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# ADOPTION OF AGRO-INDUSTRIAL TECHNOLOGIES (SUCH AS GASIFICATION OR ANAEROBIC DIGESTION)

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CORRESPONDING  
MODULE 6

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## Introduction

### Gasification

Gasification is a technological process that can convert any carbonaceous (carbon-based) raw material such as coal into fuel gas, also known as synthesis gas (syngas for short).

Gasification occurs in a gasifier, generally a high temperature/pressure vessel where oxygen (or air) and steam are directly contacted with the coal or other feed material causing a series of chemical reactions to occur that convert the feed to syngas and ash/slag (mineral residues).

The gasification of waste reduces the need for landfill space, decreases methane emissions and reduces

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the use of fossil fuels.

### **The Anaerobic digestion (AD)**

Anaerobic digestion is the natural process in which microorganisms break down organic materials.

In this instance, “organic” means coming from or made of plants or animals. Anaerobic digestion happens in closed spaces where there is no air (or oxygen).

The initials “AD” may refer to the process of anaerobic digestion or the built system where anaerobic digestion takes place, also known as a digester.

The following materials are generally considered “organic.”

These materials can be



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processed in a digester:

- Animal manures;
- Food scraps;
- Fats, oils, and greases;
- Industrial organic residuals; and
- Sewage sludge (biosolids).

How are the products of AD used?

Biogas is produced throughout the anaerobic digestion process. Biogas is a renewable energy source that can be used in a variety of ways. Communities and businesses across the country use biogas to:

- Power engines, produce mechanical power, heat and/or electricity



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(including  
combined heat  
and power  
systems);

- Fuel boilers and furnaces, heating digesters and other spaces.
- Run alternative-fuel vehicles; and
- Supply homes and business through the natural gas pipeline



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## Description

General description of the CASE STUDY with information related to the questions already mentioned in section 3 of this document.

Background, types, basic information  
Best practices

The Basilicata region, with about 345,000 hectares of wooded area, represents an opportunity for woody biomass (firewood; pellets, IE compressed sawdust; wood chips) which are the first source of renewable energy in Italy, equal to 34%: followed by hydroelectric (18%), heat pumps (12%), photovoltaic (9.5%) and wind (6.7%).

The agricultural system of Basilicata, therefore, is going towards energy transition and "green "development.

The breeder Giuseppe De Marco owns a farm in Viggiano, a municipality in the province of Potenza, in Basilicata, and precisely in Val D'agri.

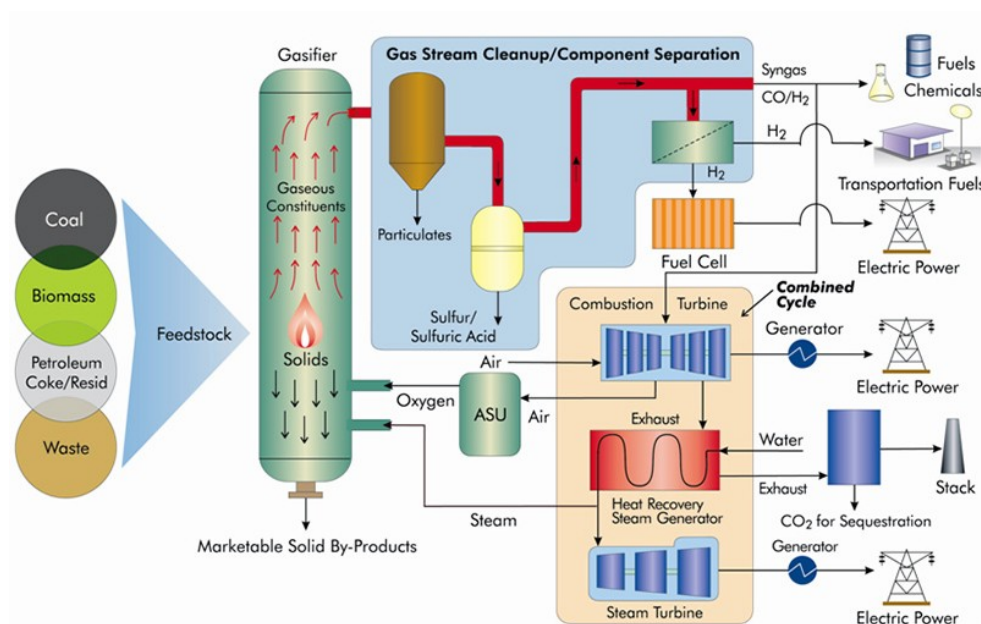
The De Marco farm has a stable with 450 cows. De Marco has invested in a sustainable breeding system from all points of view, environmental and economic.

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The farmer has invested in a 60-kilowatt biogas plant which:

- Make his livestock farm energy self-sufficient.
- Allows for the introduction of a surplus of energy into the GSE (Energy Services Manager) network from which obtain monthly income.





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Main objective of the institution implementing the case study and main achievements.

Good to remember information, practical information, links to other CSs.....

