Business Case

Biogas Plant Corwen UK

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On each slide you will see in bottom right corner button “Table of Content”. If you “click” on that button you will get back to the table of content where you can make your next selection.

When you see in slide header number 1 in brackets (1), it means there is more than one slide with the information. In that case just click on slide, enter or right arrow to get to the next slide.

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Greenacle

Greenacle stands for “green miracle” indicating all our products are “green”, means environment friendly.

Greenacle is Dutch company delivering environment friendly products (please see our page www.greenacle.com for more information).

All our products are based on brown algae Ascophyllum Nodosum and are certified in EU as “harmless for humans, animals, insects, plants and soil and can be used in all member states of EU without any special permissions”.

Our products are sold globally (EU, North America, Africa, Asia) with the great success.

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The Location

The plant is located on the farm next to the Hendwr Caravan Park, Tyddyn Hendwr, Llandrillo, Corwen, Denbighshire, Wales, UK.

The caravan park is connected to the biogas plant for hot air and electricity supply.

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The Biogas Plant

This is our smallest 200KW plant with processing capacity of 30 cubic meters of cow liquid manure.

We have selected this plant for business case as it is the first plant using our newest proprietary technology with explosion chamber that further improves digestion time and increases quality of methane.

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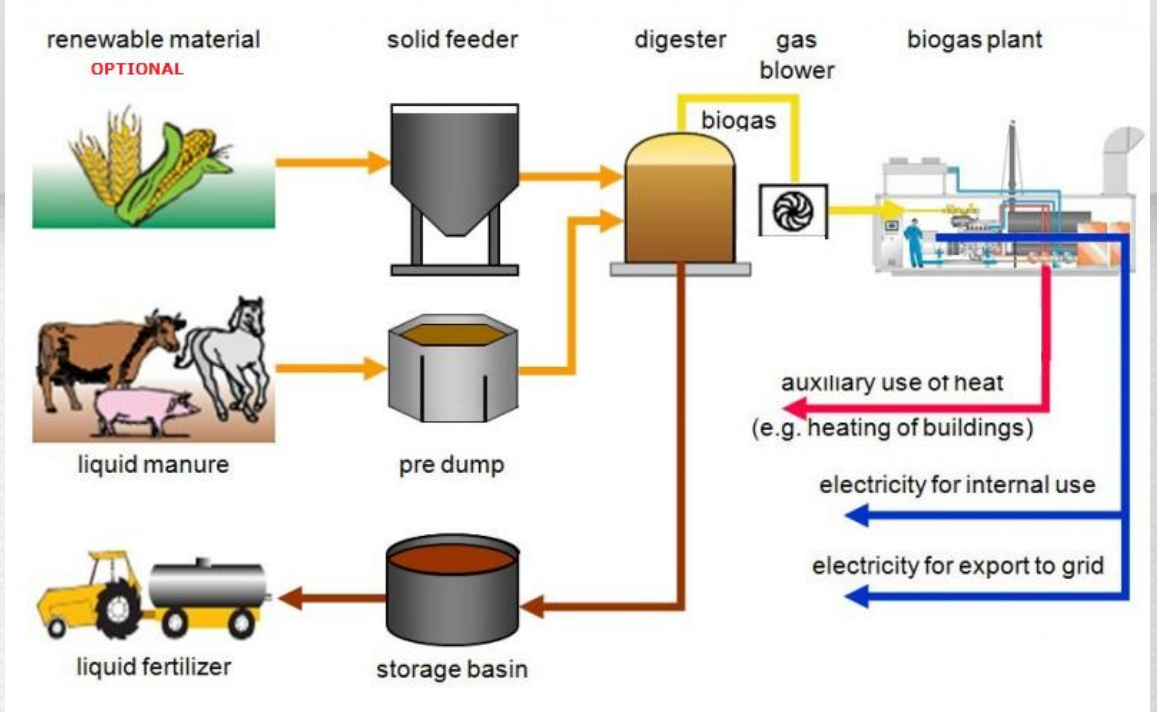
The Business Model

- Farmers from the surrounding area are providing liquid manure.
- Manure is processed into the biogas.
- Warm air and electricity are provided to the camp.
- Excess electricity is sold to the energy providers.
- Liquid fertilizer is returned to the farmers as refund for manure.



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Incentives

Farmers:

- No costs of liquid manure storage or processing.
- No environmental issues.
- Free liquid fertilizer.

Camp and biogas plant owner:

- 100% biological/ecological plant (possibilities fro subsidies).
- No costs for biomass.
- No biomass transportation costs (farmers delivers it directly to the storage tank).
- Free heating for the camp.
- Free electricity for the camp.
- Profits from the “green” electricity sold to the energy providers.
- Profits from selling CO_2.
- Close to zero residual waste and gray water.
- No odor in the area.

