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# Impact of Artificial Intelligence on Climate Change: A Comparative Analysis of China and The United States of America and Policy Lessons for India

**Saima Syed**

Delhi College of Arts & Commerce, University of Delhi, New Delhi, India

**Abstract**

The intend of this paper is to see the impact of artificial intelligence on climate change. As AI is increasingly being adopted across various sectors like energy systems, manufacturing, healthcare, and urban infrastructure, it is improving efficiency, reducing wastage and supporting better management through forecasting. Adoption of AI can reduce the energy per unit of output which further reduces greenhouse gas emissions, but at the same time, it can significantly increase the consumption of water and electricity through data centres and computational infrastructure. If this transformative technology is powered by fossil fuels, it can be detrimental for the environment since it increases emissions. Additionally, if there are efficiency gains, the cost of production decreases which further stimulates increase in production and consumption, offsetting environmental benefits.

There are three main objectives of the paper- The first objective is to provide a conceptual framework explaining the dual effect of AI in climate outcomes; the second objective is to analyse the trends in AI venture capital investment across the United States, China and India and across key sectors; the third objective is to draw policy lessons for India based on the performances and experiences of China and the United States. Data on AI venture capital investment is from 2012 to 2024, which shows rapid growth in AI funding, especially in manufacturing and transport sector. Trend of emissions from various sectors suggest that more efficiency coexists with more economic activity.

By comparing the United States and China, importance of good government policy is observed for positive environmental outcomes. In the United States advanced technologies like AI are mostly market driven, whereas in China the government takes a lead in planning and execution. Both these methods can improve the efficiency and lead to economic growth. However, the emissions depend on the scale of production and use of energy. Developing countries like India should take key lessons on AI policies which align with climate goals. Without strong government policies and clean energy expansion, growth driven by AI can further increase energy demand instead of reducing emissions.

**Keywords:** AI, Emissions, Energy Intensity, Rebound Effects

## 1. Introduction

According to the International Organization for Standardization, Artificial intelligence is a branch of computer science that creates systems and software capable of tasks which were once limited to human intelligence. It enables machines to learn from experience, adapt to new information, and use data, algorithms and computational power to interpret complex situations and make decisions with minimal to no human input. AI can understand language, recognize different patterns, solve problems and can also demonstrate creativity, often surpassing humans much faster. By harnessing these capabilities, it is reshaping how we interact and deal with technology and it is pushing the boundaries of what machines can achieve (International Organization for Standardization [ISO], n.d.).

AI is being deployed at scale across various sectors like manufacturing, transport, energy systems, urban infrastructure, and healthcare. It can help in lowering carbon emissions through forecasting in grid management, optimizing the route of vehicles and traffic signals which saves fuel, reduce the wastage of materials through smarter designing and packaging. On the hand, AI can have heavy environmental costs as it is powered by computational data centres, which consumes vast amounts of electricity and water. Additionally, efficiency from AI adoption can result in lowered cost of production, which may lead to increased use and further results in an increase in emissions. This is known as the rebound effect.

Against this background, the timing of India's stronger focus on AI is crucial. India recently hosted a major India-AI Impact Summit 2026 from 16 to 20 February 2026[1]. The theme of the summit was "*Sarvajana Hitaya, Sarvajana Sukhaya*" (Welfare for all, Happiness for all). India is a developing country which has large and growing energy requirements for its goal to scale digital services. However, it is essential to be aware of AI's impact on environment and form policies which do not have negative impact on the climate.

This paper has three major objectives:

1. The first objective is to present a conceptual framework that explains the dual role of AI in climate outcomes. This will cover how AI can increase efficiency and have both positive and negative effects.
2. The second objective is to do an empirical trend analysis in AI venture capital investment by country and by sector. The goal is to interpret how AI venture capital investment shape sectoral adoption and emissions pathways.
3. The third objective is to compare adoption of AI across various sectors for China and the United States and extract policy lessons for India.

## 2. Conceptual Analysis: The Dual Role of AI in Climate Outcomes

AI has an effect on greenhouse gases in multiple technical and behavioural ways, that can either lower it or increase it. This section lays out a conceptual framework to organise and guide the discussion that follows the empirical work and policy recommendation.

### 2.1 Mitigation channels: how AI can reduce emissions

AI lowers emissions by improving the efficiency, optimizing the use of energy, automation in production process and predicting. Following are the ways by which AI can lower emissions across sectors:

- **Grid and power system optimization**

Machine learning models are used to analyse real-time data and predict the use of electricity (World Economic Forum, 2024). This system predicts by studying vast data and manages electricity demand during peaks hours. It additionally enhances the use of renewable energy sources like solar and wind in the grid. With better forecasting, grid can be used for renewable energy which further lowers the emissions.

- **Efficiency in industrial process**

In manufacturing processes AI is adopted for fault detection and predictive maintenance which saves time

[1] See https://impact.indiaai.gov.in/ for details. Last accessed on 1st March 2026.

and minimizes loss of energy. Firms which incorporate AI in their processes show lower energy intensity (Li et al., 2025).

- **Smarter transport and logistics**

AI reduces emissions in transport and logistics by route optimization, combining the shipments more efficiently and by improving the package design. There is a decrease in the usage of fuels, distance to be covered is shorter and less use of raw materials. All this helps in lowering the emissions.

- **Better demand forecasting and resource planning**

AI can be used to predict the demand in order to reduce overproduction of goods and wastage of food. Smart thermostats are used to manage the demand in buildings, which lowers the energy use.

- **Supports low-carbon substitution**

Electrical vehicle fleet and their charging schedules can be efficiently operated by AI to align with renewable energy.

AI acts as a mitigation tool on many levels, from individual devices and factories to whole cities. Adoption of AI is beneficial when supportive policies are implemented.

