

# 6. Neighbour Heating

By “neighbour heating” is understood a farm-scale boiler that in addition to supplying heating to the farm also supplies heating to one or several neighbours.

According to the Heat Supply Act, neighbour heating plants larger than 250 kW are under the obligation to report, e.g., the heating prices to the Gas- and Heating price Committee, thereby specifying the method of the price calculation.

The difference between an actual district heating plant and a neighbour heating plant larger than 250 kW is first and foremost the size and the type of ownership. A district heating plant is typically larger than 1 MW and organised in the form of a (Danish) private limited liability company (A.m.b.a.) (see Section 7), or in the form of a publicly owned company where the plant is not liable to pay tax subject to the condition that the heat can be supplied to anyone living in the area.

The relatively few neighbour heating plants established in Denmark - smaller than 1 MW - are typically owned by the farmer or perhaps established in the form of a (Danish) partnership (I/S) with one or two partners.

## Horreby

As an example of a modern neighbour heating plant, Peter Palle’s plant “Ellehavegaards Varmeforsyning I/S” in Horreby, Falster, will be described.

In 1995, a project plan was drafted for the Danish Energy Agency on the establishing of a neighbour heating plant at Ellehavegaard. Apart from the owner’s interest in proving that small-scale straw-based district heating in a village could be established and operated satisfactorily both on the part of the owner of the plant and the heating clients, the background of the initiative was, e.g., that:

- the owner was experienced in straw firing and as a supplier of straw for a large straw-based heating plant for several years, he had the relevant straw-handling equipment, storage facilities, and straw resources at his disposal.
- Stubbekøbing Municipality’s heating planning included the precondition that Horreby should be supplied with biomass-based district heating.

- Ellehavegaard is centrally located in relation to Horreby. With several large municipal heating consumers as “safe” customers, the heating sale was secured on beforehand and the prospects of extending the distribution net with connections to several private heating clients were good.
- there were good prospects in respect of achieving public subsidies for the cost of construction via the Danish Energy Agency, and the municipality had a positive attitude towards the idea.

## Organisation and Technique

The plant that is organised in the form of a partnership with Peter Palle and his wife as the owners was started up in January 1996 and is financed by approx. 50% via a mortgage loan, 25% subsidies by the Danish Energy Agency, and the remaining 25% by the owner’s own funds.

At the time of starting up the plant and in addition to supplying heating for the farmer’s own farm, contracts for heating supplies to a total of 5 municipal large-scale consumers and an independent kindergarten institution had been concluded. The distribution net is dimensioned so that a further 50 private consumers can be connected without major piping changes. With a peak load on a cold winter morning of approx. 0.6 MW with the present heating clients, there are limits, though, to how many more private connections

the boiler output can service. The project has been approved by the Municipal Housing and Building Agency, but since the nominal output is less than 1 MW, no environmental approval is required.

The existing straw-based heating plant has been replaced by a new complete plant including the following:

- Transport system for straw to the boiler
- Feed system and boiler
- System for the removal of ash and slag
- Flue gas cleaning and control system

The plant has been designed so as to cope with peak loads, but in case of suspension of operations of the straw-fired boiler, an oil-fired boiler has been established as a stand-by boiler.

## User Agreement

An agreement was made between the Stubbekøbing Kommune (municipality) and the owner to the effect that the municipal buildings/undertakings pay a basic heating price that is equal to the oil price the municipality is paying at the time of being connected to the district heating system. Thus, the basic price is fixed at DKK 400 per MWh exclusive of VAT which is equal to an oil price of DKK 3,200 per 1,000 litres. The actual heating price is calculated as a variable charge according to the heat consumption metered,



Horreby is situated at Falster, Stubbekøbing Kommune (municipality). There are 114 houses and several public institutions



photo: linka maskinfabrik

Typical straw boiler for neighbour heating. Cyclone, rotary valve and screw stoker are seen to the left. The picture is from Krengerup Estate at Funen.

where the size of the charge is regulated on the basis of the average quarterly price of ordinary fuel oil supplied by Kuwait Petroleum based on the basic price. It is the experience of The Centre for Biomass Technology that a price agreement like that within a few years may result in a disproportion between income and expenditure. The expenditure for straw-fired heat production often increases in a regular manner with the net index whereas the oil price may fluctuate depending on international price conditions.

### General Data

**Manufacturer:**  
LINKA Maskinfabrik.

**Flue gas cleaning:**  
Multicyclone.

**Ash handling:**  
The dry ash/slag is mixed with liquid manure and spread on to the field like fertiliser/manure.

**Heat consumers:**  
5 municipal institutions and 1 private institution plus livestock housing systems, farmhouse, and 2 dwellings on the farm are connected.

**Boiler output:**  
Straw-fired boiler: 0.7 MW. Oil-fired boiler: 0.75 MW.

**Distribution loss:**  
25% of gross heat production.

**Period of operation, straw:**  
Throughout the year except for 4-5 days for maintenance.

**Distribution net:**  
Length: 1,100 m. Pipe Diameter:  $\varnothing 88$  mm,  $\varnothing 76$  mm,  $\varnothing 50$  mm,  $\varnothing 40$  mm.

**Consumer installation:**  
Only the school has installed a heat exchanger where the district heating water is exchanged with that of the internal central heating system. All other consumers have direct connections with the district heating water circulat-

ing in the internal central heating system.

**Fuel consumption:**  
Straw consumption: Approx. 500-550 tonnes (at approx. 11-12% water content) per annum. Oil consumption: Approx. 3,000 litres per annum.

**Cost of construction:**  
Boiler etc.: DKK 800,000. Buildings: DKK 300,000. Electrical power installations: DKK 80,000. Distribution net and service pipes: DKK 820,000. Consumer installations (paid by the municipality): DKK 220,000. Totalling approx. DKK 2.2 million (in 1995 prices).

**Operating costs:**  
Approx. DKK 430,000 per annum including straw expenditure. Maintenance to the consumers' boiler room is handled by the partnership.

The plant runs satisfactorily, and since the operationalisation, more private consumers have been connected to the distribution net.