

# VALUING THE ECONOMIC COSTS AND BENEFITS OF CLEAN AIR

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## SUMMARY:

*The subject of air pollution is reviewed from an economic perspective. Three main areas in the topic of air pollution are distinguished:*

- (i) Identification and quantification of causes and impacts;*
- (ii) Valuation of the costs and benefits of Clean Air, and*
- (iii) Policy on air pollution.*

*The present and previous conferences focused mainly on topic (i) whereas topics (ii) and (iii) received scant attention. The contributions also came mainly from the hard sciences with very little from the social sciences. Some issues under topics (ii) and (iii) which require investigation are indicated.*

## 1. INTRODUCTION

The title of this paper indicates that the focus will be on a discussion of economic valuation principles and techniques. But a study of the programme as well as the topics of the papers to be delivered made it seem opportune to expand the scope of this paper. Consequently the title of the paper may also have to be revised. A more appropriate title would possibly be air pollution from a social science perspective.

The reasons for the adjustment, and the intentions of the paper are the following: The Constitution of NACA and the theme of the 1991 Conference of NACA provides for a discussion on many different aspects of air pollution and from many different angles. One of the objectives of NACA, as stated in its constitution is "to provide a forum where opinion and viewpoints in connection with air pollution can be raised and discussed". This does not prescribe any particular professional angle from which the subject should be discussed. In fact it implies a holistic approach. Moreover, NACA is not a society for particular professional groups such as engineers or physicists, but encourages persons from a variety of disciplines to participate. One may thus expect that discussions on the topic of air pollution should cover at least the following three main types of issues:

- (i) Identification and quantification of causes and impacts of air pollution. This category would include the study of measuring and monitoring techniques. The topic of air pollution prevention technology may also be included here.
- (ii) Valuation of social costs and benefits of clean air. This is to gain some idea of what importance or priority society attaches to the impacts and effects measured under (i). For example, it may have been determined that the emission of SO<sub>2</sub> in a certain area is at a certain level. The impact of that level of pollution on health, agriculture and water quality was determined. But now we still only have a set of scientific data. For society to decide whether action has to be taken one way or the other, the data have to be translated into values - typically monetary values - so as to have a common yardstick for making comparisons and trade-

offs. For example, does the value of damage caused by motor exhaust gases justify the introduction and enforcement of technology to reduce these emissions? The information provided under (ii) is also crucial for the next group of topics, namely

- (iii) Policy on air pollution - will be discussed in more detail below.

A forum which intends to study and discuss the topic of air pollution holistically should give reasonably balanced attention to at least these three major groups of topics.

However, the papers at this conference, as well as at that one of 1990, primarily deal with topics under the first heading. They cover the identification, measurement, monitoring and quantification of causes and impacts. Papers dealing with valuation or policy issues are exceptions. The participants also invariably hail from the hard sciences - chemistry, physics, engineering and biology, whereas contributions from the social sciences - economics, public policy and law - area largely absent.

Thus, instead of focusing only on topic (ii) as was the original intention, this paper will briefly look at all three topics from a social science viewpoint, specifically that of economics, and make some suggestions about work that could be done with particular concentration on headings (ii) and (iii).

## 2. IDENTIFICATION AND QUANTIFICATION OF CAUSES AND IMPACTS

As mentioned in the introduction, this group of topics are the province of the hard sciences - to provide the scientific facts about causes and impacts. However, work on the social and policy side should indicate on what issues the focus should be placed. In this regard we are seeing a shift of contributions away from study of pollution on the Eastern Transvaal Highveld (ETH) to pollution in the Vaal Triangle. I agree with Els (1990) and CSIR (1991, page 319) that the scientific knowledge about pollution on the ETH is still not a sufficient basis for policy decisions. Much disagreement exists and sterile debate is taking place because we do not have adequate facts.

