

# Sustainability of the Use of Mobile Phones

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## INTRODUCTION

In the last twenty years, there has been a sharp increase in the consumption of the electronic equipment, particularly Information Technology (IT) and Telecommunications ones, such as pc, mobile phones. They are the key to the innovation capability and thus they affect the economic success of developed and developing nations. The price paid for this enormous growth in data rates and market penetration is a rising power requirement of these systems.

This scenario demonstrates the need for studies and researches examining the sustainability of this sector according to two critical aspects that are related to the behavioral patterns of the users: the first is the energy consumption of electronic devices and their associated equipment, and the second is related to the conflicting link between potential dematerialisation due to the miniaturisation of the devices and the resource consumption and waste generated in this sector.

According to the well-known concept of sustainability, which is to increase quality of life for all without compromising future generations' ability to meet their needs, this research focused on the several aspects of the sustainability in this sector, particularly the mobile phones one, and on its role in energy efficiency and sustainable development.

The increased environmental burden of mobile phones use and manufacturing is due to the short life-cycle of this equipment, and to the consequent growth in sales of the newest mobile devices. So that this non-stop technological progress has created a large potential amount of electronic waste and, at the same time, a rising consumption of resources (such as energy, water and chemical substances) to manufacture new mobile phones. Besides, the behavioural usage patterns, as underlined in this research, lead to the increasing electricity consumption.

New challenges require dedicating a massive research effort to a sustainable development, which involve the energy and material efficiency of IT and Telecommunications systems.

Prof. Carsten Schaefer, Prof. Christoph Weber and Prof. Alfred Voss (Schaefer et al., 2003), at the Institute of Energy Economics, and the Rational Use of Energy of the University of Stuttgart (Germany) are among the first scholars to address the issue of the energy consumption in the mobile phone sector.

Prof. Eric D. Williams at the United Nations University (Japan) (currently, at Rochester Institute of Technology, USA), Prof. Robert U. Ayres at the Center for the Management of Environmental Resources-CMER at INSEAD (France), and Dr. Miriam Heller at the National Science Foundation (USA) are among the first scholars who have

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addressed the topic of the energy and material flows in the sector of electronic devices (Williams et al., 2002).

Finally, Prof. Eric D. Williams at the United Nations University (Japan) (currently, at Rochester Institute of Technology, USA), Dr. Jinglei Yu and Dr. Meiting Ju at the Department of Environmental Science and Engineering of Nankai University (China) are among the leading experts in the area (Yu et al., 2010).

## OVERVIEW

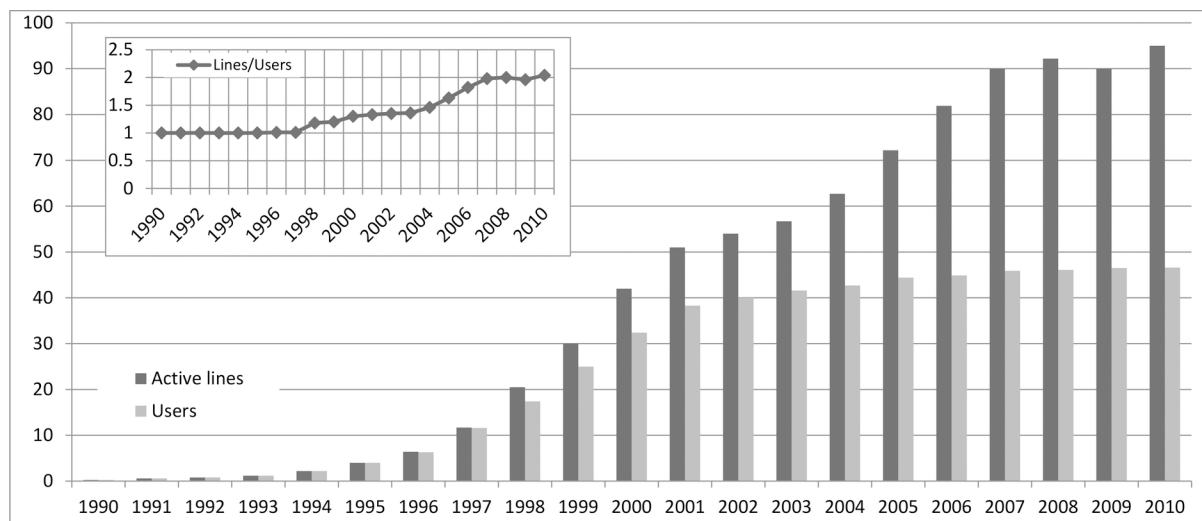
Mobile phones are characterized by a high turn-over rate (Assinform, 2007–2011; ITU, 2009); in fact, although their potential life span is approximately ten years, most users change their phones frequently, causing the usable life of these devices to decrease to less than two years (Huang et al., 2008). Such a behavior is clearly fostered by the technological obsolescence of mobile devices and by fashion trends. This, in conjunction with decreasing mobile phone prices and with the marketing strategies of mobile network operators, has led to an exponential increase of mobile phone sales (Lagioia, Paiano, & Gallucci,

2006). For the sake of example, Figure 1 shows the markedly-increasing trend of the Italian mobile communications market. The so-called penetration rate (the number of active lines per 100 inhabitants) is greater than 146, which is the highest in the European Union (EU) (European Commission, 2010). Also, mobile broadband represents a significant option in many countries; the average penetration rate is 19% in the EU, which is equivalent to over 95 million users. Italy has an expansion rate of 16.5% and accounts for 10 million users, of which approximately 6 million connect by phone and just over 4 million (6.8%) by cards, modems and other tools. As a matter of fact, the Italian market exhibited a growing trend in the mobile sector and it was less affected by the slowdown than the rest of the European Union. Currently, there are approximately 95 million active lines in Italy, while there were approximately 63 million users in 2004 and approximately 89 million in 2009 (the reference year in this chapter).

Also worldwide, the mobile phone sector has had a steady growth, as shown in Figure 2, which shows the number of active mobile lines worldwide in the 2001-2010 decade.

However, the mobile phone sector has grown at different rates in different countries and/or

*Figure 1. Trend for users and active lines in Italy from 1990 to 2010 (million) (© 2013, Elsevier, used with permission)*



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