Health Care Without Harm

Health & Environment Alliance

ACTING NOW FOR BETTER HEALTH

A 30% REDUCTION TARGET FOR EU CLIMATE POLICY

Authors

Technical report: Mike Holland, Ecometrics Research and Consulting (EMRC)

Policy position statement: Health and Environment Alliance and Health Care Without Harm Europe

Responsible Editors: Génon Jensen, Executive Director, Health and Environment Alliance (HEAL) and Anja Leetz, Executive Director, Health Care Without Harm Europe (HCWH Europe).

Lead Authors (Writing and research): Pendo Maro, Senior Climate and Energy Advisor, HCWH/HEAL; Diana Smith, Communications Adviser, HEAL; and Antonin Acquarone, Climate Intern, HEAL.

Technical advisory group: Mike Gill and Robin Stott, Climate and Health Council (CHC); Michael Wilks, Climate Adviser and former President of the Standing Committee of European Doctors (CPME); Jon Ayres, European Respiratory Society (ERS) (initial review process); Hanns Moshammer, International Society of Doctors for the Environment (ISDE), and Dave Stone, Natural England.

Editorial advisory group: Jason Anderson, European Climate and Energy Policy, WWF-EPO; Tomas Wyns and Ulriikka Aarnio, Climate Action Network Europe (CAN-E); Stephen Boucher and Tim Nuthall, European Climate Foundation (ECF); Gill Erskine and Génon Jensen, HEAL; Anja Leetz and Josh Karliner, HCWH; and Mary Taylor.

Design: www.arccomms.co.uk

Printing: Primerveraquint.
Printed on 100% post consumer waste with vegetable based inks.

HCWH Europe and HEAL thank the European Climate Foundation, the Rockefeller Brothers Fund and DG Environment of the European Commission for their financial support for the production of this report and our climate work. The views expressed in this document do not necessarily reflect the official views of these institutions.

www.env-health.org and www.noharm.org/europe/

Published in September 2010

The report forms part of a joint campaign launched in Europe by Health Care Without Harm (HCWH) and Health and Environment Alliance (HEAL) in 2009 aimed at bringing attention to the substantial benefits to health of reductions in greenhouse gas emissions associated with climate change policy.

The campaign activities have included advocacy at the EU and international level and the creation of the ***Prescription for a Healthy Planet (see page 18-19)***.

At the climate change negotiations in Copenhagen in December 2009, HEAL and HCWH led a top-level health delegation which called on leaders to avert a global public health crisis by taking urgent action to combat climate change.

The current study builds on research commissioned by HEAL and published jointly with Climate Action Network Europe (CAN-E) and WWF in September 2008: ***The co-benefits to health of a strong EU climate change policy.***

HEAL has shown a strong track record in bringing knowledge about the impact of climate change on health to the forefront of the negotiations at EU and international levels, engaging public health and health professional communities, particularly in Europe. In 2007, HEAL published a briefing which reviewed the latest scientific evidence on climate change and health from the Intergovernmental Panel on Climate Change (IPCC). This laid the basis for building policy recommendations, focusing on protecting the most vulnerable groups and considering win-win-win scenarios for public health, adaptation and mitigation, such as promoting stricter air quality standards and energy saving and energy efficiency policies as a means to reducing greenhouse gas emissions.

Through its work with the World Health Organization in facilitating World Health Day on climate change in 2008, HEAL helped to share health concerns about climate change with major stakeholder groups around the world, including via international organisations of medical professionals, patients, youth and specialist journalists.

HEAL advocacy work aims to improve the understanding of the impact of climate change - and climate change policy - on people's health and preventing ill-health, particularly that of children and those with respiratory problems. Information, resources and partnerships are provided for groups such as the European Respiratory Society, European Lung Federation and European Federation of Allergy and Airway Diseases Patients Association with materials tailored to their needs.

HCWH's work extends to advocacy efforts on climate and health at global level. Together with the World Health Organization, it launched a report entitled ***Healthy Hospitals, Healthy Planet, Healthy People: Addressing Climate Change in Health Care Settings.*** This makes the case for health sector leadership and highlights hospitals and clinics in over 30 countries that are modelling efficiency, resilience, and renewable energy strategies.

In the past two years, HCWH has launched a comprehensive energy and climate strategy for the healthcare sector and begun to position healthcare organisations and providers as a leading sector in addressing the climate crisis. HCWH provides the healthcare sector around the world with the information, resources and tools to assess and improve its energy and water efficiency, transportation policy, and other climate-related practices, thereby modelling climate mitigation policies and strategies and reducing the health sector's climate footprint. Our activities are particularly strong in Europe, the United States, with work developing in Asia and Latin America.

