

Geer's territory - Ecosystem built around the Haut Geer Biogas, HesbayeFrost and Apligeer cooperative

1. [Title](#)

Circular economy study case in Haut-Geer – Wallonia (Belgium)

2. [Description of the case study](#)

Eco-system built around the Biogas du Haut Geer (biogas unit operating in a short cycle), the HesbayeFrost company (production and packaging plant of frozen vegetables), the APLIGEER cooperative and the Geer Municipality.

Biogas du Haut Geer is a biomethanisation unit operating in a short cycle. From agricultural inputs and organic waste from the neighboring company HesbayeFrost, it produces electricity and heat using the biomethanisation process. It is a natural process for the degradation of organic waste by the action of microorganisms in the absence of oxygen, protected from light and under specific temperature conditions. It produces methane-rich biogas, which can be burned to generate electricity and heat. This is the principle of cogeneration, that is to say the production, from a single energy source (gas) of two others, namely electricity and heat. Electricity is valued by HesbayeFrost: the Ardo group's production and packaging plant of frozen vegetables is a heavy consumer. And heat is valued by producing wood briquettes (FLAMECO © briquette), with an adapted work organization promoting the work of disabled people. These briquettes are mainly made by using wood waste from regional companies. It benefits from an entirely new manufacturing process that guarantees its compaction, and therefore a longer longevity.

HesbayeFrost company is itself supplied by the APLIGEER cooperative which today collaborates with 500 farmers from Hesbaye and Condroz.

APLIGEER develops solutions which tend towards a sustainable production of vegetables without residues and which meet the most stringent nutritional requirements, but also the visual expectations of consumers.

It also helps and supports farmers who wish to embark on organic farming, which is taking an increasingly large part in its overall production.

The municipality of Geer has favored the takeover by HesbayeFrost of the old beet-grater plant of Hollogne-sur-Geer, thus recovering the old settling basins of the site to store irrigation water there. This acquisition is the meeting of the industrial world and the associative world active in the protection of biodiversity that allowed the creation of a birdwatch hotspot.

3. [Place / territory involved](#)

The Municipality of Geer located near the city of Waremme, in the Province of Liège, south of Brussels

4. [Stakeholders / actors involved](#)

The Haut Geer Biogas plant has been in operation since September 2012. This unit, based on a cooperative that groups together HesbayeFrost, several farmers, as well as various public and private partners, is supplied with inputs agricultural (crop residues, intercropping, crops), and by co-products from industries like those of HesbayeFrost. The digestate, residual material after biomethanisation, is spread on the neighboring fields, in particular through spreading contracts provided by a specialised company with a view to precise and calibrated spreading. This digestate is generally split into two phases: liquid and solid. The liquid extract is used as a fast fertiliser. The solid digestate is

concentrated and gets a higher value. The raw materials are carefully selected to obtain an organic digestate whose quality is controlled by Certisys, which allows its use in fields intended for organic vegetable production, a coherent approach in the main goal of sustainable development which drives the different activities associated to the biomethanisation project. The biogas obtained makes it possible to run two cogeneration engines, and supplies the neighboring HesbayeFrost plant. The site now has three cogeneration units, with an installed capacity reaching 1.5 MW. The Haut Geer's Biogas plant covers almost 30% of the electricity needs of HesbayeFrost.

HesbayeFrost specializes in growing and freezing fresh vegetables (peas, spinach, parsnips, carrots, Brussels sprouts, etc.), but also offers a range of rehydrated frozen dry products (pasta, rice, quinoa, lentils, etc.).

The Appligeer cooperative founded in 1999, today collaborates with 500 farmers from Hesbaye and Condroz. This group grows around 7,000 hectares of vegetables in these regions.

The municipality of Geer is active in the partnership through the collect of lawns mowing and ensuring citizens' sensitization by a municipal operator on site. The "Jesuishesbignon.be LAG is also associated to the reflection to develop side activities (support for planting hedges is under consideration).

5. [History](#)

After several years of project development, the Haut-Geer's Biogas Plant started operationally since September 2012.

