

THE PRAD CO-OPERATIVE'S BIOGAS PLANT

Biogasanlage der Genossenschaft Prad

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Abstract

The construction of the Prad (South Tyrol) biogas plant saved local farms from having to build their own slurry storage facilities. The biogas co-operative bears the costs of transporting the initial feed stock in the form of slurry, manure, apple waste and waste fat from the catering trade. The biogas is used in the Prad Electricity Co-operative's heating plant, located some 2.6 km away, allowing the exploitation of 74% of the energy in the gas. In 2004, the biogas co-operative's revenues exceeded expenditures by around €800.

Zusammenfassung

Die Errichtung der Biogasanlage Prad (Südtirol) ersparte den landwirtschaftlichen Betrieben, eigene Güllelager zu bauen. Die Kosten des Transports der Ausgangsstoffe Gülle, Festmist, Apfeltrester und Fette aus der Gastronomie übernimmt die Genossenschaft. Die Verwertung des Biogases im 2,6 km entfernten Heizwerk der Elektrizitätsgenossenschaft Prad ermöglicht 74 % der Energie zu nutzen. Die Erlöse der Biogasgenossenschaft überstiegen im Jahr 2004 den Aufwand um rund 800 €

1. Introduction

A legislative amendment on the storage of slurry was the catalyst behind the decision to build a co-operative biogas plant in Prad (Provincial Government Legislation, South Tyrol, # 5108 of 10/06/1997). Livestock farms are now obliged to maintain enough capacity to store six months' worth of slurry. By constructing the biogas plant, the farms were able to avoid having to modify their existing storage facilities to meet the new requirements. The plant was completed in 2002, and 45 farmers supply it with slurry, manure and apple waste. The plant also uses waste fat from the catering trade. The Prad biogas facility works together with the Prad Electricity Co-operative, who operate two district heating plants and a hydrological power station.

2. The concept behind the Prad biogas plant

The biogas plant is located right next to a sewage plant, thus avoiding any issues to do with potential smells from its operation. The biogas is delivered via a 2.6 km long pipeline to a district heating plant. The investment costs were around €1.2 million. Almost 80% of these costs were covered by grants and subsidies, as the community project was particularly deserving of public support. For example, the construction of the plant meant that no public funds would have to be used to support local farmers making building changes required by the new slurry storage requirements. In addition, the plant is located in an ecologically sensitive region: the Stilfserjoch National Park. The price for biogas is tied to that of petroleum.

The layout and composition of the biogas plant is given in Figure 1. It has a capacity of 350 kW. The Vinschgau machine ring collects the slurry and manure from the farms and deposits it in the biogas plant's 306 m³ reception pit. The capacity of the two fermenters is 1,820 m³, that of the secondary fermentation unit is 2,375 m³. The biogas slurry is stored in two field tanks (with a capacity of 2,540 m³) until it can be spread on fields.

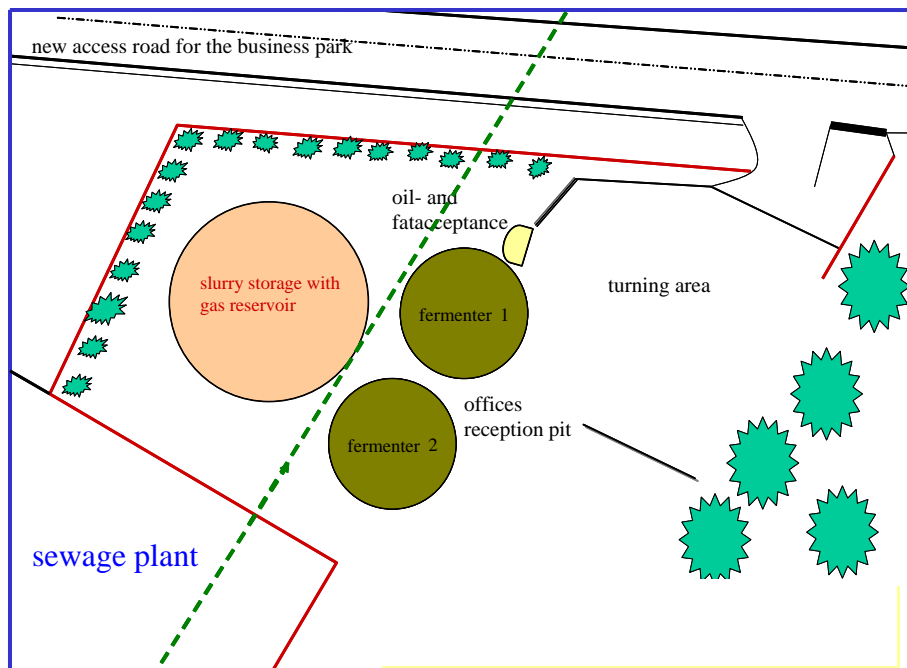


Figure 1: Layout and composition of the Prad co-operative biogas plant

3. Flows of energy and materials

The farms are about 5 km away from the biogas plant. In 2004, the following amounts of raw substrate were processed at the facility: 11,000 t slurry, 875 t manure, 1,188 t apple waste and 80 t fat. Methane production totalled 557,000 m³ (Table 1). Methane yield per tonne of substrate averaged 40 m³. Biogas is converted in a cogeneration system into electricity (36% yield) and heat (38%). Farm slurry, manure and biogas slurry is transported by the machine ring under contract to the biogas plant. A farmer can use a chip card to withdraw his share of the biogas slurry from the field tanks.