### 2.2 Cost channels: AI's direct environmental footprint

AI has environmental costs which are usually overlooked:

- Compute and data centres: Training and running vast AI models consumes substantial amount of electricity. Additionally, big data centres require water in big amounts for cooling. It is projected that electricity demand from data centres can be more than double by 2030 (International Energy Agency, 2024), with AI workloads driving a significant share of that growth. This impact largely depends on the source of electricity- fossil fuels or renewable sources.
- Materials and supply chains: Equipment like computer chips, semiconductors and memory chips are essential for AI. Manufacturing of the hardware require minerals and complex factories. Expanding AI increases the demand for the inputs which further raises their lifecycle footprint.
- Water and land use: Vast amount of water is used for cooling of data centres. Usage of this much water can put stress on environment.
- Operational externalities: Continuous use of AI increases the baseline consumption of energy. For example- streaming video inference and being retrained regularly.

In order to understand the carbon footprint from AI adoption, the full lifecycle needs to be studied- the electricity used for operation, the emissions from the hardware, and impacts from developing and training the models (Strubell et al., 2019).

### 2.3 Rebound and behavioural feedbacks

When AI reduces energy per unit of service, there can be cases where the decrease in cost can stimulate an increase in consumption. This is known as the rebound effect (or Jevons paradox). It happens because of several mechanisms:

- **Price and income effects**

Adoption of AI makes production or services more efficient, which further makes it cheaper. This decrease leads to an increase in demand and total emissions.

- **Scale expansion**

The money saved from efficiency can be used to expand the business and output. This can lead to a rise in emissions.

- **Shift in modal**

Reduction in traffic from AI can make people drive faster and further. This is induced demand where time saving leads to more total travel.

- **Demand creation through new services**

New services are created on the adoption of AI, like constant online recommendations. Such services significantly increase the use of electricity as it requires ongoing computing power.

Since the rebound effect exists, efficiency alone is not enough. Policies should be implemented which promote AI adoption along with limiting total emissions. It can be done by implementing carbon pricing, setting emission caps, or fund projects that reduce emissions.

### 2.4 Governance and measurement as decisive factors

Whether AI has a net climate benefit depends on the governance. For AI to have a positive impact transparency should be there about model compute and use of energy. Data centres should be located in areas where renewable energy is available. AI services which have low carbon energy should be preferred over ones which have very high.

## 3. Trends and Analysis of AI Venture Capital Investment and Sectoral Emissions

Before doing the cross-country case study, it is important to interpret the investment trends and sectoral patterns. The available data shows AI venture capital investment across countries and sectors. The data does not directly show the impact of emissions. It shows the trend of AI growth and lets us interpret where there may be positive or negative environmental impact.

There is an important problem to be considered, there is no standardised system to measure the environmental impact of AI. There is no consistent report on use of energy, electricity consumption by data centres or total lifecycle of the emissions. Most of the AI systems are a part of the broader digital systems, which makes it difficult to measure the impact of AI. Hence, trends in AI investment can be understood by casually linking them to emissions. However, it requires careful interpretation. Absence of clear and standard reporting rules leads to a measurement gap that makes it difficult to evaluate the impact of AI on the environment.

### 3.1 Global Trends in AI Venture Capital Investment

The global investment data shows three broad phases from 2012 to 2024:

1. Gradual expansion phase (2012-2016)
2. Accelerated growth (2017-2019)
3. Sharp surge (2020-2021), followed by a moderation

In the early phase (2012-2014), total AI VC investment was limited as this period was the initial commercialization of machine learning and learning systems, where AI adoption was mostly confined to industrial purposes, logistics/ transportation and further advancements in technology.

Between 2015 and 2019, there is a steady rise in total AI VC investment. And it became more diversified across sectors. Manufacturing continued to dominate, while healthcare, drugs, and biotechnology emerged as a significant recipient of VC funding, reflecting growing interest in AI-based diagnostics, medical imaging, and drug discovery. Transport-related investments also expanded due to advances in autonomous systems, intelligent mobility, and supply-chain optimization. This period marks a transition from experimental AI applications toward scalable, commercially viable use cases.

