

# Can AI grow green? Evidence of a Kuznets curve among AI, renewable energies and emissions

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## Abstract-

The relationship between artificial intelligence (AI) and the green agenda is one of the key current economic and social topics, driven by conflicting assumptions and evidence. On the one hand, AI use cases can drive energy savings, support renewable transition, and reduce emissions. However, its initial adoption significantly increases energy consumption, thereby deepening the challenges countries face to reach their environmental sustainability goals. This paper presents novel empirical evidence on AI development and its environmental implications in 23 middle and high-income countries, confirming that, initially, in the majority of countries AI increases energy consumption and CO2 emissions. However, we also show that these relationships are not linear, since, for high spending levels, AI has a positive impact on the environment in terms of emission reduction and higher reliance on renewable energies, a kind of green AI Kuznets curve. This reversal in the trend is achieved from \$220-\$580 AI market per capita, and therefore, as of today, only AI leading countries, such as Singapore and the US, are benefitting from this technological dividend. These results have clear policy implications, calling for a less fragmented global AI and energy governance given environmental externalities, national AI strategies with a solid energy pillar, and innovations in financing towards greener AI adoption, while achieving more transparency and standards for measuring and reporting its energy use.

**Index Terms-** AI; Energy; Sustainability

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