

# Applications of AI: Does it Impact Emissions of Carbon?

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## Abstract

Several countries, including India, have vowed to achieve net-zero emissions by the middle of the century, in line with the Paris Agreement's goals. India, as one of the world's largest and fastest-growing economies and the third-largest carbon emitter, has set lofty goals in its climate change plan. By 2030, India intends to attain carbon peaking, which represents the top of its carbon emissions before beginning a slow drop. Furthermore, the country has committed to reducing emissions by 45% and moving toward carbon neutrality. A key component of India's goal is to transform its energy industry towards sustainability. To this purpose, the government has pledged to increase the amount of renewable energy sources in its overall electric grid capacity to nearly half, with a goal of 50% by 2030. This move is critical not just for reducing carbon emissions, but also for maintaining energy security and spurring economic growth through investments in clean energy. Nonetheless, measuring emissions in India is a substantial difficulty due to varied reporting standards. Unlike some of its rivals, India does not routinely provide detailed emission statistics, making it difficult to track progress toward its climate goals. Bridging the gap in data availability and precision is critical for informed policymaking, resource allocation, and international collaboration in the battle against climate change. To meet its ambitious climate goals, India needs adopt a wide range of policies across several sectors, including energy, transportation, industry, and agriculture. This includes increasing the use of renewable energy, boosting energy efficiency, implementing cleaner industrial processes, and encouraging sustainable land use practices. In conclusion, India's aggressive approach to combating climate change—which includes setting high goals like reaching a carbon peak by 2030, reducing emissions significantly, and shifting to renewable energy sources—underlines its dedication to sustainability. However, reaching these targets will require coordinated actions from the government, business community, and civil society in addition to improve systems for tracking and disclosing emissions data.

**Keywords:** Climate change, India, net-zero emissions, Paris agreement, carbon peaking, emission reductions, renewable energy, sustainability, energy transition, carbon neutrality, monitoring, reporting, data availability, policy, mitigation, targets, economic growth.

## INTRODUCTION

Carbon dioxide (CO<sub>2</sub>) is a colorless, odorless, non-poisonous gas created by combustion processes and the breathing of living creatures. It is also considered a greenhouse gas. Emissions are the discharges of greenhouse gases and their precursors into the atmosphere over a specific time and location.

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Carbon dioxide emissions, often known as CO<sub>2</sub> emissions, are produced during the manufacturing of cement and the burning of fossil fuels. Carbon dioxide emissions from the use of solid, liquid, and gas fuels, as well as gas flaring, are also included. Carbon-reduction Artificial intelligence applications may contribute to the growth of a green

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economy. However, there is no comprehensive, definitive explanation of how and to what extent this idea of how AI affects carbon emissions is valid [1–4].

## LITERATURE REVIEW

According to a previous study on the subject, it could be concluded that artificial intelligence has some significant inhibitory effects on carbon emission integrity; however, the carbon emission effect of AI [6, 7] is noticeably more significant in megacities, metro cities, and larger cities with far better infrastructures and advanced technologies, whereas not very significant in smaller cities or medium cities with poor or average infrastructure.

Artificial intelligence reduces carbon emissions by optimizing industrial structure, which is accomplished by improving information infrastructure and green technology innovations. In order to achieve carbon peaking and carbon neutrality as soon as possible during economic development, India must continue to make significant efforts and apply AI.

## CASE STUDY IMPLEMENTATION

### Case Study 1: Google AI

Google AI [6, 7] has created a variety of AI-powered carbon-reduction initiatives, including:

- Google AI has created AI algorithms that can optimize the distribution of electricity generated by renewable energy sources such as solar and wind power. This can assist in reducing dependency on fossil fuels and lowering carbon emissions. Several utilities, for example, have employed Google AI's Grid AI platform to increase the efficiency of their grids.
- Google AI has created AI algorithms that can boost the efficiency of renewable energy systems such as solar panels and wind turbines. For example, Google AI's Renewable Energy Forecasting tool can forecast the production of solar and wind power facilities, which can assist guarantee that there is enough renewable energy available to fulfill demand.
- Google AI has created AI algorithms that can detect and apply energy-saving strategies in buildings, industries, and other environments. Google AI's DeepMind Energy platform, for example, has been used to cut energy use in several buildings by up to 50%.

### Case Study 2: Microsoft AI

Microsoft AI has created a variety of AI-powered carbon-reduction technologies, including:

- Microsoft AI [6,7] has created AI algorithms that can be used to forecast and predict future weather patterns. This can aid decision-making on climate change adaptation and mitigation methods. Microsoft AI's Earth system model, for example, has been used to predict the consequences of various climatic scenarios.
- Microsoft AI has created AI algorithms that may be used to improve agricultural practices such as crop yields and water use efficiency. This can assist to lessen agriculture's environmental effect. Farmers, for example, have used Microsoft AI's FarmBeats platform to enhance crop yields by up to 20% while lowering water consumption by up to 30%.
- Artificial intelligence (AI) for carbon capture and storage: Microsoft AI has created AI algorithms that can be used to increase the efficiency of carbon capture and storage (CCS) technology. CCS is the technique of collecting and storing carbon dioxide from industrial operations or the environment underground. Microsoft AI's CO<sub>2</sub> Capture Optimization platform, for example, has been used to cut the cost of CCS by up to 30%.

### Case Study 3: IBM Watson

#### *AI for Supply Chain Optimization*

IBM Watson has created AI algorithms that can be used to improve supply networks, reducing energy use and transportation emissions. For example, several organizations have utilized IBM Watson's Supply Chain Optimization platform to cut supply chain expenses by up to 10% while simultaneously lowering their carbon impact.

