



## Lebbe's Biogas Farm

### *INTRODUCTION*

Annick and Pierre Lebbe produce goat's milk cheese and beer under organic agriculture rules. They own an agricultural enterprise of 24ha.

Biogas unit takes in charge 400 to 450 m<sup>3</sup> of manure and 100 m<sup>3</sup> of green and white waters per year.

#### **Keywords**

- Manure
- Organic agriculture
- Fertilisers production
- Energy production



## CONTEXTE

EARL LEBBE manages a 140 goat's livestock for cheese production. They also brewed 6000 home made beer bottles; both of those products are under organic agricultural label.

The effective area is 24 ha. All goats feeding and barley fodder for beers are outcomes of these fields.

With those activities, EARL Lebbe employs 4 persons.

Animals are on goat shed all the year. The floor is straw. Manures are removed outside four or five times per year.

It represents an overall amount of 400 to 450 m<sup>3</sup> of manure.

On the other hand, 300 L of effluents are produced each day from the milking parlour (white and green waters) during lactation period (11 months).

The manure was used to be stored inside before to be spread on the field. As soon as it was raining, manure leachates overflow; nutritive value of the manure was reduced as a consequence.

Manure managing had to be changed. As no granting was on application at this moment, Mr and Ms Lebbe decided to choose methanisation to solve their problem.

They were looking forwards information in Europe (Fachverband Biogas) via EDEN association advisory service.

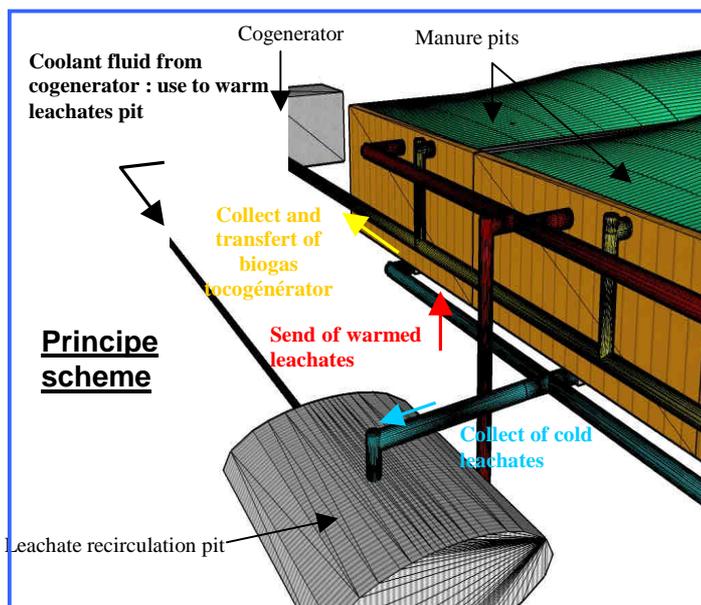
Mr Lebbe became EDEN's administrator. This association gathers people with different skills in biogas and renewable energies.

Thus EARL LEBBE started in 2000 its methanisation project:

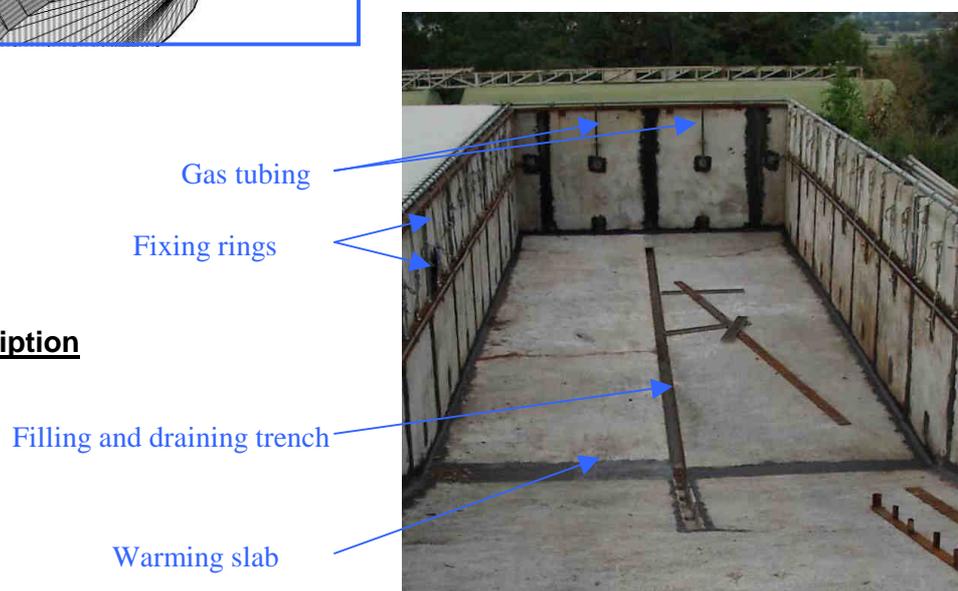
**The 1st objective**° was to clean the manure storgae area and consequently the farm surroundings.

