

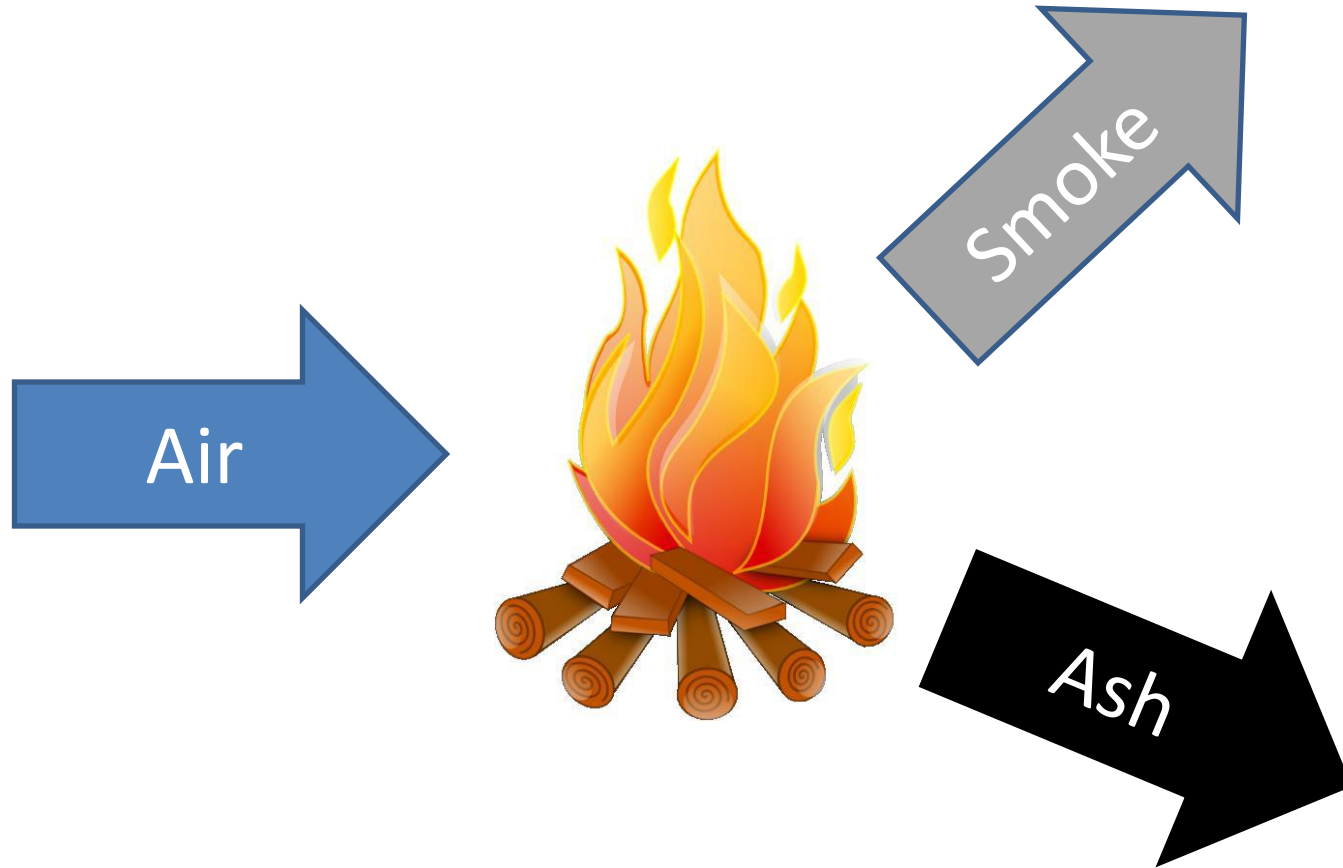
# Biomass Gasification and Combined Heat and Power

