

Subject area: Renewable energy

Project title: District heating from bio-gas production at a Camphill Community site

County: Kilkenny

Nature of the project

Purpose: To provide heating in an environmentally-friendly way in a local Community facility that is part of a world-wide charitable trust – the Camphill Community. This particular Community in County Kilkenny – which accommodates 80-100 people, contains three large houses occupied by 16 people, a further two houses with three to four occupants, four school buildings, a large community hall with a seating capacity of 300, four craft workshops and two therapy rooms, all requiring 24 hour heating for most of the year - needed to lower its heating bills which were then running at an estimated 45,000 euros a year.

Content: The project involved the establishment of a medium-scale anaerobic digestion plant to transform farm slurry and food industry waste into biogas for heating, with liquid fertilizers and compost residues as side products. Three local farmers provide approximately 14 tons of slurry to the biogas plant daily, together with approximately 7 tons of food waste from food factories (such as the Tipperary co-op), sludge from waste-water treatment plants, plus hotel waste where possible (see problems).

Inspiration: The Community wanted an environmentally satisfactory solution to its need to lower energy costs, and a German co-worker, who was familiar with Biogas, researched the possibilities of adopting it as a solution. Wood chip and wood pellet burners were also considered but biogas was favoured as it provided employment for members of their community. Part of the ethos of The Camphill Community is to provide employment for their residents, many of whom have special needs. Additionally, it has a rural development spin off and included the wider community by involving the three large dairy farmers who provided slurry and in return received the bio-product (fertiliser) which the plant produced.

Scale of the project

Size: This is a medium sized project at present, but the Community would like to expand and use bio-gas to generate electricity for sale to the national electricity grid. It has the physical capacity (in the form of a second digester) to do this, but cannot currently obtain enough raw material (food waste etc) to feed it. Bio-gas production is estimated at 600 cubic metres per day, supplying either a 85kW or 200kW hot water boiler connected to the district heating system, as well as a 85kW boiler to heat the digesters

Time scale: The concept for the plant began in 1996 when The Community needed to rationalise their heating system.

The plant was constructed and ready to operate in 1998 when they took in their first load of slurry waste.

In the year 2000 they started taking in food waste, and only then did the plant become commercially viable. Previously, they weren't producing enough heat with just slurry waste and were failing to generate an income, so the picture back in 1998, 1999 wasn't a good one.

In 2000, EU legislation directed that all commercial food waste has be steered away from landfills. Landfills were, up until this time, charging a low fee for disposal of commercial food waste. In 2000 levies for landfills were introduced so commercial food companies looked for alternatives and came to the Biogas plant at Camphill who charged a gate-fee but it was considerably lower than landfills and their deposal of the waste was also good for the environment.

However, in 2002, animal bio-product regulations were introduced by The Department of Agriculture, if the biogas plant was to continue to take in this type of waste they would have to set up a pasteurisation process which would have been capital intensive so they opted to stay out of it, this narrowed the spectrum of waste which could be taken in, however they still remained profitable as they do to this day.



Digester.

Coverage: Local but with wider regional and national potential

Initiators and supporters

Initiator: The Camphill Community was always sensitive to the need to address environmental concerns and lower their heating costs.

Supporters:

LEADER (Barrow-Nore-Suir Development Board).

Horizon – A European scheme for social employment.

The Dep of Agriculture.

University College Galways's microbiology department.

The German Biogas Association were an important connection as they're made up of all the different biogas construction operators.

Organisation: A specific company (Bio-Energy & Organic Fertiliser Services – BEOFS) was established by the Community to design, build and operate the bio-gas plant, as well as to manage the financing of the investment in the project

Partners: University College Galway and a local voluntary advisory group which was made up of business people and an electrical engineer.

LAG involvements: Barrow-Nore-Suir Development Board

Finance:

Main source of funding: Support for the capital cost of the initial phase of construction was received from the Rural Development Programme, and for the second phase from The Barrow-Nore-Suir Development Board' (BNS) through the LEADER II programme, which provided substantial part-funding of several aspects of the project. The LEADER functions of BNS are now served by Kilkenny LEADER Partnership Company and South Tipperary Local Development Company.

Duration of main funding: Capital costs only

Additional funding: A grant towards non-capital costs (design, project management, etc.) came from the European 'Horizon' scheme, supporting projects creating employment for

persons with disabilities. As a demonstration project, funding for dissemination of information (including a seminar held on-site in June 2000) came from the EU 'Altener' programme.

Funding of the project:

Grants

50-60% grant aided through LEADER; Horizon - European scheme for social employment, The Department of Agriculture; a small research grant; Altner in partnership with UCG, microbiology department.

40% was through a bank loan.

Building costs

Total cost for building the plant is estimated to be in the range of 700,000 euros though in this case it is difficult to quantify as a much of the work was provided voluntarily by people living in the Camphill Community.

Results

Direct results: The project has successfully established a new environmentally-friendly district heating system for the Community, with the potential to be developed into an income-generating activity if a second plant could be brought 'on stream' in order to supply electricity to the national grid.

