

## Climate Solutions:

# The pure money machine

**MILJØ MAGASINET recently visited a school in Skive, where rapeseed is utilized for heating. A closer look at this existing equipment reveals a true moneymaker. And, besides a recognizable economical advantage for the school, the equipment also helps meeting the ambitious climate goals for the Skive municipality.**

By Jesper Winther Andersen

Skive municipality is not just talking about being environment friendly and making statements. They take action, and that has resulted in seven



Michael Petersen, Head of Technical Department in Skive municipality, has a strong focus on how the municipality can use alternative energy:- The Hybren solution helps to give us an annual CO<sub>2</sub> saving of 114 tonnes. It fits well with the municipality having chosen an eco-profile.

ral exciting projects, one of them is a rapeseed fuelled heating plant at the school in

the city Breum, just outside Skive

The plant supplies, in combination with solar panels, the heat the school needs. But in addition to this, the plant produces rapeseed oil as a secondary gain of the heat production. This rapeseed oil is used in Skive City Hall to produce heat and electricity.

The total calculation shows that the municipality saves, all in all, nearly half a million Danish kroner (70.000 Euro) a year, while reducing its CO<sub>2</sub> emissions by 114 tonnes.

Behind this CO<sub>2</sub>-friendly money maker stands the company Hybren that develops, manufactures and sells vegetable oil presses, seed cleaners, boiler systems and related equipment.

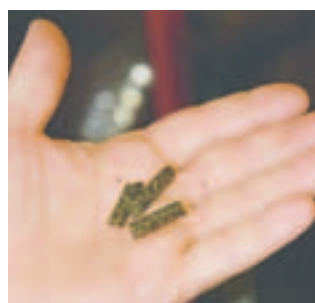
Our primary market ranges from small installations to the largest farming and country estates that produce their own raw materials for the Hybren system, explains mechanical engineer Thomas Nørgaard, founder and owner of Hybren in Hjørring.

Hybrens patented concept is based on the idea of combining coverage of more than one of a household's energy needs through full use of a locally produced commodity, namely oilseeds. In Denmark, the dominant oil-producing plant is rape and it is this plant that is primarily utilized.

Collaboration with Hybren is chosen because the transition



The Hybren patented oil expeller is so effective that it can extract 50,000 liters of rapeseed oil from 135 tons of rape seed, which is the quantity needed to cope with the heating of Breum School.



When the oil is expelled from the rape seeds, this is how the pelleted dry matter looks. The pellets are used as biofuel in the Hybren stoker boiler, to produce heat. The genius is, that rural areas can grow their own energy in the backyard and, through a good and proven solution, can be CO<sub>2</sub> neutral.



Thomas Nørgaard (left), caretaker Jan Vestergaard-Pedersen from Breum school and Niels Nielsen from the municipality's technical department on site at Breum School.

-The concept is so interesting that many municipalities have come to visit to see how we are doing here. How it is to be a beacon, and work hard to be a CO<sub>2</sub> neutral municipality by the year 2029, says Niels Nielsen.

to bio fuels to reduce CO<sub>2</sub> emissions from natural gas, which the school used before, was a job that we thought we could handle together. It held up, and Hybren has also shown that they have a very good expeller for expelling the oil from rape seed. Likewise Hybrens experience and knowledge of the secondary processes that comes with the switch over to bio fuels, has been very valuable, says engineer Michael Petersen, who is Head of Technical Department in Skive municipality.

### 100% self-sufficient

Hybren has developed a concept, where a patented oil press is combined with a stoker boiler. The idea is, that the stoker boiler burns the dry matter from the oilseeds, after the press has extracted the oil. The oil is filtered at the same time, so the final products of the process are heat and cold pressed filtered vegetable oil.

-In reality, the system is managed by the control unit on the stoker boiler. When the boiler calls for fuel, the expeller produces pellets that are fed directly to the burner. The expeller speed is regulated by the stoker control unit and stops completely when heating demand is very small. When heating demand comes back, the system restarts, and gets ignited by the automatic ignition on the stoker. The oil produced in parallel is filtered, and is then ready to feed to a vegetable oil burner or a diesel engine elsewhere. The oil can also be used to generate electricity in an electricity generator, explains Thomas Nørgaard and continues:

-This basic principle is the red thread through the Hybren plants, and it can be adapted to any need ranging from single-family houses of 110 m<sup>2</sup> to the large estate. Its only a question of dimensioning and design.

The produced oil may be used for additional heating by burning in a rapeseed oil burner, used for feed stuff mixing (or mayonnaise and fine salad oil) or, as it is the primary idea behind the Hybren concept, as fuel for a modified diesel engine. If the oil is used as motor fuel, the Hybren concept ena-



Thomas Nørgaard has modified his VW, so it runs on rapeseed oil. It gives a softer engine sound, a larger torque and MILJØMAGASINET can confirm that the car does not smell like French fries.

- The Hybren solution is "Keeping it simple", says Thomas Nørgaard, and calls for a modified tax, so his concept can be more widely applied to benefit the environment.

bles you to cover the household's or farm's energy needs 100% with CO<sub>2</sub>-neutral sulphur-free energy from a locally produced farm crop, in some cases produced by the users themselves, and with minimal transportation cost. Ash from the boiler is just minerals that can be recycled to the soil where the seed came from.

### Think new thoughts

Vegetable oil has since the diesel engine was invented been used as fuel and the fact that it is CO<sub>2</sub> neutral and sulfur-free, has become increasingly relevant as the greenhouse effect has been recognized. The fact that vegetable oil does not create small carcinogenic particles during combustion is perhaps a slightly overlooked additional benefit in proportion to the need for filters for fossil diesel-powered cars, stresses Thomas Nørgaard and continues:



In this relatively modest building at Breum School, Skive Municipality has installed a solution from Hybren, that as a whole saves the municipality for an annual energy expenditure of more than 60,000 EUR.



The finished oil that is collected in storage tanks, has a fine quality and can be used for a wide variety of applications, not least as it is the primary idea behind the Hybren concept, as fuel in a modified diesel engine.-The oil is also highly suitable for cooking, says caretaker Jan Vestergaard-Pedersen, here taking a "sample" for MILJØMAGASINET.

### It runs in oil for the municipality

Calculations on Breum school's rapeseed production: There is a saving of 40,000 m<sup>3</sup> of natural gas to 0,94 EUR/m<sup>3</sup> 37,600 EUR

The plant produces 50,000 liters of rapeseed oil 0,74 EUR/L 37,000 EUR

90 tonnes of rapeseed cake is used for heating.

135 tonnes of rapeseed is needed, bought for 0,255 EUR/kg 34,500 EUR

This gives a surplus of 40,100 EUR for maintenance and depreciation.

At the same time it has provided a CO<sub>2</sub> reduction of 24 tonnes and 50,000 l rape seed oil is used at the town hall for mini CHP, where they displace both electricity and district heating.

This means that Skive municipality get 10,000 hours of mini-CHP, the municipality has 3 units on 25 kW and 50 kW electrical heat each.

This gives the following figures:

Electricity production of 160,000 kWh / year, value 0,226 EUR / kWh 36,160 EUR

Heating production corresponds to a consumption of 23,000 m<sup>3</sup> of natural gas 21,620 EUR

Looking at the town hall economy, there are 20,780 EUR left for maintenance and depreciation.

At the same time there is a CO<sub>2</sub> reduction of 90 tonnes.

### Summary Total:

CO <sub>2</sub> saving of	114 tonnes
Gas-saving	72,000 m <sup>3</sup>
Power-saving	160,000 kWh
All this for 135	tonnes of rapeseed