Response to request for ideas: "UK Digital Strategy – the next frontier in our digital revolution"

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Key Ideas:

The UK Digital Strategy must address resilience and energy demand alongside economic growth

We agree with Ed Vaizey that the development of an ever more intensively digitised society may have profound implications.

This includes implications for energy demand and for the resilience of a digitised society.

We welcome a new Digital Strategy that aims to "take advantage of the benefits digital transformation has to offer". To do this, it is important to mitigate the costs and risks of such a transformation.

In particular, digitisation does not always result in lower energy consumption, as the popular notion of 'dematerialisation' suggests. Given the rate of growth in global data volumes and the continuing international significance of reducing carbon emissions, an important frontier is to ensure that digital development is sustainable.

Increased digitisation also deepens the dependence of services on other infrastructures, namely electricity and telecommunications. This has implications for resilience during extreme weather events and fuel shortages.

In this brief response, we outline these ideas, which are especially relevant for the third and fourth "key ingredients" of a Digital Strategy suggested by Ed Vaizey: "Transforming day to day life" and "Building the foundations".

We would be pleased to provide further detailed evidence, and to contribute tailored analysis drawing on our own distinctive research within the DEMAND Centre (see below) and other national, European and global studies of the energy demand of digital systems and services.

Will digital systems demand ever more energy?

Digital services, and the devices and infrastructures that provide them, depend upon electricity. In UK homes, computing and consumer electronics together consume 20-35% of all electricity used[1] (Zimmermann et al., 2012; Coleman et al., 2012; DECC, 2015). In addition, running and maintaining the communications infrastructure and the online services hosted in data centres and by content distribution networks requires electricity. In total, information technology devices and infrastructures are estimated to consume 5% of global electricity production (Van Heddeghem et al., 2012). If the production and use of all

[1] The higher estimate excludes electricity used for heating (DECC, 2015)

communications technologies, including devices such as TVs, are included estimates rise to around 10% of global electricity use. This is predicted to grow to around 20% by 2030, or as much as 50% in a worst case scenario (Andrae and Edler, 2015).

In contrast, digitisation of services and processes is also thought to offer substantial energy savings. Some industry estimates suggest that, by 2030, "smarter" systems could save 10 times the carbon emissions they generate (GeSI, 2015).

All such predictions are notoriously difficult to make and to evaluate. This is for many reasons. However, it is clear that the demands on data infrastructures are growing fast (Sandvine 2015) as more services across personal and professional life are moved online. Given rates of growth of data traffic, and the consequences of increasing electricity demand in the UK and internationally, the energy implications of ongoing digitisation cannot be ignored.

Will increasing use of digital systems increase vulnerability?

The flip-side of the fact that digital services require energy is that they share the vulnerabilities of the energy infrastructure. Power can be disrupted as a result of extreme weather, fuel shortages, and intentional attacks. Such disruptions, in the UK and internationally, have the potential to interrupt digitised services. As such services grow and as digital functionality is integrated into the most mundane aspects of day-to-day life, such as the control of heating systems, fridges and building security, is it easy to overlook how critical this additional vulnerability to power disruption could become. This includes simple things such as door locks, intercom systems and basic telecommunications, as well as more sophisticated systems for the distributed care of vulnerable members of society. Even without power cuts, broadband and routers can be disrupted locally, with increasingly surprising and serious consequences for businesses and householders.

Is the Digital Strategy the right place to address issues of energy, resilience and demand?

As the UK Digital Strategy moves forward, we propose that energy demand, its growth and future resilience all be taken into account. We recognise that initiatives and policy connected to digital communications and innovation at work and home do not typically consider these issues in the way that is common for more explicitly energy-demanding services such as heating, lighting and transport. However, digital systems are rapidly becoming one of the most socially significant 'energy services'. If demand and dependence on energy are separated from consideration of how government can shape and promote digital services, a key opportunity to secure benefits for UK society will be lost, and long-term implications more difficult to address later. We hope, as Ed Vaizey suggests, that the Digital Strategy is an opportunity to work across government, and to set the agenda for these inherently digital concerns.

DEMAND Centre

The Dynamics of Energy Mobility and Demand (DEMAND) Centre[2] is based at Lancaster University and brings together a consortium of researchers from eleven universities and a range of non-academic partners. It is one of six research centres funded by the Research Councils examining end-use energy demand from different perspectives.[3] In total, the Centres represent a £43m investment aiming to ensure the UK is recognised as an international lead in this area of research.

[2] http://www.demand.ac.uk

[3] http://www.eued.ac.uk/home

The DEMAND Centre was established to contribute evidence on a vital aspect of energy research that has traditionally been neglected: an understanding of the underlying dynamics of energy demand. The Centre tackles the fundamental question of what energy is for. Achieving greater energy efficiency is important, but the trend is often towards more resource intensive standards of comfort, convenience and speed. We lack a sophisticated understanding of how these trends take hold and of the underlying dynamics of demand itself. The DEMAND Centre takes this problem as its central challenge.

Researching Domestic IT and Energy

One project within this programme explores how IT use in the home and in everyday life is changing, and what the implications are for patterns of energy demand. It asks how digital connectivity and digital services have become so normal and so necessary in such a short space of time. It considers what this means for the provision and operation of a sustainable and resilient electricity system.

This research is both qualitative and quantitative, focusing on detailed work with households, combined with an historical perspective on the development of key services and practices, such as Wi-Fi and home entertainment. Our response in this document is based on this and prior research into similar topics.

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