



Economy and Environment Program
for Southeast Asia
Tanglin PO Box 101
Singapore 912404

Phone: (65) 6831-6854
Fax: (65) 6235-1849
E-mail: eeepsea@idrc.org.sg
Web site: www.eepsea.org

The Economy and Environment Program for Southeast Asia (EEPSEA) was established in May 1993 to support training and research in environmental and resource economics across its 10 member countries: Cambodia, China, Indonesia, Lao PDR, Malaysia, Papua New Guinea, the Philippines, Sri Lanka, Thailand, and Vietnam. Its goal is to strengthen local capacity for the economic analysis of environmental problems so that researchers can provide sound advice to policymakers.

EEPSEA Policy Briefs summarize the key results and lessons generated by EEPSEA-supported research projects, as presented in detail in *EEPSEA Research Reports*.

EEPSEA Policy Briefs and Research Reports are available online at <http://www.eepsea.org>.

Adding Pollution to the Bill: The Environmental Costs of Power Generation in North Vietnam

EEPSEA POLICY BRIEF • No. 2001 - PB10

Like many developing countries in Southeast Asia, Vietnam has experienced a significant increase in its electricity needs as it has developed. Since coal is a major source of energy in the country, this has led to a rise in coal mining and coal-powered electricity generation. This, in turn, has led to an increase in pollution and environmental destruction. →

ARCHIV
621.311(597)
N 51

A summary of EEPSEA Research Report 2001-RR10, *Electricity Pricing for North Vietnam*, by Nguyen Van Song and Nguyen Van Hanh (Hanoi Agricultural University and Institute of Energy, Hanoi, Vietnam; contact: nguyenvansong@yahoo.com).

Electricity & coal prices *should include environmental costs*

→ A new study has shown that these environmental costs represent a significant share of the overall cost of electricity generation.

To deal with this problem, the study proposes that the costs of dealing with pollution and other environmental problems associated with power generation be incorporated into the country's electricity pricing mechanism. It also analyzes and recommends various technological and policy measures that could reduce the environmental impact of Vietnam's power industry.

Pricing Reform

The study was undertaken by Nguyen Van Song and Nguyen Van Hanh with the help of staff and students of the Department of Economics and Rural Development at Hanoi Agricultural University. It was carried out against a background of strong economic growth — the country's Gross Domestic Product (GDP) grew 8.2% annually from 1991 to 1997. Because of this, the expansion of coal mining is set to continue and is expected to rise from a 1998 production level of 11 million tonnes to 12.5 million tonnes in 2010. This economic growth is moving forward in parallel with a program of 'socioeconomic renovation' that includes a proposed pricing reform within the electricity sector. A long-run marginal cost (LRMC) pricing system — designed

to ensure that prices reflect increases in supply cost — is being considered in the hope that it will encourage more efficient use of electricity.

To help bring the country's environmental problems into the reform process, Song and Hanh set out to analyze the total environmental impact of electricity production and to calculate its cost. Their study focused on the coal-fired thermal power plants in the north of the country and in Quangninh province. The latter is a mountainous region of about 600,000 ha which has most of the largest coal mines in Vietnam and is responsible for 95% of Vietnam's coal production.

The Cost of Coal

In Quangninh, the air in cities and communes is seriously polluted by dust from mining works. Every year, mines discharge 8.86 million m³ of wastewater that carries large amounts of pollutants into rivers and the sea. This causes a wide variety of environmental problems including the pollution of Halong Bay, a UNESCO World Heritage Site known for its spectacular beauty. Other problems caused by the mining industry

include solid waste, radioactive gas emissions, noise pollution and forest destruction.

To calculate the costs of these mining-related problems, Van Song and Van Hanh evaluated the economic implications of health problems associated with mining (including injuries, lost productivity costs and mortalities) and looked at how much is spent on air, water and noise treatment to clean up the industry's pollution. The researchers also investigated the impact of the mining industry on tourism and recreation and what effect it had on agriculture, forest production, fisheries and infrastructure. Data was drawn from a variety of studies

and commercial and government records.

The researchers calculated that the on-site and off-site costs of coal mining totaled VND 139,649 million (USD 946,500) in 1998. The highest share of this cost was due to pollution abatement in the mines (46%). The total health cost of mining-related illnesses was VND 29,413 million or 21% of the total. Agriculture, forestry and fisheries losses represented about 15% and tourism and recreation losses 10% of the total costs respectively.

Given current estimates for the expansion of the Vietnamese coal mining industry, the researchers then calculated what the industry's environmental costs would be in the future. They found that the marginal environmental cost of coal mining would be VND 19,029 per tonne in 2010 or 5.5% of the total production costs at that time.

