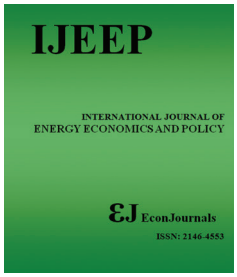

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Does Renewable Energy Transition in the USA and China Overcome Environmental Degradation?

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ABSTRACT

The use of fossil energy highly contributes to the CO_2 emissions. Compared to other countries, China and the USA were responsible for approximately half of the global CO_2 emissions in 2022. The SDG7 agenda, which aims to preserve the use of renewable energy, has made people aware of the need to switch from fossil-based to renewable energy sources by 2030. Thus, this paper aims to analyze the implications of fossil and renewable energy consumption on environmental degradation in the USA and China. This study uses the linear and nonlinear autoregressive distributed lag (ARDL) model to examine the cointegration of the fossil and renewable energy toward the CO_2 emissions from 1985 to 2021. The estimation results for USA using linear ARDL shows that fossil energy lead to higher CO_2 emissions, meanwhile renewable energy reduces the CO_2 emissions. Similar finding in the nonlinear ARDL, most of the models for China and the USA found significant impact of renewable energy consumption, where higher renewable energy transition contributes in lowering environmental degradation. This provide justification for policymakers in both countries to continue their efforts in renewable energy transition to archive the SDG7 agenda in 2030.

Keywords: Carbon Emission, Energy Consumption, Kuznets Curve, Renewable Energy
JEL Classifications: Q35, Q40, Q45

1. INTRODUCTION

Global warming refers to the steady rise in average Earth-atmosphere temperatures. It causes sea level rise, more severe weather, and ecosystem changes. Through a process known as the greenhouse effect, specific gases in Earth's atmosphere (also called greenhouse gases) trap heat from the sun and maintain a habitable climate. Earth's average temperature would be around −18°C (0°F) without the greenhouse effect, making it too cold for most living forms to survive. Human actions such as burning fossil fuels and clearing forests have led to a dramatic increase in atmospheric concentrations of greenhouse gases, particularly carbon dioxide (CO_2) (McJeon et al., 2021). Global warming is a phenomenon where the Earth's temperature rises due to an intensified greenhouse effect brought on by an increase in greenhouse gas concentration. You et al. (2021) have stated that CO_2 is the primary cause of global climate change.

The world is moving toward heavy industry and technology. As a result, global competition is continually increasing economic growth and escalating energy consumption, leading to more CO_2 emissions, according to Appiah et al. (2018) and Su et al. (2021). Li et al. (2018) stated that the consumption of fossil fuels, particularly coal-fired power production, is the main source of CO_2. Several policies have been presented to reduce and prevent increasing temperatures due to the uncontrollable CO_2 emission in the past. The Sustainable Development Goals (SDGs) is one of the most potential policies to ensure that the world has a healthy ecosystem in the long term. The United Nations General Assembly adopted the SDGs in 2015 as part of the 2030 Agenda for Sustainable