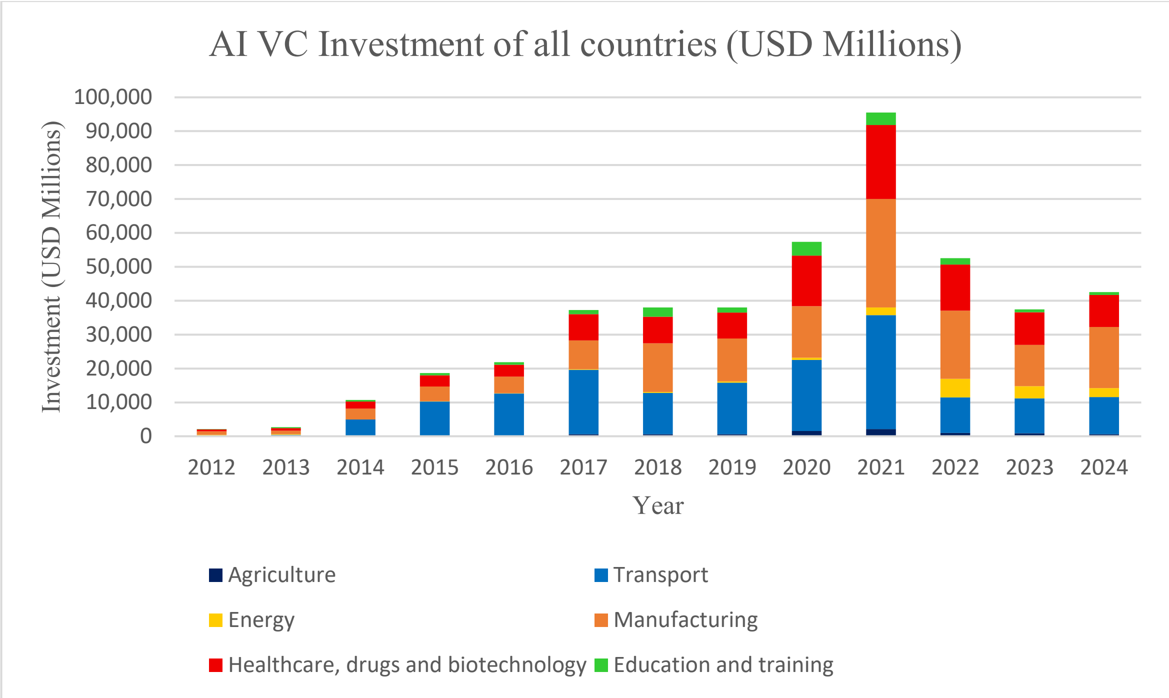


**Figure 1. AI Venture Capital Investment of all countries (USD Millions)**
Source: OECD.AI (2026), data from Preqin, last updated 05/01/2026, accessed on 27/02/2026, https://oecd.ai/

A pronounced surge in AI VC investment is observed during 2020–2021, with 2021 representing the peak of total investment in the series. This expansion was driven predominantly by manufacturing and healthcare, which together account for the largest share of the total funding. The sharp increase sheds light on the accelerated digital transformation, increased demand for automation, and the rapid scaling of AI solutions in response to the global pandemic. Education and training also experienced noticeable growth, indicating rising adoption of AI-enabled digital learning platforms.

The pandemic pushed acceleration of digital strategies as organisations adopted AI to manage operations remotely and take calculated risk and decisions under the conditions of uncertainty. Another reason of the surge is the improvement in cost of production, reduction in cost and the performance in many firms which put confidence in the future of AI and its economic impact. Competitiveness of firms also played a crucial role. Firms feared falling behind their competitors and rapidly adopted AI.

### 3.2 Country-Level Trends- United States, China, and India

#### *3.2.1 AI Venture Capital Investment in the United States*

The United States dominates AI venture capital flows in absolute terms. Total investments have sharply risen after 2014 with an evident surge in 2020-2021 caused by digitalization and increased AI use during pandemic.

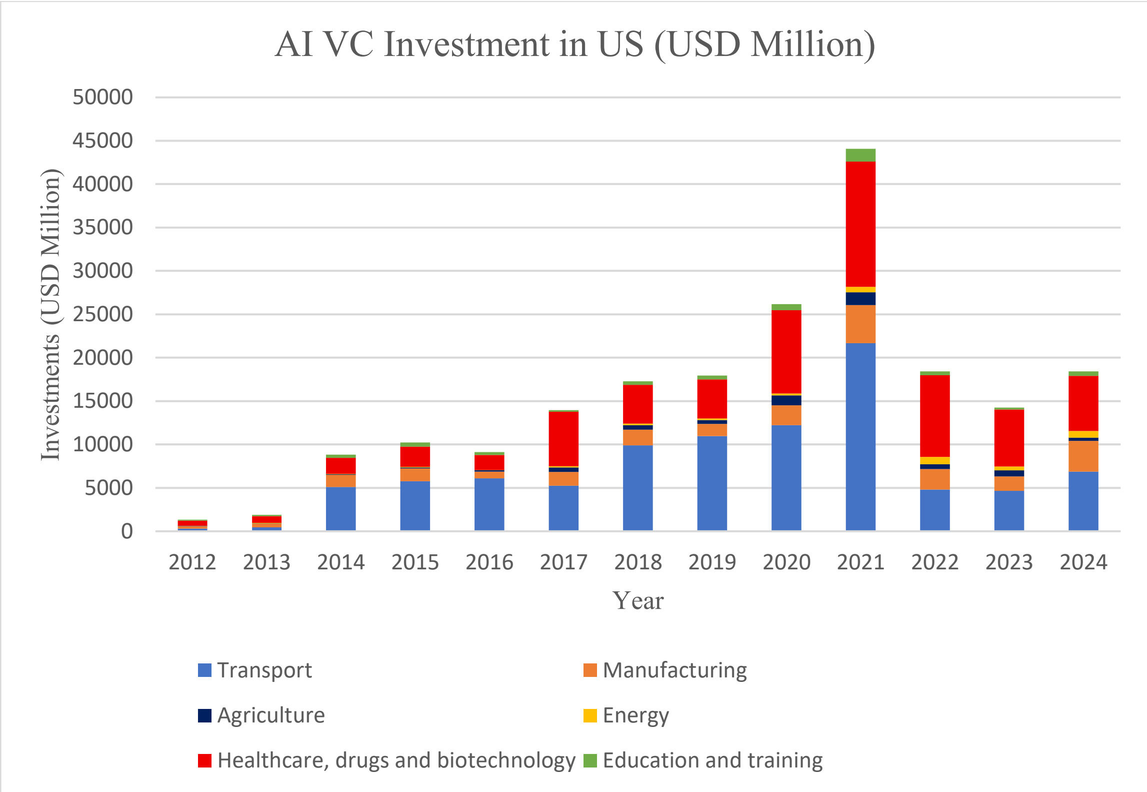


**Figure 2. AI Venture Capital Investment in the United States (USD Millions)**
Source: OECD.AI (2026), data from Preqin, last updated 05/01/2026, accessed on 27/02/2026, https://oecd.ai/

Sector wise, transport and healthcare dominate the AI VC investment. Investments related to transport have significantly expanded, reflecting advancements in autonomous vehicles and optimization in logistics. Healthcare is the second largest component, which indicates strong AI adoption in diagnostics, drug research and development. Manufacturing and energy are comparatively smaller in share but the shares steadily increasing, whereas agriculture and education remain marginal throughout the years.
Figure 2 shows that the investment is diversified as well as innovative with capital concentrated in risky and high return sectors.

