AIR AND FUEL STAGING IN PULVERIZED COAL FIRED BOILERS
AIR STAGING IN PULVERIZED COAL-FIRED BOILERS
AIR STAGING IN TANGENTIALLY FIRED BOILERS

axial staging

over-
under-
stoichiometric

radial staging

over-
under-
stoichiometric

combined staging

over-
under-
stoichiometric

λ < 1

λ > 1

COMBUSTION AND FUELS
AXIS AIR STAGING USING OFA NOZZLES

- Lean combustion ($\lambda > 1$)
- Rich combustion ($\lambda < 1$)

OFA nozzles
Air
Fuel
RADIAL AIR STAGING - DIFFERENT RADIUS OF COAL AND AIR

Fuel

Fuel rich zone

30% of air

30% of air

Air

Fuel
AIR STAGING SYSTEM LNCFS

SOFA

1. OFA 1 & oil burner
   - core air
   - bottom air & oil burner

2. Pulverized coal nozzle 2

3. Pulverized coal nozzle 1

4. OFA 2

a) core air
b) pulverized coal
c) secondary air & oil burner
OFA NOZZLES IN OP 430 BOILER
OFA NOZZLES ON SIDE WALL OF OP 650 BOILER
FUEL STAGING IN THE PF BOILERS
FUEL STAGING: Minimum Pollution (PM) METHOD
FUEL STAGING: system of pulverized coal supply
(Power Plant ŁAGISZA)

loose pulverized coal  dense pulverized coal
Fuel staging in wall-fire boiler furnace

- Burners for loose pulverised coal stream
- Upper burners for dense pulverized coal stream
Combined low-NO\textsubscript{x} combustion methods

Low-NO\textsubscript{x} boiler furnace with cyclone reburning of unburnt char,
1 – natural gas, 2 – pulverized coal, 3 – air,
4 – flue gas recirculation, 5 – bottom ash disposal
Combined low-NOx combustion methods II

Low-NO$_x$ boiler furnace with fluidized reburning of unburnt char,
1 – natural gas, 2 – pulverized coal, 3 – air,
4 – flue gas recirculation
FUEL STAGING: reburning

Conventional combustion

- Coal (100%)
- Basic fuel - coal (75-90%)
- Additional air
- Reburning zone (λ < 1)
  - (reduction NOx to N2)
- Basic burning zone (λ > 1)

Combustion with reburning

- Reburning fuel (10-25%)
- Additional air
- Zone of unburnt fuel combustion (λ > 1)