A brief introduction

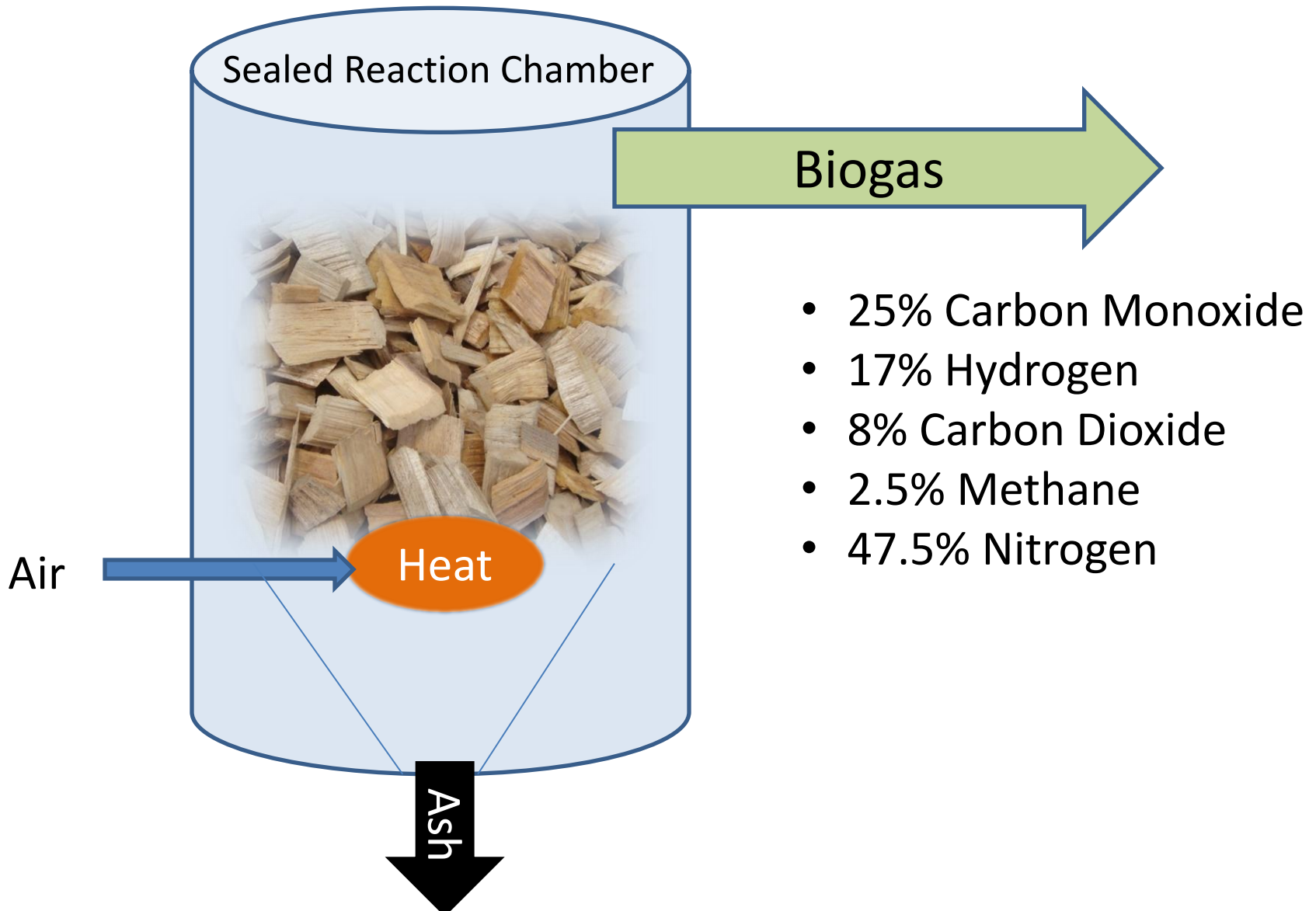
Ben Loeffler

FNSB Energy Management Engineer

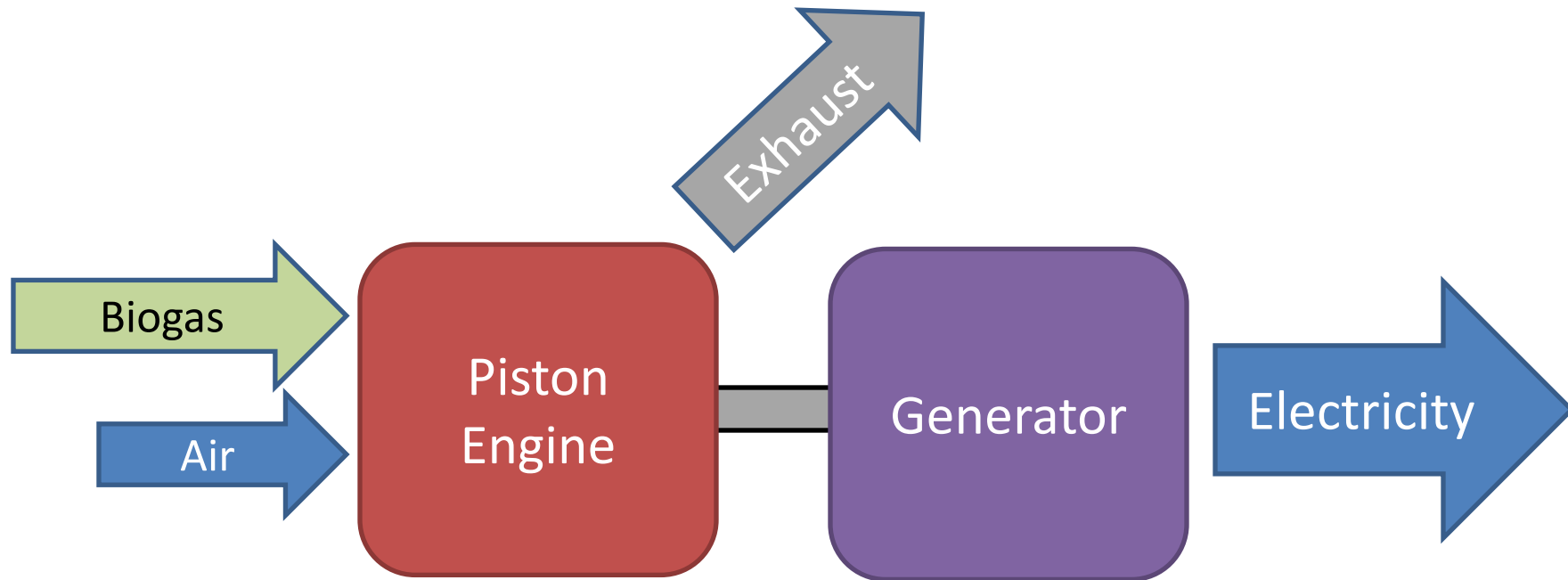
# Traditional Open Combustion of Wood



