

## Supplementary information

Table S1 Key parameters of the 220 t/h CFB boiler (installed in a 50 MW power station unit)

Item	Parameters
Unit capacity/MW	50
Boiler model	HX220/9.8-IV1
Boiler type	CFB, natural circulation
Maximum continuous rating (B-MCR), t-steam/h	220
Furnace width, mm	14500
Furnace depth, mm	5500
Fuel sources	Fuel #1: treetops and leaves Fuel #2: wood scraps Fuel #3: sugarcane leaves
Fuel size	Length < 150 mm Width < 80 mm Thickness < 50 mm
Bed material	river sand
Sand size	D90 = 1.651 mm D10 = 0.245 mm

Table S2 Tube material in the different parts of boiler.

Part	Tube material
Membrane wall	–
Platen superheater	SUS316
High-temperature superheater	SUS316
Vertical tubes at cyclone outlet	–
Low-temperature superheater	
Upper group	12Cr1MoVG
Middle and bottom group	20G
Economizer	20G

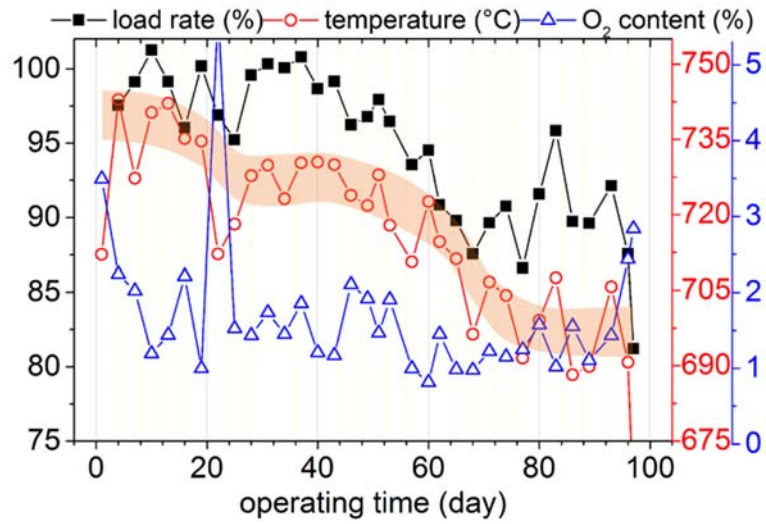


Fig. S1 Variation of the boiler load rate, the flue gas temperature and pressure drop in PSs (determined at the furnace outlet).

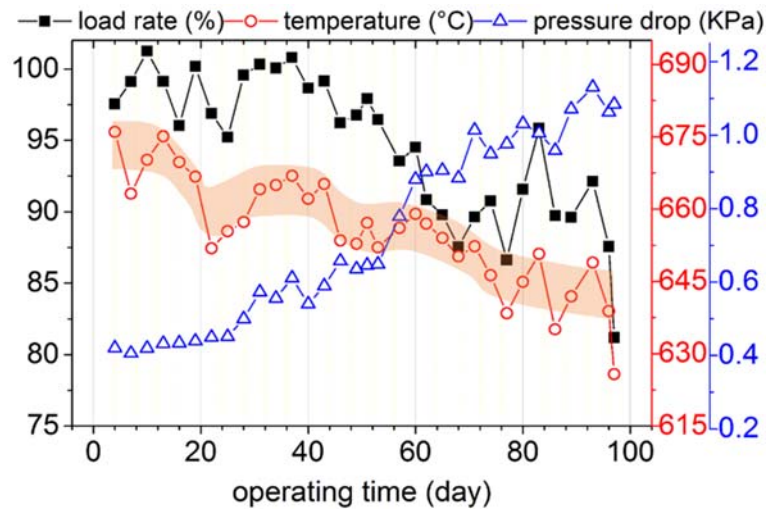


Fig. S2 Variation of the boiler load rate, the flue gas temperature and pressure drop in upper LTSs.