

SYNERGISTIC NEXUS OF GEOTHERMAL ENERGY AND CLIMATE CHANGE MITIGATION; A SYSTEMATIC LITERATURE REVIEW

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Abstract: The growing concern over climate change has prompted an intensified examination of sustainable energy sources, and geothermal energy is a promising candidate in this regard. This sustainable energy source, derived from the Earth's internal heat, offers many advantages that position it as a viable solution for reducing greenhouse gas emissions and transitioning towards a low-carbon future. Therefore, the objectives of this systematic review were to (1) comprehensive synthesis of the existing body of research on the relationship between geothermal energy utilization and its role in climate change mitigation, (2) explore the opportunities, challenges, and potential outcomes associated with geothermal energy adoption and provide valuable guidance for policymakers, researchers, and stakeholders invested in achieving a sustainable and resilient energy future. We reviewed 50 scientific papers published from 2000 to 2022 using the Scopus search engine, and "climate change", "geothermal energy", "renewable energy and power" were the main keywords. We focused our search on scientific articles written in English. The relationship between geothermal energy utilization and its role in climate change mitigation was reviewed. Further, the opportunities, challenges, and potential outcomes linked with adopting geothermal energy and practices to achieve a sustainable and resilient energy future were explored. As a stable and renewable power source, geothermal energy reduces greenhouse gas emissions (97%), helps decrease reliance on fossil fuels, and supports climate-resilient infrastructure. Compared to the fossil fuels, primary shared obstacles to geothermal resources include high initial expenses, intricate and costly technologies, extended production periods, and significant financial risk without rewards. Nevertheless, geothermal energy offers multiple advantages: it remains unaffected by weather, exaggerated widespread accessibility, lacks geographical constraints, eco-friendly, and cost-efficient. Geothermal energy has become a robust partner in the global struggle against climate change.

Keywords: Climate change mitigation; Energy utilization; Geothermal energy; Renewable power; Sustainable energy