

Emå Dairy



Mjölk från din hemtrakt™

"Milk from your home area" is Emå Dairy's slogan. The milk is collected from the local farms Hagelsrum, Virstad, Fröreda, Torsjö Säteri and Ålatorp, which gives short transports and thus less environmental impact. Producing its own electricity and heat from local biofuels is entirely in Emå Dairy's line with a focus on locally produced goods. The fact that Emå Dairy has replaced its oil-based heating system is partly due to reduced tax relief for the manufacturing industry, partly to the ambition to meet consumers' increased environmental awareness, but also to the fact that the existing heating system was in great need of redevelopment.

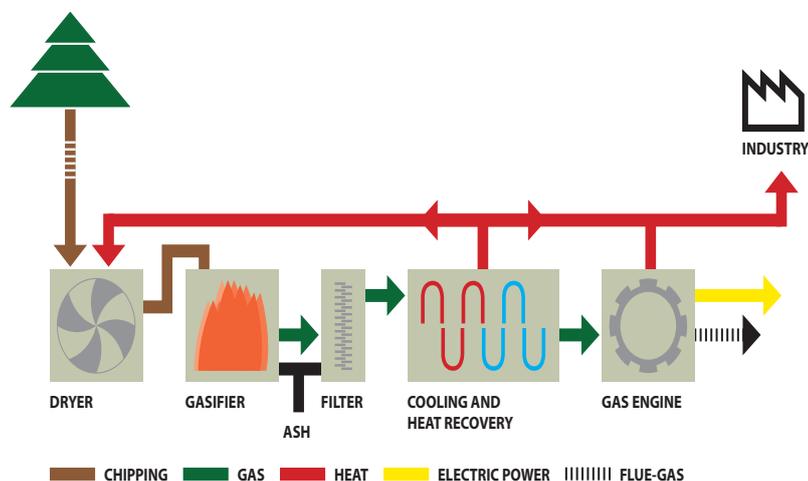
Emå Dairy in Hultsfred has built a gasification plant where wood chips are converted into heat and electricity.

In gasification plants, gas is formed via incomplete combustion of organic materials. The wood chips are fed to the top of the reactor and then move gradually downwards with the help of gravity, after which it is consumed. Due to a lack of oxygen, a partial / incomplete combustion of the fuel takes place and gas is formed. The hot gas that is formed is energy-rich and combustible and can thus be used both to extract heat and to drive an ordinary internal combustion engine.

The gas is led to an internal combustion engine which is connected to an electric generator. It transforms the mechanical work into electric energy that can either be used within the company or sold to the electricity grid.

The residual product biochar can be used to bind nutrients and provide more efficient agriculture that does then not need additional fertilizer. A gasification process gives a high electricity yield, between 20 and 30%. At the plant in Hultsfred, the electricity yield is 23%.

PROCESS PICTURE



PLANT DATA

EFFECT

40 kW of electricity (45 kW) generator and 100 kW heat

OPERATING HOURS/YEAR

Max 6000 h

ELECTRICITY

Max 240 MWh / year

INVESTMENT COST

Approximately 4,3 million

CALCULATED REPAYMENT

Approximately 10 years

RAW MATERIAL

Roughly fractioned chips

MOISTURE IN RAW MATERIAL

15–18%



MODELL

Volter™ 40 Indoor

DIMENSIONS

4,8 m X 1,3 m X 2,5 m

WEIGHT

4,5 tons

QUANTITY OF ASH

Approximately 500 liters / week (about 1-2% by outgoing fuel)

ASH HANDLING

Automatic ash handling

GAS COMPOSITION

CO (carbon monoxide) 25%
H₂ (hydrogen) 17%
CO₂ (Carbon dioxide) 8%
CH₄ (Methane) 2.5%
N₂ (Nitrogen) 47.5%

CALORIFIC VALUE, GAS

5,75 MJ/m³

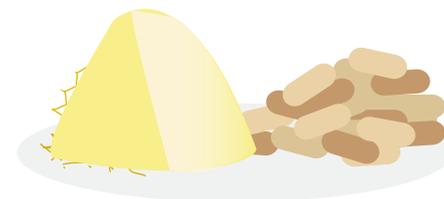
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Lessons learned

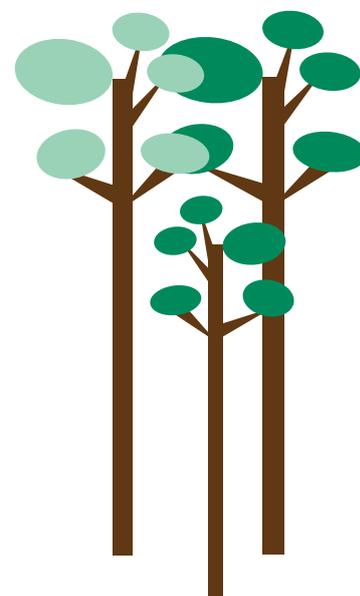


A dry and homogeneous fuel is needed for a gasifier to function optimally. One of the lessons learned from the gasifier at Emå Dairy is that the excess energy created inside the gasifier chassis is sufficient to dry incoming fuel to the gasifier down to the desired moisture content, which is below 15%.



The results also show that a gasifier works best with an even heat production and an installation is therefore best suited for an operator with an even surface at a relatively low temperature, for heating buildings. At Emå Dairy, the heating system was supplemented with an accumulator tank to even out the heat demand, which can also be done in other places with fluctuating heat demand.

The daily maintenance of a gasifier powered by wood chips is important. The maintenance mainly consists of ash emptying, changing the oil in the engine and one general check of the system. Our conclusion based on the experience of Emå Dairy, and in discussion with other suppliers of gasifiers, is that a service person is required who has several gasifiers to handle and who has the opportunity to keep a spare stock.



If the right conditions are given to a gasifier, with dedicated staff, a gasifier will have a payback period of around 10 years with the current electricity prices in Sweden. With a higher electricity price, the repayment period can be shortened for another couple of years.

Results

For the gasifier to become commercially viable, it is required that some conditions are met, such as higher electricity prices and lower prices for biomass.

Calculations within the project show that a gasifier can have a payback period of about 10 years already with today's energy prices.

The current tax limit on biopower also affects the profitability of installations around 50 kW.

