

ICTs, sustainability and the green economy

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Introduction

The concept of sustainable development has been elaborated and refined in the years since the Brundtland Report on environment and development, which defined sustainable development as “development that meets needs of the present without compromising the ability of future generations to meet their own needs.”¹ Although there is no single definition of sustainable development, there is general agreement on certain fundamental principles:

- The goal of sustainable development policy is human well-being for people everywhere, measured in terms of factors such as security, satisfaction of material needs, health, social relations, and freedom of choice and action.
- To meet this goal it is necessary to generate and distribute wealth in ways that reduce poverty and provide a decent standard of living to people everywhere.
- This can only be done in the long run through policies and strategies that balance economic growth with social development and with environmental sustainability.
- Technology and social organisation play critical roles in achieving the long-term balance between human development and the natural environment that is essential for sustainable development.
- Technological, economic and social innovation will be key factors in reducing our “ecological debt”. This debt results from the fact that the planet’s resources are being consumed at a greater rate than they can be replenished. It would take the resources of 1.5 planets to support our current lifestyle, and two planets under a business-as-usual scenario by mid-century.

ICTs and the environmental crisis

There is no question that the production and use of information and communications technologies (ICTs) contribute to the crisis. The energy consumption of ICTs is on the rise. The ICT sector’s contribution to global CO₂ emissions – currently 2-3% – is projected to double by 2020

under business-as-usual scenarios.² Furthermore, the ICT sector depends on the extraction of essential and valuable metals such as tantalum, which played a role in funding the bloody civil war in the Democratic Republic of Congo between 1996 and 2003.³

At the other end of their life cycles, vast quantities of ICTs become highly specialised waste that includes environmentally hazardous metals like lead, mercury and cadmium, as well as toxic flame retardants and plastics.⁴ Developing countries are already hot-spots for electronic waste (e-waste). About 80% of all the e-waste that is diverted – out of a yearly global e-waste production of about 40 million tonnes⁵ – is exported to developing countries such as China, India, Pakistan, Vietnam, the Philippines, Malaysia, Nigeria and Ghana.⁶ Some of this e-waste is salvageable, but the Basel Action Network, a civil society organisation, found that up to 75% of every shipping container arriving in Lagos ends up being dumped in landfills or by the roadside as garbage. In China and India, extracting valuable minerals from e-waste has become a major, informal industry, dangerous to both health and environment.

Who is responsible? Much of the e-waste exports may be illegal under the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal and Organisation for Economic Co-operation and Development (OECD) directives, but exporting countries are not taking responsibility, leaving recipients with the problem of stopping undesirable imports at the border.⁷ Importing e-waste has been illegal in Nigeria since 1988 and in China since 2000, but continues, owing among other things to missing regulations, a lack of awareness or resources among lower-level and local officials, and corruption. Yet even if foreign waste streams are curtailed, ICT use is rapidly increasing in developing countries, and

1 World Commission on Environment and Development (1987) *Our Common Future*, Oxford University Press, Oxford, p. 43.

2 The Climate Group (2008) *SMART 2020: Enabling the Low Carbon Economy in the Information Age*. www.smart2020.org/_assets/files/02_Smart2020Report.pdf

3 Vetter, T. (2009) Resource Wars and Information and Communication Technologies, paper by the International Institute for Sustainable Development. www.iisd.org/pdf/2008/com_resource_wars.pdf

4 Robinson, B. H. (2009) E-waste: An Assessment of Global Production and Environmental Impacts, *Science of the Total Environment* 408 (2), p. 183-191.

5 United Nations Environment Programme (2010) *Recycling – From E-waste to Resources*. www.unep.org/PDF/PressReleases/E-Waste_publication_screen_FINALVERSION-sml.pdf

6 Puckett, J., Westerwelt, S., Gutierrez, R. and Takamiya, Y. (2005) *The Digital Dump: Exporting Re-use and Abuse to Africa*. www.ban.org/Library/TheDigitalDump.pdf

7 Ibid.

their volume of obsolete PCs – to take one example – is expected to exceed that of richer countries by 2018.⁸

At the same time, ICTs have been shown to be a significant driver of economic growth in both developed and developing countries.⁹ OECD member countries invested significantly in broadband infrastructure, smart electricity grids, buildings and transportation systems, and e-health and e-education applications as part of the stimulus packages they adopted to restore growth in the aftermath of the 2008-2009 financial and economic crisis.¹⁰ The World Bank has found an increase in economic growth of one percentage point per ten percentage point increase in connectivity, with an even stronger correlation in low- and middle-income countries. Higher broadband penetration raises productivity throughout the economy and increases a country's exports by over four percentage points for every one percentage point increase in internet users. Investments in ICTs can also serve to strengthen economic opportunities and reduce income disparity in rural communities, by providing access to previously unavailable information and services, such as market prices for produce, health, and education.

