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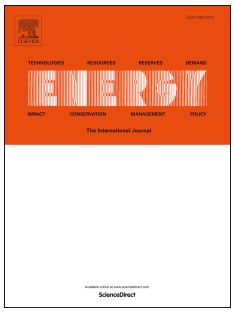

Renewable energy, coal as a baseload power source, and greenhouse gas emissions: Evidence from U.S. state-level data

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Renewable Energy, Coal as a Baseload Power Source, and Greenhouse Gas Emissions: Evidence from U.S. State-Level Data

Abstract

This paper examines the relationship between renewable energy production and greenhouse gas emissions (GHG) using U.S. state-level data for 2010. After controlling for other sources of emissions, U.S. states that produce a larger share of renewable energy are found to have lower GHG emissions. It is estimated that a 10% increase in the share of renewable energy could decrease CH_4 emissions by about 0.26%. Since the use of renewable energy sources does not release GHG emissions, this effect can be interpreted as stabilizing if renewable energy is added to coal use or as corrective if it replaces coal. After accounting for the role of coal as a baseload power source, an increase in the share of renewable energy is estimated to mitigate N_2O emissions at the U.S. state level only if states individually decrease their share of coal use to levels below 41.47%. These findings have significant policy implications for the provision of guidance to policymakers in identifying optimal energy mixes and in pursuing realistic goals to enhance renewable energy penetration and to contribute to the current efforts of tackling climate change.

Keywords: Renewable energy, United States, greenhouse gas emissions, coal, baseload, STIRPAT

1. Introduction

Renewable energy is often praised for its ability to mitigate environmental emissions, improve public health, increase economic activity through job creation, and provide a more reliable and affordable energy system. Renewable