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# COMPARISON BETWEEN A RETROFITTED AND A NEWLY-DESIGNED OXYCOMBUSTION BOILER INTENDED TO BE USED IN CARBON DIOXIDE SEQUESTRATION

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## Abstract

Greenhouse gases emissions represent a first-degree concern in power generation from fossil fuels combustion. Over the past two and a half centuries, since the dawn of the industrial era, huge amounts of carbon dioxide have been released into the atmosphere from combustion processes, most of it coming from fossil fuel-fired power plants. The effects of $CO_2$ accumulation in the atmospheric environment become more and more apparent due to the increasingly strong greenhouse effect leading to global warming. One of the leading carbon dioxide emissions reduction techniques is $CO_2$ sequestration by means of oxycombustion. The present paper deals with the calculus of a new boiler's heat transfer surface areas of the furnace, superheater, and economizer sections of the water-vapor path in the case of pure oxygen as oxidizer, for $CO_2$ sequestration. The aim is to determine the decrease of the necessary heat transfer surface area and thus to show that 100% oxygen contents in the oxidizer leads to a more compact boiler. A comparison is performed in terms of heat transfer surface areas between an existing natural gas-fired supercritical boiler retrofitted for oxycombustion and the new oxycombustion boiler resulting from the computational model that we have developed. The comparison involves two situations: with or without an imposed temperature of the oxidizer after the air preheater.

*Key words:* boiler performance, boiler retrofitting, $CO_2$ sequestration, oxycombustion

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