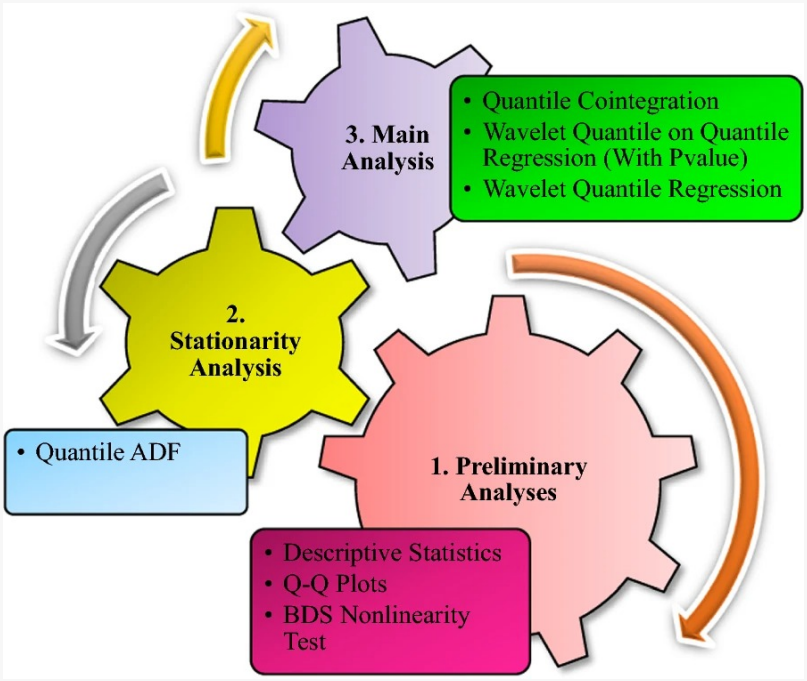
ICT technologies in the US contaminate rather than clean an already polluted planet, researchers say

Contrary to widely held views, ICT technologies in the United States are aggravating CO2 emissions rather than alleviating their impact on the environment.



Exploring the role of ICT adoption technologies and renewable energy consumption in achieving a sustainable environment in the United States. Credit: Environmental Sciences Europe (2025). DOI: https://doi.org/10.1186/s12302-025-01059-z

SHARJAH, EMIRATE OF SHARJAH, UNITED ARAB EMIRATES, April 1, 2025 /EINPresswire.com/ -- Information and Communication Technology (ICT) is a factor augmenting CO2 emissions in the United States and doing little to address the host of environmental challenges facing the planet, research published in the journal Environmental Sciences Europe suggests. (https://doi.org/10.1186/s12302-025-01059-z)

The research investigates the key drivers of CO2 emissions in the United States – the case of the study – using data covering three decades (from 1990 to 2021). The research is led by scientists from Turkey, Poland, the United Arab Emirates and Malaysia.

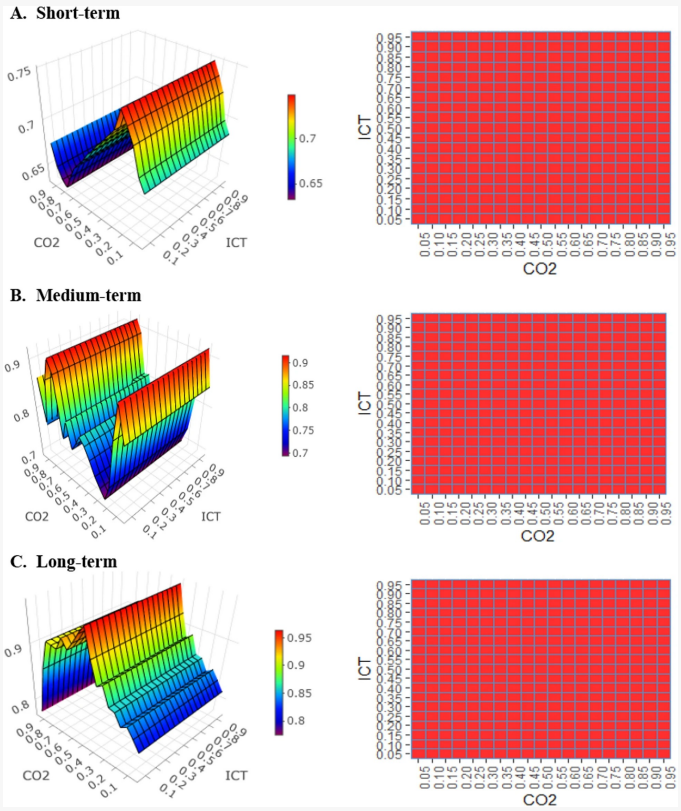
It employs wavelet quantile-on-quantile regression to identify interrelationships between series across various quantiles and periods. It complements the method with quantile cointegration to allow for additional volatility of independent variables and the analysis of all dynamics across different quantiles and timeframes.

