Environmental Engineering and Management Journal xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
http://omicron.ch.tuiasi.ro/EEMJ/

"Gheorghe Asachi" Technical University of Iasi, Romania

EMISSION INTENSITY AND ABATEMENT COST OF FOSSIL FUEL POWER PLANTS IN THAILAND

Wasin Pinprateep[1], Chanathip Pharino[2*]

[1]*Graduate Program in Environmental Engineering, Department of Environmental Engineering, Faculty of Engineering, Chulalongkorn University, Pathumwan, Bangkok 10330, Thailand*
[2]*Department of Environmental Engineering, Faculty of Engineering, Chulalongkorn University, Pathumwan, Bangkok 10330, Thailand*

Abstract

Monitoring of air emission and pollution control cost is a key to improve air quality management of electricity generation industry. This research comprehensively evaluates abatement cost of sulfur dioxide (SO_2), nitrogen oxides (NO_x), emission intensity and emission inventory of sulfur dioxide (SO_2), nitrogen oxides (NO_x), particulate matter (PM), and carbon dioxide (CO_2) emitted from Thailand's fossil fuel power plants. The research applied bottom-up approach with continuously monitored data from 64 percent of Thailand electricity generation industry. The data was used in an evaluation of emission intensity according to technology, fuel type and pollution control system. The research finding indicates that lignite-fired power plants are the major contributors of air pollution in Thailand. The research results will help in improving performance of emission forecast and monitoring via usage of site-specific emission factors. Air emission factors from power plants were found to be 0.022 – 1.432 g-SO_2/kWh, 0.122 – 5.229 g-NOx/kWh, 0.031 g-PM/kWh, and 452 – 1,443 g-CO_2/kWh. The cost for SO_2 reduction from fossil fuel-based power plants are estimated to be 0.03-0.26 US$/Kg-$SO_2$ while abatement costs of NO_x are 0.31-9.63 US$/kg-$NO_x$. Flue gas desulfurization with wet lime and dry low-NO_x burner are more efficient and cost-effective in controlling SO_2 and NO_x than the other techniques. The research results were also benchmarked against available international data sources. The findings can be used in policy planning and decision making process of key stakeholders to help improve air quality in the future.

Key words: abatement cost, emission intensity, fossil fuel power plant, primary air pollutant

Received: June, 2013; Revised final: December, 2014; Accepted: December, 2014

[*]Author to whom all correspondence should be addressed: e-mail: chanathip.p@chula.ac.th; Phone: (66)2 218 6668; Fax: (66)2 218 6666