

# Chapter 98

## E-Business/ICT and Carbon Emissions

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### ABSTRACT

*The high-tech industry, its associated Information and Communication Technologies (ICT), and subsequent e-business and Internet applications, have had profound effects on our economic lives, social development and environment. This revolutionary change is not only appreciated by computer gurus, but also by private and public organisations. This chapter attempts to focus on the relationship between the e-business/ICT and carbon emission—one of the causes of global warming. Aspects to be considered include energy consumption and CO<sub>2</sub> emission associated with the Internet throughout its lifecycle—from manufacturing of Internet equipment/hardware to its usage and final disposal. On the other hand how Internet technology facilitates environment management and benefits industries via, for example Carbon Trading, will be discussed. The aim of this chapter is to provide a clarification and comprehensive picture of the carbon impact of ICT/e-business to private and public organisations as well as individuals, especially some “behind-the-scene” type of facts. Therefore environmental factors can be taken into account for more informed decision-making during business conduction.*

### INTRODUCTION

“In 1965, Gordon Moore, one of the visionary founders of Intel, predicted that the high-tech industry could double computing speed and power every two years. This vision, referred to as ‘Moore’s Law’, has been realised” over and over

again (SVTC, 2006a). This revolutionary change is not only appreciated by computer gurus, but also the whole society. Through one touch of a mobile phone, one can surf the Internet, send SMS and emails, or shoot 5-mega-pixels resolution photos and share them with the whole world, at a matter of seconds literally. What’s more, these devices are improving constantly, becoming faster, smaller, cheaper, increasingly powerful and more

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advanced. However, what shouldn't be ignored also is - they have shorter and shorter lifecycles. Taking pleasure in the revolution exultantly, few of us have noticed what sacrifices have been made to reach this achievement and what side effects are coming along.

Information and Communication Technologies, supported by the high-tech industry, and subsequent e-business and Internet applications, have made profound effects on our lives. The inevitable growing usage has marked it as digital economy era. On the other hand, with the recent Copenhagen Climate Change summit happening during a global recession, how to achieve a low carbon economy has also been on the top agenda of most governments. The further growth of these two trends seem unavoidable, however, are these two going to contribute or contradictory to each other? Study on the interaction between the environment and ICT is relatively new. And very few people really understand the full picture. The obvious links can be exemplified via, just to name a few, teleconferencing reducing carbon emission, online shopping replacing shopping malls, mp3 files substituting CDs, e-commerce deliveries causing additional transport pollution, extra packaging and increasing WEEE (Waste Electronic and Electrical Equipment) issues. Researchers have started to review these impacts from different angles using various methodologies. As can be expected from an emerging field of research, awareness and understanding of this topic is rather limited. Previous studies have presented mixed results.

This chapter attempts to focus on the interactive relationship between the Internet and the environment, energy consumption and carbon emission particularly. Further information regarding the broader linkages between the ICT/e-business and sustainable development (economic growth, environment protection and social development) can be found in the materials provided in the additional reading section at the end of this chapter.

The specific interaction between the e-business/ICT and carbon emission has been mostly looked at from the angle of "the Internet is associated with how much electricity". Rather than assessing the issue from this macroeconomic point of view, which is the most common approach, this chapter attempts to analyse it from a more detailed perspective, at the operational level. The aim is to provide a clearer and comprehensive picture of the carbon impact of e-business/ICT to private and public organisations as well as individuals, especially some "behind-the-scene" type of facts. Therefore they can take the environmental facts into account to make more informed decisions while they conduct business.

Aspects to be considered include (i) energy consumption and carbon emission associated with the Internet throughout its lifecycle, from manufacturing of Internet equipments/hardware to its usage and final disposal, and (ii) how Internet technology facilitates environmental management and benefits the energy industry via, for example Carbon Trading.

## **BACKGROUND**

Mark P. Mills, one of the earliest to study the environmental impact of the Internet, claimed the energy consumed by Internet totalled about 8% of all US electricity use in 1998 and predicted it would grow to half of all electricity use in the next decade (Mills, 1999). These figures were claimed to be "significantly overestimated" by the Energy End-Use Forecasting and Market Assessment Group at Lawrence Berkeley National Laboratory (LBNL) (EUF, 2004). The debate reached an unprecedented level when the US House Subcommittee on National Economic Growth, Natural Resources, and Regulatory Affairs held hearings on "Kyoto and the Internet: the Energy Implications of the Digital Economy" on February 2nd 2000. At that hearing, Jay Hakes, Joseph Romm, and Mark Mills, the most authoritative and active

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