Såtenergi AB- 4 MW Straw heating plant

Lantmännen Energi AB, Sweden

Summary

The Såtenergi project is a successful and profitable co-operation between owner, customer and fuel supplier in the south/central part of Sweden, just south of the lake Vänern. The customer, an Air Force base, buys approximately 20 GWH of district heating energy annually and also supplies personnel for operation of the plant. The fuel supplier, an organisation owned by 40 local farmers, owns 9% of Såteneri AB. The main owner (91%) Lantmännen Energi AB, a subsidiary to a Swedish co-operative of 55 000 farmers, supplies administration and technical support. Såtenergi AB has been in operation since 1994. Total investment in 1993 was € 1,4 million. The contract with the Air Force base runs until 2013.

End-user area		Target Audience		Technical	
	New buildings		Citizens		Energy efficiency
	Refurbishment of buildings		Households		Heating
	Transport and mobility		Property owners		Cooling
	Financial instruments		Schools and universities		Appliances
■	Industry		Decision makers		Lighting
	Legal initiatives (municipal regulations, directives, etc)		Local and regional authorities		CHP
	Planning issues		Transport companies		District Heating
	Sustainable communities		Utilities		Solar energy
	User behaviour	■	ESCOs	■	Biomass
	Education		Architects and engineers		Wind
	Other		Financial institutions		Geothermal
			Other		Hydro power
					Other

Context

Lantmännen Energi AB started their first district heating plant based on straw in 1985. The plant, Kvänum Energi, was the result of experiments on how to use straw as a commercial fuel for heating plants. The plant is still (year 2003) running with good technical and economical result. The Såtenergi plant is based on experiences from the Kvänum plant.

Objectives

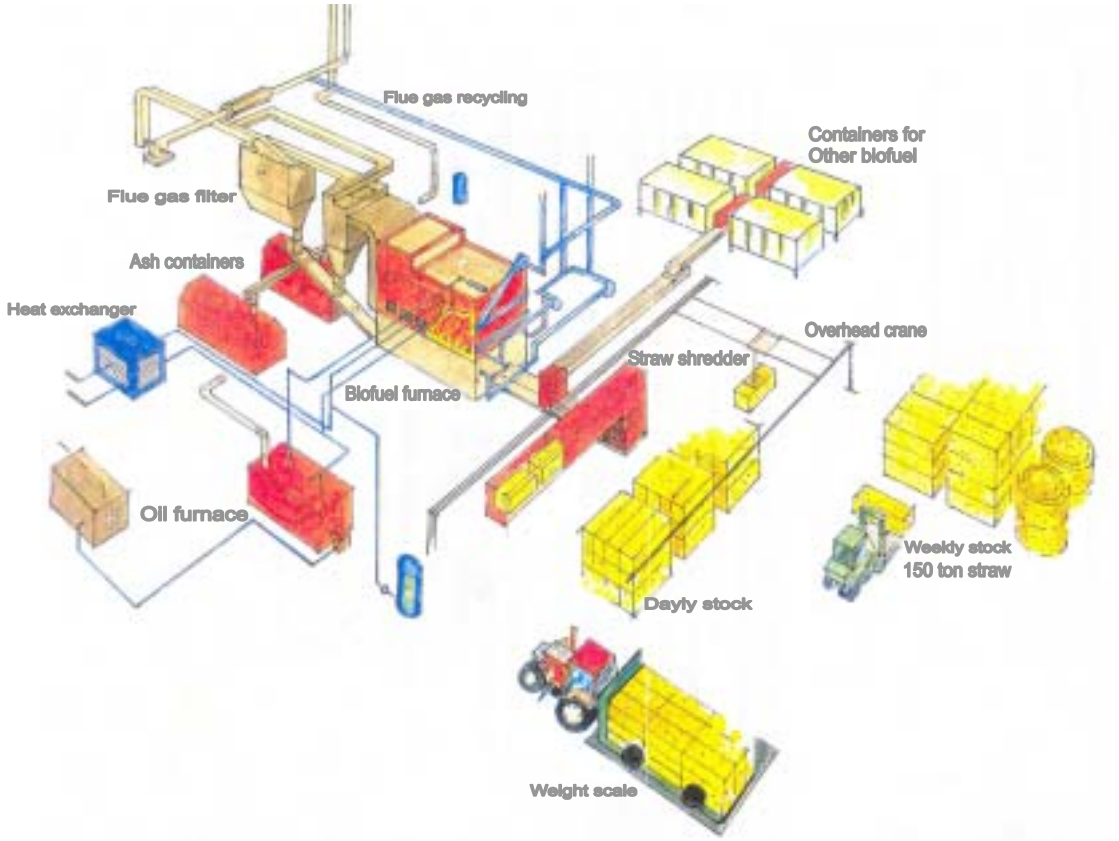
During the 1980-ies the Swedish National Association of Farmers (LRF) decided to appoint an Energy Co-ordinator in every local authority district in order to find possible projects for converting into biofuel. Apart from environmental reasons, it was also a way of finding new use (energy crops) for farming areas that was put into fallow due to over-production of corn.

