

# Turbec's T100 CHP microturbine at Klitte & Lund HB, Mörarp, Sweden



## Facts about Klitte & Lund HB's greenhouse

Area	23 000 m <sup>2</sup>
Culture	Cucumber
Period of production	March - October
Volume of production	1 500 000 kg/year i.e. 4 000 000 cucumber
	5% of the annual production of cucumbers in Sweden
Heat production	2 x 2 MW gasboilers 1 x 180 kW T100 CHP
Electrical power production	1 x 100 kW T100 CHP
Gas consumption	900 000 m <sup>3</sup> per year
Number of employees	10
Turnover	14 000 000 SEK
Built	1973 -2000

Generally, energy costs are a major portion of the production costs at greenhouses. This is the first greenhouse installation of Turbec's T100 Combined Heat and Power (CHP) microturbine. With it, local production of heat and power goes into a new era.

A major benefit of the T100 CHP is that flue gases can be used to fertilize cucumbers with carbon dioxide (CO<sub>2</sub>) without using expensive gas cleansing equipment.

The T100 CHP is connected to the Priva computer system of the greenhouse making it possible to optimize the running of the microturbine with respect to requirements on electrical power, heat and CO<sub>2</sub>.

### Electrical power

The T100 CHP runs on natural gas with a maximum output of 100 kW of electrical power. In general the output of the T100 CHP satisfies the entire power consumption of Klitte & Lund's greenhouse.

On increased demand for CO<sub>2</sub>, the T100 CHP automatically goes to full power production to produce as much CO<sub>2</sub> as possible. Excess electrical power is sold to Öresundskraft, a local electricity company.

When CO<sub>2</sub> is not in demand the T100 CHP produces electrical power to match the power consumption of the greenhouse. This function, matching power output to power consumption, is called load following.

### Heat

Together with an additional heat exchanger the T100 CHP can produce up to 180 kW of heat. This heat exchanger guarantees that the flue gas temperature does not exceed 57° C. This is the maximum temperature that the conduit system for CO<sub>2</sub> distribution can tolerate. When heat is not required in the greenhouse, excess heat is stored in an accumulator tank.

### CO<sub>2</sub>

At full power the T100 CHP produces roughly 90 kg of CO<sub>2</sub> per hour. CO<sub>2</sub> in the flue gas is distributed to the cucumbers by a fan and a conduit system. The greenhouse has a system that continually measures the level of CO in the flue gas. To guarantee the health and safety of the personnel at the greenhouse, the fan that distributes the flue gas is switched off if the CO level in the flue gas exceeds a set level.

### Interested parties

The greenhouse installation at Klitte & Lund HB is of general interest: local production of heat and power means efficient production without the losses connected with centralized condensation plants.

Local production of heat and power reduces losses in distribution of electricity and heat and avoids costly investments in distribution systems. The following sponsors have participated in the project together with the owners of the installation, Klitte & Lund HB: Öresundskraft, DESS, SGC and Turbec AB



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