The HesbayeFrost company has its origins in the stately farm of Geer built in 1609 by the lord-abbots of Flône and Geer. The farm was then taken over by Emile Lejeune who founded the company "Mon Jardin" in 1933. He transformed it into a modern factory which produced canned fruit and vegetable for more than 40 years. The factory was then bought by the Marie Thumas group in 1972. In 1980, it passed into the hands of the State and was called "Conserveries de Geer". If frozen products make their appearance there, the production of canned goods always remains predominant. It was in 1985 that two companies specializing in the production and marketing of frozen vegetables founded the company HesbayeFrost. The production of canned food, in the middle of a crisis, was abandoned in favor of frozen food.

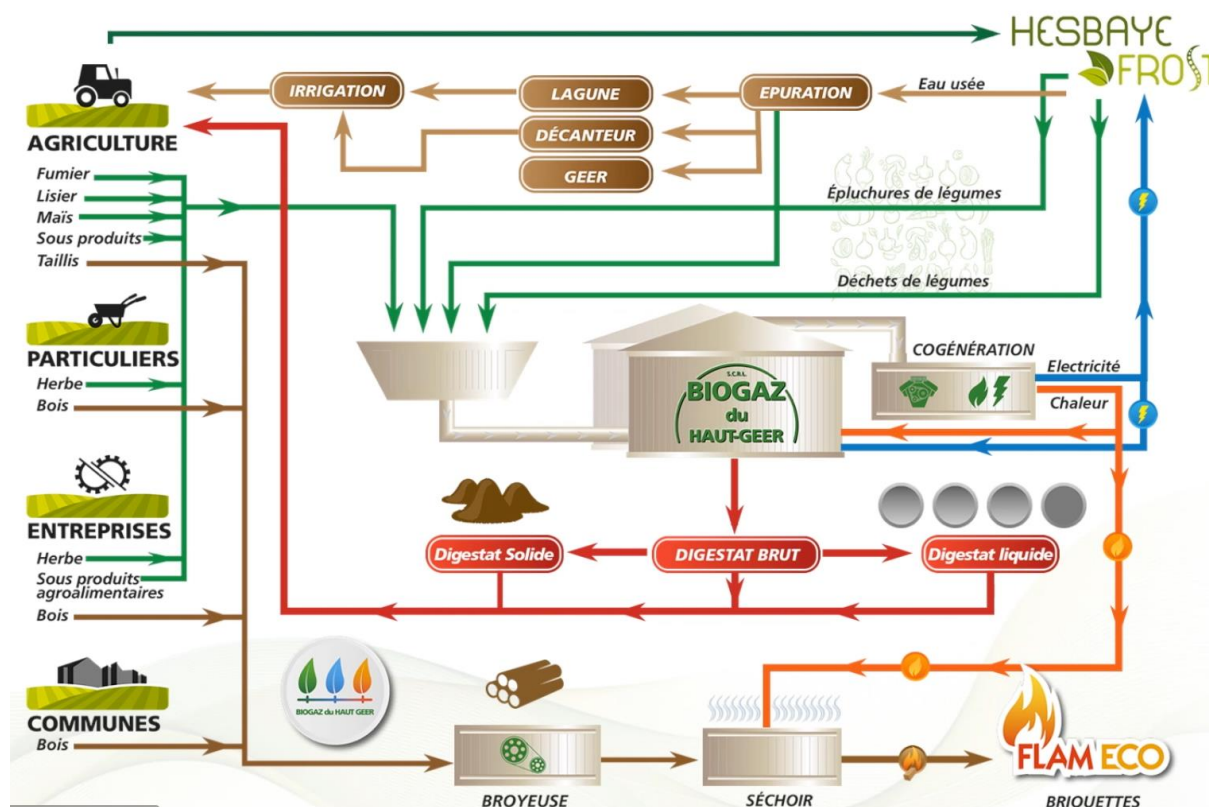
Founded in 1999, the Apligeer cooperative now collaborates with 500 farmers from Hesbaye and Condroz.

