



Assessing interim objectives for acidification, eutrophication and ground-level ozone of the EU National Emission Ceilings Directive with 2001 and 2012 knowledge



Jean-Paul Hettelingh^{a,*}, Maximilian Posch^a, Guus J.M. Velders^b, Paul Ruysenaars^c, Martin Adams^d, Frank de Leeuw^c, Anke Lükewille^d, Rob Maas^b, Johan Sliggers^b, Jaap Slootweg^a

^a Coordination Centre for Effects at RIVM, P.O. Box 1, 3720 BA Bilthoven, The Netherlands

^b RIVM – Centre for Environmental Monitoring, P.O. Box 1, 3720 BA Bilthoven, The Netherlands

^c European Topic Centre on Air Quality and Climate Change Mitigation at RIVM, P.O. Box 1, 3720 BA Bilthoven, The Netherlands

^d European Environment Agency, Kongens Nytorv 6, 1050 Copenhagen, Denmark

HIGHLIGHTS

- Air quality targets of the EU NEC Directive are met with 2001 scientific knowledge.
- Ground-level ozone targets are also largely met with 2012 scientific knowledge.
- Acidification and eutrophication targets are not met with 2012 knowledge.
- Eutrophication due to excess nitrogen remains a major environmental problem.

ARTICLE INFO

Article history:

Received 1 November 2012

Received in revised form

5 March 2013

Accepted 30 March 2013

Keywords:

Acidification
Air pollution
Critical loads
Eutrophication
NEC Directive
Ozone

ABSTRACT

The National Emission Ceilings Directive regulating European Union (EU) Member State emissions of acidifying and eutrophying pollutants as well as ozone precursors was adopted in 2001. Its interim environmental objectives, to be achieved in 2010, consist of a reduction of the exceedance of critical loads for acidification and eutrophication and of critical levels of ground-level ozone relative to 1990. Objectives for acidification and ground-level ozone were to be met in every single receptor grid cell in the European Union. For eutrophication, however, the target was to be met only for the EU area as a whole. Since 2001, reported emissions for 1990 and 2010 as well as knowledge and methodologies and for computing atmospheric dispersion and critical loads and levels have changed. In this paper, it is shown that acidification and eutrophication objectives are largely met when assessing them with the knowledge of 2001. However, with 2012 knowledge the interim objectives for acidification and eutrophication are not met in most of the EU. The objectives for ground-level ozone are met in most EU Member States with both 2001 and present (2012) knowledge, with the exception of the objective for forests, which was still not met in most Member States in 2010. Therefore, it seems prudent that science is employed also in the implementation phase of policy agreements.

© 2013 Elsevier Ltd. All rights reserved.

1. Introduction

In 2001 the European Parliament and the Council adopted the National Emission Ceilings (NEC) Directive regulating EU member state emissions of acidifying and eutrophying pollutants as well as

ozone precursors (EC, 2001). Interim objectives for environmental and human health, to be achieved by 2010, were formulated to help define emission reduction requirements in every member state. These objectives were set with the support of scientific methodologies and data available until 2001 for the computation of atmospheric dispersion and critical loads for the deposition of acidifying and eutrophying pollutants and critical levels for ground-level ozone (see, e.g. Bull et al., 2001) as developed since the late 1980s under the Convention on Long-range Transboundary

* Corresponding author. Tel.: +31 30 274 3048; fax: +31 30 274 4433.

E-mail address: jean-paul.hettelingh@rivm.nl (J.-P. Hettelingh).

Table 1
EU-27 emissions for 1990 and 2010, old and present knowledge (EEA, 2012b; UNECE, 2001).

Compounds, emissions (kton)	NH ₃	NM VOC	NO _x	SO _x
EU-27 1990 (old)	5270	19,315	17,028	27,139
EU-27 1990 (present knowledge)	5016	17,248	17,120	26,331
EU-27 projected 2010 (old) ^a	4294	8848	9003	8297
EU-27 realised 2010	3588	7389	9020	4536

^a NEC Directive 2010 ceilings.

Air Pollution (LRTAP). Using this scientific knowledge, non-exceedance of critical loads of acidification was to be achieved in more than 50% of terrestrial and aquatic ecosystem areas 'in each grid cell' of the dispersion model, compared to the situation in 1990 (EC, 2001, article 5a). The eutrophication target was, that the EU area (the 'community area') with depositions of nitrogen (N) in excess of the nutrient N critical loads was to 'be reduced by about 30% compared with the situation in 1990' (EC, 2001, Annex 1, footnote 1). Finally, ozone concentration objectives were set to diminish the risk of both health and vegetation effects: 'The

ground-level ozone load above the critical level for human health (AOT60 = 0) shall be reduced by two-thirds in all grid cells compared with the 1990 situation. In addition, the ground-level ozone concentration should not exceed an absolute limit of 2.9 ppm h in any grid cell' (EC, 2001, art. 5b). Finally, ozone objectives to reduce vegetation effects also consisted of two requirements: 'The ground-level ozone load above the critical level for crops and semi-natural vegetation (AOT40 = 3 ppm h) shall be reduced by one third in all grid cells compared with the 1990 situation.' In addition, the ground-level ozone for forests (AOT40) should not exceed an absolute limit of 10 ppm h (EC, 2001, art. 5c).