For example, the work done by Bosman (1990) on The Impact of Atmospheric Sulphate Deposition on Surface Water Quality in the Eastern Transvaal Highveld, is of immense importance and should be continued. We are left

\* The views expressed in this paper are those of the author and do not necessarily reflect the views of the Development Bank of Southern Africa.

with the conclusion in that study that (page 8) "The surface soil is buffering the acid input at this stage, and no acidification will consequently be observable in the rivers themselves", and (page 9) "There still clearly remains much buffer capacity in the soil and subsoil of the catchment". But surely "buffer capacity" is an exhaustible characteristic. One would like further work for example to indicate the rate at which the buffer capacity of the soil is being depleted. Will the effect on soil then be irreversible - will its productive use be lost permanently or will the damage be so expensive to reverse that it could be regarded as a permanent loss? Will it be a large or a small loss? This is certainly not the time for scientific research (or its sponsors) to turn their backs on these issues. Even sensitivity studies which use a range of different, but possible, projections, would give one a much better grasp of the risks involved.

### 3. VALUATION OF SOCIAL COSTS AND BENEFITS OF CLEAN AIR

Suppose clean air were a commodity that was purchased over a counter at a price set by a market. Every week I would go into a shop for "clean air" and buy so many cubic meters of clean air at a certain price and at the end of the week I would have to pay somebody else to get rid of the dirty air, or to clean it up. The clean air I bought was to be for my exclusive use. If I polluted it, only I would suffer the effects. Nobody else would use my clean air. Likewise, factories would buy their quota of clean air just as they have to buy their other materials - minerals, electricity, labour, computer time, and so forth.

If this were the actual situation we would not have had this conference today - there are for example no associations for clean coal, clean steel or clean cement. But property rights on clean air are not established. Markets do not regulate its demand and supply. Consequently no market prices exist to indicate the value society places on clean air. Specific public action must be undertaken to regulate its use. Indirect methods must also be employed to establish the worth of clean air to society.

An example of the type of work which needs to be done in this regard is the Eastern Transvaal Highveld case. We know more or less the cost (R6 billion) of controlling gaseous pollutants from coal combustion (CSIR, 1991, p. 319), but we do not know what the monetary amount of the benefits of such controls will be. It will thus be necessary to calculate the monetary value of the present and future projected damages caused by the emissions on eg. agriculture, soil productivity, forestry, water quality and health. (This is a further reason why the scientific facts on impact should be as complete and accurate as possible). It needs to be shown that the benefits of the controls will be at least as large as the costs of pollution before the investment in control equipment and the consequent rise in electricity prices, will be justified. It should be mentioned that such a rise in prices will not constitute a real cost to society - it is merely a shifting of the cost of pollution between different segment of society. Instead of the farmer, forester or water user bearing the cost, the will now be shifted to the consumer of electricity. This also has other advantages, as will be mentioned

below. Of course, the application of cost benefit analysis is fraught with dangers and difficulties - but at the present state of knowledge there are no other, more acceptable techniques to aid decisionmaking. It must however be applied very carefully, and a range of answers, based on different assumptions regarding the crucial variables, should be presented.

One suggested approach to the topic of air pollution in the ETH is that the cost of control of the pollution should be traded off against electrification of black urban areas. Rather than spending R6 billion on cleaning up pollutants from coal combustion in the ETH, the money should be spent on electrifying black urban areas, which ostensibly could also lead to a reduction in pollution (from coal fires).

I submit that this argument may sound compelling, but that it is wrong:

When considering the implementation of projects in a portfolio of investments (public and private) one does not compare only two projects with each other, but considers the portfolio as a whole and arranges the projects in increasing order of worth in terms of profitability (for private firms) or net social benefit (for public investments). The amount of funds available for investment will determine where the cut-off point will lie. For a public utility such as ESKOM, electrification of black urban areas and control of pollutants from coal combustion are only two projects in a large portfolio of capital projects. One needs to know what the rest of the portfolio looks like before expressing an opinion. Maybe there are projects of lower profitability or public benefit which could be scaled down and thus release funds for other uses - the electrification of farms may be a possibility here. When looking from a broader perspective of public investment, the possibilities are even greater. For example, trading off projects such as Mossgrass against air pollution and electrification projects. (The issues of seeking alternative or complementary energy sources for black urban areas is certainly relevant, but will not be dealt with here. Likewise the question of the efficacy with which the use of coal stoves could be phased out).