6. [Innovation and key success factors in the circular economy](#)

1. Fermentable materials obtained from: Agricultural waste or crops trapping nitrates from neighboring fields; agro-food waste from HesbayeFrost - production and packaging plant of frozen vegetables (peelings, vegetable waste, waste obtained after purification of cleaning water); Dedicated crops: corn easy to store; Manure and slurry (in a minor part as the region is mainly oriented to cropping).
2. Water from agro-industrial processes (HesbayeFrost) : decantation and lagoon storage in basins (ornithological reserve managed by an environmental association), irrigation of vegetable crops.
3. Supply of green electricity for HesbayeFrost (direct line).
4. Digestate on neighboring crops: 43,000 m³ digestate / year (0.6% nitrogen = 258 tons of nitrogen not from the chemical industry). Certified organic digestate in the majority (depending on heavy metals composition). Gross digestate = fertiliser + structure. Phase separation Liquid digestate = fast fertiliser and solid digestate = structure + fertiliser.

5. Heat : use in a wood energy sector; the wood is harvested as closely as possible (companies, municipal woods, private plantations), ground on site (energy from green electricity), drying of the wafers (green heat), screening \Rightarrow chips, pellets, compressed briquettes.

6. Socio-economic aspects: creation of jobs for anaerobic digestion (direct: 4 FTEs and indirect: maintenance); agricultural cooperative (purchase of inputs, supply of digestate, mobilization of labor and agricultural equipment for transport); municipal partnership (use of mowing from dwellers, supervision by municipal worker); adapted work (handling of fuel wood by disable worker).



Focus on the environmental part of the ecosystem

Zero discharge of water into the river

HesbayeFrost is a big consumer of water. Currently, on average, half is re-used for irrigation and the other half is purified. This proportion can vary depending on the weather, with a greater amount used for irrigation in the event of drought. The water from the HesbayeFrost treatment plant meets all agri-food standards and requirements, but is not necessarily drinkable. HesbayeFrost's goal is to no longer discharge any water into the Geer, the river that borders the factory. To do this, two avenues are being considered: improving irrigation possibilities and greater use of purified water in the factory, in a closed circuit. Water could be used for the "coarse" washing of vegetables (this is the phase which precedes their blanching) and the cleaning of floors. But this requires additional treatment and a modification of the process at the treatment station. Several avenues are currently being explored.

The Haut-Geer nature reserve

HesbayeFrost bought the old beet-grater plant in Hologne-sur-Geer, thereby recovering the site's old settling tanks to store irrigation water. HesbayeFrost is committed, in a charter, to make this space the Haut-Geer Nature Reserve. It is managed by a non-profit organization which brings together representatives of Natagora, HesbayeFrost and APPLIGEER, with the participation of the municipal administration of Geer. It is a true paradise for native birds and their passionate observers. There are

several flagship species, such as the black-necked grebe, the water rail, the blue throat, not to mention the many species of duck, sedentary or migratory. Since spring 2016, around thirty sheep are also present. It is estimated that the Reserve receives some 10,000 visitors per year.

Self-produced renewable energy by floating panels

One of the treated water storage basins, with an area of ± 2.5 ha and a capacity of 110,000 m³, has just been partially covered with 3,200 photovoltaic panels. They produce around 300 watt-peaks each, for a total output of 1 megawatt-peak.

The choice of such an installation is explained by the imperative of perfect water tightness of the factory roofs which cover, for the most part, freezers. The photovoltaic panels could not be anchored mechanically. The other option would be a heavy supporting, but well placed and weighted on the roofs which would be too great a risk for the structure.

Organic development

If organic farming is experiencing growing success today, both in terms of consumer demand and supply, the first conversions date back a good ten years. As a partner of farmers, HesbayeFrost makes available to those who want to embark on the adventure of organic, its experience and advice.

The use of digestate in organic farming

The biomethanisation process generates two forms of products: biogas, used for cogeneration, and the digestate composed of organic matter, which can be used as a soil amendment. From the status of "waste", this residue has become a "product" exploitable in agriculture. Today it is an important source for the development of organic farming in the Hesbaye region.

MIMOSA (Minimum Impact, Maximum Output Sustainable Agriculture)

HesbayeFrost makes every effort to reach the "zero residues" of active ingredients in its productions. An objective supported by the implementation of a research program since 2014. The positive results are obtained by the combination of several points of attention: the use of precision seed drills allowing better sowing, the evolution of the products of treatment themselves more effective at lower doses and which degrade completely and the variety choice, with the selection of plants more resistant to diseases. HesbayeFrost's expertise in cultures dedicated to baby food is a serious asset. The experience and the accumulated know-how made it possible, on the one hand, to note that such a step did not involve a significant loss of output, but, on the other hand, that it could extend, to traditional culture.

