



To the point!

Cross-Asset- and Strategy-Research

Artificial intelligence and carbon emissions

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AI is meant to drive transformation
– and yet, it poses a problem itself

Since the emergence of ChatGPT at the latest, it has become evident that artificial intelligence (AI) will shape our future in every conceivable way. One hope is that these digital brains will spearhead the transition to carbon neutrality. With their assistance, for instance, millions of electric vehicles can be charged in a grid-friendly manner when green electricity is abundantly available and then discharged when it is scarce. Buildings can be heated or cooled in an energy-efficient way. An increasingly complex electricity grid can be maintained cost-effectively. These are just a few examples.

By 2030, optimistic forecasts project that AI will help to reduce global [greenhouse gas emissions](#) by an amount equivalent to what the countries of the European Union produce today.

Yet, as it goes in life, there's a catch. AI not only has the potential to conserve resources: it also consumes vast amounts of electricity and water. Within a few years, AI data centers alone are expected to consume as much electricity as [Argentina](#) does in a year. The energy appetite for developing large language models, which are a prerequisite for ChatGPT & Co., is not even included in this estimate. And as long as the necessary electricity is not produced emission-free, obviously corresponding CO₂ emissions occur.

AI is neither a panacea nor a boondoggle

This is hardly conducive to the sustainability goals of tech giants. Google reported a 13 percent increase in its greenhouse gas emissions for 2023. Compared to 2019, they have grown by almost half. The main reason: new data centers required for AI and cloud computing. At Microsoft, the increase in 2023 was even 29

Special role
in the climate
transition

Climate goals
at risk?

percent. By 2030, these corporations aim to be carbon-neutral. At the moment, they are getting further away from this objective. Moreover, the U.S., the world's second-largest CO₂ emitter, might miss its goal of halving emissions by 2030, partly due to the data centers, despite the successes attributed to the IRA.

It is estimated that the cooling of AI data centers worldwide will soon require as much water as United Kingdom uses in a year. An average Google data center consumes three Olympic swimming pools full of water per day. No wonder [resistance](#) is growing in some U.S. regions, particularly those affected by drought, against the construction of new data centers.

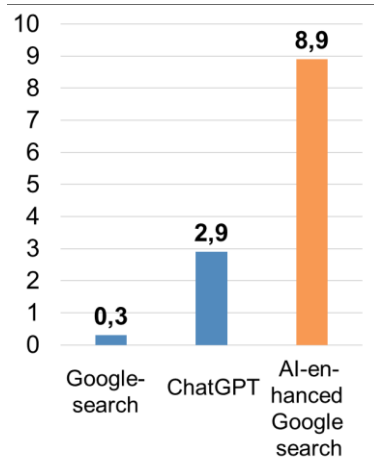
The march of AI will not be halted by such collateral damage. States around the world are already competing to position themselves as locations for data centers. At the same time, data centers cannot simply be built where water and electricity are cheap and plentiful. The facilities are too critical for data security. All of this presents a challenge.

Savings Must Exceed Consumption

However, this also acts as an incentive to advance the technology with as much energy efficiency as possible. And to simultaneously promote the expansion of renewable energies and energy infrastructure. Everywhere. In the hope that AI will one day indeed save significantly more resources than it consumes.

Interestingly, ChatGPT 4.0 was still unable to generate this “To the point” column upon request even, with a precise description of the desired outcome. The AI managed to spit out a few sterile statements of common knowledge. No more. Yet those ultimately futile 28 prompts consumed some 80 watt-hours of electricity (see figure). I could have used that to make myself a cup of tea and bake a few waffles. Which would have been cozier.

Estimated energy consumption per request (in Wh)



Source: [Alex de Vries](#), LBBW Research

Next time,
I'd prefer
a cup of tea

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