***3.2.2 AI Venture Capital Investment in China***

China's AI VC investment trajectory is rapidly growing throughout with mild contractions post 2021. Total investments rise sharply 2015 onwards, peaking around 2020-2021 and then declining. In comparison to United States, China's scale is smaller but the structural composition is significant.

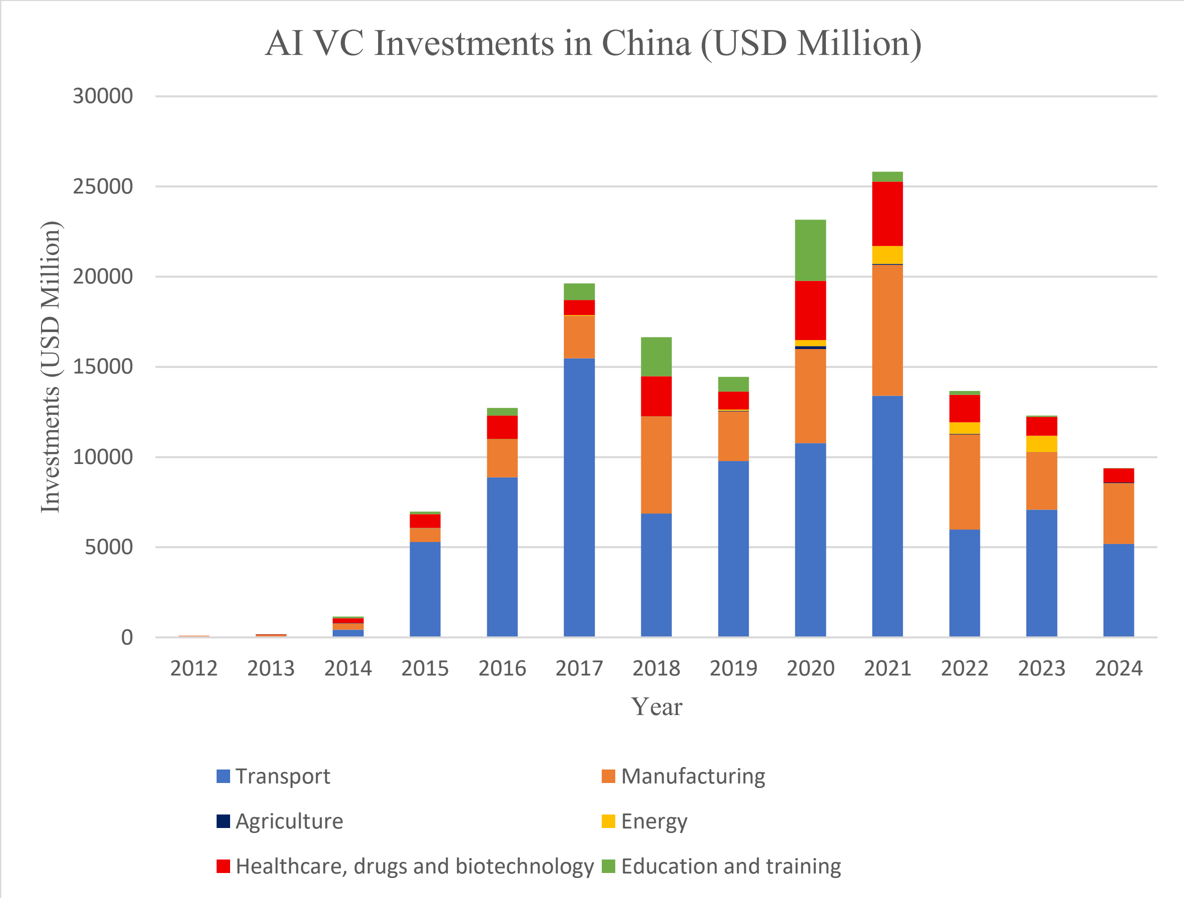


**Figure 3. AI Venture Capital Investment in China (USD Millions)**
Source: OECD.AI (2026), data from Preqin, last updated 05/01/2026, accessed on 27/02/2026, https://oecd.ai/

Figure 3 shows that transportation and manufacturing are dominant. It reflects China's focus on integrating AI in industrial production, logistics and infrastructure development. Agriculture, energy and education attracted comparatively less investment, indicating that AI deployment in China is mainly in industrial productivity. The recent decline in AI VC investments may reflect strictness in regulation.

***3.2.3 AI Venture Capital Investment in India***

India's AI VC investments are smaller in magnitude compared to the US and China; however, it shows an upward trend especially 2018 onwards. Comparatively, India's growth is more gradual, it does not have sharp spikes in comparison to China. The country's AI ecosystem is expanding by focusing on its application across sectors.

The composition across sectors reveals that majority of the investment is made in transport, followed by education and training. There is decent growing AI VC investment in healthcare. High investments in transportation are linked to urbanization, while education and training reflect India's advancement and comparative advantage education technology and skill-based application. Modest AI VC investment is made in manufacturing sector, whereas agriculture and energy remain underrepresented.

Figure 4 suggests that the focus is more on digital platforms instead of capital-intensive industries.