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## Advantages and challenges

Advantages of biogas plant:

- **Eco-friendly solution:** a renewable, as well as a clean,

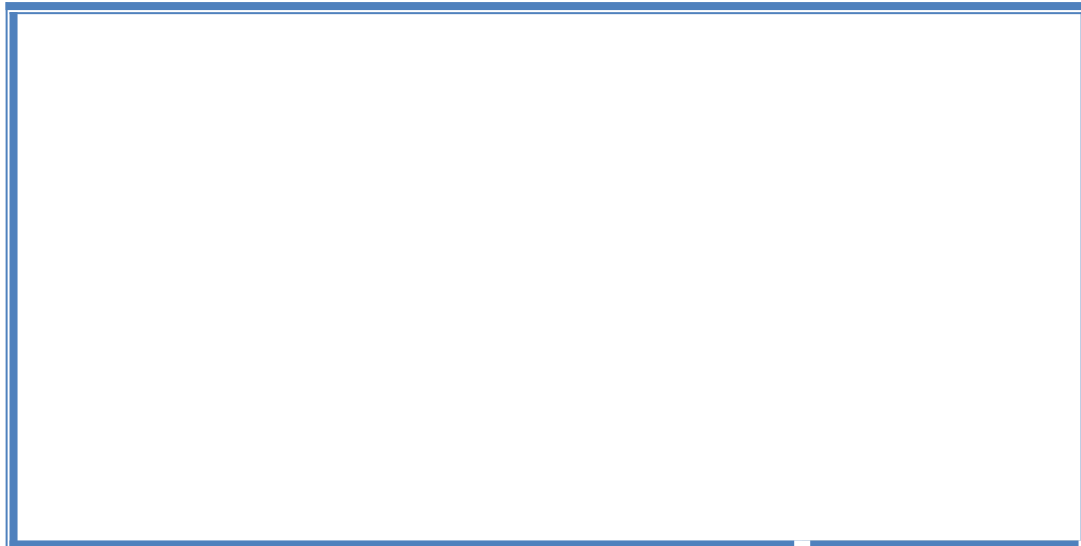
source of energy. Gas generated through biodigestion is Biogas is a renewable, as well as a clean, source of energy. Gas generated through biodigestion is non-polluting; it actually reduces greenhouse emissions (i.e. reduces the greenhouse effect). No combustion takes place in the process, meaning there is zero emission of greenhouse gasses into the atmosphere; therefore, using gas from waste as a form of energy is a great way to combat global warming.

- **Energy self-sufficiency** the system allows to obtain energy, water and heating not only for the farm, but also for its own homes, saving in a significant way.
- **Biogas Generation Reduces Soil and Water Pollution** Overflowing landfills don't only spread foul smells- they also allow toxic liquids to drain into underground water sources. Subsequently, another advantage of biogas is that biogas generation may improve water quality.
- **Biogas Generation Produces Organic Fertilizer** The by-product of the biogas generation process is enriched organic digestate, which is a perfect supplement to, or substitute for, chemical fertilizers.

Challenges:

- **Few Technological Advancements** An unfortunate disadvantage of biogas is that the systems used in the production of biogas are not efficient. There are no new technologies yet to simplify the process and make it accessible and low cost.
- **Contains Impurities** After refinement and compression, biogas still contains impurities. If the generated biofuel was used to power automobiles it could corrode the metal parts of the engine. This corrosion would lead to increased maintenance costs. The gaseous mix is much more suitable for kitchen stoves, water boilers, and lamps.





### Main data

Budget, main dates (investment, start of production, period of raise funding, etc.), location, module name and number, contact data when possible, institution

Biogas plant information:

- Initial investment: 420.000 € (Private investment)
- Monthly revenues: Monthly invoices to GSE 7.000
- Monthly expenses: 2.500 € to Enel
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### Further

### Information

..... to be completed with links when possible

<https://netl.doe.gov/research/Coal/energy-systems/gasification/gasifipedia/intro-to-gasification>

<https://www.lagazzettadelmezogiorno.it/news/potenza/1336747/basilicata-dalle-mucche-nelle-stalle-il-biogas-per-non-pagare-bollette-da-suicidio.html>

<https://www.consorziobiogas.it/>



## ANNEX - STRUCTURE OF MODULE CONTENT TO PREPARE SLIDES

<b>Module Name:</b> <b>The name of the partner:</b> <b>Country:</b>
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<b>The name of the module</b>	
<b>Target group involved</b>	
<b>Current information about the topic</b>	
<b>Principles of the specific module</b>	
<b>Basic terms/measures of the module/topic</b>	
<b>Training materials (tasks, case studies, exercises)</b>	
<b>Short description of the materials</b>	
<b>Link of the online resources (film or video resources)</b>	
<b>Specific images (to support the purpose of the resources)</b>	
<b>Duration</b>	
<b>Materials</b>	
<b>No of Learners/Representatives</b>	
<b>Individual or group work</b>	
<b>Step by step guide</b>	