


# Chapter 6

## AI–Driven Solutions for Climate Change Mitigation: Opportunities and Challenges

**G. Jyothi**

 <https://orcid.org/0000-0003-4486-8007>

*Nitte University, India*

**E. Balachandramurthy**

 <https://orcid.org/0009-0007-5944-8669>

*Surana College, India*

### **ABSTRACT**

*Climate change is arguably the most pressing problem this century has to offer, and it requires both innovative approaches to address it. From enhanced energy efficiency and more accurate climate modelling, to advocating sustainable behaviours, Artificial Intelligence (AI) has become a very potent tool against climate change. The research signifies the possibilities and challenges of AI-enabled solutions to alleviate climate change. It offers detailed insights into the use of AI in renewable energy, carbon footprint reduction, and climate resilience. Ethical, economic and policy challenges to the implementation of AI in climate policies are also discussed. Finally, potential future research directions and policy implications are described.*

DOI: 10.4018/979-8-3373-3246-8.ch006

## INTRODUCTION

Climate change is, of course, the fundamental challenge of the twenty-first century; it will reshape ecosystems and economics and human cultures in increasingly profound ways. On the whole, global warming, the increasing frequency of extreme weather events, and the degradation of the environment are rapidly increasing at a pace that requires mitigation as an immediate issue (IPCC, 2021). Traditionally, policy measures, better building design, and the development of alternative energy sources have come a long way but struggle to keep up with the severity of the climate crisis. According to Rolnick et al. *Nomura Says Here's How You Can Play It* (2019), artificial intelligence (AI), is an incredible technology that can change energy efficiency to be able to get sustainability/ climate modelling. Various AI technologies including Machine learning (ML) algorithms, deep learning models, data analytics may help increase climate resilience, decrease carbon emissions and help policymakers and businesses take better choices in real time (Wang et al., 2020)

The motivation behind this research is to explore and understand what is possible to leverage AI to make an impact on climate action. Clean energy forecasting with AI, carbon footprint reduction using AI, and climate disaster forecasts using AI are opening doors to global sustainability initiatives. However, alongside the promising contribution of AI, a number of concerns including ethical issues and the economics of implementation and lack of data have kept AI from being fully adopted. In this essay we will explore AI-based techniques to mitigate climate change, including innovations as well as challenges and future directions for the application of AI to climate policy.

## RESEARCH PROBLEM

While AI is proving highly promising for tackling climate change, there are still multiple challenges to fully incorporating AI into climate mitigation systems. AI faces several challenges, one being the limited availability of robust and reliable environmental datasets needed to train AI models that may lead to inaccuracy in climate predictions (Wang et al., 2020). In addition, economic and policy limitations impede the use of AI applications in combating climate change, such as high computational expenses and the absence of a harmonized regulation of the AI-climate solutions (Krause & von Bredow, 2021). Ethical concerns about the consequences of

16 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage: [www.igi-global.com/chapter/ai-driven-solutions-for-climate-change-mitigation/379033](http://www.igi-global.com/chapter/ai-driven-solutions-for-climate-change-mitigation/379033)

## Related Content

---

### Smart Learning and Smart Schools: Transforming Indian Education Through AI-Enabled NEP 2020 Implementations

Nasir Ahmad Ganaie, Senthil Kumar A. V., Tavseef Ahmad Mir, Irfat Jan, Nagakishore Bhavanam S. and Sambasiva Rao K. R. S. (2026). *Human-AI Leadership for Transforming Schools* (pp. 223-258).

[www.irma-international.org/chapter/smart-learning-and-smart-schools/405017](http://www.irma-international.org/chapter/smart-learning-and-smart-schools/405017)

### Fuzzy Logic in Healthcare

Güney Gürsel (2015). *Handbook of Research on Artificial Intelligence Techniques and Algorithms* (pp. 679-707).

[www.irma-international.org/chapter/fuzzy-logic-in-healthcare/123096](http://www.irma-international.org/chapter/fuzzy-logic-in-healthcare/123096)

### Using Ambient Social Reminders to Stay in Touch with Friends

Ross Shannon, Eugene Kenny and Aaron Quigley (2009). *International Journal of Ambient Computing and Intelligence* (pp. 70-78).

[www.irma-international.org/article/using-ambient-social-reminders-stay/3881](http://www.irma-international.org/article/using-ambient-social-reminders-stay/3881)

### Accounting for Individual and Situation Characteristics to Understand the User Behaviour when Interacting with Systems during Critical Situations

Yuska P. C. Aguiar, Maria de Fátima Q. Vieira, Edith Galy and Charles Santoni (2014). *International Journal of Ambient Computing and Intelligence* (pp. 29-55).

[www.irma-international.org/article/accounting-for-individual-and-situation-characteristics-to-understand-the-user-behaviour-when-interacting-with-systems-during-critical-situations/147382](http://www.irma-international.org/article/accounting-for-individual-and-situation-characteristics-to-understand-the-user-behaviour-when-interacting-with-systems-during-critical-situations/147382)

### Exploratory Cluster Analysis Using Self-Organizing Maps: Algorithms, Methodologies, and Framework

Nuno C. Marques and Bruno Silva (2023). *Philosophy of Artificial Intelligence and Its Place in Society* (pp. 187-213).

[www.irma-international.org/chapter/exploratory-cluster-analysis-using-self-organizing-maps/332606](http://www.irma-international.org/chapter/exploratory-cluster-analysis-using-self-organizing-maps/332606)