Under the heading of Valuation falls the viewpoint, often heard, that while South Africa still has many problems similar to those of developing countries, pollution control will not be a priority. But following the logic of evaluation of public projects, as sketched above, the invalidity of this viewpoint is also revealed. One cannot make a general statement about whether it pays society to pollute or not. The costs and benefits of each case have to be individually established. In some cases the pollution may be of so little consequence that expensive investments to prevent it may not be worth while. In other cases the negative effects of the pollution, eg. widespread acidification of water for industrial and household use, may be so severe that it may be worth the investment to prevent the damage.

It may however be true that a poor society may value goods such as a clear view, at a lower level than will a more wealthy society. Some of the numbers incorporated into the calculations may therefore differ. But the logic of calculating and comparing costs and benefits will apply,

irrespective of the level of development of the country. One could even say that the poorer the country, the less it could afford the net negative effects of pollution.

#### 4. POLICY

The Atmospheric Pollution Prevention Act (Act No. 45 of 1965) is already 26 years old and is based on thinking on environmental policy and control which was current about thirty years ago. Great advances have been made internationally in the past few decades on policies and approaches on control of air pollution. This especially applies to the introduction of approaches incorporating economic incentives which are complementary to command and control approaches. The experience of Emission Charges in Europe and Emissions Trading in the United States of America is now more than ten years old. Many surveys of a theoretical and empirical nature are now appearing. This source may be used to develop some innovative approaches applicable to South Africa.

A specific issue which should be discussed here, is the principle or policy of "the polluter must pay". To repeat the example of air pollution on the ETH above, forcing the consumer to pay for the cost of pollution abatement does not constitute an increase in cost to society, but a shift of cost from the persons affected by the pollution, to consumers of the polluting products. The consumer thus pays not only for the miners' wages, the cost of the generating equipment and transmission lines, but also to prevent the ill effects to persons not involved in the transaction.

Shifting the cost to the consumer will have further beneficial results: When faced with the full cost of his/her actions, the consumer, whether household or manufacturer, will tend to use the resource more frugally. A saving in the use of the resource could thus take place; while previously, wasteful use was actually encouraged.

Consumers will then also tend to look more favourably at alternative sources of energy - and as the theme of this conference is "Air pollution and the environment", this point is especially relevant. By burning coal, we are not only causing air pollution, but also producing an enormous quantity of solid waste as well as destroying an exhaustible resource which has other useful applications.

The price the consumer faces should in fact include these costs as well. One should also not ignore the possibility of a tax being introduced on the production of CO<sub>2</sub> as is being mooted internationally. The difference between the cost of electricity from coal and alternative energy sources may then begin to look much smaller. The development of technology on alternative, less resource-wasteful and less pollutive energy sources will then also be encouraged.

The powerful effects of using price as a policy tool must not be underestimated. Its use by politicians is however not very popular.

#### 5. CONCLUSION

The need for and worth of extending the scope of topics addressed by this society should, I hope, be apparent. An effort to recruit participants from other disciplines is suggested. An interesting question for me as an economist is naturally, where are the economists - why don't they work on air pollution? A possible answer could be that public investments (that is including those by parastatals or ex-parastatals) were in the past largely made for non-economic reasons. (Compare again the Mossgas venture near George). The economics of pollution was a very minor consideration in decision making on these projects. We shall look ahead with some anxiety to see whether the coming deep changes to South African public affairs will change all that.

#### REFERENCES

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