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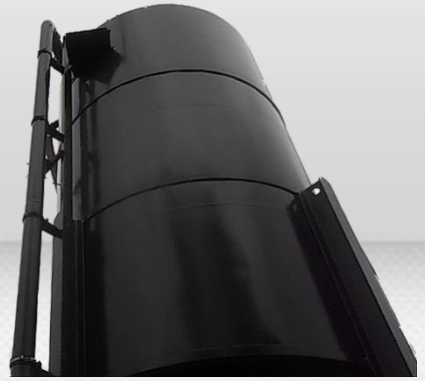
The Process (1)



The liquid manure is delivered to the 20 cubic meters storage tank.

The manure is preprocessed in separation unit, where small stones and other hard substances are removed…

… and is delivered into the hydrolysis storage tank.

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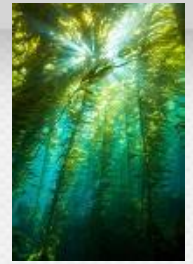
The Process (2)

In the next stage the explosion unit is sending biomass with the speed close to the speed of sound into the wall. In this process the cell shield of biomass is breaking and any remaining hard particles are broken. This results in the biomass that is easier to digest and improves methane quality for up to 20%, resulting in the methane purity up to 80% in optimal conditions. This is our unique proprietary and patented technology



After explosion our additives are introduced to the process with automated dosing device.

The anaerobic process occurs in the environment with the temperature about 25 degrees Celsius. That air is used sent to the camp heating system.

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The Process (3)

In the anaerobic digestion/fermentation process the methane is produced...

… which is used to generate electricity.

Electricity is supplied to the camp. Excess electricity is sold to the energy providers.

Liquid fertilizer is collected by the farmers and sprayed in the fields.

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Competitive Comparison - Results

When comparing our plant with one of the largest Dutch biogas plants manufacturers we can see the following advantages:

	Competitors	Our plants
Hydrolysis retention time	50-60 days	17 days average
Fermentation retention time	2-3 weeks	3 days
Methane average purity	45-50 %	up to 80%
Methane best achieved results	60 %	80%
Methane volume per m^3 of biomass	20-25 m^3	up to 48 m^3
Ammonia (NH3) degradation	N/A	Yes
Sulfates (H_2S)degradation	N/A	Yes
Odorless	No	Yes

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Competitive Comparison - Value

On the previous slide we see that our plants has:

- 3.2 – 4 times shorter end to end retention time.
- 1.9 - 2.4 higher methane volume.
- 1.3 – 1.7 better methane quality (caloric value).

Taking these figures in the account our plants are producing between (3.2 x 1.9 x 1.3) 7.9 and (4 x 2.4 x 1.7) 16.32 more energy per day than competitor plants.

This results in either large production with the same footprint or 8-16 times smaller footprint (an equivalently the investment costs) for the same energy production as competitor.

Adding to that competitors energy costs and other processing costs delivering less environment friendly residual waste will heavily outbalance regular costs of our additives that are required for our plants to operate.

Finally our biogas plants are priced extremely competitive, which reduces initial investments and improves ROI (Returns On Investments) and Break Even time.

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Biogas Plants Delivery and Size

Our average delivery time for smaller plants presented here is 6-10 months.

Each plant is designed and adjusted to the customer requirements. We can process any animal manure (including poultry) individually or mixed in the same process.

Additionally, we can mix in the same process any biomass from the plants (green waste).

Finally, we are the only biogas plant in the world (up to our knowledge) that can process wood in our biogas plants, which can be mixed with the rest of the biomass in the same process.

The plant used in this case is the smallest with the capacity of 200 KW or equivalent to 30m^3 of liquid manure per day. At this time we are starting the project with the newest technology used in this plant for plant in Turkey with the capacity of 800m^3 per day.

The largest plant we have built is 7 MW plant in Slovenia, however this was built without explosion chamber.

We can build practically any size of the plant desired by the customer assuming it is practical and sustainable.

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Organized Plant Visits

For the parties interested in our technology and that would like to see technology at work we can organize plant visits on requests for smaller groups.

Please contact us for further details or requests and we can plan the visit at your convenience.

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In Conclusion

We hope that we have proved that our technology is outstanding and we are the top supplier for biogas plants.

We are heavily outperforming our competitors in abilities as well as price-performance ratios.

For that reason many competitors and their customers approached us to provide upgrades to their existing plants in order to achieve results comparable to ours.

More than 300 biogas plants worldwide has requested our upgrades.

However, it is important to understand that all this is possible ONLY due to our unique additive. As this additive is our unique proprietary technology, we believe we will remain top supplier for a long time.

Our scientists are continuing delivering improvements and new solutions. We are working on technologies to further improve methane purity and volumes.

At the same time we are already testing new technology that will allow plastic recycling in the same plants as biomass, or in separate plant, dependent of customer needs and choice. These plants shall deliver high quality methane from the biomass and high quality biodiesel fuel from the plastic waste.

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