Scientific and technological knowledge used to assist in setting the above-mentioned objectives in 2001 ('old' knowledge) has improved since the adoption of NEC Directive. The frame of reference expressed in the Directive's text as 'the situation in 1990' was based on an integrated assessment of (a) 2001 estimates of historical emissions for 1990 and projections for 2010, (b) a dispersion model version available in 2001 computing only *average* depositions and concentrations on a 150 × 150 km² grid cells targeting 15 (instead of the current 27) Member States and (c) the European critical loads database of 1998 addressing mostly

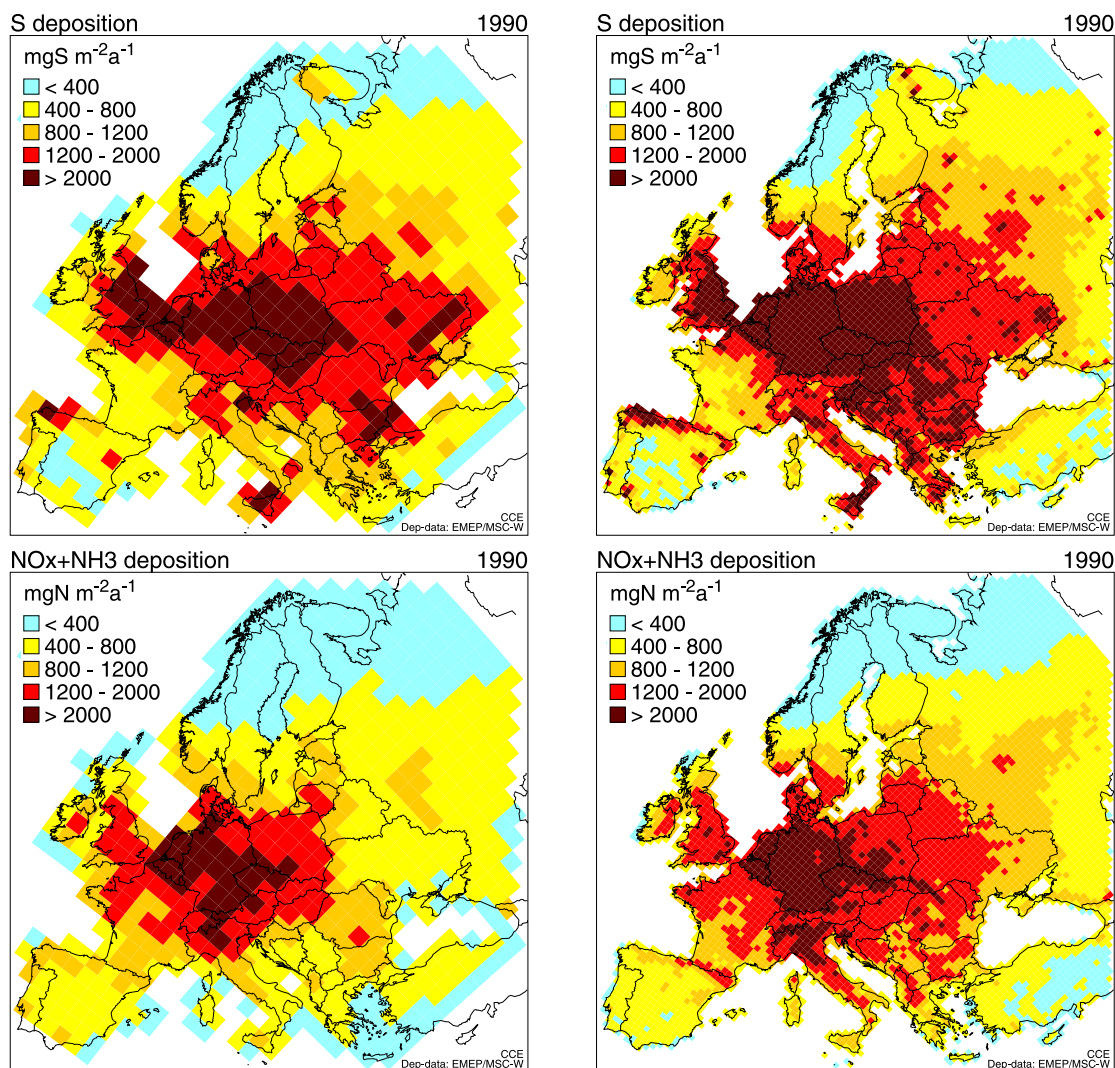


Fig. 1. Total (wet + dry) grid-average deposition of sulphur (top) and of oxidized + reduced nitrogen (bottom) in 1990, computed with old (Lagrangian model; left) and present knowledge (Eulerian model; right).

Download English Version:

<https://daneshyari.com/en/article/6341855>

Download Persian Version:

<https://daneshyari.com/article/6341855>

[Daneshyari.com](https://daneshyari.com)