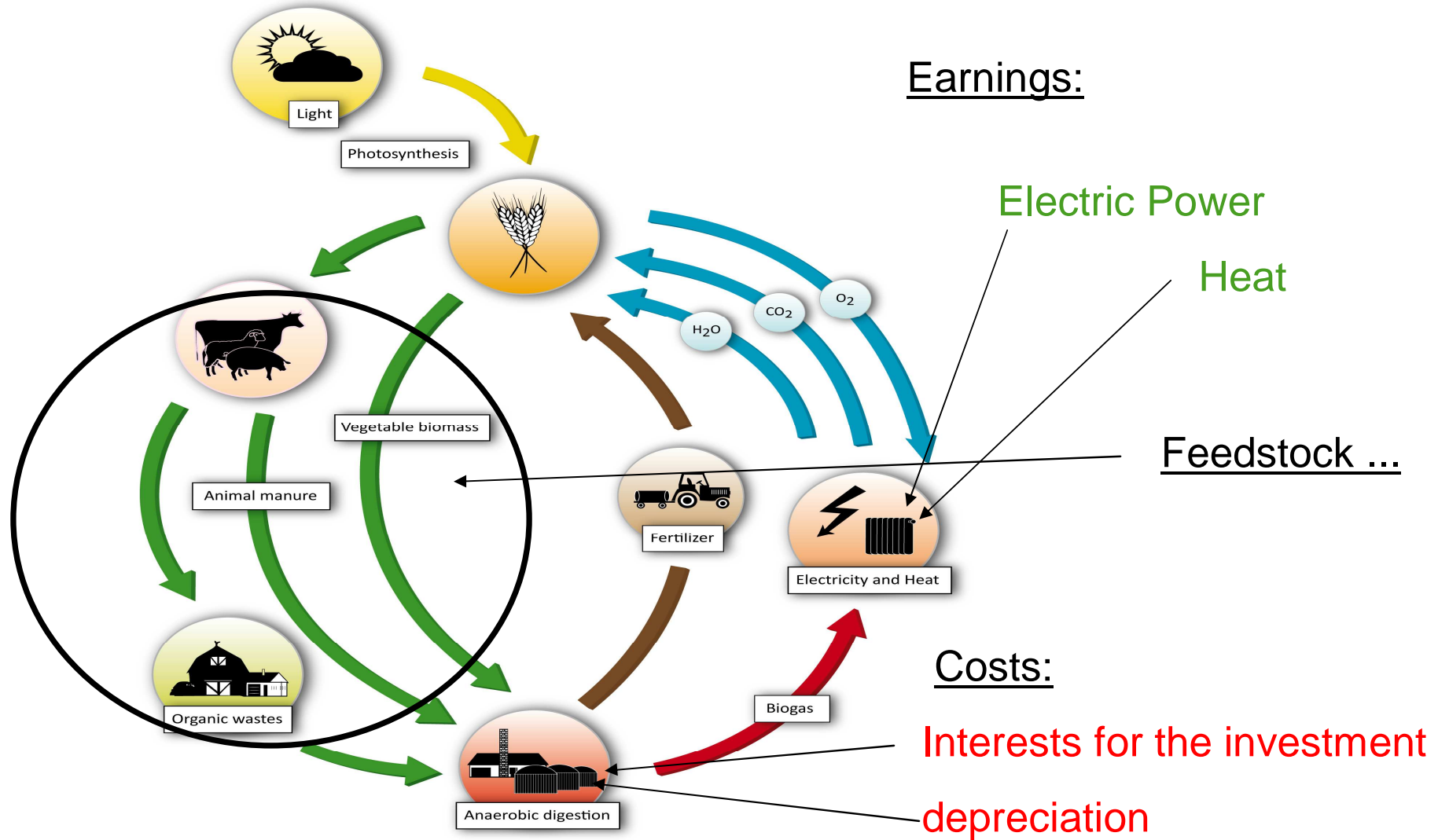
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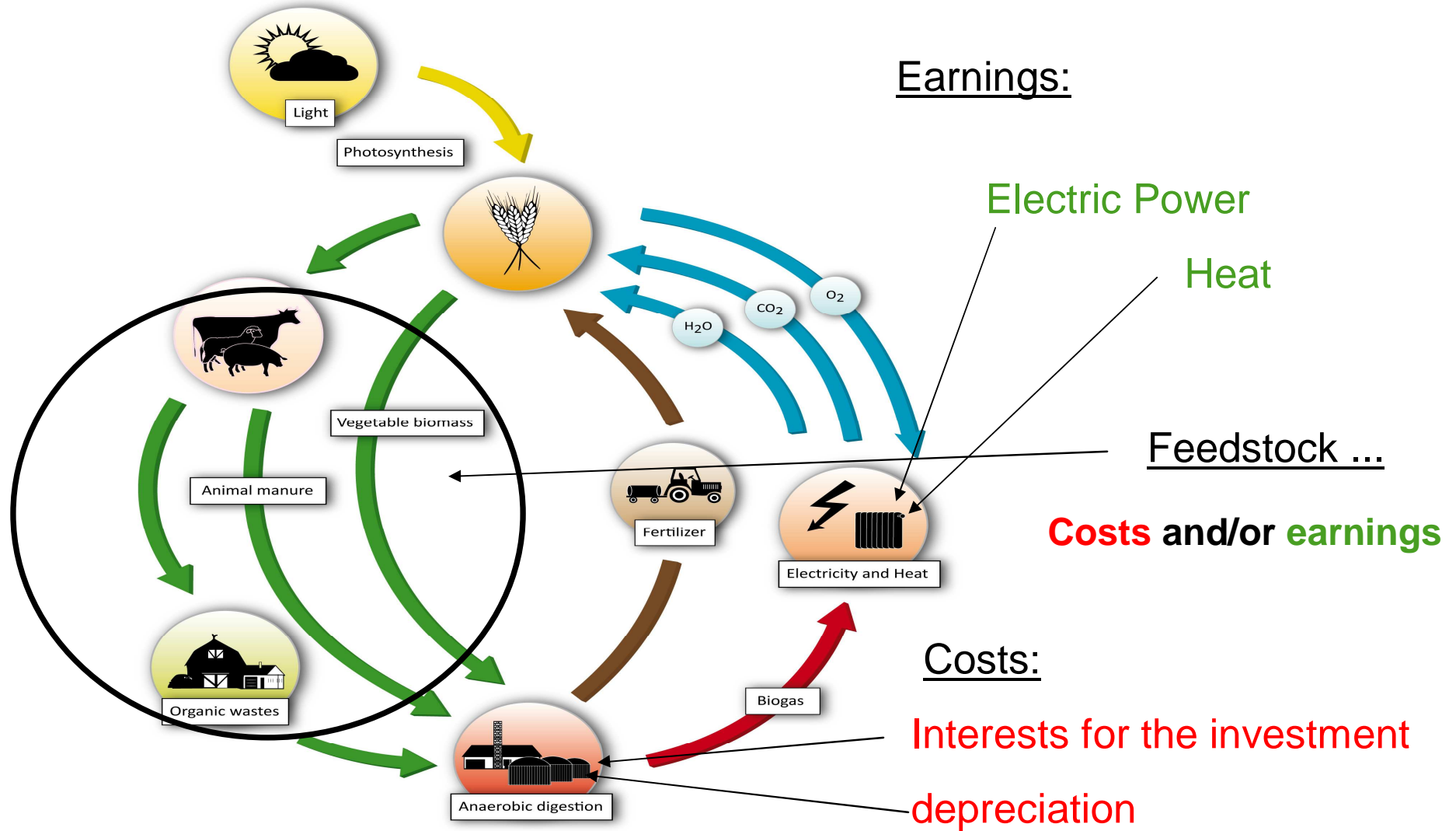
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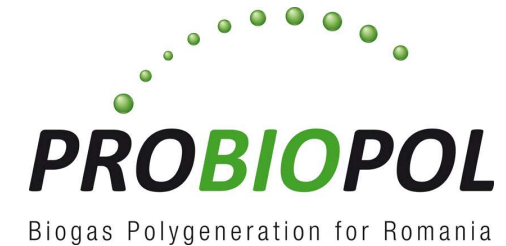








