

DP customized solutions Upgrade of waste-to-energy plant

REFA Nykøbing Falster, Denmark

Introduction

REFA (Renovation, Energi, Forbraending, Affald) is an organization owned by the county of Nykøbing Falster in Denmark. REFA owns a waste-to-energy (WtE) plant which combusts household and industrial waste to supply district heating to the local community. The plant consists of three individual WTE lines. Two lines dated back to 1986, each having a waste capacity of 3t/h. The third line was from 2000, and had a waste capacity of 9t/h. The two older lines were deteriorating in efficiency and availability, largely due to outdated technology.



Requirements

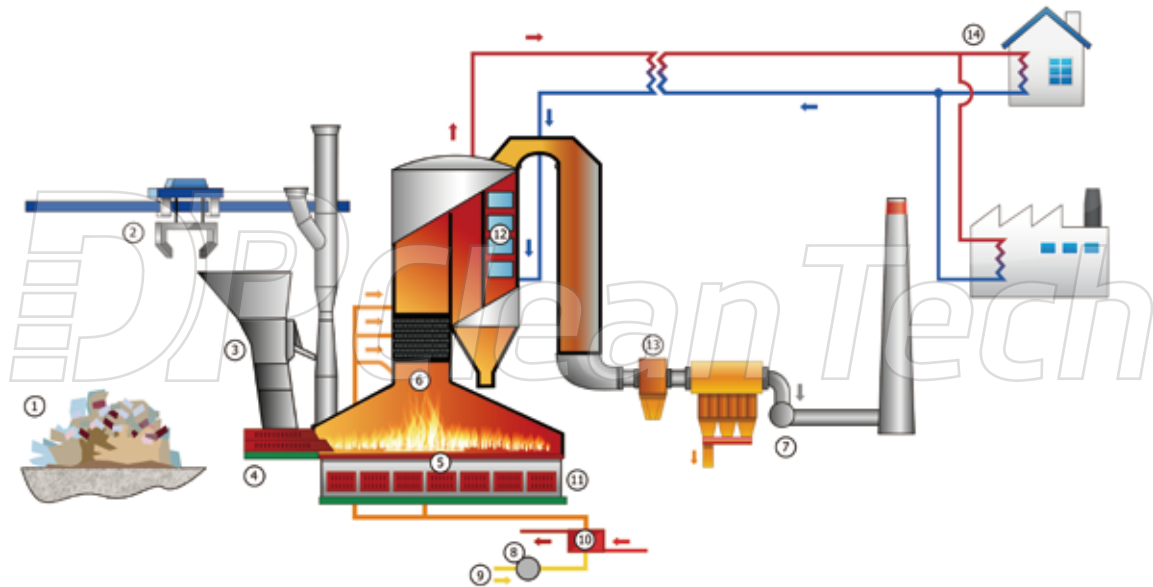
REFA chose to rebuild the entire 3 line plant using newer technology. The owners required improvements in plant performance, so that in future it would operate at higher efficiency and with an increased capacity. In addition they needed to reduce and minimize the high level cost of downtime which was needed every month to clean the heating surfaces manually.

The project was divided into two stages, with separate contracts. The first stage which was undertaken in 2010 required the rebuild of the boiler and convection pass. The

second stage required an engineering study and technical solution for upgrading the combustion system. The second stage rebuild was implemented in 2011.

DP CleanTech was chosen as the supplier for both contracts due to its unique and proven in-house experience; and its cost effective efficient project execution.

Waste Fired Boiler (Hot water generation)



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|------------------|-------------------------|--------------------|
| ① Waste bunker | ⑥ Combustion chamber | ⑪ Ash conveyer |
| ② Crane | ⑦ Induced draught fan | ⑫ Economizers |
| ③ Feeding hopper | ⑧ Forced draught fan | ⑬ Flu gas cleaning |
| ④ Pusher | ⑨ Combustion air intake | ⑭ District heating |
| ⑤ Step grate | ⑩ Air preheater | |

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DP Solution

Stage 1 - Conversion

DP CleanTech redesigned and converted the existing three pass boiler into a four pass boiler. This included new heating surfaces in the fourth pass to reduce the flue-gas temperature to below 550°C before the convection pass.

The convection pass is built as a free standing economizer tower with four bundles of tube coils. The availability is improved by installing water cleaning in the second, third and fourth passes of the boiler, together with steam soot-blowers in the economizer tower.

Stage 2 – New combustion system

The second stage of the complete solution involved installing a new combustion system with waste fuel feeding system to give an optimal and steady feeding to the existing combustion grate. To improve the combustion system, a new air preheater with secondary air nozzles was installed to improve the combustion air distribution. The

volume of combustion air was further increased with new primary and secondary fans.

New water-cooled wear zones were installed in the furnace to reduce the furnace temperature, which would subsequently improve performance and reduce maintenance costs of refractory materials.

Resulting plant performance

The targets for the rebuild were a reduction in annual shutdown to only once per annum for maintenance and cleaning; and an increase in line capacity to 4.5 t/h of waste. Ongoing assessments to ensure performance expectations are met, and to identify further potential improvements are an essential part of the DP commitment to quality and service standards.