Digital opportunities in the green economy

The concept of the "green economy" is still evolving, but is gaining traction around the world, as much as a process as an end state. According to the United Nations Environment Programme, greening the economy refers to "the process of reconfiguring businesses and infrastructure to deliver better returns on natural, human and economic capital investments, while at the same time reducing greenhouse gas emissions, extracting and using less natural resources, creating less waste and reducing social disparities."¹¹

Although its emergence on the international agenda was triggered by the financial and economic crisis of 2008-2009, the concept of a green economy is a product of paradigm shifts that have taken place in recent decades as economic, social and environmental issues have begun to converge in the context of globalisation. Just

as sustainable development policy makers have begun to focus on the role of innovation, market mechanisms, and social entrepreneurship in the achievement of environmental and other objectives, the ICT sector and ICT policy makers have begun to recognise the opportunities emerging from the critical role ICTs can play as a key enabling technology supporting green growth and the development of the green economy.

Over the past five to ten years a consensus has emerged that ICTs can support the development of the green economy in three principal ways:

- By decreasing *direct effects* on the environment of the production, distribution, operation and disposal of ICTs through improved energy and materials efficiency, increased use of renewable energy sources, reduced use of toxic materials, and improved recycling and end-of life disposal of ICTs.
- By increasing the *enabling effects* of ICTs on the development of the green economy through improvements in the efficiency of production, distribution and consumption of goods and services throughout the economy and society; by reducing demand for energy and materials through the whole or partial substitution of virtual products and services for their physical equivalents (dematerialisation).
- By supporting *systemic effects* that result in transformation of the behaviour, attitudes and values of individuals as citizens and consumers; economic and social structures; and governance processes.

Key questions to be resolved

- *Rebound effects*: Will the increased energy and material efficiencies enabled by the internet result in increased consumption? Economic theory and practical experience suggest that this is likely to happen in the absence of measures to suppress demand and/or supply. If so, what are the relative merits of different policy options for dealing with rebound effects?
- *Unintended consequences*: What is the human impact of the openness and dematerialisation enabled by the internet? How and to what extent could unintended consequences for individuals, social relationships, communities, organisations and countries limit the capacity of the digital economy to support the transition to a green economy? What policies, strategies and governance mechanisms are needed to deal efficiently and effectively with unintended consequences?

8 Yu, J., Williams, E., Ju, M. and Yang, Y. (2010) Forecasting Global Generation of Obsolete Personal Computers, *Environmental Science & Technology*, 44 (9), p. 3232-3237.

9 World Bank (2009) *Information and Communications for Development 2009: Extending Reach and Increasing Impact*. go.worldbank.org/NATLOH7HV0

10 OECD (2009) *The Impact of the Crisis on ICTs and their Role in the Recovery*. www.oecd.org/dataoecd/33/20/43404360.pdf.

11 United Nations Environment Programme (n.d.) Green Economy Initiative. www.unep.org/greeneconomy

- *Uncertainties and unforeseen events:* What new kinds of threats and vulnerabilities arise in a world where human, material and natural systems are interconnected and hyperlinked in real time, particularly when artificial intelligences of one kind or another make decisions? What policies and strategies are needed to anticipate uncertainties and respond to the impact of unforeseen events? How can these policies and strategies be shaped so as to avoid creating barriers to the synergistic growth of the digital economy and the green economy?

Final thoughts

We live in a world where constraints of space and time have shrunk, interconnection has increased, and the pace of change has accelerated. These changes have been largely enabled by ICTs. The time has come to use these technologies much more effectively to manage the consequences of the economic and social change, and its impact on the environment. Although the need for a green economy is now widely recognised, international resolve is still lacking.

Governments play an essential role in enabling sustainable development and in the transition to a green economy, but they are slow to implement policies, and powerful economic and political forces often protect the status quo and vested interests that are at odds with the vision of a new economy. Undoing the policies and practices that are behind business as usual clearly is a mammoth task, but ICTs can facilitate the transition. The development of the internet and other ICTs has created a platform and tools for information processing, communications, knowledge sharing, consensus building and decision making that enable all peoples to progress toward the goal of sustainable development. ■