Zero Waste

The idea is to continue to develop a process for recycling each waste that has not been sorted beforehand. Waste therefore becomes a recoverable material.

Constraints encountered

1. The supply of raw materials for organic norms (quantities and prices) \Rightarrow recovery of local agricultural products ... but also local waste (mowing lawns).
2. Digestate storage capacity (often underestimated) \Rightarrow managed by nearby spreading.
3. The interest of the digestate in agriculture and the availability of land for spreading \Rightarrow contractualization, regular supply, improvement of the agronomic value of the digestate, development in organic farming. Attention to the quality of the inputs!

4. The industrial risks of the company (a breakdown = loss of production) ⇒ prevention, maintenance – as far as possible by local technicians, professional network, in particular of a nutritionist.
5. The 24-hour operation of the company and the availability of staff.
6. The capacities of personnel to carry out all tasks. ⇒ training
7. Biological risks of the process ⇒ analysis and monitoring of inputs and products.
8. Control of environmental and waste legislation. ⇒ training, advice.
9. Political decisions in terms of supporting the production of renewable energy. ⇒ information (and awareness of political decision-makers).
10. Support for research to develop new sectors, particularly in the bio-economy: biomethanisation supporting the optimization of wind power surpluses (conversion of hydrogen into biomethane); algae development (recovery of CO₂, heat and digestate fractions) ...

7. Lessons learned

The circular economy is possible thanks to plural partnerships

8. Sustainability / perspective

Biogas du Haut Geer will soon install a CNG (gas for vehicle) service station and in particular supply the vehicles of HesbayaFrost and hopes to develop an extension of 1.500 kW (permit for land use management already introduced). For this purpose, the support for EAFRD (measure 8.6) had been introduced. The support from EAFRD had not been allowed for the first investment due to the major participation of HesbayaFrost in the partnership.

Currently, biomethanisation is an activity widely supported by the public authorities, a small part in investment (for which security standards are heavy) and especially for production (Green certificates linked to the GHG reduction, the calculation of which is based on carbon emissions from transportation). For his part, Gaëtan de Seny aspires that the Biogas sector can be profitable without any help, which would be the surest way to make this sector sustainable, like any business. For this, he considers it essential to adapt the legislation to the different possibilities offered by this tool:

1. Encourage energy crops and develop second crops and recovery of agricultural organic matter (for example: agree to deduct material exports from the calculation of the "rate of soil linking" in nitrogen control).
2. Reduce the constraints on "waste" legislation, in order to reduce costs while maintaining control.
3. Authorize the management of voltage on the electrical network by authorizing production per period, and no more instantaneously, (which would make it possible to supply electricity on demand, during consumption peaks).
4. Reducing the constraints on environmental legislation (investment and control), it is a huge budget which is not justified in his eyes (partly due to the superimposition of the regulations of the different sectors: agriculture, public health, development of territory...).
5. Promote multi-production capacities (electricity, heat, fuel) by favoring access to the natural gas network. Biogas is an excellent complement to intermittent energies.
6. Reduce the administrative complexity of investment and development (we have planned an increase in power since 2008 and we still do not know if we would be entitled to CVs).
7. Set up local producer / consumer mini-networks via the existing network under acceptable conditions (It is not logical that the electricity producer receives 35 € / MWh and that the final consumer pays 200 € / MWh)

8. Reduce the constraints on the digestate and recognize it as a full-fledged fertilizer, this would allow it to be valued at its fair value (the price of chemical fertilizer).

9. Business model - Financial revenue (2018 figures) :

Sale of electricity (direct to HesbayeFrost)	23.61% (15,358,988 Kg of fossil CO2 avoided = consumption of 228,199 inhabitants)
Sale of digestate: (contracts with neighboring farmers)	3.27%
Sale of heat: (internal valorisation: drying of wood chips and packaging in wood briquettes)	5.24%
Organic raw materials with positive value	1.17%
Green Certificates (public support for Renewable Energies)	66.69%

10. Contact(s)

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