

Chapter 4

Review Environmental Implications of Incineration of Municipal Solid Waste and Ash Disposal

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ABSTRACT

Rapid consumption of resources produces municipal solid wastes (MSW) in developing countries at the present time. MSW comprises the various kinds of waste present at different levels such as household products, industrial waste, biomedical waste, pesticides, sanitation residue, agriculture residue, building material waste, and so forth. The presence of solid waste in the water system is very hazardous and can cause severe health diseases in the human body such as dermatological disorder, respiratory infections, eye and blood infections, cholera, typhoid, tuberculosis, amoebic dysentery, anthrax, and so forth. Due to incineration of waste materials, the remaining ash is dumped into the water system so the amount of free oxygen in the water is diminished, which results in the death of fishes, beneficial bacteria, and worms, which play an important role in the fertility of the soil. This chapter reviews the challenges, methods, technologies, barriers, and opportunities associated with improving waste management worldwide.

DOI: 10.4018/978-1-5225-9452-9.ch004

INTRODUCTION

Currently, the global production of MSW is remarkably high. The production of MSW was about 1.3 billion tons in 2012 only, and it has been predicted that it may be increased up to 2.2 billion tons by 2025 (Hoorweg & Bhada-Tata, 2012). The main constituents of MSW are paper, food, metals, textiles, and glass and the amount of these constituents depends on the practices of different cultures, policies and legislation related to the management of wastes, and on the major economic sectors of various regions (Burnley, 2007; Liu, Liu, & Li, 2006; Wu, Wang, Chai, Takahashi, & Shimaoka, 2016). The basic step of the life cycle of MSW and its management is the incineration with energy recovery which reduces its mass and volume by 70 and 90%, respectively. Hence, the incineration of MSW is the best and cost-effective method for waste treatment, which also saves landfill space area. About 70% of the total mass of MSW is lost in the form of flue gas and only a small amount left as residue in the air pollution control (APC) systems (Brunner & Rechberger, 2015). The significant components of the flue gases are NO_x, HCl, CO, furans (polychlorinated dibenzofurans (PCDF)), dioxins –(polychlorinated dibenzo-p-dioxins (PCDD)), and so forth. Waste management especially industrial and municipal is a global problem which is continuously increasing. The European Union (EU) has imposed regulation, and it is allowed only a restricted amount of waste to go to landfill. Due to the strict regulation of the atmospheric emissions, various incinerator plants have been closed in the past few years, and near future, all incinerator plants must obey new standards established in a recent European Commission draft directive. The world has long-lasting alternative solutions to tackle the waste disaster. The primary alternative solutions are the implementation of waste prevention strategies, waste recycling, reuse, and so forth. Despite the said solution, there is another solution which is also in trend like construction or plans to build new incinerators to provide a ‘quick fix’ solution to the waste calamity. Incinerators are supposed to be more favorable because it is expected that they can reduce the waste up to one-tenth of the original volume, and as a crux, the volume of waste for the landfill sites will also reduce. However, the construction of incinerators is contentious due to their potential impacts on the environment and human health and the economic point of view because they discharge several toxic chemicals into the troposphere and release ashes and other solid waste residues. The Philippine is the only country which has taken a serious step at a government level due to the strong public opposition to incinerators and passed the resolution of “Clean Air Act of 1999”. The “Clean Air Act of 1999” of the Philippine has barred the incineration of medical, municipal and hazardous wastes. Waste reduction, reuse, and recycling are being promoted while non-burn technologies are recommended for waste that needs some form of treatment. Some governments of the EU have been promoting the creation of extra incinerators. This report is commenced to draw the attention of the scientific community on incinerator discharges and their effects on human being. The effect appears in those who live near the incinerators and in those who work in this type of installations. These impacts are adverse for the respiratory system, cancer (among both children and adults), heart disease increased allergies, immune system effects, and congenital abnormalities. It has been found that cancer is caused due to older incinerators rather than a modern one. Though, the modern incinerators (operational from the last few years) have also related to the antagonistic effect on health. Despite the reduction of some chemicals in mass discharges, they are still releasing several toxic chemicals and other residues like fly ash and bottom ash into the environment. Mostly, the health implications due to the incinerators are not related to the specific contaminant, and the finding related to a health issue is limited. It is difficult to forecast the health impact of incinerators either new or updated one. These health-related issues show

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