

# How Can Artificial Intelligence Be Used for Climate Change Mitigation and Energy Conservation?

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**Abstract**—As AI models quickly advance, their environmental consequences—namely, high energy and water demands—have become a pressing issue. However, AI’s contributions to the environment are not only negative; instead, AI-driven optimization in various fields can be a tool against climate change. This paper reviews and synthesizes several of the most promising recent applications of AI for climate change mitigation and resource conservation. One example of climate AI optimization is in meteorology, where it can accelerate climate modeling and predict natural disasters. AI can also play a significant role in the energy industry in two distinct ways. AI-integrated smart grids can reduce energy use from residential and commercial buildings alike, potentially decreasing energy usage by 16%, and implementing AI directly into renewable energy farms can increase renewable energy production by around 7%. In residential applications, optimizing HVAC and lighting systems with AI successfully reduced household greenhouse gas emissions and household energy use. AI-driven supply chain management in the agricultural and industrial sectors led to reduced chemical usage in agriculture and less waste production during manufacturing. Lastly, in the aviation sector, AI was able to create flight maps that allowed pilots to avoid global warming-inducing contrails, leading to a 54% decrease in contrail production. Across these examples, this paper highlights several valuable lessons for how engineers and policymakers can best harness AI’s potential for climate change and resource use reduction.

**Keywords**—Artificial Intelligence, Climate Change Mitigation, Energy Conservation, System Optimization.