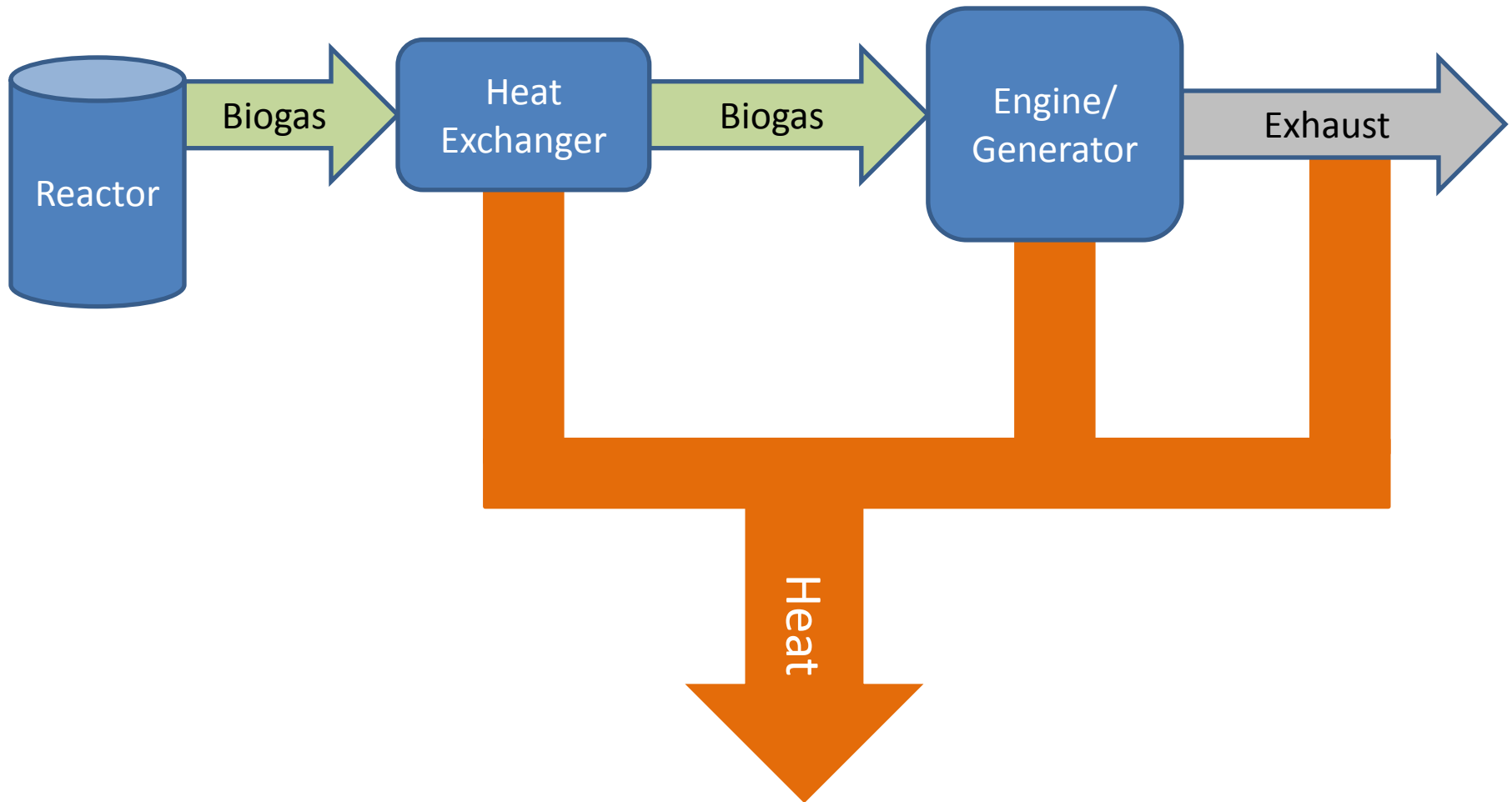
# Wood Gasification



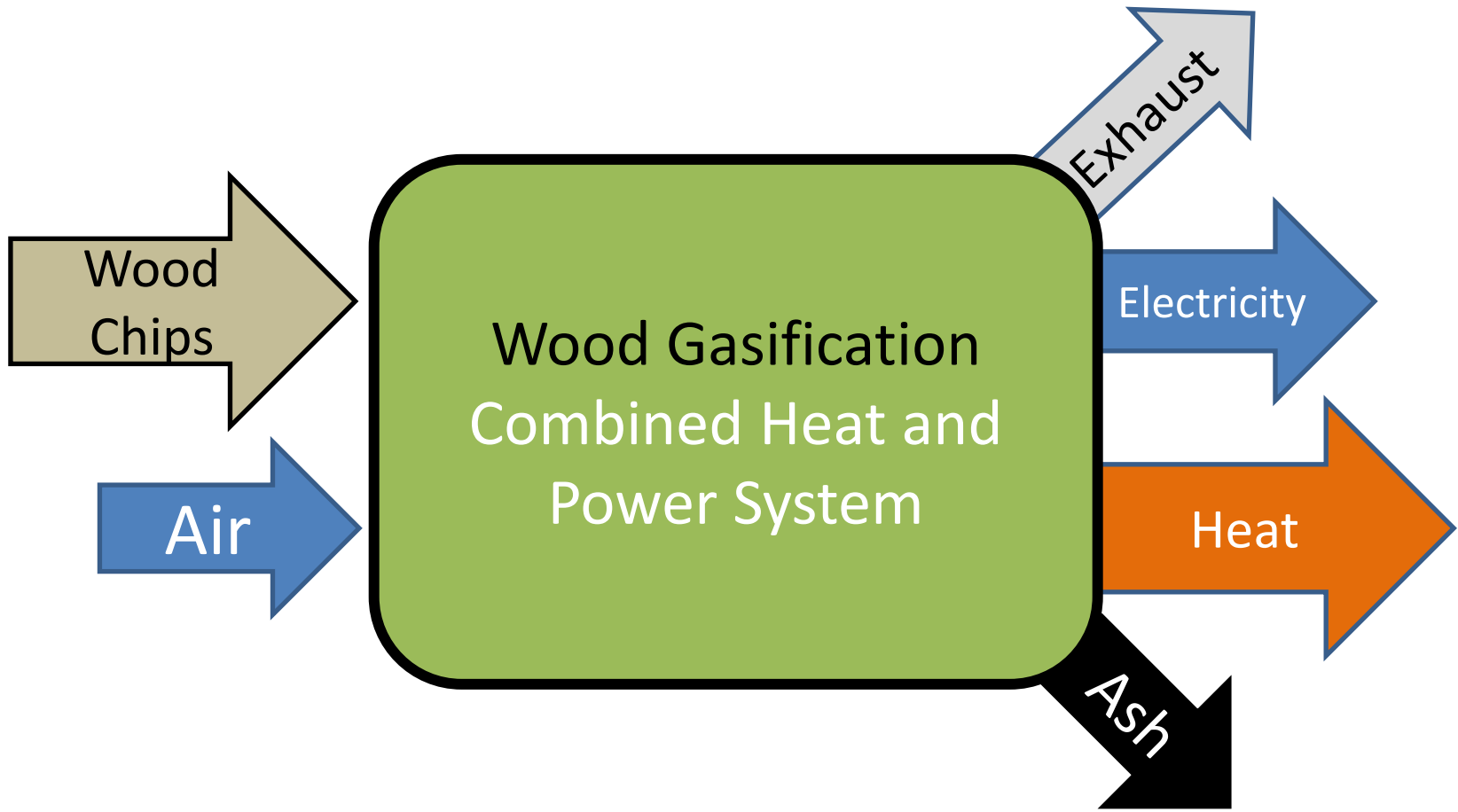
# Wood Gas Combustion



# Combined Heat and Power



# Overall Operation



# Emissions – PM 2.5

- Pounds PM 2.5 per ton wood consumed
  - Hydronic Heater – **64 lb/ton**
  - EPA Certified Wood Stove – **8.76 lb/ton**
  - Pellet Stove – **3 lb/ton**
  
  - **Wood Gasification CHP - 0.01 lb/ton**