BOILERS WITH CIRCULATING FLUID LAYER (CFV) IN HEAT SECTOR

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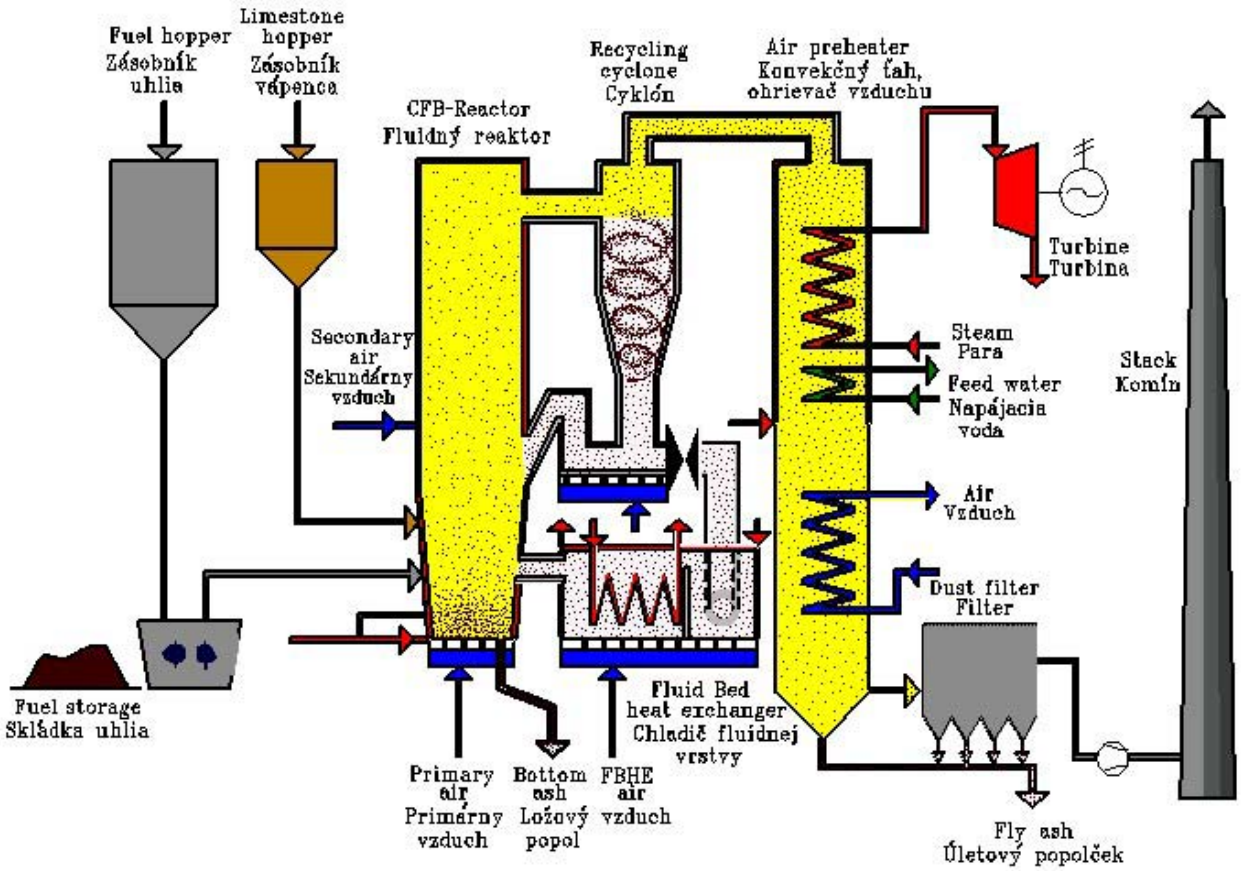
For the small and medium producers of electricity and heat, combustion of wide range of fuels is becoming a part of their survival strategy. A way, how to realize this idea, is to use a technology of combustion in circulating fluid layer.

