

SPG course MJ2405

Exercise 4: Boiler Efficiency via the indirect method

For a steam boiler that handles the same fuel and combustion process as in Exercise 1
– Estimate the boiler efficiency!

The fuel was “mushroom compost”, with high humidity and ash content.

Elementary composition of the fuel (dry mass basis):

C	30.2 %
H ₂	3.5 %
O ₂	24.3 %
N ₂	2.3 %
S	2.7 %
Ash	37.0 %

Moisture in the fuel = 61.8 %.

The higher heating value (HHV) for the **dry** fuel was 12.19 MJ/kg

Additionally, the following loss parameters have been measured for this case:

Flue gas temperature to the stack	170 °C
Unburned carbon in residual ash	5 %
Radiation losses from boiler	0.5 %
[CO] in dry flue gas	390 ppm (carbon monoxide per dry gas)