Chapter 8.2
Infrastructure Sharing & Renewable Energy use in Telecommunication Industry for Sustainable Development

Dilupa Ranatunga
University of Colombo, Sri Lanka

Rasika Withanage
University of Wales, UK

Dinesh Arunatileka
University of Western Sydney, Australia & University of Colombo, Sri Lanka

ABSTRACT

An important factor in green ICT challenges is to reduce the creation and emission of green house gases by all means. This chapter is concentrating on how telecommunication network operators could operate in a very much more environment friendly way by co-existing with their fellow operators by way of sharing infrastructure such as towers and power generators which will reduce the emission of green house gases. The chapter has described the impact and the magnitude of telecom infrastructure on the environment and the ways that can be practised in order to reduce the emission of green house gases.

DOI: 10.4018/978-1-60960-472-1.ch802

INTRODUCTION

There is currently a worldwide concern about global warming caused specifically by the CO_2 fuelled greenhouse effect and the role that pollution plays in weather and environment. Some scientists say global warming is also intensifying naturally depicted through extreme weather patterns like typhoons, floods, severe droughts, changes in sea levels and marine biology (Lu, H. 2009).

Telecommunications is an essential component of development in today's context and has one of the highest growth rates in the world. Therefore, "green" movement in the telecom industry is essential to us all. As energy prices soar, telecommunication network operators are even more motivated to scrutinize their expendi-

tures and evaluate their environmental and social responsibilities. In practice, the energy usage can be calculated into CO_2 emissions. One kilowatt-hour can be converted into about 0.658 Kg CO_2 emission (In-stat. 2009).

Our main focus in this chapter would be to look at how base stations in the telecommunication networks could be made greener so that environment will be cleaner for the future generations. Aside from the energy usage closely associated with the operation of base station equipment, the use of other resources and materials can also be calculated by the emission of CO_2. The consumption of raw materials and field-consumption can be converted into CO_2 emission as follows.

1. Material usage refers to the energy used to produce the steel and concrete to build the base stations, which can be converted into CO_2 emissions.
2. The decrease of forest area brought about by the field consumption of base stations can also be converted into CO_2 emissions. (In-Stat. 2009).

To assume one normal base station can be used for 5 years, the gross emissions would be 211 tons of CO_2. One-time consumption of raw material or field occupation can be calculated into CO_2 emissions, and then distributed across a 5-year cycle. As illustrated in Figure 1, the total CO_2 emission volumes can be broken down by operation energy usage (including main equipment, ancillary equipment, and other equipment) and the one-time consumption (raw material and field occupation).

As shown in Table 1 base station sites consume up to 90% of the energy in the network. Hence maximum sharing of land, towers, power and shelters will effect the highest possible reduction in the energy consumption. Thus it will be the best approach to minimize the CO_2 emissions in the telecommunication industry. The following calculation shows the CO_2 emission for a tower built;

Manufacturing 1 tonne of steel produce 0.04 metric tons of CO2 (U.S. Environmental Protection Agency2003)

Average weight of a 70m tower (three leaded) is 17 tones (The Ministry of industry of the Republic of Belarus. 2008)

Total CO2 emission when manufacturing a 60m tower= 0.068metric tones

KEY APPROACHES TO DECREASE CO_2 EMISSIONS

There are numerous ways to minimize the environmental impact caused by the telecommunication

Figure 1. Energy usage of each component in the mobile networks (Adopted Source In-Stat)