Global Energy Transition: Challenges and Solutions for a Decarbonized Economy

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ABSTRACT

The urgency of addressing climate change highlights the critical role of renewable energy technologies in reducing carbon emissions and enhancing climate resilience. Transitioning from fossil fuels to renewables is more than energy conservation; it represents a transformation of inefficient systems into sustainable infrastructures. This shift is essential to achieving near-zero emissions and stabilizing atmospheric CO_2 levels.

This paper investigates advancements in renewable energy technologies, low-carbon policy developments, and the global transition toward a decarbonized economy. It focuses on the implications for international investment while addressing key challenges such as intermittency, energy storage, and the financial barriers faced by low-income countries.

Recent innovations, including advanced battery storage, smart grids, and decentralized energy systems, have shown substantial potential to enhance the efficiency and reliability of renewable energy. Coupled with supportive policies and international collaboration, these advancements render the transition to a sustainable energy system not only achievable but highly practical.

The study emphasizes that aligning technological progress with robust policy frameworks is critical to ensuring a fair and equitable energy transition. Claudia Kemfert, director of E3—a research group at the German energy consultancy Wüstenrot—reinforces this perspective, asserting that current technologies provide a solid foundation for replacing fossil fuel systems. By addressing these challenges and leveraging available technologies, this paper argues that a global, low-carbon economy is within reach, paving the way for long-term environmental and economic sustainability.

Keywords: Renewables, Resilience, Decarbonization, Innovation