The Environmental Impacts and Benefits of the Internet

What effects does the Internet have on the environment and vice-versa?

Digitalization is not only a key lever for social progress, it is also necessary for decarbonizing the global economy. Digitalization and sustainability go hand in hand: digital technologies and services are key for the decarbonization of other sectors. In particular, modern connectivity and high-capacity networks are important enablers of more efficient and greener economies having extensive spill over benefits, opening up possibilities for innovative forms of emissions reductions.

GSMA's report, *the enablement effect*, calculated the current enabling impact of mobile communications technologies to be around 2,135 million tCO2e for the year 2018, amounting to more than twice the total yearly GHG emissions released by the EU's highest emitting country. Compared to the carbon footprint of mobile networks themselves, the level of avoided emissions enabled by mobile communications technologies is 10 times greater, globally.

Digital technology can also provide solutions for reducing emissions. As stated by the World Economic Forum (WEF), digital technologies can help reduce global emissions by 15-35% in the next 10 years. The link between digital and green transitions will help create new business models and jobs as well as improve the health and quality of life of people.

Specifically considering the exposure of the telecom sector to the potential risks of climate change we can consider different scenarios of CO2 concentration in the atmosphere and different time scales. In the more dramatic scenarios, the major risks that can affect infrastructures and operations would be those associated with climate variables, whether temporary (increase in extreme weather events) or chronic (increase in temperature, variation in rainfall). In those cases, the main measures to be taken are the business continuity plans for climate disasters and the energy efficiency and renewable energy plans, which enable to reduce power consumption, fossil fuel consumption and greenhouse gas emissions.

How can we improve the impact the Internet has on the environment and take advantage of its potential to help address climate-related issues?

Many of the mobile technologies that can enable a transition to a low carbon economy already exist. Widespread investment and implementation of these technologies will help reduce the future costs of climate change for businesses, governments and societies alike. Through the enablement effect, mobile network operators have the capacity to act as a catalyst to transform how sectors can decarbonize. By providing alternative

solutions, improving energy efficiency, and promoting positive behavior change, they can enable sectors to decarbonize in a faster, yet methodical and sustainable manner.

Indeed, digitalization should be promoted in strategic sectors, like energy, industry, transport, cities and agriculture, by accelerating high-speed connectivity infrastructure and fostering innovation (e.g. for industry to create more efficient and sustainable production and supply chains, connected and automate vehicles to reduce transportation emissions, improve renewable energy integration through smart grids; deployment of energy efficiency solutions in smart cities and agriculture). Those sectors, through uptake of digital infrastructure and digital services, have the opportunity to become more productive, more modern and more service-oriented, while dramatically reducing their carbon footprint.

Full-fibre networks are much more power-efficient than copper networks, irrespective of data usage, and 5G networks provide more efficient transmission of data for each kWh of energy consumed[1]. While calculations widely vary, there is agreement that a full transition to fibre and to 5G is regarded by all as a crucial step in improving dramatically the energy consumption in the telecoms sector.

First, the deployment of 5G technology will strongly improve energy efficiency of mobile networks. As traffic volumes continuously increase, 5G provides the required capacities while consuming the least energy in terms of "watt per byte" (up to 90% more efficient than 4G)[2].

Second, the deployment of fibre networks is delivering increased efficiency in terms of energy consumption and CO_2 emissions.

Therefore, to help accelerating the green transition, we believe it is vital putting in place policy and regulatory approaches (including sustainable financing) that would incentivise investment in fibre roll-out and 5G deployment.

What role should stakeholders play in shaping the environmental impacts and benefits of the Internet?

Earlier this year, 13 European telecom operators founded the European Green Digital Coalition, committing to be climate neutral by 2040 at the latest.

Concretely, this will be done through the following actions:

I. Investing in the development and deployment of green digital solutions with significant energy and material efficiency that achieve a net positive impact in a wide range of sectors.

[1] Available here: https://etno.eu/library/reports/95-state-of-digi-2021.html

[2] A new study by Nokia and Telefónica has found that 5G networks are up to 90 percent more energy efficient per traffic unit than legacy 4G networks. https://www.nokia.com/about-us/news/releases/2020/12/02/nokia-confirms-5g-as-90-percent-more-energy-efficient/ or https://www.telefonica.com/en/communication-room/blog/telefonica-makes-progress-in-the-design-of-a-green-5g-network/

II. Engaging with relevant organisations to develop standardised, credible and comparable assessment methodologies for the net impact of green digital solutions on the environment and climate in priority sectors such as energy, transport, manufacturing, agriculture and the building sector. It is critical that the developed calculation methods are standardized and that methods from the industry that exist are taken into account.

III. Promoting cross-sectoral dialogue and to contribute to the development of guidelines and recommendations for the deployment of green digital solutions in different sectors, and to encourage workforce upskilling.

What are the policy, regulatory and other relevant matters associated with the environmental impacts and benefits of the Internet?

To unleash the full potential of the digitalization on the environment, policymakers must consider the following:

- Review policies to bring down the cost of deployment of 5G and fibre networks and allow for a fast roll-out (for example, spectrum licensing best practice exchange).
- Reduce barriers that impede the development and deployment of digitally-enabled services.
- Promote voluntary network sharing agreements to reduce costs, increase network efficiency by improving coverage and quality.
- Provide incentives like tax benefits, fee reductions, preferential regulatory treatment and benefits in public sector tenders and procurement for environmentally efficient ICT solutions.
- Ensure all sustainable finance instruments support digital solutions and networks.
- Promote the enhancement of High-Performance Computing Infrastructure for Big Data storage and analysis functional to the achievement of carbon neutrality.