

Best-Practice-Projects for Bioenergy utilisation in urban environments



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Project name: Tractments de Juneda, S. A. (TRACJUSA)
Location: Juneda (Lleida), Catalonia
Bioenergy Technology Concerned: Cogeneration with biogas from a pig manure treatment plant

Executive Summary:

Since 2001, it is operating in Juneda (Les Garrigues) a pig slurry waste-to-energy plant to treat this animal waste to produce biogas consumed in a cogeneration plant of 16,3 MWe based on reciprocating engines. The treatment capacity is 110000 ton/y of pig manure.

CASE DESCRIPTION:

Background:

The expansion of the pig sector in the past has brought as a consequence the accumulation of great amounts of organic matter (pig slurry and other wastes), contributing to the polluting load and the progressive environmental deterioration in the nearby zones. Two proprietary companies SGT and SENER constructed the treatment plant of pig slurry produced by 90 farms located in the vicinity of the power plant. SGT and SENER along with other stakeholders and farmers constituted, the society Tractaments de Juneda, S.A. (TRACJUSA). The plant is designed to reduce 50% of pig slurry (a mixture of solid excrements, liquid, water and food rest of the farms) of the region.

Description:

The CHP plant installed is designed to meet the heat and electricity requirements of all the slurry-treatment processes. The excess of electricity generated is exported to the grid, thereby contributing to the financial feasibility of the project. The main objectives of the patented treatment process are: eliminate the pig manure, produce biogas to run a cogeneration plant and obtain as a subproduct a solid fertiliser.

The cogeneration plant consists of six Jenbacher JMS 620 GS-N L gas engines, of 2740 kW each one. The fuel employed is natural gas combined with the biogas produced in the slurry digestion process.

The exhaust gas from the six engines is sent to a single-pass fire-tube boiler, capable of raising 10000 kg/h of 6-bar steam. The water from the engine high pressure cooling circuit is used to supply heat to the evaporator and to maintain the required temperature in the digesters. The waste heat in the low-pressure water circuit is dissipated in the cooling towers. These towers, as well as the water treatment plant, the biogas tank and the natural gas regulating and metering station are situated in an independent area, connected to the rest of the plant through a pipeline rack. The exhaust gas is also used to dry the final residue of the process to produce a solid fertiliser for commercialisation.

A second pig manure treatment plant with biogas cogeneration of the same capacity and using exactly the same process entered into service in 2004 located three kilometres from the first one. Tracjusa is also operating this second plant belonging to the company VAG, S.L. (Valoritzacions Agroramaderes de Les Garrigues, S.L.).

Technical Data (capacity, output, etc.):

- Biomass Type: Pig slurry
- Biomass Treatment Capacity: 110000 tons/year
- CHP installed capacity: 16,3 MWe
- Conversion to biogas: 20/25 Nm³/ton of treated manure
- Biogas Production: 10900 MWh/y, 6.4 kWh/Nm³ (65% CH₄)

- Electricity Production: 119900 MWh/y
- Steam Demand: 4670 kg/h
- Occupaied area: 15000 m²

Financial Data (investment, subsidies, etc.):

Total Investment (20% provided directly by the owners): 18 million Euros each plant (total 36 million Euros). The rest of the investment was financed by a long term credit.

Which main problems had to be overcome?

Legal factors:

Socio-economic factors:

The plant has solved satisfactorily the problem of the farmers urged to find a solution for the correct manure disposal.

Economic:

The cost of the natural gas mixed with the biogas has increased faster than the incentives and the price of the electricity produced compromising the future of this type of plants.

Others:

The plant initially started using liquefied natural gas transported by road until the construction of the natural gas network.

Information flow (which information needed, sources, difficulties, etc)

The plant is based in a patented treatment process owned by an engineering company that is also part of the proprietary company of the plant.

Lessons learned

The construction of a second plant of the same size and close to the first one clearly shows that it has been a successful project for the solution of an important problem such as the treatment of pig slurry in densely farm populated areas.

The two plants are located close to Juneda, a small village of 3000 inhabitants. The presence of these important facilities has made possible for the city inhabitants to get access to the natural gas network in advance to other small cities of similar size and location. Also the electricity transport lines have been improved with new substations acting as a pole of attraction for other industries that could not be installed in the area due to a lack of electricity supply.

The fertiliser obtained as a byproduct in the form of pellets contains organic material and also can replace satisfactorily synthetic fertiliser originated by non-renewable primary energy.

Contact:

Tractaments de Juneda, S.A.
Camí de Juneda a Arbeca, s/n
25430 Juneda (Lleida)
Spain

Pictures:

