

# The case for Gothenburg

## *The benefit of including all 'Gothenburg Protocol' countries in the scope of the National Emission Ceilings Directive Review*

### **Introduction**

The UN-ECE Convention on Long-Range Transboundary Air Pollution, which last year celebrated its 25th Anniversary, marked the first international response to the concerns over the impacts of long range transportation of air pollution on human health and the environment. This underlines the longstanding recognition that emissions from bordering countries can have potentially significant impacts on a given country's ecosystems and the health of its citizens.

This understanding underpins the more recent UN-ECE multi-pollutant, multi-effects 'Gothenburg Protocol' and the parallel European Union National Emission Ceilings Directive (NECD).

A key difference between these two initiatives is the number of countries included in their scope. The NECD was confined to the then 15 EU Member States, whilst the Gothenburg Protocol included in its scope some 34 European Countries.

Importantly, both initiatives were developed using the same Integrated Assessment Methodology (IAM), underpinned by the same models and databases, to determine the individual pollutant ceilings for each country. The key principle in this methodology is to achieve the agreed improvements at the lowest overall economic burden and to derive the individual national ceilings accordingly. In the case of the NECD the Integrated Assessment Modelling process emission changes beyond the 'business as usual' (or 'Current Legislation') case were limited to those of the then 15 EU Member States. Inevitably, this restriction resulted in higher burdens on EU Member States than their corresponding burden under the Gothenburg protocol, because the solution did not allow for potentially more cost-effective changes in non-EU countries. The EU political process of finalising the NECD legislation reflected an understanding of this situation, as the NECD ceilings finally

adopted were close to those of the Gothenburg Protocol.

As the European Commission embarks on the National Emission Ceilings Review, will the recent EU enlargement by 10 more States solve the problems outlined above? As we shall see, current evidence suggests that, for the Member States bordered by non-EU countries, this will not be the case. This article explores the case for widening the scope of this process to more countries bordering the EU.

### **The approach to the analysis**

To undertake this analysis, CONCAWE has been able to use the so-called 'functional relationships' which lie at the heart of IIASA RAINS<sup>1</sup> model and were developed by IIASA<sup>1</sup> within the scope of the European Commission's CAFE<sup>1</sup> Programme. These relationships, derived from multiple runs of the UN-ECE EMEP<sup>1</sup> model, link emissions from a given country to their impact on all related receptors.

To simplify the analysis, CONCAWE has focused on the priority concern in the CAFE programme (and the subsequent Thematic Strategy on Air Pollution) namely: human exposure to fine particulates. In this case, functional relationships were developed by IIASA for each 50 x 50 km EMEP grid in EU-25. Each individual relationship is a function of the emissions from each contributing EU country to both primary and secondary particulate concentration levels in that grid. The relationship also includes terms expressing the contribution from sea areas and an overall constant term (derived from the statistical fit of the data) which represents the non-EU or non-sea area contribution.

