

Current and new air quality evaluation tools

Review of the AQS measures

The new Air Quality Strategy (AQS) was released on the 17th July outlining the air quality and economic benefits of the measures that were assessed.¹ In the production of the AQS, the economic analysis behind the work was undertaken by the Interdepartmental Group on Costs and Benefits (IGCB) and as such showed which measures were cost beneficial, along with the air quality assessments lead to measures being put forward for further consideration or not. The measures taken forward included Euro 5/6 and Euro VI vehicle emission standards (Measure C2), a measure to increase the uptake of low emission vehicles (Measure E), reducing emissions from ships (Measure N) and a combined measure containing the previous three (Measure R).

Work going forward on this will require the new Impact Assessment form which will fully replace the Regulatory Impact Assessment format next month. This format will look to create better clarity in presenting the impacts of a policy proposal, through a shorter format, the completion of individual specific impact tests separate to the evidence base and there is a new signing off procedure incorporating the relevant secretary of State, and for later stage IAs, the signoff of the Chief Economist. The Air Quality Branch of Climate Change Economics has taken the lead in understanding the new document format within the economist division and has provided preparatory advice in the form of a presentation to AEQ on the new guidance.

Current tools of evaluation

1. Impact-Pathway Approach

The impact-pathway approach is the usual approach taken when carrying out detailed quantification and valuation of air quality impacts resulting from a specific policy. This approach formed the basis of the cost-benefit analysis used in the updated Third Report of the IGCB². The approach shows the logical progression from the point of emission through to monetisation of air pollution. The more detailed explanation of the approach can be found in Chapter 2 of the updated Third Report of the IGCB. Though in simpler terms it is as follows:

- Quantification of emission for both the baseline and additional policy measures.

¹ <http://www.defra.gov.uk/environment/airquality/strategy/index.htm>

² <http://www.defra.gov.uk/environment/airquality/publications/stratreview-analysis/index.htm>

- Conversion of emissions into population weighted concentrations to quantify the exposure of people, the environment and buildings to changes in air quality.
- Quantification of health and non-health impacts associated with the change in pollutants
- Valuation of health and non-health impacts

The impact-pathway method is the recommended approach for valuing the impacts of policies on air quality as it uses a more detailed, step-by-step approach to quantifying and valuing the impact of air pollution changes. However, it is recognised that a large volume of information and resource is required to undertake this approach. Therefore for policies where emissions are considered over a period of less than 20 years, and either air quality benefits are ancillary to the policy or policies are part of a scoping analysis, the damage cost approach can be used instead to approximate the expected value of air quality impacts. These values measure the external marginal costs of each additional tonne of pollutant emitted (or opposite for benefit). The guidance for use of this approach is available on the IGCB website.³

2. Valuation Tools

First an update of the tools that we have been using over the last year to 18 months during the production of the Air Quality Strategy. Using the emission modelling provided, we have been able to compute life years and then monetised impacts through our valuation template for PM life years, PM hospital admissions, ozone impacts and sulphur dioxide. This template has been a major time saver and remains a very important tool we use in the quantification of air quality impacts. Small updates to these templates can be made quite quickly if required.

The use of damage costs has also been widespread, not only in the production of the AQS, but also in interim work and other projects. The methodology has been updated to incorporate the latest health and scientific advice and further technical updates will take place in the near future.

A significant improvement to the methodology came in through the inclusion of Monte-Carlo analysis by Paul Watkiss, which allows us to gain an idea of the distribution of the overall benefits of a measure and also the probability of a measure having a positive net present value. This is an area that we are looking to expand in the future and become part of our central analysis. It's use is also recommended by the Treasury's Green Book. Details of the methodology behind this can be found in Annex 7 of the current IGCB report. These tools will continue to be used in future work that CCE are involved in the coming months.

We have the two key valuation methods that are at our disposal, but the way these are used will change in due course. Such examples of this include:

³ <http://www.defra.gov.uk/environment/airquality/panels/igcb/pathway.htm>

- Linear vs. non-linear hazard rate reductions: This was an area of work that developed very late in the AQS production process and relates to use of non-linear scaling to derive hazard rate reductions for the calculation of life years, based on the recommendations of COMEAP. Our central analysis uses a coefficient of a 0.6% hazard rate reduction per microgram per metre cubed of PM_{2.5}, (more commonly referred to in the report as a 6% reduction in hazard rate per 10 microgram per metre cubed of PM_{2.5}), and the high and low estimates are achieved by doubling the value for the 12% coefficient, and dividing by six for the 1% coefficient. However the use of these arbitrary calculations are not as exact as possible. These are a reasonable approximation; however the exact changes in risk have been determined more exactly (to create the best estimate available for life years lost). It has been seen that at the approximate 6% reduction in hazard rate, using the non-linear scaling methodology reduces the life years saved by 2-3% compared to linear scaling, this increases to 4-6% at the approximate 12% reduction hazard rate. It is hoped that the use of hazard rate reductions derived by non-linear scaling will be used in future analysis and will be discussed by the IGCB in the group's next meeting.
- Damage Cost methodology: While we do not expect the assumptions to change in the near future, one area of work undertaken is to create an easier to use and more complete version of the damage cost calculator and methodology. We are currently in the process of creating a new template; the new spreadsheet will be tested soon and then distributed via the IGCB website. Updates will allow for many pollutants to be assessed in one appraisal and the calculator will be easier to use. The IGCB website is also being updated and released in the near future.

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Linked into this is the role of the IGCB, which is in the process of undertaking a review into the methodology that it uses in the production of economic analysis (such as attempting to monetise other pollutants, especially ammonia). The proposals will be put forward soon and are to be discussed in a forum during the final quarter of 2007. These recommendations will then be used in all future appraisal work that is undertaken by CCE and IGCB.

Another area of work that is being undertaken is the attempt to promote the IGCB methodology. The group produces interdepartmentally agreed best practice and through the combination of economists, policy specialists and scientific experts; the group has created expert analysis. We have strived to promote this methodology not only within government, but also outside as well. The methodology has been actively promoted within Defra and we also looking at further channels to promote the methodology. These include the Government Economic Service, the Green Book and other relevant publications.

As far as the meeting process of the IGCB is concerned, the next meeting of the IGCB will take place on 21st November. This meeting will also review the production of the updated Third Report, the problems that were faced and potential ways to overcome these in the future. To that end we would welcome the views of other IGCB members and welcome those within government who wish to join the IGCB to let us know, the e-mail address is igcb@defra.gsi.gov.uk.