

New study on the impact of digitalization—how does 5G affect the climate?

October 29 2020



The new 5G mobile communications standard significantly increases the efficiency of data transmission. Credit: James Yarema for Unsplash

With the ever-increasing digitalization of our society, the question arises as to what potential this digital change has for climate protection. On behalf of the business association swisscleantech and the mobile phone operator Swisscom, a team of researchers from the University of Zurich and Empa has analyzed the effects of the 5G mobile phone standard on

greenhouse gas emissions. The team concludes that, with an assumed eightfold increase in future data traffic, 5G technology will be more efficient and enable innovative applications, such as flexible working, a smart grid or precision agriculture, thereby helping to reduce CO₂ emissions. Today, the study authors will present their results to the parliamentary groups Cleantech and Digital Sustainability in Bern.

The study examined the energy and material flows for the construction and operation of the infrastructure of a 5G network and thus possible (new) applications up to the year 2030. Expressed in kilograms of CO₂ equivalents, the climate impact can be calculated using life cycle assessments. The production and use of a typical business laptop, for instance, causes around 32 kg of CO₂ equivalents per year. "Our calculations are based on the current planning specifications of the mobile phone operator Swisscom," says Roland Hischier from Empa's Technology & Society lab in St. Gallen. The 4G network will still exist in 2030, but will only account for around 20 percent of data traffic. The study shows that the expansion of the 5G network and the new equipment required for new applications on the 5G network should cause environmental pollution in the order of 0.18 megatons of CO₂ equivalents in 2030. "On the other hand, new applications also offer a savings potential of up to 2.1 megatons of CO₂ equivalents," says Hischier.

One reason for the climate-friendly CO₂ savings is the greater energy efficiency of 5G technology. The 5G network in 2030 should cause around 85% fewer emissions per unit of data transported than today's mobile phone network. In addition, there are indirect savings from new uses, such as smart grids or new applications in agriculture with more targeted use of fertilizers and pesticides. Likewise, the faster, more reliable and (in terms of quantity) much larger data transmission supports flexible working, which in turn reduces commuter traffic and business travel, since virtual collaboration can be carried out more

efficiently in the 5G network, according to the Empa researcher.

Additional reductions in [greenhouse gas emissions](#) can be achieved through new technologies that will only emerge with the expansion of 5G networks, such as autonomous driving, tele-surgery and intelligent buildings. Hischer: "These applications will, however, not be able to exploit their full potential in the very near future, which is why they will not yet come to fruition within the time window of our study up to the year 2030."

With the study, Hischer points out, a basis for future political decisions is now in place, which shows that the spread of 5G technology has environmental benefits. "Technological developments, if applied in a smart way, are a major contributor to further reducing our CO₂ emissions." After all, the 5G [network](#) promotes and enables promising technologies, which in turn meets the future needs of society and helps achieve sustainability goals.

Provided by Swiss Federal Laboratories for Materials Science and Technology

Citation: New study on the impact of digitalization—how does 5G affect the climate? (2020, October 29) retrieved 25 April 2024 from <https://phys.org/news/2020-10-impact-digitalizationhow-5g-affect-climate.html>

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