



ECONOMY AND ENVIRONMENT PROGRAM FOR SOUTHEAST ASIA

POLICY BRIEF

SEEING THROUGH THE SMOKE: CHOOSING THE BEST OPTIONS FOR POLLUTION CLEAN-UP IN THE PHILIPPINES

Pollution from power stations is a growing problem in many developing nations. The Philippines is no exception and many people in the country are voicing concerns about the effects on people's health. However, a recent study has shown that, when economic costs and benefits are weighed up, there are ways to reduce pollution that make sense for society as a whole.

The research, carried out by the Resources, Environment and Economics Center for Studies in Manila, looked at two power plants - one oil-fired and one coal-powered - in Region IV of the Philippines. The team consisted of Elvira M. Orbeta, Carlito M. Rufo, Jr and Anabeth L. Indab. Their main finding was that a switch to cleaner fuel and improvements in coal-burning thermal efficiency would result in significant pollution reductions and bring equally significant health gains. They also found that the potential economic benefits from health improvements were larger than the cost of the clean-up.

The study was conducted against a background of steadily increasing power generation in the Philippines. Generating capacity almost doubled between 1988 and 1998, reaching 10,855 MW. This in turn has led to widespread pollution. Power plants are the major source of sulfur oxide emissions, accounting for over 50% of total emissions between 1988 and 1992. The health impacts of this pollution are multiple. For example, SOx from power plants has been shown to aggravate respiratory and cardiac diseases that increase the risk of premature death among children and adults. Unless adequate pollution control measures are put in place, such problems are going to get worse as power generation expands.

EEPSEA is supported by a consortium of donors and administered by IDRC.

Mailing address: Tanglin PO Box 101, Singapore 912404.

Visiting address: 7th Storey RELC Building, 30 Orange Grove Road.

Tel: 65 235 1344 Fax: 65 235 1849 Internet: dglover@idrc.org.sg

Deputy Director: hermi@laguna.net Website: <http://www.eepsea.org>

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In light of this situation, Ms. Orbeta's team conducted a benefit-cost analysis (BCA) of different control options for the pollutants PM10 and SO2. These included switching to cleaner fuel, increasing thermal efficiency, and end-of-pipe pollution control measures such as electrostatic precipitation (EP) and flue gas desulphurisation (FGD). The researchers wanted to find out whether it makes better economic sense to use available resources to treat the symptoms of pollution or the cause. Their analysis involved three steps: assessment of the physical impact of the control options; valuation of the benefits and costs of putting them in place; and a final analysis to determine which option is best.

The first piece of research was to analyse the effectiveness of different clean-up options. To do this, the researchers used performance data from the US EPA. They found that, for example, cyclones would reduce PM10 emissions from the oil-fired plant by about 30%, while a switch to cleaner fuel would give a 67% reduction in SO2 emissions. For the coal-fired plant they found that, for example, EP technology would produce a 98.7% reduction in PM10 emissions. Once they had worked out the performance of the different pollution-reduction options, the researchers then analysed the impact on the ambient pollution affecting the areas around the power stations. To do this, they used air dispersion modelling and meteorological data to take into account the effects of wind and weather. One of their findings was that a switch to cleaner fuel (1% S for bunker oil and 0.5% S for coal) would bring ambient concentrations of SO2 down to within legal limits.

The impact on people's health of each of the clean-up options was then assessed. Both the power plants chosen for study have three municipalities within a 10 km. radius and over fifty within a 50 km. radius. The researchers used census data to determine who was at risk. They then used dose-response coefficients from various epidemiological studies to estimate the effect different doses of pollutants would have. They then estimated the potential health benefits that the different clean-up options would produce. The types of pollution-related health impacts analysed included mortality and morbidity effects such as emergency room visits, acute bronchitis and asthma attacks as well as death.

The researchers found that extending the impact area under study from 10 km. to 50 km. greatly increased the magnitude of the health effects avoided. For example, a switch to cleaner fuel by the oil-fired power plant was projected to reduce premature mortality by two cases in a 10 km. impact area. In the 50 km. impact area the same pollution control measure was estimated to reduce premature mortality by 1,102 cases.

A benefits transfer approach (transferring, with appropriate adjustments, estimates from other countries) was used to value these health benefits. As with the physical benefits, the researchers found that the incremental economic benefits were much larger when the impact area was enlarged. They found that a switch to cleaner fuel, for example, would generate a total incremental benefit of PHP 1.13 billion within a 50 km. radius, compared to about PHP 4.15 million within a 10 km. radius.

Once they had calculated the value of the health benefits the different pollution-reduction options would bring, the researchers calculated how much each option would cost to implement. They then compared the two figures. They found that among the control measures analysed, most would cost more to implement than the value of the health benefits they would produce. However, a switch to cleaner fuel for the oil-fired plant and increased thermal efficiency for the coal-burning station were found to have incremental net benefits of about PHP 117M and PHP 131M respectively. Retrofitting an FGD was also found to be economically justified, but only when high monetary unit values were used for the health effects avoided and a 50 km. radius impact area was considered.

From this research, it is clear that investments to improve the environmental performance of power plants in ways that benefit the health of the people living around them are financially justifiable. They are not costless, however - they would increase the cost of producing electricity by about 4%. Much of this would be passed on to the consumer. If consumers realize that the health damages they avoid more than make up for the costs to their pocket books, they may be willing to make the tradeoff.

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Note: 41 PHP = 1 USD

The full text of this study is available as an EEPSEA Research Report:

Benefits and Costs of Controlling Emissions from Fossil-fired Power Plants in Region IV, Philippines - Elvira M. Orbeta, Carlito M. Rufo, Jr., Anabeth L. Indab.

For information contact:

Elvira M. Orbeta

Resources, Environment and Economics Center for Studies (REECS)

Suite 405, The Tower at Emerald Square

JP Rizal & Tuazon Streets

Project 4, Quezon City 1109, Philippines

<EOrbeta@gate.pids.pidsnet.gov.ph>

<EOrbeta@mozcom.com>