“The results of our study reveal that, across all quantiles and time periods, the adoption of ICT technologies and fiscal decentralization contribute to an increase in CO2 emissions,” confirms co-author Dr. Dilber Ozsahin, University of Sharjah’s associate professor of health sciences.

The study extends credit to “globalization, renewable energy consumption, and financial development” which, according to Dr. Ozsahin, “are associated with a reduction in these emissions.”

Although the study is wholly focused on the US, its findings can have broad implications to countries and regions with heavy ICT infrastructure and technologies and even more so when its conclusions contradict the widely held view that ICT can play a pivotal role in addressing environmental challenges facing society.

Previous research on the effect of ICT solutions on GHG emissions sees information technologies as a game changer in the fight against pollution telling that they could deliver about 8 Gtonnes CO2e or 12% of the global emissions savings in 2030.



Impact of ICT on CO2. The left-hand side figure shows the effect of the independent variable on the dependent variable across all periods and quantiles, while the right-hand side figure shows the corresponding p value across all quantiles and periods. Cre

“The results from the study showed that across all quantiles and periods, ICT adoption technologies and fiscal decentralization increase CO2, while globalization, renewable energy consumption and financial development lessen CO2,” the authors write.

The adoption of ICT technologies has transformed various industries, enabling energy efficiency, smart grid solutions, and data-driven decision-making. From AI-powered energy management systems to IoT-enabled smart cities, technological advancements are playing a crucial role in optimizing energy use and reducing carbon footprints.

The study suggests that the United States, a world leader in information technologies, should adopt complementary policies to mitigate the environmental impact of ICT by incentivizing energy-efficient data centers and transitioning to renewable energy sources.
In the authors’ opinion, the pursuit of a sustainable future lies in integrating ICT-adopted technologies and renewable energy consumption – a merger they see as a key driver for environmental progress.

“Furthermore, expanding renewable energy capacity and infrastructure, promoting innovation, and providing financial incentives for clean energy transitions will be essential for meeting long-

term (U.N.) sustainability goals," maintains Dr. Ozsahin.

To alleviate ICT technologies on the environment, the authors emphasize "the need for complementary policies to mitigate [ICT] environmental impact," urging governments "to focus on improving energy efficiency in ICT infrastructure by incentivizing energy-efficient data centers and promoting the use of low-power devices.

"The negative impact of renewable energy consumption on CO2, particularly in high-emission sectors, underscores the importance of expanding renewable energy capacity and infrastructure across the United States. Policymakers should focus on increasing the share of renewable energy in the energy mix by making substantial investments in solar, wind, and other sustainable energy sources."

There has been "notable interest" in the project, according to Dr. Ozsahin, from various external stakeholders, including industries, policymakers, and other actors outside the university.

"These groups recognize the potential impact of the project on advancing sustainability and technological solutions. Their involvement and support will be crucial in ensuring the successful implementation and scaling of the initiatives, particularly in integrating ICT technologies with renewable energy for long-term environmental and economic benefits."

Asked what in her opinion should the U.S. pursue in battling environmental challenges, Dr. Ozsahin said, "The integration of digital solutions with eco-friendly energy policies presents an opportunity to achieve long-term environmental goals while fostering economic growth.

"By harnessing ICT technologies and renewable energy, the United States should be making significant strides toward a cleaner and more sustainable environment".

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