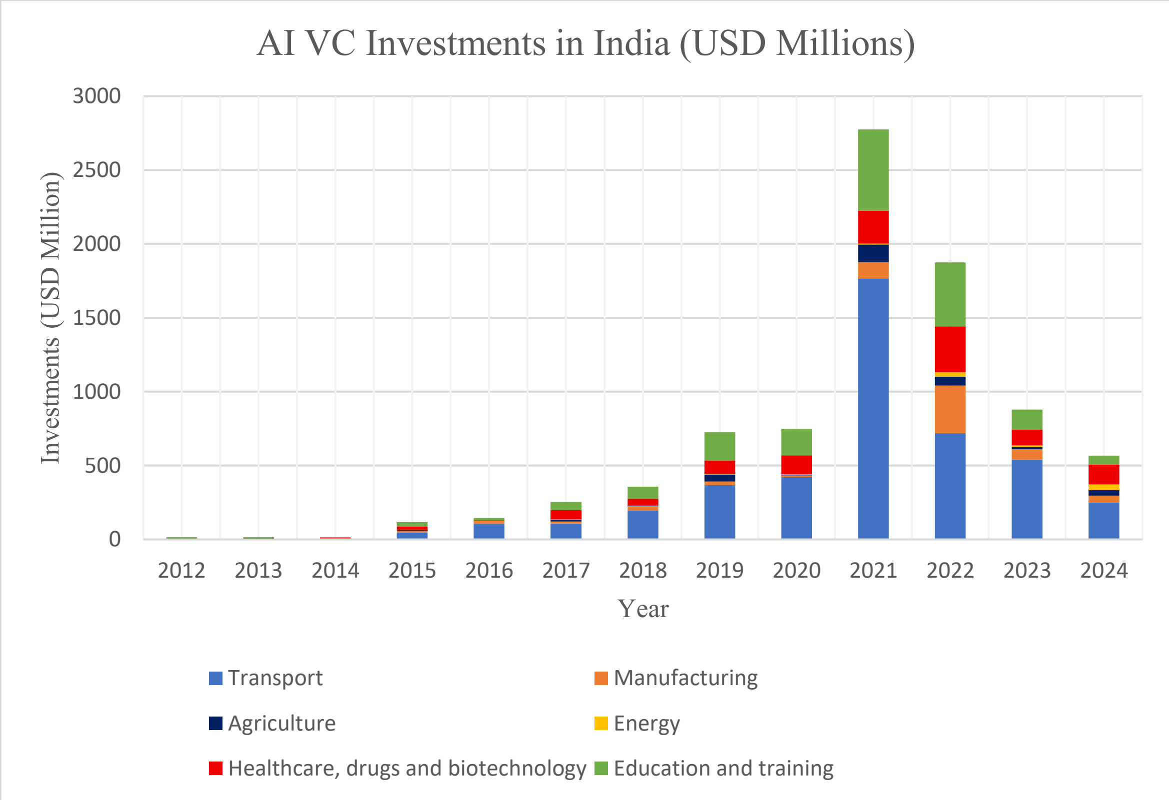


**Figure 4. AI Venture Capital Investment in India (USD Millions)**
Source: OECD.AI (2026), data from Preqin, last updated 05/01/2026, accessed on 27/02/2026, https://oecd.ai/

**3.3 Sectoral Trends and Emissions Patterns**

The juxtaposition of AI investment and sectoral carbon emissions yields important descriptive observations. The trends shown in figures are only descriptive and do not imply causation. In order to show a clear causal effect between AI venture capital investment and emissions, it is necessary to have micro level data and econometric methods which can isolate the effect of AI from other factors like fluctuations in trade, government regulations or commodity cycles. This kind of analysis is beyond the scope of this study.

***An Analysis of AI VC Investment Trends and Carbon Emission Dynamics in the Transport Sector***

The transport sector has the highest AI VC investment compared to other sectors, this shows there is good AI application in logistics, traffic management and autonomous vehicles. There was a sharp increase in the investments until the year 2021, followed by a drastic decline in the following years. Emissions in transport sector also show an upward trend, followed by a sharp decline around 2020 due to covid.

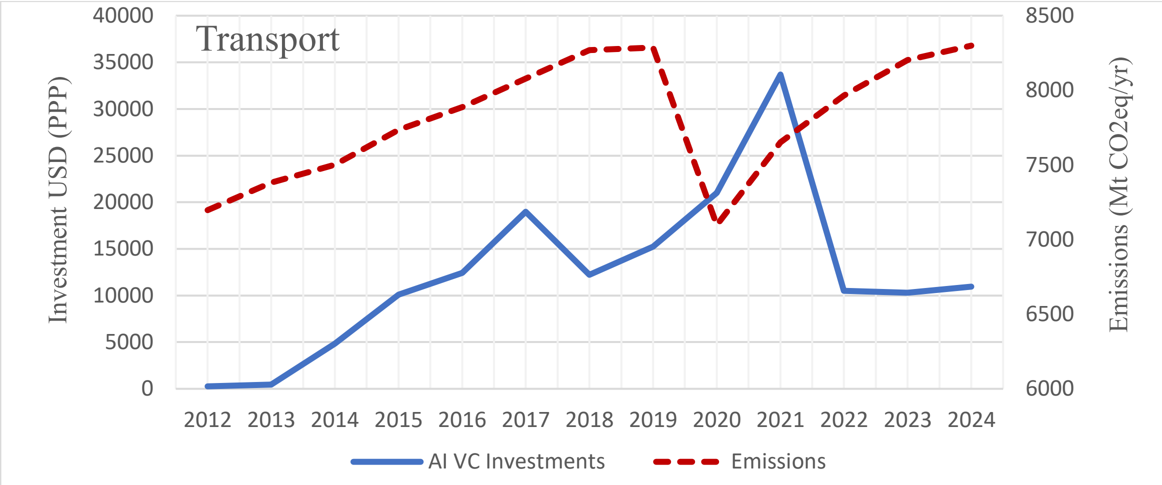


**Figure 5. Trend in AI VC Investments and Carbon Emissions in Transport Sector**

Source: For AI VC Investment- OECD.AI (2026), data from Preqin, last updated 05/01/2026, accessed on 27/02/2026, https://oecd.ai/; For Emissions- European Union 2025, European Commission, Joint Research Centre (JRC), EDGAR (Emissions Database for Global Atmospheric Research) Community GHG database, comprising IEA-EDGAR CO2

***An Analysis of AI VC Investment Trends and Carbon Emission Dynamics in the Energy Sector***

There was gradual increase in AI VC investment until 2019, followed by drastic increase in 2021-22, followed by moderating. Emissions in the energy sector continued to increase. The simultaneous increase in AI investment and emissions shows that AI is adopted in grid management and forecasting.

