Capacity Development for Reducing Environmental Impacts of Energy Consumption: The Role of Energy Efficiency in Cleaner Production

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Abstract

Industrial energy efficiency and pollution reduction activities have been initiated since the 1970s but usually independently of each other. This paper reviews the trends in environmental education and energy studies and how the need for the rational use of energy and the preventive approach to pollution reduction and prevention have led to the development and promotion of cleaner production. Integration of cleaner production capacity building approaches into professional training courses and academic curriculum are outlined.

Introduction

The world's primary energy consumption increased by an average of 11% from 1988 to 1998. In the Asia Pacific region, the increase was about 47% (Table 1) due mainly to the shift from traditional agricultural to industrial production in the region. The GDP growth rate in many Asian economies, despite the economic crises in 1997 - 98, has shown a continuous increase (Figure 1). The economic crisis actually stimulated industrial growth as countries re-structured economic policies to attract more industrial and infrastructure investments. As a result of economic liberalization, significant foreign capital has been invested in the industrial sector. At the same time, there has been an increase in incentives for modernization and procurement of new and clean technologies. In Thailand, as part of the Japanese Government funded Miyazawa Plan, an impressive economic restructuring plan has been proposed by the Ministry of Industries. The plan focuses on the promotion of cleaner production concepts as a means of improving the competitiveness of the Thai industrial sector.

Global industrial growth in recent years has resulted in higher energy consumption and has contributed to global anthropogenic emission of carbon dioxide and other greenhouse gases (GHG). In 1990, industrial growth accounted for approximately 35% of global economic activity, while consuming 44% of all primary energy, and emitting a similar percentage of carbon dioxide. The International Energy Agency (IEA) data presented in Figure 2 shows that during the period 1987 to 1997, there has been a steady annual growth in total energy consumption by the manufacturing sector in the Asia Pacific region. Although China had only moderate growth of 1.3% compared to India's 6.8%, the South East Asian countries showed significant growth of 15% or more during this period. The industrial sector will continue to be the major source of GHG emissions. The long atmospheric residence period of these gases, their radioactive properties and ever-increasing energy demands now threaten the world's climate. By the end of 1999, CO_2 had increased by 31% since pre industrial times and is presently 367 ppmv (Obasi, 2000). The continuous use of outdated and inefficient production technologies in developing countries will result in continued increases in GHG emissions.

In the 70's and early 80s, energy and pollution were usually considered separate issues. The increase in oil prices, development of renewable energy resources and technologies, and