AI is supposed to make us more efficient, but it could mean we waste more energy

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The European Union is negotiating an Artificial Intelligence Act, the world's first comprehensive law that aims to regulate artificial intelligence (AI) based on the risk it poses to individuals, society and the environment.

However, discussions of AI overlook one significant environmental risk: a potential increase in energy consumption from using it in everyday activities. Without acknowledging this risk, the development of AI may contribute to the climate emergency.

AI can be a double-edged sword. It can be a powerful tool for climate action, improving the efficiency of the energy grid, modeling climate change predictions or monitoring climate treaties. But the infrastructure needed to run AI is energy- and resource-intensive. "Training" a large language model such as OpenAI's GPT-3, a popular AI-powered chatbot, requires lots of electricity to power data centers that then need lots of water to cool down.

In fact, the true scale of AI's impact on the environment is probably underestimated, especially if we focus only on the direct carbon footprint of its infrastructure. Today, AI permeates almost all aspects of our digitalized daily lives. Businesses use AI to develop, market and deliver products, content and services more efficiently, and AI influences how we search, shop, socialize and organize our everyday lives.

These changes have massive implications for our total energy consumption at a time when we need to actively reduce it. And it's not yet clear that AI will support us in making more climate-positive choices.

How AI is changing us

AI can indirectly change how much energy we use by changing our activities and behavior—for instance, by completing tasks more efficiently or by substituting analog tools like physical maps with their digital equivalents. However, things can backfire if convenience and lower costs simply spur demand for more goods or services. This is

known as a "rebound effect," and when the rebound effect is larger than the energy saving, it leads to greater energy use overall. Whether AI leads to more or less energy use will depend on how we adapt to using it.

For example, AI-powered smart home systems can improve energy efficiency by controlling heating and appliances. A smart heating system is estimated to reduce gas consumption by around 5%. Home energy management and automation could even reduce households' CO_2 consumption by up to 40%.

However, a more efficient and comfortably heated home can make people stay at home more often with the heating on. People may also have increased comfort expectations of a warmer house and pre-warming of spaces. A study on smart homes found that people purchase and use additional smart devices to increase control and comfort, rather than to use less energy.

In the transport sector, ride-hailing apps that use AI to optimize routes can reduce travel time, distance and congestion. Yet they are displacing more sustainable public transportation and increasing travel demand, resulting in 69% more climate pollution.

As AI in the transportation sector becomes more advanced, the effect may escalate. The convenience of an autonomous vehicle may increase people's travel and in a worst-case scenario, double the amount of energy used for transport.

In retail, AI-powered advertising and search functions, personalized recommendations or virtual personal assistants may encourage overconsumption rather than sustainable shopping.

Rebound effects can also transpire through time use and across sectors. Research predicts that AI could take over 40% of our time spent doing

domestic chores within the next ten years. That idle time is now available for other activities which may be more energy-intensive, such as additional travel.

How AI is affecting climate action

At a larger scale, AI will also have systemic impacts that threaten climate action. We are aware of AI's risks of exacerbating misinformation, bias and discrimination, and inequalities. These risks will have knock-on effects on our ability to take action on climate change. Erosion of people's trust, agency and political engagement may undermine their desire to cut emissions and adapt to climate change.

As we grapple with the potential risks of AI, we have to broaden our understanding of how it will affect our behavior and our environment. Scientists have called for more work to improve and standardize accounting methodologies for reporting the carbon emissions of AI models. Others have proposed best-practice solutions to reduce energy and carbon emissions from machine learning.

These efforts tackling the direct carbon footprint of AI infrastructure are important, but not enough. When considering the true environmental impacts of AI, its indirect impact on everyday life should not be ignored.

As the technology becomes ever more embedded in our lives, its developers need to think more about human behavior and how to avoid unintended consequences of AI-driven efficiency savings. Eventually, they'll have to somehow embed that into the design of AI itself, so that a world in which humans rely on AI isn't a world which uses extra energy unnecessarily.

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