# The Investment



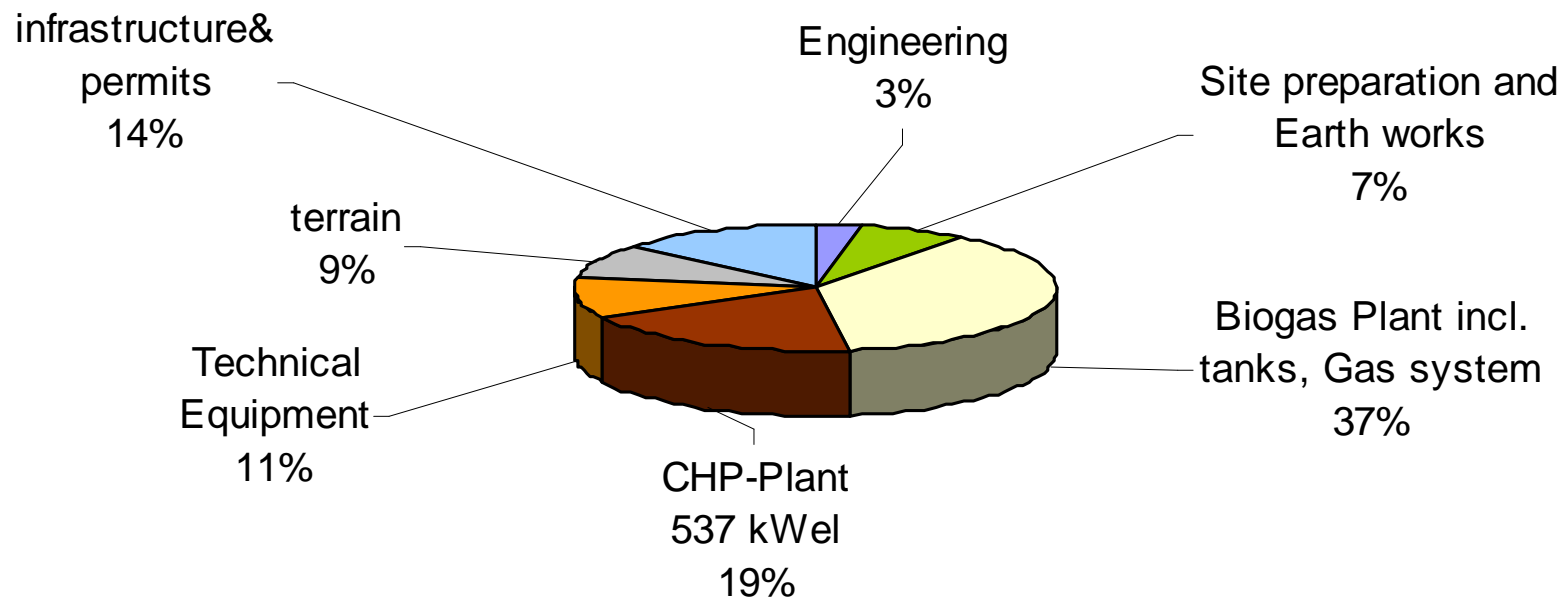
Engineering	70.000 €			
Preparing the site	12.000 €			
earthworks	150.000 €			
feedstock cavity	30.000 €			
Piping including Armatures	93.000 €			
Compressor (Air)	3.000 €			
Input for Feedstock	80.000 €			
first Digester [2000 m³]	240.000 €			
second Digester [2000 m³]	220.000 €			
Gassystem and - analyser	13.000 €			
Gastreatment / drying	37.000 €			
Tank for Digestate [3000 m³]	145.000 €			
CHP-Plant 537 kWel	440.000 €			
Flare	25.000 €			
Electric equipment	60.000 €			
Pumps	20.000 €			
Process measurement	20.000 €			
concrete works	10.000 €			
Lorry-Balance	35.000 €			
Transformator	40.000 €			
miscellaneous	30.000 €			
land / estate	200.000 €			
Feeder to electric grid	50.000 €			
Heat-distribution	10.000 €			
infrastructure (roads, water)	70.000 €			
permits	30.000 €			
spare parts	150.000 €			
<b>Total costs</b>	<b>2.283.000 €</b>			

**Biogas Plant**

<b>Engineering</b>	<b>70.000 €</b>
<b>Site pre. and Earth works</b>	<b>162.000 €</b>
<b>incl. tanks, Gas system</b>	<b>861.000 €</b>
<b>CHP-Plant 537 kWel</b>	<b>440.000 €</b>
<b>Technical Equipment</b>	<b>240.000 €</b>
<b>terrain</b>	<b>200.000 €</b>
<b><u>infrastructure&amp;permits</u></b>	<b><u>310.000 €</u></b>
	<b>2.283.000 €</b>

