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Editorial

Special Issue "Optimization Technology of Greenhouse Gas Emission Reduction"

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The problem of global warming and its relationship with human activity is increasingly evident. The year of 2022, which has seen the proliferation of wildfires, floods and waves of extreme weather, among other major events induced by global warming, has highlighted the need to rethink our daily activities and energy consumption model.

Obviously, the ideal solution would be a total substitution of fossil fuels and the limitation to the greatest extent possible of emissions such as methane, refrigerant gases, etc. However, it is clear that this solution is unfeasible for several reasons, particularly due to the lack of maturity and availability of so-called clean technologies. When clean technologies will become widely available is difficult to predict today, as the transition to clean energy is a gradual progress.

Industrial processes using heat at low and medium temperatures as their main source of energy or those that use steam as an energy vector (such as the ceramics sector, glass and paper manufacturing) are highly dependent on natural gas, impeding the ease of their transition to new clean energy systems due to a lack of flexibility, availability of clean fuels or space or the nonexistence of technologies that would allow for their elimination at a reasonable cost.

The substitution of heat-based technologies for direct use of electrical energy only transfers the problem of emissions to electrical generation. The increased use of biomass also leads to indirect emissions due to the large amount of raw material requiring transportation and the waste generated that subsequently must be managed.

The recent war in Ukraine and the energy tensions derived from it have pushed back the proposals for further eliminating polluting energy sources such as coal to the detriment of the use of natural gas.

While progress is being made in the development of these new technologies and the resolution of the current energy crisis, we need to seek other methods of reducing emissions that take into account energy efficiency and the control of production processes.

This Special Issue, "Optimization Technology of Greenhouse Gas Emission Reduction", will focus on the latest advances in the development and application of predictive or analytic models, strategies and manufacturing processes to reduce the GHG emissions from production plants and seek alternatives.

We have selected six articles that cover this objective. [1] The first focuses on smart production systems for green production. This study suggests a logistics design to minimize carbon damage in supply chain management processes across 102 countries. The results show that carbon damage depends on the technology used and emphasized the need to move forward by adopting fuel-efficient technologies to minimize carbon damage across countries.

The second [2] analyzes the transport sector, whose activities entail notable repercussions for global warming, concluding that we need to increase clean transportation technologies while explaining the barriers currently blocking the use of electrical battery vehicles.

The third article [3] analyzes the impact of renewable energy, biofuels, bioenergy efficiency, population and urbanization levels on CO_2 emissions. The authors' findings suggest

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that public policies must be implemented at the national level to encourage the consumption of renewable energy and biofuels in the EU, while the population and urbanization level should be considering when placing restrictions on CO_2 emissions.

Tan [4] uses numerical simulation to improve the heat transfer model mainly by predicting the combustion of diesel engines fueled with biodiesel. The results demonstrate the optimum method of boiling heat transfer and the effects of different performance parameters on global efforts to reduce emission.

Prado-Galiñanes [5] analyze the utility of the LCI as a tool for immediate application in industries to facilitate decision making in different scenarios to industrialize a certain product with the lowest environmental impact possible. This tool, through carbon footprint estimation, shows how applying the LCI method can reduce the impact of production. This article shows that LCI/LCA methodology can be considered in decision making and industrial planning for new products and services.

Finally, Calvo [6] documents how the allowance allocation policy affects industrial activities and how the extra cost of CO_2 reinforces the need for industry to reduce CO_2 emissions. The article discusses the possibilities offered by maintenance actions, whose integration into production processes can successfully reduce the CO_2 emissions through maintenance rules to obtain significant thermal energy savings.

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