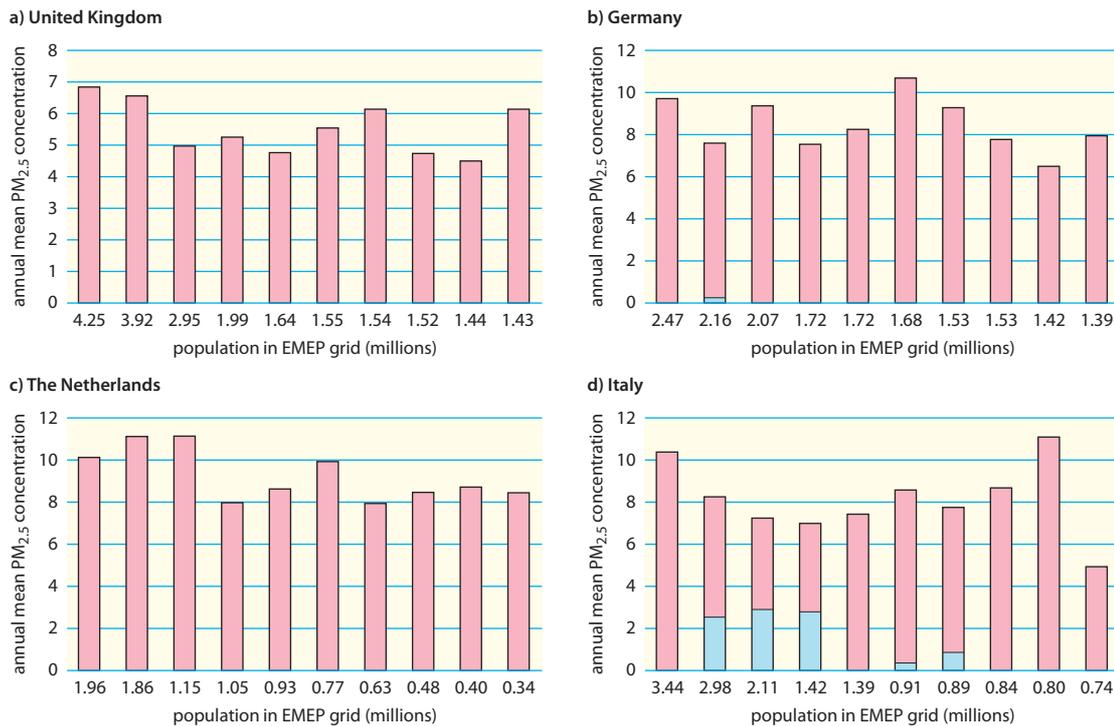
<sup>1</sup> See 'Abbreviations and terms' on page 26 of this Review

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### Contribution of PM<sub>2.5</sub> concentrations in ten highest populated EMEP grids for four countries which are not on the outer border of the EU (2020 TSAP scenario)

■ non-EU-25 land sources    ■ EU-25 and sea area sources



**Figure 1**

*In the case of the UK, Germany and The Netherlands, PM<sub>2.5</sub> concentrations are essentially from EU-25 and sea area sources only. Italy is of course influenced both by bordering Adriatic non-EU countries and, importantly, by the significant volcanic source of sulphur oxides e.g., from Etna, which are also included in the EMEP inventory.*

## Results

It is this non-EU/non-sea area term that provides a perspective on the consequences of restricting the scope of 'emission changes' to EU-only countries in the NECD review process. In Figures 1a to 1d the relative contribution of this term is shown for four countries which are not on the outer border of the EU. The EMEP grids chosen in a given country are those with a significant human population.

In the case of the UK, Germany and The Netherlands, the 'as modelled' contribution to overall PM<sub>2.5</sub> concentrations are essentially from EU-25/sea areas only. Italy is of course influenced both by bordering Adriatic non-EU countries and, importantly, by the significant volcanic source of sulphur oxides from Etna, which are also included in the EMEP inventory.

Figures 2a to 2d show the corresponding plots for countries on the outer border of the EU. Beside the highest

populated grid bars, an additional bar has been added to the series showing the maximum non-EU/non-sea area contribution.

## Conclusions

It is clear from these figures that non-EU/non-sea area emission sources make a significant and, at times, dominating contribution<sup>2</sup> to overall concentrations of PM<sub>2.5</sub> in countries lying along the borders of EU-25.

An important question is whether the above findings could have any material impact on policy making in the context of the NECD. After all, the optimisation approach finally adopted by the Commission in their Thematic Strategy on Air Pollution was aimed at delivering the

