



©Jouko Parviainen

Farm-Scale CHP in Nurmes

Kuittila farm, located in Nurmes, established a small-scale heat and power production (chp) plant in December 2012. Aim is to reduce the energy cost, improve the security of energy supply and eventually become self-sufficient.

A company, Kuittila Power Ltd., was established to provide energy for the farm, and co-located engineering works. In the Pielinen Karelia context, the farm is a large-scale having 160 dairy cows, the same number of young cattle, and two milking robots.

The chp plant is based on the gasification of wood chips. The 140 kW (40 kW electricity and 100 kW heat) plant can produce annually up to 1200 MWh of energy. Woodchips are gasified to process gas (incl. CO, H₂, CH₄) that is used in combustion engine (AGCO Sisu Power). The plant uses annually about 1400 loose cubic of wood chips that are dried by using natural drying and excess heat from the plant.

Table 1. The energy numbers (kWh/a) of Kuittila farm and co-located activities.

| | Electricity | Heat |
|--|-------------|---------|
| Barn | 250 000 | 100 000 |
| Engineering works of Ylä-Karjalan Korjaamo Ltd | 25 000 | 25 000 |
| Dryer | 0 | 295 000 |
| Farm buildings | 25 000 | 30 000 |
| Feeding to the public grid | 26 000 | 0 |
| Own use of the chp plant | 13 140 | 0 |
| Drying of woodchips | 0 | 250 000 |
| Total | 339 140 | 700 000 |

Contact:

PIKES Ltd.
Ms. Niina Huikuri
Kirkkokatu 20, FI-75500 Nurmes
+358406898166, niina.huikuri@pikes.fi



PIKES





Table 2. Small-scale chp -unit of Volter Ltd.

| | |
|---------------------|---|
| Model | Volter 40 |
| Fuel | Forest chips (birch, spruce, pine) |
| Fuel moisture | <18 % |
| Fuel particle size | 8mm ≤ P ≤ 50mm, fines (<3,15mm) <1%, all <63mm |
| Container | Length 6m, Width 2.5m, height 3m, mass about.10tn |
| Container structure | Steel structure, insulation |
| Colours | According to contract |
| Fuel feeding | Spring agitator outside the container |
| Engine | AGCO Sisu Power |
| Power | Generator 40kW, heat power 100kW |
| Power input | 1,5-2kW |
| Fuel consumption | Approx.4,5 loose-m3/24h |

The plant uses dry woodchips fed to the gasifier. Woodchips are pre-heated before gasification in pyrolysis area. Gasification temperature is 900-1200 C. gas components are 25 % carbon monoxide, 18% hydrogen and 3% methane. Gas is cooled from 550 C to 200 C filter temperature. Fine soot is filtered, after which gas is cooled to 50 C, and ready for combustion. Combustion engine runs the generator, producing high-quality electricity for the farm and outside through the national grid. The heat from the gas and engine cooling is utilised in the farm scale micro heating network.

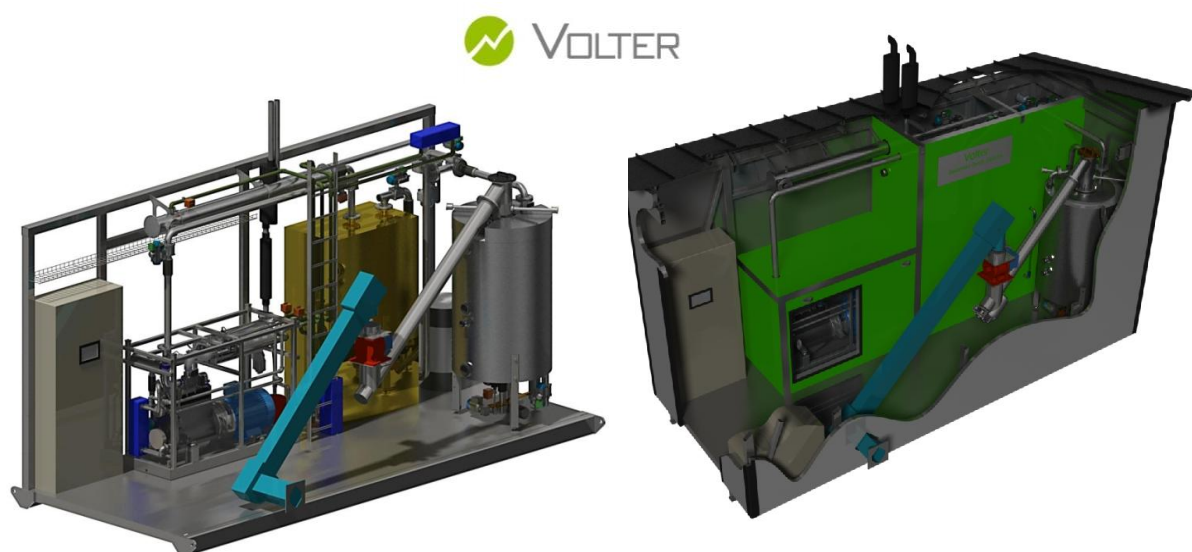


Figure 1. Volter 40 chp-unit is a compact container-build solution for small-scale heat and power production.

The investment costs of the chp unit were 223 000 euro, and the whole project 400 000 €. The project received 35 % public investment support and is expected to pay back in 10 year period.

The project of Kuittila farm is part of the ERDF co-financed Pielinen Karelia Bioenergy Networks and Flows Project of Pielinen Karelia Development Company PIKES Ltd. and Karelia University of Applied Sciences (2011-2014).