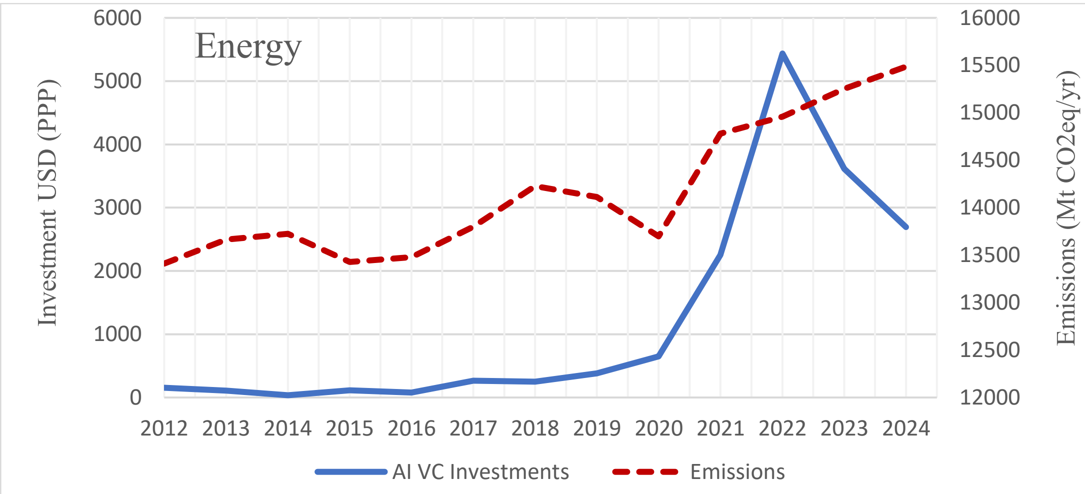


**Figure 6. Trend in AI VC Investments and Carbon Emissions in Energy Sector**

Source: For AI VC Investment- OECD.AI (2026), data from Preqin, last updated 05/01/2026, accessed on 27/02/2026, https://oecd.ai/; For Emissions- European Union 2025, European Commission, Joint Research Centre (JRC), EDGAR (Emissions Database for Global Atmospheric Research) Community GHG database, comprising IEA-EDGAR CO2

***An Analysis of AI VC Investment Trends and Carbon Emission Dynamics in the Manufacturing Sector***

The manufacturing sector shows an increase in AI VC investment over a period of time especially after 2018, there was a sharp surge in 2020-2021. Emissions rise gradually and show relatively less volatility in comparison to investment. The faster growth in AI investments compared to emissions shows that AI adoption such as automation and predictive maintenance may improve efficiency reduce emissions.

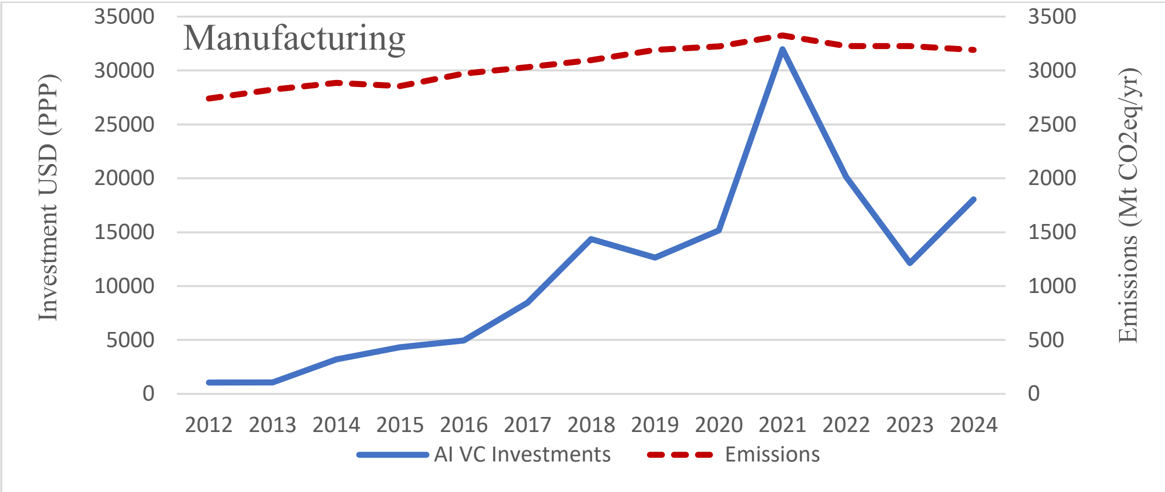


**Figure 7. Trend in AI VC Investments and Carbon Emissions in Manufacturing Sector**

Source: For AI VC Investment- OECD.AI (2026), data from Preqin, last updated 05/01/2026, accessed on 27/02/2026, https://oecd.ai/; For Emissions- European Union 2025, European Commission, Joint Research Centre (JRC), EDGAR (Emissions Database for Global Atmospheric Research) Community GHG database, comprising IEA-EDGAR CO2

### 3.4 Analytical Interpretation

The trends across sectors reinforce three analytical conclusions:

**1. Efficiency and decarbonization are not the same**

Improvement in energy intensity because of AI does not automatically reduce total emissions.

