TACKLING CLIMATE CHANGE COST-EFFECTIVELY

Understanding what is truly cost-effective

An overview of a study by the Centre for European Policy Studies (CEPS) and the Energy Research Centre of the Netherlands (ECN), which proposes a broader approach to cost-effectiveness and examines the impact of this on the prioritisation of policy measures in the field of climate change

OVERVIEW

At the international and at the European level, one of the main considerations for choosing policies to tackle climate change has been cost-effectiveness, i.e. the number of euros per tonne of carbon dioxide saved. With climate change measures having important impacts on other policy areas such as security of energy supply, air quality and competitiveness, such a simple cost-effectiveness analysis may be leading to sub-optimal policy choices. In order to address this, a new approach to cost-effectiveness analysis is needed that takes into account the impacts on a range of policies that a given measure will have.

This leaflet provides an overview of a study by the Centre for European Policy Studies (CEPS) and the Energy Research Centre of the Netherlands (ECN), which proposes such an approach and examines the impact of this on the prioritisation of policy measures in the field of climate change. The conclusion is that it is possible to develop a wider cost-effectiveness analysis and that this leads to energy efficiency in buildings, particularly insulation, coming out as the number one most cost-effective measure to combat climate change.

EUROPE – facing a new set of challenges

It is clear that Europe faces a very different set of challenges now than it did at its creation fifty years ago. Its greatest threats are no longer peace within Europe but are arguably globalisation, security of energy supply and climate change.

These threats are coupled to a strong competitiveness agenda within the European Union, which is leading to a greater focus by policy makers on ensuring that climate change measures are cost-effective. Such an increased focus reinforces the need to fully understand what is cost-effective, particularly in relation to energy security and competitiveness.

THE CEPS/ECN STUDY – a proposal for a broader approach

The study undertaken by CEPS together with ECN has analysed the wider costs and benefits of climate change mitigation measures. By including the co-benefits of climate change measures on air quality and energy security of supply it has proposed a method for including these benefits within a cost-effectiveness analysis. The key conclusion is that it is possible to include these wider impacts and in doing so it forces a rethink of which policies are most cost-effective.

THE CEPS/ECN STUDY – a reviewed approach identifies energy efficiency in buildings as a priority area

The study demonstrates that to achieve climate change objectives, whilst supporting other policy goals, Europe will need to focus policy more on energy demand management measures and the development of energy technologies. Both these stress the need for European Union competencies in the field of energy.

Domestically it will be of crucial importance that the European Union achieves greenhouse gas reductions across all sectors including notably buildings and transport. A potential over reliance on sectors covered by the present emission trading system (ETS) would increase the cost burden for industry and undermine Europe's competitiveness.

The study indicates that energy efficiency in buildings is set to be eminently represented in an efficient portfolio of climate change policies and measures. It will also be greatly enhanced by an early introduction of innovative energy production technologies.

KEY FINDINGS

DEVELOPING A NEW APPROACH – it is possible

In terms of the possibility to develop a wider cost-effectiveness analysis, the study concludes that it is possible to integrate both air quality and energy security of supply benefits into a cost-effectiveness modelling.

Other benefits such as employment were not so easily included in a pure cost-effectiveness analysis. In addition, disadvantages, such as the potential of nuclear accidents, could also not easily be monetised. Instead the study suggests that these need for the time being to be left to the appreciation of the policy makers concerned.

A REANALYSE OF PRIORITIES – the priorities change

From the social cost-benefit analysis of specific measures five options stood out as having the best cost-benefit ratio, when taking into account the externalities that could be quantified:

1. Insulation is very cost-effective from the end-user point of view in reducing the emissions of the GHGs and has some ancillary benefits for energy security and air quality, although the overall scale of reductions is only medium with the present Energy Perfomance of Buildings Directive (EPBD) if compared to supply side options

2. Integrated gasification combined cycle (IGCC) power plants have medium costs but contribute significantly to the (probable) long-term goal of applying Carbon Capture and Storage (CCS) in such and other coal-fired plants

3. Bio fuels for transportation have medium to high implementation costs and high benefits for energy security; there may be scale limitations