Process

Our Energy Co-ordinator came up with the idea to ask the Air Force base if they were interested in converting their heating energy production into biofuel. At the same time the Air Force base was applying to the Swedish Environmental department for increasing their flight hours due to that the new JAS-fighter aeroplane was to be stationed there. The proposal of converting to biofuel, and giving the Air Force base a green profile, probably helped them to get more flight hours.
The idea to use Straw is partly the result from earlier plants and partly a way for the local farmers to earn some money from the Air Force base as a sort of compensation for the noise from the base

The Såtenergi AB district heating plant is located in the south/central part of Sweden, just south of the lake Vänern and 140 km north-east of the town of Gothenburg. The geographical location is a big plain where corn has been grown since several centuries. There are no traditional Swedish forest areas in at least a radius of 50 km.

The first contacts with the Air Force base vas made in 1991 and the contract for 20 years of energy deliveries was signed in 1993. The plant was taken into operation in 1994 and is expected to run at least until the end of the contract period.



The biofuel plant is connected to the Air Force base district heating grid and delivers almost 20 000 MWh of energy annually. The 4 MW biofuel furnace has a moveable grate and is equipped with a cleaning system consisting of cyclones and textile filters. The fuel feeding system has a shredder for

the straw and a container system for the wood chips and cereal residues. The biofuel furnace has a moveable grate for flexible use of biofuel. The biofuel furnace is running 24 hours a day and all year around, except for 2-3 weeks of planned maintenance during the summer. A 3 MW oil furnace is also connected to the district heating grid and can be started for back up and peak loads. The biofuel plant is equipped with a storage system, handling system with a shredder for the straw and a container system for the wood chips and cereal residues. The fuel is mixed and fed into the boiler in correspondence with the heat load. Over 90% of the fuel is biofuel.

Financial resources and partners

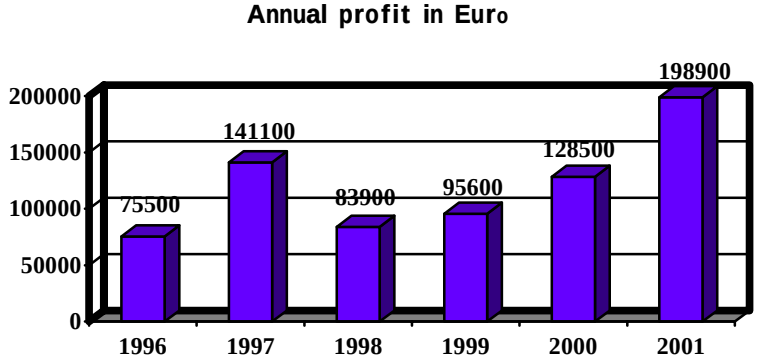
Total investment costs: **€ 1.4 million** (13 Million Swedish Kronor (SEK)) divided in;
Construction work: **€ 0.4 million** (3.7 million SEK)
Boiler and fuel feeding system: **€ 0.9 million** (8.3 million SEK)
Engineering, electricity, ventilation and water system etc: **€ 0.1 million** (1.0 million SEK)

Financing of the plant:
Commercial credits: **€ 0.9 million** (8.2 million SEK)
Shareholders capital: **€ 0.3 million** (3.0 million SEK)
Demonstration support: **€ 0.2 million** (1.8 million SEK)

Partners were: Skanska – construction works and Osby Parca AB – boilers and machines.

Results

Economy



Environment: The maximum dust emission limits for the plant is 100 mg/nm3. The installed flue gas cleaning system means that emissions are lower than this, approximately 15 mg/nm^3.
The decrease in the use of oil, 2000 m^3, has led to decreased sulphur dioxide emissions of 11 tonnes/year and decreased carbon dioxide emissions of 4900 tonnes/year.
Since the farming co-operative providing the fuels to the plant is local, the need for transportation is minimized. The bioashes from combustion are delivered back to the farmers who then return it to the fields as fertilizer.

Jobs created: Operational staff: 1,5; straw harvest including transport: 3; maintenance and administration: 0,5. Total approximately 5 annual jobs created.

Lessons learned and repeatability

The lessons learnt were that it is most important to have a high accessibility (many operating hours – few break down hours) of the biofuel plant. Three important factors are specified demands on fuel quality, qualified and motivated staff and preventive maintenance.

The positive aspects of project implementation:

- The customer buys their heating energy at 70% of the corresponding price for oil;
- In spite of their enterprise, the customer gets a green and positive profile;
- The local farmers (the fuel supplier group) has got an extra source of income. Approximately € 250.000 annually to divide;
- The owners earn money.

Fuel quality problems, mainly deviations from the ideal moisture content and muddy straw, have been solved by educating the fuel suppliers and only paying full price for specified quality. Technical problems has been solved by new investments into improved technology. Due to the profitability of the plant, it has been easy to reinvest. The staff is informed and motivated continuously by regular (monthly) meetings and the management is very sensitive to opinions from the staff.

The Såtenergi-project can be implemented anywhere in Europe as long as the local infrastructure is suitable.

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