Benefits from combining climate, air and energy security policies

Policies based on cost-benefit analysis that tackle climate change, air pollution and energy security together produce far greater benefits than policies designed to address these issues separately, according to a new study. For example, current oil reserves would last until much longer than currently predicted and the number of premature deaths due to air pollution would be reduced by some 3 million per year globally, if all three policy areas were combined.

Fossil fuel consumption has led to rapidly rising emissions of greenhouse gases and other substances with negative consequences for climate change and air pollution. In addition, supplies of affordable oil as a traditional liquid fossil energy carrier are diminishing thus leading to concerns about future energy security.

This is the first study to analyse the effects of policies to combat climate change, reduce air pollution and improve energy security in combination as well as separately, for the period 2000-2100. The researchers used an extended version of the MERGE model to estimate the costs and benefits of these different policies, their combination, their interactions and the deployment of new (e.g. low-carbon) energy technologies. They focused on the impact of policies from European countries belonging to the Organisation for Economic Co-operation and Development (OECD), in addition to relevant policies at the global level.

Among the results for OECD Europe, the study found:

- There are larger falls in CO₂ emissions if climate policy is combined either with air pollution or energy security policy (or both), rather than when it is implemented alone. The most significant reduction in CO₂ emissions occurs when all three policies are combined. With the combination of these three policies, European emission reductions occur sooner (from 2020 onwards) and are more significant (practically the zero emission level is reached in 2100). Global climate policy alone would initially cause annual CO₂ emissions in OECD Europe to increase slightly from around 0.9 gigatonnes in 2000 over the first few decades to around 1.1 gigatonnes, but they eventually fall to around a third of 2000 levels at about 0.3 gigatonnes in 2100.
- All combinations of policies that include control of air pollution reduce particulate matter (PM) emissions, both in Europe and globally, to near zero from 2050 onwards. PM annual emission levels in Europe more than halve from 1.2 megatonnes in 2000 to about 0.5 megatonnes during the second half of the century for all scenarios that do not include explicit policy on air pollution control.
- Policies that include energy security concerns rapidly reduce oil consumption in Europe in the first decade, from 28 exajoules in 2000, to about 20 exajoules per year, and remain around this level until about 2050. After about 2050 oil consumption again drops rapidly until the end of the century, irrespective of the policy combinations. Only when all three policy areas are combined, oil consumption is reduced down to about 10 per cent of today’s level by 2100. This and similar effects in other regions allow oil reserves to last well into the 22nd century.

Other benefits from integrating all three policy areas include:

- A global temperature rise that does not exceed 3°C by 2150 compared with pre-industrial levels: although this is higher than the desired maximum 2°C increase (set out by the EU as a target). If these three policies are not combined, temperature rises will exceed 3°C.
- A significant reduction (amounting to 40 per cent) in annual premature deaths (that is, around 14,000 per year) from air pollution in Europe when all three energy policies are combined. Globally the number of premature deaths could be reduced by over 3 million per year.


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