4. The cost of combined heat and power (CHP) is probably low (with high uncertainty) while having both a large potential to reduce emissions of GHGs, and medium ancillary energy supply security and air pollution benefits

5. Nuclear power appears to be cost-effective and has significant benefits regarding avoided air pollution and energy supply security. Yet its suitability needs to be assessed based on political acceptability and proliferation risks, and including all the costs, such as the cost of the final storage of used fuel and the risk of accidents

8 OPTIONS TO SAVE 1 BILLION TONNES OF CO_2

Technology	Required for 1 billion tonnes reduction of carbon
Coal-fired power plant with CO_2 capture & storage	700 x 1 GW plants
Nuclear power plants replace average plant	1500 x 1 GW (5 x current)
Wind power replaces average plant	150 x current
Solar PV displace average plant	5 x 1 million (2000x current)
Hydrogen fuel	1 billion H_2 cars (CO_2-free H_2) displacing 1 billion conventional 30 mpg (approx. 8 litres per 100 kms) cars
Geological storage of CO_2	Inject 100 mb/d fluid at reservoir conditions
Biomass fuels from plantations	100 x 1 million ha (half of US agricultural area)
Measures related to energy consumption in existing building stock (heat installation, insulation, appliances, etc.)	9 times the present Energy Perfomance of Buildings Directive (EPBD) for EU-15 if extended to all houses (hypothetical global application)

The table explains how "much" of the 8 options that is needed in order to save 1 billion tonnes of carbon

BEHIND THE FIGURES

SECURITY OF ENERGY SUPPLY

A novel approach was used for including security of energy supply in the calculations. Developing a model to account for energy security benefits is not easy, given the range of possible benefits and the fact that the market place naturally includes a proportion of these costs in the traded price.

However, issues such as the impact on the European economy of price volatility as well as the military expenditure needed to secure long-term access to oil and gas, makes a case for the need to include such benefits of climate policy into the analysis.

EXTERNALITIES – what was included

The study considered a number of externalities and benefits. In the report the following conclusions were reached:

Air Pollution: Quantification of externalities of air pollution was based on literature approaches and it was possible to include this in the cost-effectiveness analysis.

Security of Energy Supply: Due to a lack of existing approaches a novel "risk premium" approach is suggested for measuring impacts on security of energy supply.

Other externalities: Areas such as damages and employment are discussed although the effects are not included in the cost-benefit calculations because of the difficulties in quantifying them in a meaningful way.

CLASSIC COST-EFFECTIVENESS ANALYSIS – problems identified

Short-term cost-effectiveness of greenhouse gas reduction options, (i.e. €/tonnes CO_2 avoided), without due regard for long-term social costs and benefits appears to be the most important criterion for policy-makers in designing emission reduction programmes. The study has shown that the application of this criterion for prioritising climate change mitigation options is problematic due to:

- widely diverging, inconsistent practices in cost-benefit analysis (CBA), the scarcity of data and large cost uncertainties
- its disregard for many long-term social costs and benefits in which quantification problems constitute but one underlying factor
- key factors such as discount rates and the high volatility of energy price trajectories over time are not accounted for properly and may lead to underestimation of the longer-term cost-effectiveness of certain options

RECOMMENDATIONS

CLIMATE CHANGE POLICY – time for a review

Given that a wider and more sustainable cost-effectiveness analysis provides different priorities for mitigating climate change, Europe needs to review its policy priorities. Such a review is needed to ensure that Europe's approach reflects the true societal costs that are being paid.

In terms of specific measures, the study finds that the two most immediate and least contested elements from an environmental or climate change policy point of view are:

- Demand side measures (energy efficiency in buildings and transport sectors)
- Support to technology development (in the energy supply sector)

One area that stands out due to its high cost effectiveness as well as the lack of attention within the climate change policy community is energy efficiency in buildings. Given its ability to deliver climate mitigation, energy security, reduced air pollution and job benefits, its absence from the core of climate change policy at the European level is concerning and should be addressed.

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This study was carried out with the support of the above mentioned associations.