IBM Watson has created AI algorithms for energy management that may be used to monitor and improve energy use in buildings and industrial settings. For example, a number of businesses have utilized IBM Watson's Energy Management platform to cut their energy use by up to 20%.

### ***AI for Environmental Monitoring***

IBM Watson has created AI algorithms that can monitor environmental factors such as air and water quality. This can aid in the more effective identification and resolution of environmental issues. IBM Watson's Environmental Monitoring platform, for example, has been used to monitor air quality in a variety of cities, assisting in the reduction of air pollution levels [9].

## **RECOMMENDATION**

### **Reduce Energy Use in Commercial and Industrial Buildings**

Create AI-powered building management systems (BMS) capable of real-time monitoring and control of energy use. These systems can improve HVAC, lighting, and other energy-consuming systems by learning from past data and occupant behavior. Implement AI-based demand response solutions that allow utilities to minimize peak energy demand by rewarding users to adjust their energy consumption or implement energy-saving measures during peak hours. Identify and correct energy-wasting problems or inefficient operations in industrial equipment and processes using AI-powered anomaly detection techniques.

### **Make Renewable Energy Technology More Efficient**

Using AI-powered forecasting tools, grid managers can optimize power generation and distribution by predicting renewable energy output from solar and wind sources. Create artificial intelligence-driven optimization algorithms to improve the efficiency of renewable energy systems, such as optimizing solar panel output by detecting sun movement and altering panel angles.

### **Create Environmentally Friendly Transportation Systems**

Create AI-powered traffic management solutions that improve traffic flow, reduce congestion, and reduce fuel use. Improve fuel economy and minimize pollution from personal transportation by developing AI-driven autonomous vehicle technology. Encourage the adoption of AI-powered ride-sharing and carpooling services to reduce the number of automobiles on the road and related emissions.

### **Improve Farming Practices**

Implement crop production prediction models driven by AI to optimize resource allocation, reduce fertilizer and pesticide consumption, and reduce agricultural waste. Create artificial intelligence-powered irrigation systems that intelligently control water consumption depending on crop demands and weather conditions, saving water resources and lowering agricultural water footprint. Using AI-based pest and disease detection algorithms, agricultural hazards may be identified and addressed early on, reducing the need for toxic pesticides and boosting sustainable pest management methods.

### **Encourage the Use of Carbon Capture and Storage (CCS) Technologies**

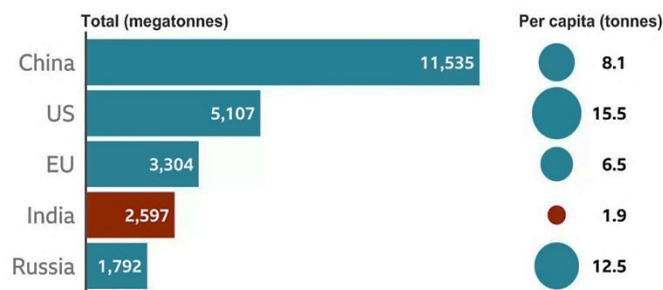
Use AI-powered optimization techniques to increase the efficiency of CCS operations, minimizing energy usage and carbon capture costs. Create AI-powered site selection tools to find acceptable locations for CCS projects while reducing environmental impacts and optimizing carbon capture potential. Implement artificial intelligence-based monitoring and verification technologies to assure the safe and effective functioning of CCS projects, eliminating leaks and maintaining the integrity of carbon storage.

## **DISCUSSION**

In addition to the other four promises, Mr. Narendra Modi also made a guarantee, saying that by 2030, India will get half of its energy from renewable sources and save one billion tons of projected carbon emissions. India stands as the fourth biggest emitter of carbon dioxide in the world after China, the US, and the EU (Figure 1).

## India is the world's fourth biggest emitter of carbon dioxide

Total and per capita emissions of CO<sub>2</sub> per year



2019 data, EU includes UK  
One megatonne = 1,000,000 tonnes

Source: EC, Emissions Database for Global Atmospheric Research



**Figure 1.** India is fourth biggest emitter of carbon dioxide.

Additionally, India has committed to reducing its emissions to net zero by 2070, missing the main objective of the COP26 meeting, which is for nations to commit to and accomplish that goal by 2050 [8]. However, because training a single AI may release over 250,000 pounds of carbon dioxide into the atmosphere, the use of AI technology in all industries generates massive emissions that are equivalent to those of the aviation industry.

Researchers at the University of Massachusetts, Amherst performed an examination of the life cycle of several common large [10, 11], AI models and found that training these models might result in around 626,000 pounds of carbon equivalent [5, 12].

## CONCLUSION

Up to 3 billion new middle-class customers will emerge globally over the next 20 years, compared to 1.8 billion today. As greenhouse gas emissions continue to rise, it is expected that 30 Indians will migrate to cities every minute in India over the next 20 years. In a country like India, dealing with the effects of increased greenhouse gas emissions would be exceedingly difficult. Furthermore, this is happening because of a range of human-caused events and actions. Notably, these activities will very probably contribute to global warming in the country and hence damage the ozone layer.

Environment conservation is a communal obligation not just for the government and companies, but also for everyone, and by employing artificial intelligence, they may help to reduce carbon emissions to some level.

However, no realistic carbon footprint calculator adapted to Indian conditions have been developed to engage people and make them part of the solution. As a result, Indians may be unable to determine their CO<sub>2</sub> footprint or reduce their environmental effect in a methodical manner. Because only informed communities in many cities can collaborate. Based on global social media trends, such groups are expected to actively participate in partnerships to address their mutual issues.

A systematic, coordinated, and focused approach that goes well beyond a carbon footprint calculator is required to engage the general public and all other stakeholders in solving energy and climate concerns.

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