Main beneficiaries: The Camphill Community has established an efficient district heating system at its Ballytobin site in a way that respects its environmental concerns and priorities. It

has also helped local farmers who supply some of the inputs to the plant (cow slurry) and receive bio-product fertilizer for the land in return

Social aspects: The project contributes directly to delivering the social goals of the Camphill

Community:

- Providing education, advocacy, therapeutic care and other services to support people with disabilities and helping them participate fully in the world as contributing citizens;
- Caring for and healing the earth through sustainable and healthy methods of consumption, agriculture, and natural resource use; and
- Creating social arrangements designed to nurture the growth and development of individuals and families that separate money from work so that all community members contribute their time and skills according to their capabilities and all community members receive sustenance based on their needs.¹

Environmental aspects: In addition to providing a renewable energy source for the Community, the liquid digestate that results as a side-product of the production of bio-gas is returned free of charge to non-organic farmers as a nitrogen-rich fertilizer

Wider benefits: [has the project had spill-over effects in terms of promoting innovation, changing attitudes, encouraging participation?] While the project has led to a similar initiative elsewhere in Ireland, it is not clear whether it has had any wider effects in changing attitudes to change in the local area or region

¹ www.camphill.com

Relationship to wider objectives: The project is directly related to the objectives of the Rural Development Programme

Replication: The project is being replicated in another part of Ireland, County Clare.

Other countries: It could be adapted in any country where the waste products that power the anaerobic digestion plant (cow slurry and other waste) are readily available, though it's essential to investigate what restrictions in regards to waste which might exist in different countries and well as the cost involved in connecting with the national grid.

Innovative impact: The project is seen as particularly innovative in Ireland since it is the first of its kind in the country

Financial: Operating costs

Two part-time workers, one full-time = 60,000 euros.

Other costs

Insurance, electricity supply to keep pumps running and administration is gestimated to be 40,000euros.

Gate-fees are taken in on 3,000 tons of waste allows for a small operating profit, which is donated to the Camphill community for its own capital projects.

(Gate-fees fluctuate and are determined by the nature of waste, the exact fee is commercially sensitive information)

Heat-sales to community is gestimated to be in the region of 40,000euros.

Environmental: This form of energy production is seen as environmentally friendly – the project reduces carbon emissions by 165 tons a year, as well as creating odourless fertilizers. However, there are detailed issues to be addressed – see problems section.

Problems: Various technical problems have had to be faced in developing the project:

- The first digester did not work properly and had to be replaced by a second type which proved better at producing gas
- Storage facilities are needed for the winter months when the bio-product (i.e. fertiliser) cannot be spread on fields due to environmental restrictions.
- Rigorous monitoring of food wastes has proven necessary to ensure that the digestion is not inhibited e.g. by adverse pH values.
- Many permits are required to run a biogas plant, and many restrictions exist concerning the types of waste that can be accepted.
- Maintenance of the original plug-flow digester has proven more difficult than with the stirred reactor, due to the need to empty the vessel in order to undertake any repairs to the impeller. Therefore the original digester is now used as a storage facility.

- Researchers from the Agriculture and Food Development Authority in Ireland (TEAGASC) claim that the presence of heavy metals is an obstacle to the use of municipal waste as fertiliser, and this problem needs to be addressed by separating the waste material at source, if necessary.

Some financial difficulties have been faced as a consequence of the fact that, as a consequence of the recession, the volume of waste product inputs available to the project has decreased, and those using the facility to dispose of waste have proved unwilling to pay the ‘gate-fee’ for doing so, even though the level of fee has been reduced.

Lessons learned from this project:

It is possible, and practical, to supply small local communities – in this case a particular kind of social Community – with heating from self-contained renewable energy sources.

However:

- Innovative projects in the area of renewable energy may involve technical problems that take time to overcome
- Bio-gas is a renewable source of energy, but care has to be taken to respect appropriate environmental criteria in its creation and use
- The economic viability of projects like this are inevitably affected to some extent by the kinds of economic fluctuations we are experiencing in the current recession as well as stringent regulations and distance from the main electricity grid.

- It may be too expensive to connect with the electrical grid due to distance involved.
- If a plant is being set up from scratch it should include a pasteurisation process to make the operation more economically advantageous.

Background information

The Camphill Community is a charitable trust that works with children and people who have intellectual disabilities and other kinds of special needs. It is a worldwide movement with one hundred communities in twenty countries. In the Republic of Ireland, eighteen communities of varying sizes and settings are home to around 500 people, plus a number of day attendees.²

Camphill communities are particularly concerned about the environmental as well as the social impact of their work. This includes issues such as water usage, heat sources, and the impact of their buildings. As a result they have pursued leading-edge, plant-based wastewater filtration systems, and buildings designed to minimise the need for conventional energy.

The Camphill Community is one of the largest in Ireland and situated in the rural area of Ballytobin, outside the town of Callan, Co. Kilkenny in the south-east of Ireland. Between eighty and one hundred people (including volunteers and those with multiple disabilities) live in a traditional farmhouse and modern purpose-built accommodation. There are classrooms, offices, catering facilities, art and craft workshops, and a large meeting hall used for community activities, religious services, local events and seminars. About eleven hectares of land are used for grazing, gardening and organic farming.

² www.camphill.com

When the Community decided to add a new meeting centre, they wanted to heat it through a renewable energy source that was sustainable and cost-effective, and eventually commissioned Ireland's first centralised anaerobic digestion (Biogas) system.

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