**2. Sectoral composition matters**

When investment is concentrated in high emission sectors, it is important to have strong climate policies.

**3. Institutional context determines outcomes**

AI reduces emissions when it is adopted in countries and sectors with strong regulations and decarbonization frameworks.

In addition to the three conclusions, two important structural mechanisms should be kept in mind. First, more investment in AI implies more computer infrastructure. When there is an increase in AI venture capital investments, there is an increase in computational infrastructure including data centres, computers and training models. Even if exact energy-use data is not available, it is reasonable to expect that the growth in AI deployment increases the use of electricity for computing and cooling. The environmental impact depends on the carbon intensity.

Second, there may be rebound effects as AI makes transportation, manufacturing and energy sector more efficient. It arises when artificial intelligence leads to efficiency which further leads to lower energy costs, which then stimulates more use of energy leading to more emissions. In manufacturing sector, if machines become more efficient, firms will increase their production which will cause total energy use to increase. Similarly, in transport sector, if less energy is used per kilometer, it would make travel cheaper leading to boost in vehicles. Although this analysis does not measure the size of rebound effects, the persistence of upward emissions trend along with growing AI investment may suggest that improvement in efficiency alone may not lead to overall decrease in emissions.

Overall, AI adoption signals innovation and potential improvement in efficiency, but its net effect depends mainly on electricity decarbonization, regulatory policies and management of its expansion.This analysis sets the stage for looking at how expansion of AI has unfolded in the United States and China.

## 4. AI Expansion and Environmental Impact: Country Case Studies

This section will examine how AI has expanded in the United States and China, the focus will be mainly on government policies and sectoral applications.

### 4.1 United States: Market-Driven Expansion and Sectoral Diffusion

In the United States, AI expansion is mainly pushed by private sector and is supported by start-ups, research universities and technology firms. The country intends to reduce greenhouse gas emissions by 50-52% below the 2005 levels by 2030 and have pledged net zero emissions in 2050 (Fam & Fam, 2024).

***Transport and Logistics***

AI-driven operational efficiencies adopted in the United States Transport sector ensures cut in fuel usage and the emissions, and at the same time it improves profits. AI is adopted for reducing idle time for trucks and ports operations as it lowers the unnecessary burning of fuel and CO2. Route optimization is another benefit of AI-powered tools as it plans more efficient routes. Air Alaska saves 3-5% fuel on long flights with the help of AI- based routing system (World Economic Forum, 2025). This illustration showed how route optimization not only reduced cost, but also generated environmental co-benefits.

***Energy Systems***

In the United States, Utilities use AI for demand forecasting, detecting power outages quickly, and managing the grid effectively. There were gains noticed in key areas, like 10% improvement in service reliability, 11% boost in grid uptime,10% increase in energy efficiency, and a 10% improvement in customer satisfaction (IBM, 2025). With more renewable energy like solar and wind, AI makes sure to improve integration of variable resources.

However, increasing data centers and cloud infrastructure is leading to an increase in electricity demand. The net environmental impact heavily depends on the availability of renewables and the carbon intensity of the electricity supply.

***Manufacturing***

Deployment of AI in manufacturing involves predictive maintenance, digital twins and automation, which improve productivity and reduce wastage. American company Johnson and Johnson implemented AI-driven process control to optimize production, industrial internet of things cleaning and digital twins to test and improve without wastage. These implementations led to a 47% decrease in material waste, a 26% decrease in greenhouse gas emissions and a 23% reduction in overall energy consumption (World Economic Forum, 2025). Amazon's Package Decision Engine selects the most efficient style of packing for each item it learns about, thereby reducing the quantity of cardboard boxes, air pillows, tape, and mailers necessary to deliver goods to customers. This technique, combined with other packaging advances, has helped Amazon avoid approximately 3 million metric tonnes of packing material worldwide since 2015 (Amazon, 2024).

AI-driven processes often decline energy intensity. Yet, reduction in unit energy does not necessary translate into lower total emissions if the output increases.

The United States case shows a decentralized, market driven AI expansion with noticeable efficiency gains but uncertain emissions outcomes due to rebound and scale effects.

### 4.2 China: A State-Led Coordination and Industrial Integration

China's AI adoption is aligned with the national industrial and climate strategies. The country commits to peak its emissions by 2030 and by 2060 achieve carbon neutrality (Wang et al., 2021).

***Energy and Grid Management***

China has successfully deployed AI to reduce emissions in energy sector. The State Grid Corporation uses an AI based energy load forecasting system which analyses real time data and make predictions regarding energy use, and it has achieved 97.8% accuracy in 2024 (World Economic Forum, 2024). This system manages electricity demand during peak hours and enhances the integration of renewable sources like wind and solar into the grid. At Shenzhen Power Supply Bureau, implementation of AI in power grid management reduced the power outage resolution time from 6-10 hours to just 3 seconds (Chen, 2022). This shows artificial intelligence's transformative potential by thoroughly analysing data and accurately forecasting electricity's requirement, additionally it is integrating renewable energy to reduce emissions.

***Smart Cities and Transport***

Shenzhen is an excellent example of AI-driven traffic management system, where carbon dioxide emissions significantly fell by 20% from 12 million tons in 2020 to 8.7 million tons in 2023 with the help of AI powered traffic management system (Zhao, 2025).