Table 1: Raw substrate and methane production in 2004

Substrate	Amount in t	Yield m ³ /t	Methane in m ³
Slurry	11344	28	317632
Manure	875	80	70000
Apple waste	1188	102	121176
Fat from catering trade	80	600	48000
Total	2143	810	556808

4. Revenue and expenditure

According to the 2004 year-end report, the Prad biogas plant had revenues of €133,000, of which 64% were generated from biogas sales and 32% from the "Grünen Zertifikat" ("Green Certificate") program. Expenditures came to a total of about €132,000. The biggest cost was transport (of raw substrate to the plant and biogas slurry to the field tanks) at about €52,000: 66% for slurry transport, 10% for manure, 17% for apple waste and 7% for fat. Labour costs for staff and contractors were €19,000, while other costs were debt servicing (€1,000), maintenance (€1,000), binder, energy, expendable supplies and auxiliary material (€7,000) and miscellaneous (€2,000). All figures have been rounded up or down to the nearest €1,000.

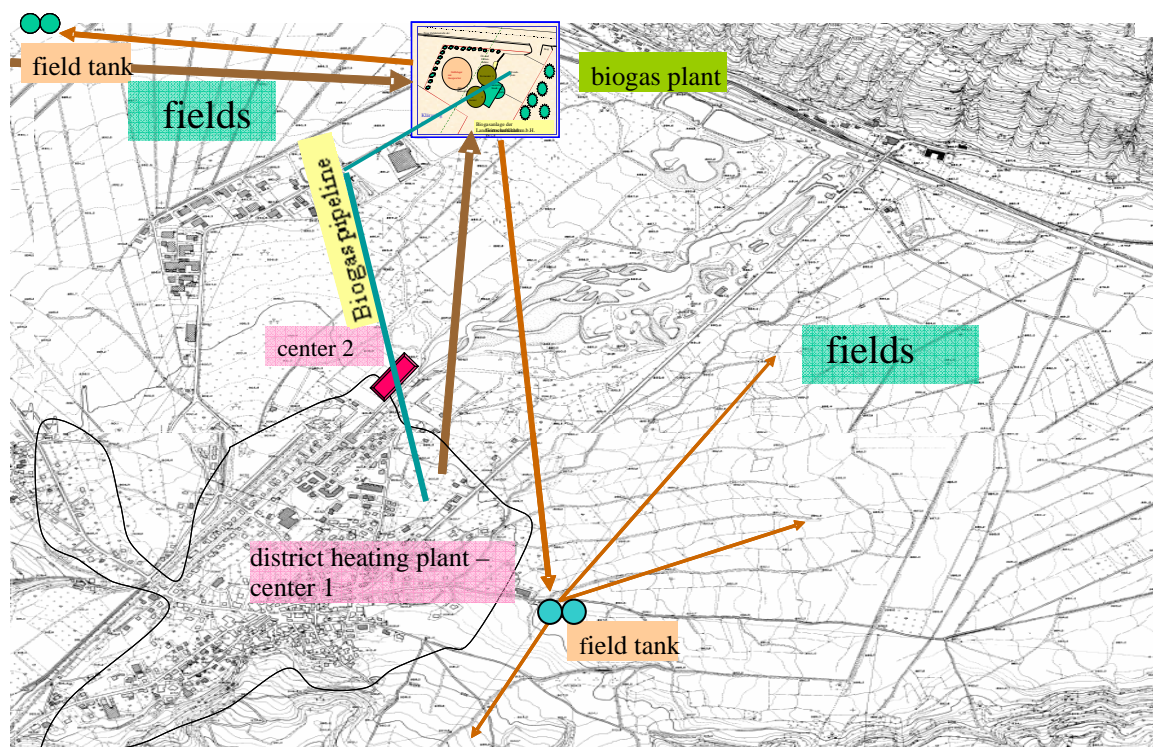


Figure 2: Flows of energy and material in relation to the biogas plant in Prad

5. Advantages of the communal biogas plant in Prad

The Prad biogas plant brings the following benefits (see E-Werk Prad, 2002, 23):

- The problems associated with the smell of farm animal waste are greatly reduced by applying biogas slurry to the fields, rather than the unfermented original. Complaints about smells are rare.
- The organised transport of slurry using a large tank (11.5 tonnes) from farm to biogas plant and back out to the field tanks reduces the time and effort previously devoted to animal waste transport by the farmers.
- By storing the fermented slurry out near the fields, labour requirements during the period of application are reduced, and the farmers are able to avoid traffic and save wear and tear on their machines.
- The various storage facilities associated with the biogas plant mean that many individual farmers do not need to expand the slurry storage facilities on their own farms. Instead, they can make use of the 6,700 m³ total slurry storage capacity provided by the plant.
- Biogas is a locally-produced renewable energy that can substitute for fossil fuels (Prad's average daily production of 1,700 m³ is equivalent to about 1,000 litres of petroleum). It makes a significant contribution to local self-sufficiency in energy production.
- The use of this local energy source helps invigorate the local economy and improves the quality of the area; the biogas plant contributes to the real net output of this economy and helps stabilise the local socio-economic complex.

References

E-WERK PRAD (2002): Tätigkeits- und Geschäftsbericht 2002, Ed: Elektrizitätsgenossenschaft Prad am Stilfserjoch, April 2003.

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