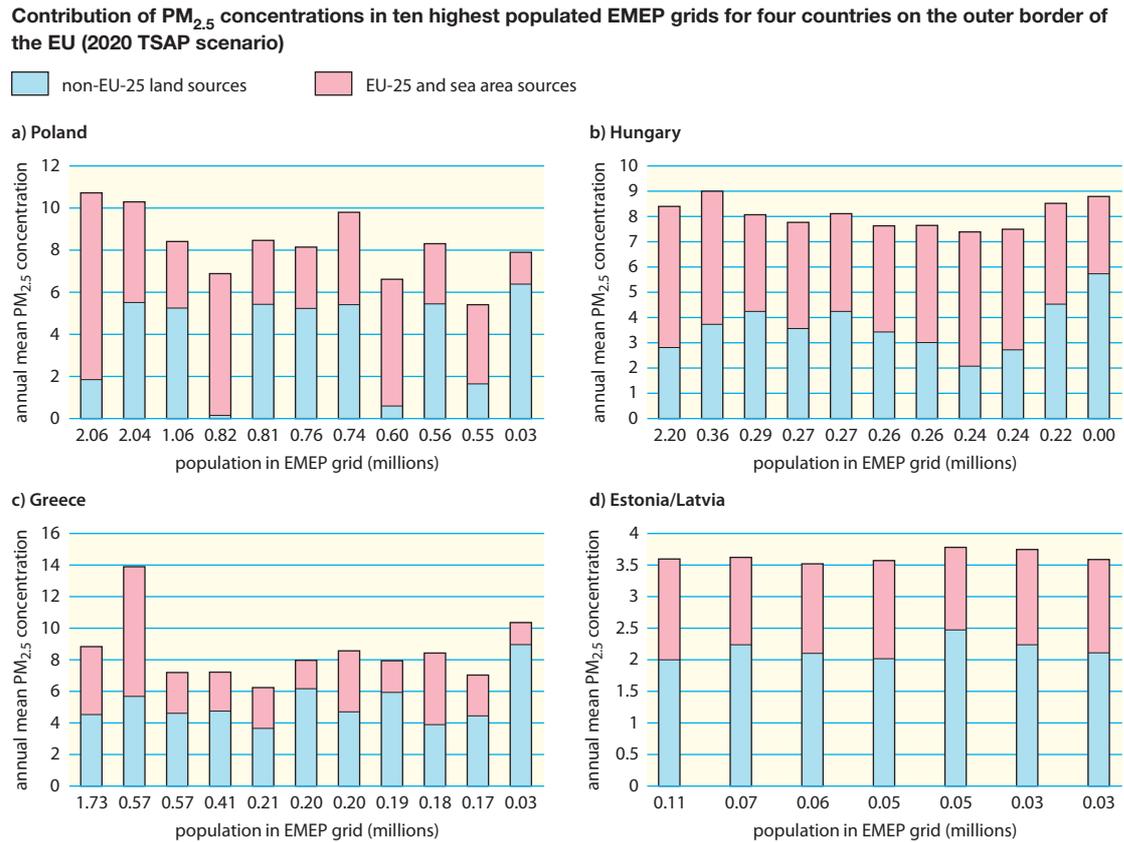
<sup>2</sup> Implied by the regression analysis of IIASA in developing their functional relationships.

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**Figure 2**

*Non-EU/non-sea area emission sources make a significant, and at times, dominating, contribution to overall concentrations of PM<sub>2.5</sub> in these four countries, which are on the outer border of the EU.*



desired reduction of the impact of exposure to PM<sub>2.5</sub> in EU-25 in the most cost-effective way. Individual country targets were not set as constraints but rather an overall EU target was established.

This does not mean that the exclusion of the significant 'uncontrolled' contributions depicted in Figure 2 is unimportant. Indeed, not allowing the IAM to look for cost-effective reductions in countries bordering the EU must, by definition, drive up the cost of delivering a given target for improvement, even if it is set only on an overall EU basis. The economic impact of this restriction will of course be more significant at higher ambition levels.

The analysis described above shows that we can learn helpful lessons from the original development of the NECD and the Gothenburg Protocols. The development of revised ceilings within the NECD review process would benefit from the inclusion of UN-ECE countries. At the very least the candidate countries to the EU should be included. This can only assist in ensuring the best alignment of two key EU goals: to be a leader in solving its environmental problems, a well as a strong competitor in the global market place.