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ENVIRONMENTAL BARRIERS OF BIOMASS FOR HEAT GENERATION

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When using biomass as fuel for the boiler heating systems one of the main challenges is to ensure the required size buffer zones, defined as the distance from emission sources to the limit residential development, areas of public facilities, buildings and facilities, recreation and others. . By the pollutants released by burning biomass include nitrogen oxides NO_x, carbon monoxide CO, dispersed particles (dust, ash) and sulphur dioxide SO_2 and greenhouse gas CO_2.

These constraints often make it impossible to transfer the implementation of existing sources of heat from natural gas to biomass.

In the article the calculations and analysis of emissions of harmful gases in the production of heat from biomass.

According to calculations of CO_2 emissions during the production of 1 MW·h warmth of wood are 0.403 tons. In comparison to natural gas emissions are 0.202 T/1MW·h. Some sources assertion that CO2 emissions from combustion of biomass should be taken to be zero, since the amount of CO_2 was absorbed by the plant during its growth. But this statement can be justified only if biomass meets the criteria of sustainable development, for example biomass should be obtained from energy crops or if wood, its use should be compensated plantings.

Researches indicate that biomass typically contains sulphur in its composition, leading to the presence in the composition of the combustion of sulphur dioxide SO_2. In addition, permitted by the regulations and the actual concentration of nitrogen oxides NO_x and carbon monoxide CO, significantly higher than that for such fuel, such as natural gas.

Another problem is the presence of chlorine and a part of the biomass. The reason for the presence of chlorine is probably the practice of mineral potash, which is the basis of potassium chloride. Analysis of soil different districts of Poltava region confirms the presence of a bound chlorine in an amount of from 0.1 to 0.2 %.

With the passage of the high-temperature zone of the furnace in the presence of intermediate products of combustion and gasification chlorinated compounds in combustion products can form toxic ingredients such as dioxins and toxic phosgene $COSl_2$, hydrochloric compounds.

To prevent the formation of highly toxic chlorinated compounds the temperature in the furnace space of combustion equipment must not be less than 1200^oC. But the actual calculations straw combustion temperature show that even with burning completely dry straw actual temperature combustion in the boiler does not exceed 970^oC. In addition compounds of chlorine and hydrogen leads to intensive corrosion of boilers heating surfaces.

The comparison results of harmful components emissions in the atmosphere are given in Table 2.

Tab. Environmental characteristics 2 emissions from the boiler capacity of 1 Gcal/ hour running on natural gas and straw

№	Characteristic of combustion products	Units of measurement	Amount	
			Natural gas	Strow
1	Fuel consumption	m^3/hour	133	387
5	The number of hours on max. power	hour	4488	
6	Gross emissions of toxic and harmful ingredients	T/year		
	- NO_x		1,72	10,9
	- CO		0,86	6,77
	- SO_2		–	2,08
	- chlorinated compounds		–	6,77
	- solid particles		–	0,52
	- CO_2		1170	1180

Analysis of the data in table 2 shows that gross emissions of toxic ingredients combustion of straw is ten times higher than the emissions of natural gas combustion products, even with cleaning systems. This requires careful consideration of the environmental impact of emissions of biomass boilers and selection locations for such boilers in a dense area of settlements. Typically, these issues should be settled by observance of buffer zones and the introduction of highly efficient gas cleaning equipment.