Power Plant Problems

To investigate the environmental costs of Vietnam's thermal power stations, Song and Hanh analyzed the performance of three existing plants — Ninh Binh, Uong Bi I and Pha Lai I, which have a combined capacity of 645 MW. They also looked at the potential performance of four proposed power stations that will be constructed to meet the latest Vietnamese air-pollution

regulations. The researchers' estimates were based on the cost of implementing and running environmental control technologies such as wet multicyclones, electrostatic precipitators and baghouse and limestone injection. Three different technological packages were analyzed, representing three different levels of investment.

Song and Hanh found that the major environmental problems linked to power generation in Vietnam involved particulate, NO_x and sulfur emissions, and wastewater treatment. Many problems in the sector are due to poor maintenance: For example, the Pha Lai Thermal Station has an electrostatic precipitator capable of removing 98% of particulate emissions. Due to a lack of spares, only two of the four electrolytes are currently in operation. Oils, lubricants and chemicals are routinely dumped into streams and end up in rivers. This affects a total agricultural area of approximately 30,000 ha. Studies show that this could be reducing agricultural productivity by as much as 25%, causing an annual loss of about USD 7.5 million in agricultural output in the region.

Other problems are related to out-of-date equipment. This is the cause of very bad particulate pollution at the coal-fired Ninh Binh power station. Pollution levels

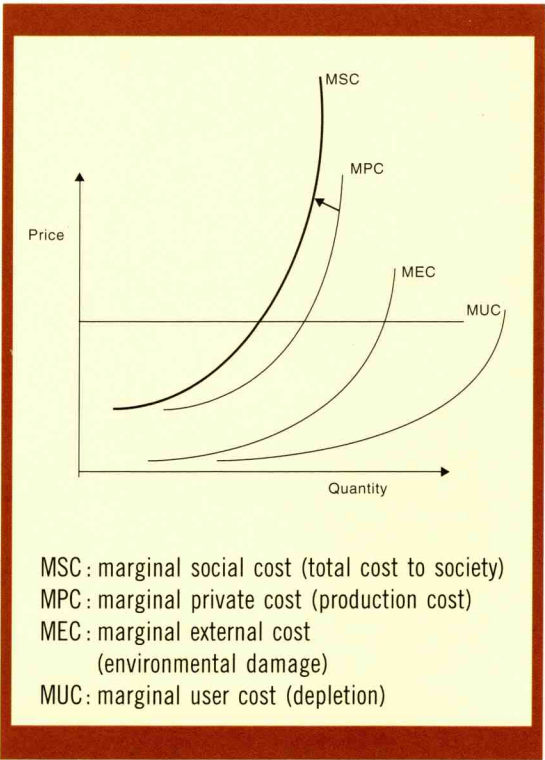
Environmental Damage	Cost in millions of VND	% of total env. cost
Health examination & treatment cost	2,328	2
Injured workers	4,232	3
Mortality risk	1,000	1
Lost workdays	18,603	13
Pollution treatment inside the mines	64,828	46
Health cost to nearby residents	3,249	2
Pollution treatment outside the mines	6,885	5
Loss of tourism & recreation	13,750	10
Loss of agriculture, forestry and fishing	20,636	15
Damage to infrastructure	4,135	3
Total Environmental Cost	139,649	100%

Environmental Costs of Coal Mining in Vietnam, 1998

there are three to four times higher than at comparable facilities and are due to the war-time design of the old plant.

Paying for Pollution

Overall, Song and Hanh found that for 1998, environmental costs related to energy generation were



Social Cost of Electricity



about VND 160/kWh at the transmission stage and VND 171/kWh at the distribution stage. This was about 15 times larger than the coal-mining-related environmental costs. The researchers therefore concluded that it is necessary to prioritize the pollution-mitigating measures for flue-gas discharges. Thanks to their analysis they were able to advise on the most cost-effective technological investment option for pollution control — precipitators for old power stations and bag filters and limestone injection for new stations. Such measures would cost VND 1,862 billion.

Extrapolating their results into the future (based on projected

increases in energy demand), the researchers found that the total environmental cost of power production in Vietnam would account for about 15% of the total kWh electricity cost up until the year 2010. The researchers concluded that, given the worsening environmental problems caused by coal mining and coal-fired power generation, the current subsidy of 25-30% of production costs should be removed. Instead, environmental costs should be included in electricity and coal prices. Vietnam Energy has, in fact, been planning to remove this subsidy, in line with the researchers' recommendations.

Song and Hanh put forth a number of legislative, regulatory and

management mechanisms to encourage clean-up. They also recommend that an environmental charge be added to the cost of production. This could provide electricity producers with the funds necessary to pay for abatement equipment. By raising the price of energy produced from dirty fuels, it will also give consumers an incentive to shift to cleaner energy sources, such hydro-electricity, natural gas and renewables.

14,800 VND = 1 USD (June/01)

EEPSEA is an international secretariat administered by Canada's International Development Research Centre (IDRC) on behalf of EEPSEA's sponsors:



Canadian International
Development Agency

Agence canadienne de
développement international



MACARTHUR
The John D. and Catherine T. MacArthur Foundation