National governments need to manage the out-of-control energy demands of the internet

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Credit: Jordan Harrison on Unsplash

National governments need to incentivise more efficient datacenters to limit the unsustainable and unchecked growth in internet and online services which represents a very real threat to energy security and global emission targets, warns new research from the University of Sussex Business School.

Governments should use enabling initiatives and grants to incentivise the building of sustainable datacenters that have better economies of scale, leverage circular economy concepts, and operate at higher energy efficiency, the study published in *Renewable and Sustainable Energy*

Reviews recommends.

Policymakers could also limit datacenters' demands on the grid by charging excessive peak time rates to datacenters in tandem with emission tariffs and renewable energy credits to encourage operators with centers using fossil fuel-based generators to move to advanced onsite storage technologies.

Internet and datacenter demand is one of the fastest growing sectors of electricity consumption. Internet and online services account for about 10 percent of global electricity demand but that is expected to at least double over the next decade—compounded by ever faster internet speeds and technology developments in 5G, edge computing, fourth industrial revolution (4IR), and autonomous and self-driving cars. With their energy use predicted to continue to double every four years, datacenters have the fastest-growing carbon footprint within the information and communications technology (ICT) sector.

Procurement standards, tax credits and other rebates could all be implemented to ensure datacenters are incentivized to purchase and install state-of-the-art energy efficient devices, study authors Prof Benjamin Sovacool, Dr. Chukwuka Monyei and Dr. Paul Upham added.

Planning and infrastructure policy initiatives from national and regional governments should anticipate the growth in datacenter footprint and pave the way for new facilities to be integrated into existing district heating networks. Researchers found there was currently no incentive for datacenter operators to invest in infrastructure to support heat reuse.

The researchers also recommend increased public R&D funding to help develop cutting-edge options to lower emissions including liquid and immersion cooling techniques, AI for infrastructure management, increased chip specialization, materials for ultrahigh density storage, and

quantum computing.

The study found the need for more transparent and reliable information on datacenter performance, energy use and operation. Researchers found considerable differences between countries with data completely lacking for some major datacenter hubs such as China. Better data and analysis on how to create green datacenters would help inform industry stakeholders and planners, the researchers noted.

Benjamin K Sovacool, Professor of Energy Policy in the Science Policy Research Unit (SPRU) at the University of Sussex Business School, said: "The transformative potential of ICT to reduce the energy-intensity of daily life and in many industrial sectors has long been advocated. However, with the number of Internet-connected devices now surpassing the number of people on the planet, and the energy demands of the sector growing at an incredible rate, ICT has become as much a threat to averting climate catastrophe as it is a ray of hope.

"The internet and its digital practices now have potential negative sustainability impacts and without rapid intervention, those impacts threaten to worsen considerably. The global growth in ICT emissions is currently unsustainable, unchecked, and represents a threat to energy security and climate stability."

Dr. Chukwuka Monyei, research fellow in the Energy Justice and Transitions in the Science Policy Research Unit at the University of Sussex Business School, said: "More needs to be done to combat the ever-growing demand for data and its associated energy impacts.

"The way we all use digital devices and online services is changing in ways that make even greater demands on energy use and yet there has been little societal consideration of or reflection on the environmental costs of the built-in growth, by either industry players or policymakers."

The researchers analyzed datacenter management and sustainability practices in three Nordic European countries (Greenland, Iceland, and Norway) which are becoming favored locations for Big Tech companies because of access to inexpensive energy, Arctic temperatures to cool hot computers, stable governments, and tax incentives. Hosting datacenters offers Nordic governments the potential for economic diversification away from mining, fishing, and tourism.

Researchers interviewed a host of sectoral experts including datacenter managers and firms; internet providers and telecommunications companies; municipal authorities and planners; officials from relevant national ministries; environmental civil society groups; energy companies and suppliers and academic researchers alongside focus groups of urban and rural residents in the destination datacenter countries.

The researchers found missed opportunities for higher levels of energy efficiency with just a quarter of surveyed datacenters in Norway evidencing documented heat reclamation or heat export capabilities, and none in Iceland.

The study also identified significant efficiency differences within the region with datacenters in Norway using 50 percent less electricity per unit area compared to facilities in Iceland. datacenters in Norway are also more than 50 percent bigger that those in Iceland, according to the new study.

Dr. Paul Upham, research fellow in the Energy Policy in the Science Policy Research Unit at the University of Sussex Business School, said: "There is a transformative potential to improve the energy efficiency and sustainability of datacenters and the trend over the past two decades has shown significant progress.

"But innovation can only carry the industry so far. Further improvements in energy efficiency alone will be unable to keep up with the sheer growth in datacenter usage and there is an urgent need to further decouple electricity demand from our ever-increasing appetite for digitalization and data services.

"The move towards green data centers built upon innovative green and renewable technologies needs to be fast tracked and we believe national governments have policy levers that can help incentivise datacenter operators to go down that route."

More information: Benjamin K. Sovacool et al, Making the internet globally sustainable: Technical and policy options for improved energy management, governance and community acceptance of Nordic datacenters, *Renewable and Sustainable Energy Reviews* (2021). DOI: 10.1016/j.rser.2021.111793

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