**The 2° imperative** was to limit the work time for charging the pits.

Another aspect of this project which was not foreseen was the draining of many visitors which up the working time of the farmers.



### Pit digester description



## TECHNICAL OVERVIEW

Methanisation unit works on a discontinuous system (derived from Ducellier-Isman researches) which consists in storing manure in pits (like silo) covered by a leak proof membrane.

The three first pits have been designed as discontinuous digesters: PVC cover, manure immersion system, leachates change system, warming slab (to enhance biogas production, isolation with polyurethane).



The three digesters are filled one after the other. Each time the farmer removes manure, he stores it in a digester. Then the digester is closed, water filled (white and green). The PVC tarp lies directly over the water/manure mix. Wood sticks are fixed across the pit (every 60 cm) to avoid manure flooding and ensure leak proof of the hydraulic gasket.

Then manure ferments during 6 months before spreading on the fields.

The warming slab keeps temperature constant. An option has been designed for warming by leachate recirculation.

The recirculation system allows also to stir the bacterial flora in the digesters.



The 3 pits system gives the opportunity to remove manure only during spreading time.

A storage area is not required with such a system, which limits nitrogen loss.

Methanised manure is rich in ammonium, which is the best way to be assimilated by the plants.

Pierre Lebbe estimate that handle time dedicated to pit caring (removal and filling) is only two hours more than before.



## BENEFICE

A first benefice was directly observed with nitrogen maintain in the digested residue. Those waste waters (black) acted as a better fertiliser than manure not digested and are easier to spread. céréales ou des prairies.

The second one is directly linked to biogas valorisation:

-6000 Litres of fuel saved (used before for warming the installation)

-gas self-sufficiency for malt kilning and beer preparation.

-electricity production (thanks to a cogenerator from EDEN)

-willing to implement biogas as a vehicle fuel for their domestic car

|                      | Description                | Cost (€) |
|----------------------|----------------------------|----------|
| <b>Fumiers</b>       | Walls                      | 8667     |
|                      | Gaskets                    | 3330     |
|                      | Power showel               | 868      |
|                      | others                     | 6261     |
| <b>Méthanisation</b> | Slabs                      | 3300     |
|                      | Floor isolation            | 3300     |
|                      | Warming slab               | 2213     |
|                      | Walls isolation            | 780      |
|                      | Walls protection           | 1628     |
|                      | Plastic accessories        | 3855     |
|                      | Metal accessories          | 1268     |
|                      | Gas accessories            | 700      |
|                      | Pit                        | 433      |
|                      | Pit isolation              | 1460     |
|                      | Pit connection             | 462      |
|                      | Others                     | 818      |
|                      | Rope                       | 420      |
|                      | Cogenerator reconditioning | 1700     |
| <b>Total</b>         | <b>41463</b>               |          |

## FINANCIAL ASPECTS

The unit costed 40 000 € (without working hours) and was granted (15000€) in the framework of CTE (Contrat Territorial d'Exploitation).

Currently 5000 € are saved per year (4 000 € fuel economies and 1 000 € fertilisers economies). This gives a return of investment time estimated around 10 years

Besides those savings, the farm is cleaner than before and has considerably reduced its greenhouse gases emissions. The final volume of wastes is less important and the fertiliser spread is richer in nitrogen than before.

*In collaboration with Ms and Mr Lebbe*



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### EDEN

Energies, Développement, Environnement

Is a Non Gouvernemental Organisation. Its aim is to promote renewable energys, specially biogas on farm where access to energy is difficult.



**School visiting**