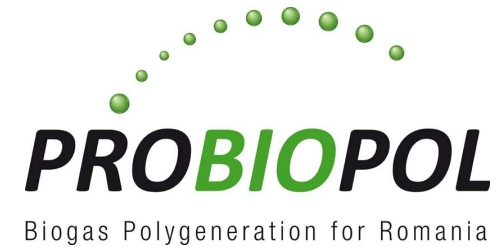
# The Investment

## Total costs 537kWel Biogas-Plant: 2.283.000 EUR





## Costs, Income and Profit



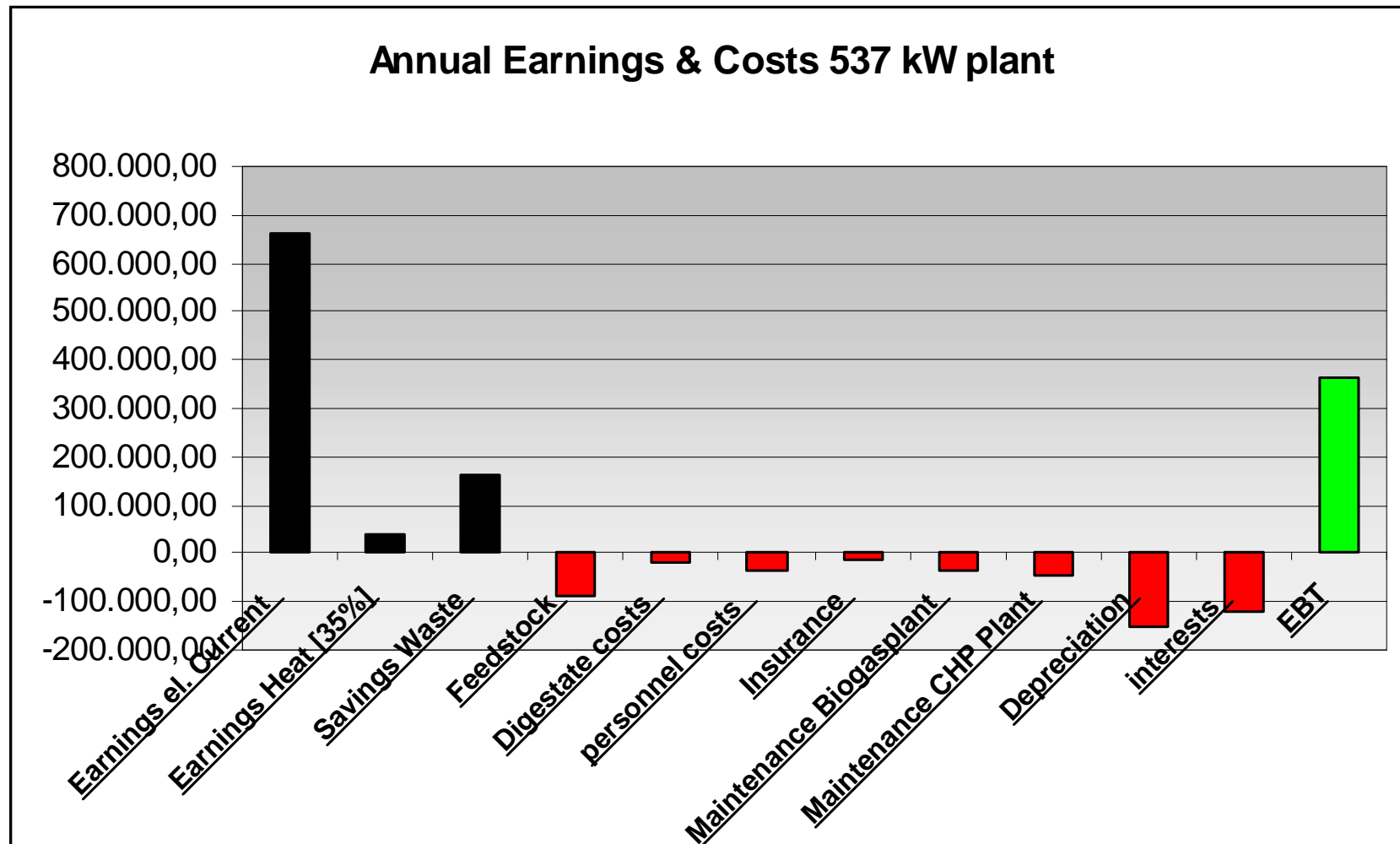
Electric Current:  $500 \text{ kW} * 8000 \text{ h/a} * 0,165 \text{ €/kWh} = 660.000 \text{ €/a}$

Heat: (35 % sold) :  $175 \text{ kW} * 8000 \text{ h/a} * 0,03 \text{ €/kWh} = 42.000 \text{ €/a}$

65 % own wastes as feedstock:  $10.833 \text{ t/a} * 15 \text{ €/t} = 162.500 \text{ €/a}$

35 % of feedstock bought:  $5.833 \text{ t/a} * (- 15 \text{ €/t}) = - 87.500 \text{ €/a}$

# Costs, Income and Profit



## Second Example Food Industrie



- Liq. Treatment 620 m<sup>3</sup>/d
- Wastes 3,5 m<sup>3</sup>/d
- Fats 3,5 m<sup>3</sup>/d
- Need of Surface: 250 m<sup>2</sup>
- COD Ø incl. Cofermentate 5.600 mg/l
- Max. COD dayrate 3.500 kg/d
- Input-Temperature 30°C
- Capacity: 30 m<sup>3</sup>/h
- Volume: 600 m<sup>3</sup>, insulated
- Operating temperature: 35 - 38 °C
- Biogas yield: 53 m<sup>3</sup>/h

Investment: Biogas Plant with Polygeneration; 1.650.000 EUR

**Annual Waste-Treatment-Costs before: 455.000 EUR**

**Annual Waste-Treatment-Costs with Biogas Plant: 337.000 EUR**

**Earnings from Polygeneration: 167.000 EUR**

**Annual Benefit: 285.000 EUR**



**Thank you for your attention !**