Principle of work of boilers with CFV

The combustion process in circulating fluid layer runs in a stream of combustion products, fuel and additive in combustion chamber. As a consequence of intensive mixing of all of mentioned components and optimal temperature, a high share of releasing SO_2 is absorbed by the additive. At the same time, because of low temperature during combustion process, a reduction of released NO_x is achieved,



Fundamental scheme of a function of the boiler with circulating fluid layer

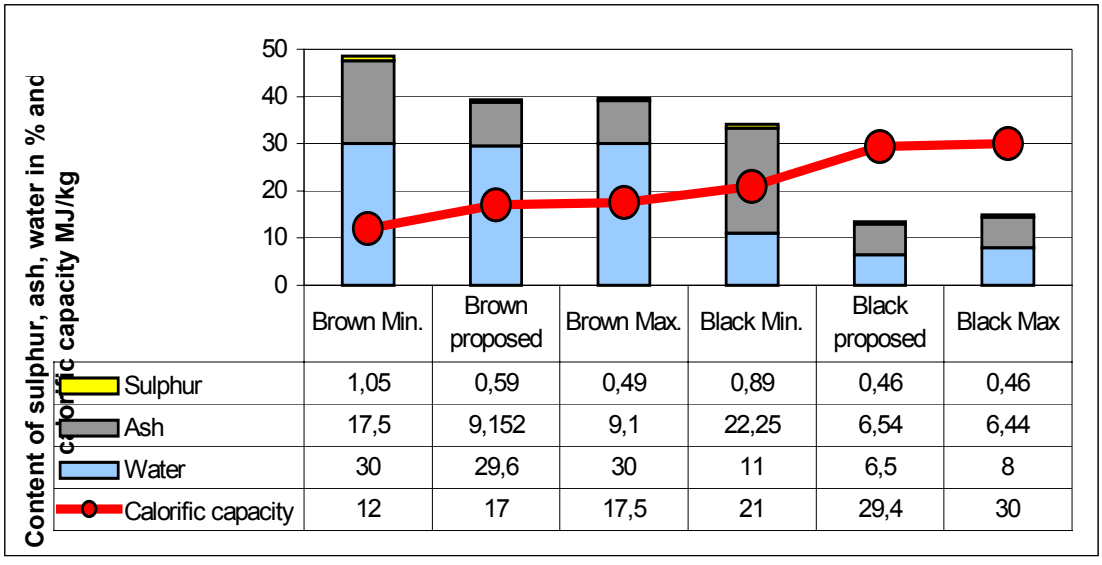
when we compare it to traditional boilers. To remove dust from the combustion products we use a textile filter or an electric filter.

Main preferences of fluid boilers

Boilers with CFV are suitable to fire a wide range of fuels from wood, lignite through black coal to anthracite coals. Following the emission limits by these devices is solved inside the device without other external systems for combustion products cleaning.

A process of intensive mixing of the circulating material is running in the circulating fluid layer and also as a consequence of relatively low temperature (850-870°C) this technology is suitable to combust additional fuels as fillets, bark, separate municipal waste, waste oils, biogas and so on. This additional combustion together with main fuel (coal) is viable also for boilers, which have been put in operation in the past. However, high attention should be focused on the question, how to transport the additional fuel to the boiler.

Boilers with CFV behave friendly, while the outputs are low enough and up to 40% of the output it is possible to run them without use of stabilization fuel.



	Brown Min.	Brown proposed	Brown Max.	Black Min.	Black proposed	Black Max
Sulphur	1,05	0,59	0,49	0,89	0,46	0,46
Ash	17,5	9,152	9,1	22,25	6,54	6,44
Water	30	29,6	30	11	6,5	8
Calorific capacity	12	17	17,5	21	29,4	30

Fuels of the boiler with CFV 125 t/h Moravské teplárny Zlín

Development of fluid boilers in SES Tlmače lasts already many years. The first contract for a fluid boiler 160 t/h of capacity was signed in 1992. It was the very first commercial boiler with circulating fluid layer in the past Czechoslovakia. Since 1995, this boiler is in operation at the heating plant Energetika Třinec. Since those days mainly the construction of these boilers passed through important changes and our

constructers made real breaking point in the technology of fluid boilers by utilization of new way of corroboration. In 1995 we stood before difficult task to place the fluid boiler 350 t/h in the boiler chamber, where was a lack of free space because of massive pillars supporting the construction. They have found a unique solution to make the boiler self-standing and to use the light steel frame only to support platforms of the boiler. Since those days we have delivered several so constructed boilers to Slovakia, Czech Republic, Italy and Ukraine. Many of them are already in commercial operation. Outputs of fluid boilers designed in SES Tlmače move between 81 and 670 t/h. All the boilers have natural circulation; some of them are equipped by inter-economizer as well.

