

## ABSTRACT

**TITLE** **Co-firing of refined biomass pellets on Nordjylland Unit 3**

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Due to the effort to reduce the CO<sub>2</sub> emissions from Danish power stations, test work has been carried out with co-firing of refined bio pellets.

Nordjylland Unit 3 is a hard-coal fired CHP unit (850 MW<sub>thermal</sub>) with an USC (ultra-super critical) double reheat steam cycle (steam temperatures of 582°C / 580°C /580°C). The refined pellets tested were of the steam-exploded type that were produced in a batch production process, where mini wood chips are pressurised with steam in a closed vessel. After a few minutes, the steam pressure is relieved abruptly, and the fibre structure of the chips decomposes, and are then pelletized. The benefits of the refined pellets are their ability to be stored outdoor, they have a higher heat value than white wood pellets and they require minimal refurbishment of the pulveriser.

The tests included outdoor storing of the refined pellets during both summer, autumn and winter. Even though the moisture content increased, the pellets did not disintegrate, and could be handled as dry ordinary pellets.

The boiler has four MPS pulverisers, each of which supplies a single burner level with fuel. During the test one of the pulverisers was fed with refined pellets only, thus co-firing the boiler with 25% refined pellets on energy basis. The tests have proved that with minor adjustments it was possible to operate the pulveriser in the full load range and with max. gradient (4% pr. min). During the test, the pulveriser was operated with maximum grinding pressure to control the pellet level on the yoke (grinding table). This resulted in an increased power consumption, but still within the acceptable range. The tests also demonstrated that the emissions (NO<sub>x</sub> and SO<sub>2</sub>) were lower compared to coal firing.

It has been concluded that the unit can successfully be co-fired with refined pellets. Due to the lower heating value all 4 pulverisers must be in operation to obtain full load, whereas only 3 are needed when firing coal.

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