

Cost-effectiveness of environmental policies

An inventory of applied ex-post evaluation studies with a focus on methodologies, guidelines and good practice

Executive Summary

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Economic analysis for ex-post policy appraisal addresses the question whether a policy objective has been achieved in the most cost-effective way. This question can be answered with the help of a cost-effectiveness analysis (CEA), which relates the costs of a measure to the physical effects that have been achieved (i.e. Euro per ton of CO₂ emissions reduced or per river km restored). The current study has investigated the use of ex-post CEAs to assess the efficiency of environmental policy measures in Europe, the existing guidelines and manuals for this purpose, and the instances where European environmental legislation where ex-post CEA has to be conducted. In addition, ex-ante CEAs were considered where they provided additional insights. Detailed summaries of case studies, guidelines and legal requirements can be found in the web-based PANACEA database created for this project.

Although a few European countries have undertaken a number of ex-post CEAs of environmental policy measures in the last years, ex-post evaluation of environmental policy performance in general remains a relatively recent phenomenon and experience with it is still limited.

- At the EU level, there is little experience with carrying out such assessments, and even less with using their results to feed back into policy implementation. While several environmental Directives require the regular evaluation of the Directive's performance, few of these explicitly require an assessment of their cost-effectiveness. Of the environmental acquis, only four Directives explicitly mandate that the cost-effectiveness be assessed ex-post (Directives 2001/77 on renewable energy, 2001/81 on national emission ceilings, 2003/30 on biofuels and 2004/8 on cogeneration). This report argues that ex-post cost-effectiveness assessments of European Directives need to be better integrated with the process of impact assessments that are carried out for all major European Directives. These ex-ante impact assessments should already formulate the research questions for an ex-post CEA, and identify the data required for it.

- At the level of the EU Member States, the experience with undertaking ex-post CEA of environmental policies is largely confined to the UK and the Netherlands, with occasional studies from other countries. In these two countries, the process of ex-post policy performance evaluation (including cost-effectiveness) is most institutionalised on the basis of legal or other requirements and national guidance documents. Outside the EU, some good examples of applied ex-post CEA, as well as some fairly developed guidance documents, can be found in the US.

In terms of the environmental issues addressed, the case studies reviewed during this study cover a wide range of environmental problems, including acidification, air quality, biodiversity, climate change, chemicals, waste and water. Occasional studies have addressed noise and ozone depletion.

While the study identified several thorough and elaborated case studies, there was no showcase example of a study that included all aspects suggested in the guidance. Instead, a common finding was that many case studies would apply simplifications and shortcuts to the proposed methodologies, or omit parts of the analysis altogether. While the case studies themselves are not very transparent in explaining why such simplifications were made, one main reason is presumably the difficulty of obtaining the necessary data. Indeed, some guidance documents argue that finding ex-post data on costs and effects will often be more problematic than forecasting costs and effects ex-ante. An option to remedy this is to clearly state the objective of a policy measure up front, along with time-bound targets and indicators, and to require reporting on the public and private costs of achieving the targets.

Turning to the guidelines surveyed in this project, the picture that emerges is that guidance exists on how to conduct a thorough ex-post CEA of environmental policies, including on the dangers and pitfalls of such an evaluation and ways of overcoming them. However, the available knowledge is distributed across different documents, none of which comprises all the necessary elements. Thus,

- Guidelines on economic assessment often devote more attention to cost-benefit analysis than to cost-effectiveness analysis;
- Guidance documents for cost-effectiveness analysis are generally written with ex-ante analysis in mind, treating ex-post analysis as a special case, and in far less detail;
- Guidance documents that are specifically geared towards ex-post policy appraisal often say little about cost-effectiveness and how to measure it, but rather address evaluation more generally.

In order to provide adequate and user-friendly guidance for performing ex-post CEA of environmental policies, it is proposed to develop a clearly structured guidance document with appendices for different policy areas. This guidance should focus first on those Directives where an ex-post CEA or some other ex-post evaluation is required. There is an obvious yet unavoidable trade-off involved in specifying the level of detail expected in a guidance document. Parts of a CEA will necessarily be complex and technical, at the same time guidance should be practice-oriented and accessible to non-economists practitioners who carry out or oversee such assessments. A simplified guidance will therefore need to skip some technical aspects, move them to an annex or to a separate, more detailed manual. The guidance document should provide clear pointers to other documents, where further information can be obtained on certain steps of the process. For example, the US EPA's work on cost definitions and measurement and the Dutch, EU and UNESCO guidance on ex-post evaluation can provide many useful insights. The document should also make reference to case studies where particular aspects have been addressed in an exemplary way. To this end, a web-based implementation with links to good practice examples and in-depth guidance would provide a useful companion to a written report. The web-based PANACEA database developed for this project could serve as a starting point for this.

Thus, most of the knowledge required for conducting ex-post CEAs already exists. However, there is still a need for further research to address issues that are not adequately dealt with in the literature:



- There is an issue whether some form of discounting should be applied to the effectiveness term of a CEA. Discounting is routinely applied to compare monetary sums at different points in time, but it is not normally done for physical units such as reduced emissions. However, to ensure the comparability of different options, discounting the effects might also be considered.
- Also, the guidance is not quite clear about which types of costs should be considered. These range from financial costs associated with specific, locally implemented measures (i.e. investment and operational costs) to public expenditure costs, and general equilibrium estimates of the wider economic impacts including foregone producer and consumer surplus. Clearer guidance on which costs to consider in which cases, and how to compute them, would therefore be helpful.
- A general problem for the use of ex-post CEA is gathering the necessary data. Unless objectives, indicators and monitoring requirements have been specified before a policy measure is implemented, it can be very costly and time-consuming to collect the data for an ex-post CEA. Therefore, a targeted and proportional approach for CEA is necessary, whereby the complexity of the analysis (and thus data requirements) is adjusted to the complexity of the decision. Here, more insights are needed on how shortcuts can be applied in a methodologically sound way.

This project provides a useful first step in the process of applying the CEA tool effectively in the ex-post evaluation of European environmental policy measures. By providing a snapshot of the state of play with detailed analysis of a range of existing case studies and guidance documents, the need for a more focussed approach has become clear. A first step in taking this work forward could be a consultation exercise with practitioners and those in charge of commissioning studies that would lead to a more tailored and prescriptive web-based tool for conducting consistent cost effectiveness analyses in the future. Such efforts should be accompanied by increased recognition of the data needs for all future analyses of both effectiveness and cost-effectiveness research.