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# The environmental sustainability of 6G:

*Is it really a trade-off?*

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Framed as a trade-off between  
*6G for Sustainability vs*  
*Sustainable 6G*

## 6G for Sustainability

- Deals with induced effects of the services and applications 6G may enable.
- Problems:
  - Effects on the social metabolism are **hard to predict**.
  - **Unclear** if mobile communications should account for all the benefit<sup>1</sup>.
  - Difficult to consider the effects of other **(non)-technological contributions**.
  - Induced effects may also be **negative!**
- Already controversial for 5G networks wrt the GSMA report<sup>2,3</sup>.

<sup>1</sup> Bergmark P, Coroamă VC, Höjer M, Donovan C (2020) A methodology for assessing the environmental effects induced by ICT services: Part II: Multiple services and companies. Proceedings of the 7th International Conference on ICT for Sustainability, June 2020, 46-55.

<sup>2</sup> GSMA. The Enablement Effect. The impact of mobile communications technologies on carbon emission reductions. Technical Report. (2019).

<sup>3</sup> Roussilhe, G. Que peut le numérique pour la transition écologique? Available from:

<https://gauthierroussilhe.com/media/pages/ressources/que-peut-le-numerique-pour-la-transition-ecologique/739b60aef6-1659704444/NTE-Mars-2021.pdf>

## Sustainable 6G

- Deals with direct effects (costs) of the technology itself.
- Focus on energy consumption of the network and per bit.
- Ignores<sup>4,5</sup>:
  - What matters is **global** energy consumption.
  - Energy consumption **may actually increase**.
    - Due to **induction** and **rebound** effects.
  - Higher demand implies higher need for **equipment**:
    - At the network, user and other infrastructures.
    - Impact on material extraction, production, transport and electronic waste.

<sup>4</sup> Williams L, Sovacool BK, Foxon, TJ (2022) The energy use implications of 5G: Reviewing whole network operational energy, embodied energy, and indirect effects. Renewable and Sustainable Energy Reviews 157:112033. DOI 10.1016/j.rser.2021.112033.

<sup>5</sup> C. Cano, H. March. 5/6G: Networks of the future or defuturing networks. Available from <https://arxiv.org/abs/2207.02533>

# Discussion