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ANALYSIS OF AN ENERGY-EFFICIENT CONDENSING BOILER DESIGN

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Abstract. The demand for energy-efficient heating systems has intensified in recent years due to the increasing awareness of environmental sustainability and the rising costs of energy consumption. Condensing boilers have emerged as a promising solution, offering improved efficiency by recovering latent heat from flue gases. This research aims to analyze the design and performance of an energy-efficient condensing boiler, focusing on its key components, operational principles, and environmental impact

Introduction. Traditional boilers often waste a significant amount of energy in the form of latent heat, which is carried away by the flue gases. Condensing boilers address this inefficiency by capturing and utilizing the latent heat, resulting in improved overall efficiency and reduced environmental impact.

Condensing Boiler Technology. Condensing boilers operate by extracting heat from the combustion process, allowing water vapor in the flue gases to condense into liquid form. This latent heat recovery significantly increases the overall efficiency of the boiler. [1]

The condensing boiler's design includes components such as a secondary heat exchanger, a condensate trap, and advanced control systems. Understanding these components is crucial for optimizing performance. [2]

The choice of materials for the heat exchanger and other components plays a vital role in ensuring durability and efficient heat transfer.

Sophisticated control systems are integral to managing the condensing process, optimizing combustion efficiency, and minimizing energy waste. [3]

The increased efficiency of condensing boilers results in lower fuel consumption and, consequently, reduced carbon emissions, contributing to environmental sustainability.

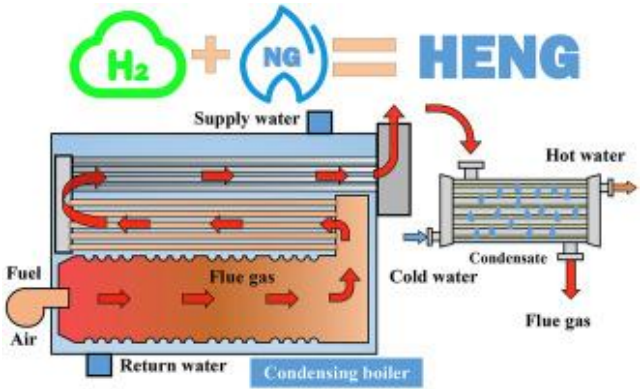

Fig 1. Condensing boilers [8]

An assessment of the entire life cycle of condensing boilers, from manufacturing to disposal, to understand their overall environmental impact. [4]

An economic analysis to evaluate the initial investment required for condensing boilers and the potential long-term energy savings. [5]

Exploration of existing incentives and regulations related to energy-efficient heating systems to provide a comprehensive overview of the economic landscape. [6-7]

Conclusion. This research aims to contribute valuable insights into the design, performance, and viability of energy-efficient condensing boilers. By understanding the operational principles, design features, environmental impact, and economic considerations, stakeholders can make informed decisions regarding the adoption of condensing boiler technology, fostering a more sustainable and energy-efficient future.

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ВИБІР РІШЕННЯ ПІДВИЩЕННЯ ПОТУЖНОСТІ КОТЕЛЬНІ ЗАВОДУ

CHOICE OF A SOLUTION TO INCREASE THE POWER OF THE BOILER PLANT

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На промислових підприємствах є котельні установки, що доповнюють технологічні агрегати, у яких пара виробляється за рахунок теплоти газу, що спалюється. Устаткування котельної установки умовно розділяють на основне і допоміжне. Допоміжними називають устаткування і пристрої для подачі