***Manufacturing***

Manufacturing sector in China has deployed AI for automation and predictive maintenance. The Siemens Chengdu factory positioned itself to become a leader in reducing carbon emissions, amid a 92% growth in production output in the past three years. The factory adopted digital energy management system to track, predictive maintenance across its manufacturing processes, implemented artificial intelligence automation which could detect 16 different types of production waste. All these innovations and efforts resulted in a 24% decrease in unit product energy consumption and a 48% decrease in production waste (World Economic Forum, 2025). It was also noted that private owned enterprises benefitted more from energy intensity reduction than state owned enterprises. It may be because private firms are more efficient and innovation is encouraged there, whereas state owned enterprises tend to be more rigid and face bureaucratic constraints. It was also noticed that companies located outside smart city pilot areas benefitted more than those located inside smart cities (Li et al., 2025).

Overall, China's case shows that AI adoption and deployment in energy and manufacturing is backed by the government, and has efficiency gains at big scale. However, like in the United States, the total emissions outcomes depend on the scale of production and electricity decarbonization.

## 5. Conclusion: Policy Insights for India

The comparative experiences of the United States and China can give important lessons for India as it accelerates adoption of AI.

- From the United States: A market-driven innovation creates multiple private solutions like logistic platforms and corporate sustainability initiatives. When firms need to meet environmental standards, they internalise costs. Government support includes funding researches and tax incentives to accelerate private investment in clean AI.
- From China: Strong state coordination pushes rapid deployment of AI in public infrastructure like power grids, smart cities and manufacturing. Centralized programs and pilot projects like the one in Shenzhen can improve services and lower emissions. However, the impact on environment depends on regional electricity mix and how productivity gains align with broader industrial policy.

Three main lessons emerge:

1. **AI improves efficiency, but efficiency alone is not enough**

Both developed countries, the United States and China show that AI can reduce energy intensity in transport, energy and manufacturing. However, total emissions may not always decrease because of scale expansion.

2. **Electricity decarbonization is decisive**

The environmental impact of AI depends largely on the electricity used in data centres. If the electricity is from fossil fuels, the emissions are high. However, if it comes from renewable source, the emissions may be considerably low.

3. **Institution and governance matter**

The United States relies more on market incentives and private innovation, whereas China has more of centralized coordination. For both the countries, policy and governance have an influence, if AI reduces emissions or increases overall energy demand.

India must adopt an approach which has elements from both the United States and China. India can use government procurement to create early demand for environment friendly AI solutions like China. At the same time, it should encourage competition and innovation among private firms like the United States. Additionally, companies must mandatorily report the amount of energy used to limit direct AI emissions.
More specifically, India should:

- Align AI adoption with expansion of renewable energy and energy storage
- Compulsory reporting from companies on the energy used for computing and processing data
- Government should promote green infrastructure
- Link incentives for adoption of AI industrially, to reduce energy intensity
- Monitor rebound effects in manufacturing as well as transport
- Develop expertise where knowledge on AI and climate policy can be combined

India's strategy in deploying AI across sectors must consider climate impacts from the very beginning. Rapid technological expansion without considering its environmental impact can be detrimental as it can intensify energy demand and can put stress on environment. On the other hand, if AI adoption is aligned decarbonization policy it can promote sustainable development. Researches in India should focus more on sector-level and firm-level data to better understand the causal effects of AI on environment.

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**References**

1. International Organization for Standardization. (n.d.). What is artificial intelligence (AI)? from https://www.iso.org/artificial-intelligence/what-is-ai
2. Fam, A., & Fam, S. (2024). Review of the US 2050 long-term strategy to reach net zero carbon emissions. *Energy Reports, 12*, 845–860. https://doi.org/10.1016/j.egyr.2024.06.031
3. Li, H., Lu, Z., Zhang, Z., & Tanasescu, C. (2025). How does artificial intelligence affect manufacturing firms' energy intensity? *Energy Economics, 141*, 108109. https://doi.org/10.1016/j.eneco.2024.108109

4. Strubell, E., Ganesh, A., & McCallum, A. (2019). Energy and policy considerations for deep learning in NLP. *Proceedings of the 57th Annual Meeting of the Association for Computational Linguistics*, 3645–3650. https://aclanthology.org/P19-1355/
5. World Economic Forum. (2024, January 21). Blueprint to action: China's path to AI-powered industry transformation (Industries in the Intelligent Age white paper series). World Economic Forum.
6. World Economic Forum. (2025, January). Intelligent transport: Greener future: AI as a catalyst to decarbonize global logistics [White paper]. World Economic Forum.
7. Zhao, W. (2025). Smart city technologies for sustainable urban planning: Evidence and equity lessons from Shenzhen. *Sustainable Futures, 10*, Article 101198. https://doi.org/10.1016/j.sftr.2025.101198
8. Wang, Y., Guo, C.-H., Chen, X.-J., Jia, L.-Q., Guo, X.-N., Chen, R.-S., Zhang, M.-S., Chen, Z.-Y., & Wang, H.-D. (2021). Carbon peak and carbon neutrality in China: Goals, implementation path and prospects. *China Geology, 4*(4), 720–746. https://doi.org/10.31035/cg2021083
9. IBM. (2025, November). Utilities in the AI era: Powering ahead to a smarter future. *IBM*.
10. World Economic Forum. (2025, January). Artificial intelligence's energy paradox: Balancing challenges and opportunities (In collaboration with Accenture). White paper. World Economic Forum.
11. Amazon. (2024). Sustainability at Amazon: AI helps reduce packaging. https://www.aboutamazon.com/news/sustainability/amazon-sustainability-ai-reduce-packaging
12. Chen, S., (2022, July 28). China's AI-driven power grid can recover from a blackout in 3 seconds. *South China Morning Post*. https://www.scmp.com/news/china/science/article/3186870/chinas-ai-driven-power-grid-can-recover-blackout-3-seconds