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EVIDENCE BRIEF

The **Social Sciences and Humanities Research Council** in collaboration with the **Natural Sciences and Engineering Research Council** and the **Canadian Institutes of Health Research**

SSHRC's Imagining Canada's Future initiative mobilizes social sciences and humanities research to address emerging economic, societal and knowledge needs for Canada, and help guide decision-making across all sectors toward a better future. This evidence brief addresses the Future Challenge Area of: **Living Within Earth's Carrying Capacity**

Tackling the carbon footprint of streaming media

About the project

Information and communication technologies (ICT) are responsible for an increasing proportion of global electricity consumption and resulting carbon footprint. Video streaming—including video on demand, YouTube, video embedded in social media and websites, video conferences, video calls and games—represents a major component of ICT's energy consumption, about 80% of consumer data demand. In 2019, French think tank The Shift Project calculated that streaming video contributes over 1% of the greenhouse gases that cause global warming. That figure is increasing rapidly, exacerbated by the COVID-19 pandemic. This overconsumption occurs almost entirely in wealthy countries.

Engineers and other analysts have been studying ICT's electricity consumption and means of energy efficiency for two decades, and in the past six years a few ICT engineers have turned their attention to the carbon footprint of streaming media. However, their findings are not known beyond the field, with the exception of The Shift Project's report. Media and industry responses to these reports have been polarizing. Therefore, it is crucial that engineering research in sustainable ICT reach a larger public.

Key findings

- Having surveyed 22 studies by ICT engineers of the electricity consumption of ICT as a whole, seven studies of the electricity consumption of streaming video, and scores of related articles, **we corroborate The Shift Project's analysis that streaming video is responsible for over 1% of greenhouse gas emissions worldwide, and this figure is rising fast.**
- Disagreement among ICT engineers about these figures largely centres on varying definitions of the **system boundary** of the Internet and of streaming; that is, whether devices, data centres, production, disposal and mining of metals should be included.
- Streaming video epitomizes the **rebound effect**, whereby increased energy efficiency leads to greater consumption of a resource. Streaming one video does consume less electricity than driving to the video store. However, the availability of online video has created new consumption patterns, driven by addictive design—thus cancelling out any energy savings. Streaming video exists within a market-driven feedback loop of infrastructural expansion and consumer demand. Videoconferencing also poses the danger of rebound effects.
- Redundancy, or the doubling of power supplies for data centres and networks in anticipation of spikes in demand, is one of the foundations of ICT's disproportionate carbon footprint.
- Although mobile devices are energy efficient, they constitute a large proportion of ICT's carbon footprint, given their market-driven short lifespan and because about 90% of a phone's energy consumption occurs in its manufacture.
- **Slowing this increase begins with the individual.** Networks and data centres consume electricity regardless of consumer activity. However, curbing consumer demand can help slow the expansion of infrastructure. Individual best practices include streaming less; streaming at lower resolution; watching physical media and TV instead of streaming; and keeping your phone for three years or more.

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- Policy changes will be necessary to encourage telecoms and media platforms to curb the electricity consumption of ICT manufacturers, networks and data centres, and to encourage energy-efficient best practices.
- These energy consumption patterns will be even more intense for artificial intelligence, blockchain and the Internet of Things.
- The Internet is a finite system. The miniaturization that led advances in computing for decades (Moore's Law) is coming to an end. Thus, energy efficiency cannot be the only solution: **an absolute decrease in energy consumption is necessary.**
- Transitioning from fossil fuels to renewable energy will diminish streaming video's carbon impact. However, such a transition cannot occur quickly enough for the planet to meet the goals of the Paris Climate Accord.

Policy implications

- Digital services are undervalued, but service providers are unlikely to raise rates and lower resolution unless required by governments. Governments should put a speed limit on the Internet, regulating streaming platforms, telecoms, and data centre and network companies. However, given the disadvantage to Canadians of a unilateral carbon tax, there needs to be a global solution. Moreover, since most streaming companies are US-based or international, the issue cannot be addressed at the federal level alone.
- To avoid industry "solving" the problem with carbon offsets, governments should regulate not only CO^2 emissions but also energy efficiency.
- Require streaming platforms to default to standard or low resolution, putting the onus on the viewer to increase resolution (again, an international issue).
- Regulate cryptocurrency, AI and other highly electricity-intensive applications.
- Mandate recycling of used devices and screens.
- Require full transparency on the footprint of digital products so consumers can make informed choices.
- Educate the public about the carbon footprint of ICT and streaming media and suggest best practices. Link these to the dangers of addictive and surveillant media and the mental health effects of excessive social media and screen time.

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FURTHER INFORMATION

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