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### The EU's Green Deal and Challenges in Croatia: A Study of Air Quality Deterioration and the Role of Renewable Energy in Driving Sustainable Development

The Industrial Revolution, with its reliance on fossil fuels, led to a significant increase in anthropogenic greenhouse gas (GHG) emissions, compounded by a nearly seven-fold rise in the human population. In response to these critical levels, the European Union (EU) launched the ambitious European Green Deal in 2019, targeting net-zero GHG emissions by 2050. This research explores the impact of these policies, focusing on Croatia, the EU's newest member state. It analyzes trends and statistical data on GHG emissions in Croatia over the past decade and compares them to the EU average. A more detailed analysis of air quality in Zagreb reveals that emissions from the heating season (September to April) significantly increase concentrations of nitrogen dioxide (NO<sub>2</sub>), particulate matter (PM<sub>10</sub>), and fine particulate matter (PM<sub>2.5</sub>), which often exceed WHO guidelines. This is particularly concerning as Croatia, like other EU countries, relies on fossil fuels for heat energy production and is already facing EU scrutiny for failing to meet air quality standards. The study highlights the legal and public health implications of this non-compliance and underscores the urgent need for cleaner heating solutions. The paper also discusses potential legal actions for failing to comply with EU law and those that might be initiated by individuals due to air pollution, emphasizing that non-compliance can lead to significant legal and financial consequences for the state. It analyzes the potential for and current trends in implementing renewable energy sources and energy efficiency measures in residential settings. The paper discusses available national and EU incentives designed to encourage citizens to invest in sustainable energy technologies, which would help reduce GHG emissions, increase energy independence, and stimulate local economies. The study also identifies obstacles faced by households and provides recommendations to improve existing policies, fostering greater public participation in Croatia's energy transition.

#### Biography

Dr. Mirsada Čehić, who holds a PhD in natural sciences from the University of Zagreb, is the Head of the Environmental Protection Department at the University of Applied Sciences in Security and Safety, Zagreb. She has authored numerous scientific papers, participated in research projects, and is an active reviewer and conference organizer. Prof. Dr. Ana Rački Marinković, with a PhD in law from the University of Zagreb, works at the same institution. She has also authored or co-authored several scientific papers published in academic journals and conference proceedings.