Heating block 30 MW with boiler with CFV 125 t/h Moravské teplárny Zlín

Construction of the boiler with CFV is designed as self-standing. All main parts of the boiler – combustion chamber, recycling cyclone, and air preheater – are supported by concrete foundation. It's the first fluid boiler, where all the main elements are connected firmly and they create a united body.

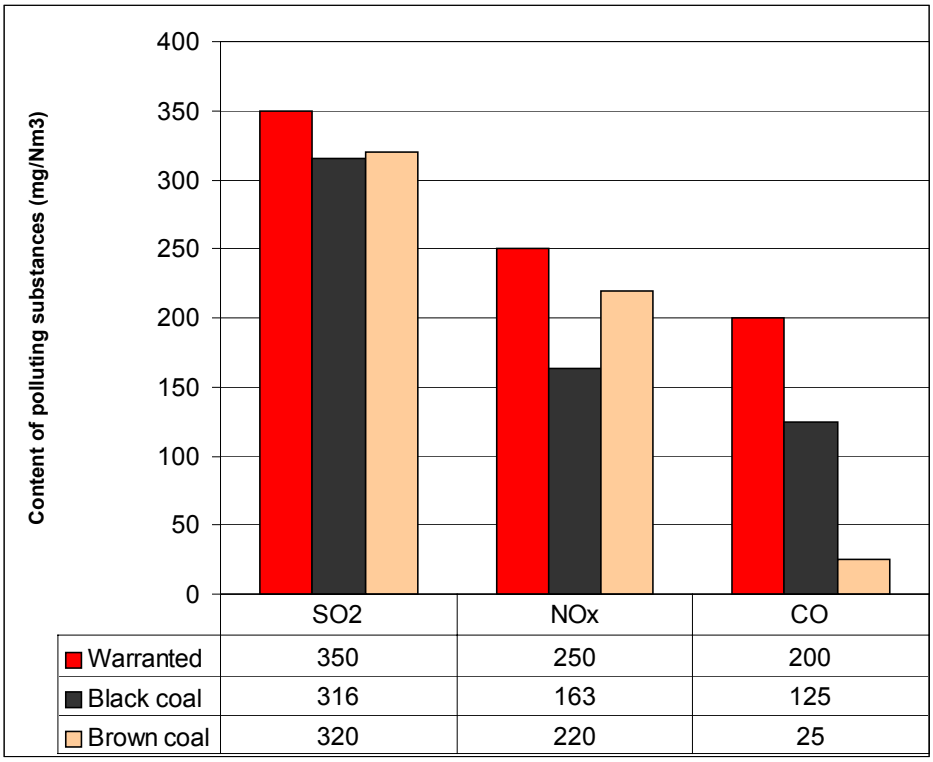
The boiler was installed into a space, where used to be boilers K7 and K8 originally. It is interesting, that axial distance of original concrete pillars, the boiler 125 t/h is placed between, is 13,45m and the length of the boiler in the old boiler room is 31,10m. Except of these dimensions, a new lift shaft, stairway and a space for montage hole dimension of 3,75 x 10,80 m, are placed there. During re-construction of the heating plant, an existing concrete bunker building was used, in which some re-constructed coal bins, hammer shatters and chain

A look at the boiler room of the boiler with CFV 125 t/h Moravské teplárny Zlín

coal transporters are placed.

Some air ventilators and blowers are placed in the bottom part of the bunker building. From the process aspect it's going on a boiler with natural circulation, convection water preheater, three levels of steam preheating and a regulation of temperature of preheated steam by injection of feed water. Evaporator of the boiler is created by membrane walls of combustion room, a cyclone, air preheater, fluid bed heat exchanger (CHFV) and evaporation bunch engrossed in fluid layer of CHFV. The combustion air is secured by radial ventilators – one of them for primary air and the other for secondary air, and blowers for supply of fluidized air to CHFV and fluid shutter.

The heating plant with fluid boiler presents a up-to- date generator of heat and electricity production, based on ecological combustion of wide range of coals by a system of fluid technology.



	SO2	NOx	CO
Warranted	350	250	200
Black coal	316	163	125
Brown coal	320	220	25

Warranted and achieved emission values of the boiler with CFV 125 t/h
Moravské teplárny Zlín