Contents

Introduction

The impact on health of climate change will be felt everywhere, including in Europe. A Commission set up by the leading medical journal, The Lancet, concluded in 2009 that "Climate change is the biggest global health threat of the 21st century[1]."

The greatest impact will be caused by malnutrition, diarrhoea and extreme climate events in poor regions of the world. However, an increase of more than 2 degrees Celsius in average temperature would result in negative health impacts in all regions. Heat waves would be one of the largest climate change threats in the developed world[2].

Records show average temperatures climbing. The year 2005 was the warmest since modern record keeping began, according to the US National Aeronautics and Space Administration (NASA). 2009 was the second warmest; only a fraction of a degree cooler than 2005, and similar to the annual temperature in a cluster of other years — 1998, 2002, 2003, 2006 and 2007[3].

The future burden and costs of the impact on public health resulting from climate change are challenging to measure. However, many policies aimed at combating climate change have indirect benefits for health aside from the direct benefits that avoiding global warming would bring. For example, 'active transport' where people walk or cycle more and use their cars less, reduces greenhouse gas emissions and leads to reductions in cardiovascular disease and cancer through improved fitness. Cleaner sources of energy use in industry and transport reduce greenhouse gas emissions and also reduce the levels of certain other air pollutants. Cleaner air benefits everyone's health and especially those with asthma or other respiratory or cardiac conditions.

This report addresses the benefits for health of reducing levels of these air pollutants which takes place as greenhouse gas emissions fall.

The analysis makes the case for the European Union stepping up its current 20% target in greenhouse gas emissions by 2020 (from 1990 levels) to a 30% domestic target. It shows additional health benefits beyond 20% estimated at between €10.5 billion and €30.5 billion per year by 2020 by commitment to the extra mitigation effort. This is equivalent to between €21 and €60-worth of health savings for each person in the EU27 countries per year in 2020.

The upper estimate of the health benefits at €30.5 billion per year in 2020 is equivalent to roughly two-thirds of the European Commission's own estimate of the implementation costs of the internal 30% target. The Commission puts the additional cost at €46 billion per year in 2020, equivalent to 0.3% of GDP[4].

The estimated health benefits produced for this report cover morbidity as well as mortality and include figures on health savings for individual EU countries. This goes beyond any previous analyses from other organisations, including the European Commission and the World Health Organization. These first-ever figures on health benefits for different EU Member States show that some countries would benefit by several billion Euros per year by 2020.

Finally, the study shows that acting immediately on climate policy will produce greater benefits for health. The analysis contrasts the much higher benefits for health of starting implementation of the 30% target now compared with those accruing should action be delayed.

1 Horton, R (2009). *The climate dividend*. The Lancet 374:1869 – 1870, http://www.thelancet.com/series/health-and-climate-change (accessed 14.08.2010)

2 Sunyer, J (2010). *Geographical differences on the mortality impact of heat waves in Europe.* Environmental Health 9:38, http://www.ehjournal.net/content/pdf/1476-069x-9-38.pdf (accessed 14.08.2010)

3 National Aeronautics and Space Administration, NASA. *Second Warmest Year on Record; End of Warmest Decade*. NASA Research News, Jan 21, 2010. http://www.giss.nasa.gov/research/news/20100121/ (accessed 14.08.2010)

4 European Commission Communication, May 2010, COM (2010) 265 final. Analysis of options to move beyond 20% greenhouse gas emission reductions and assessing the risk of carbon leakage. http://ec.europa.eu/environment/climat/pdf/2010-05-26communication.pdf (accessed 14.08.2010)

Most policies aimed at combating climate change also benefit health.

The report is divided into two parts:

A **policy position statement** highlighting the study findings and their significance, key messages for policy makers and policy recommendations.

A **technical report** explaining the rationale, the methodology, the detailed results, the conclusions that can be drawn from the findings and an appendix of results by country.

As well as making the case for EU and Member State politicians and policy makers to support the move to a 30% domestic target on greenhouse gas emissions, this report re-frames the climate debate from a 'cost' to a 'benefit' perspective. It quantifies a part of the health gains for Member States and European citizens of strong climate change policy.

Génon Jensen

Executive Director

Health and Environment Alliance (HEAL)

Anja Leetz

Executive Director

Health Care Without Harm Europe (HCWH Europe)

HEAL and HCWH Europe have commissioned this report to provide estimates of the health co-benefits for specific EU countries of moving to a 30% internal target on reductions in greenhouse gases.

Written by a leading European consultant, the analysis quantifies the mainly respiratory health benefits for European Member States and citizens of the European Union moving to the higher target.

The findings go beyond previous analyses and further strengthen the case for greater EU leadership in climate change policy that puts peoples' health first.

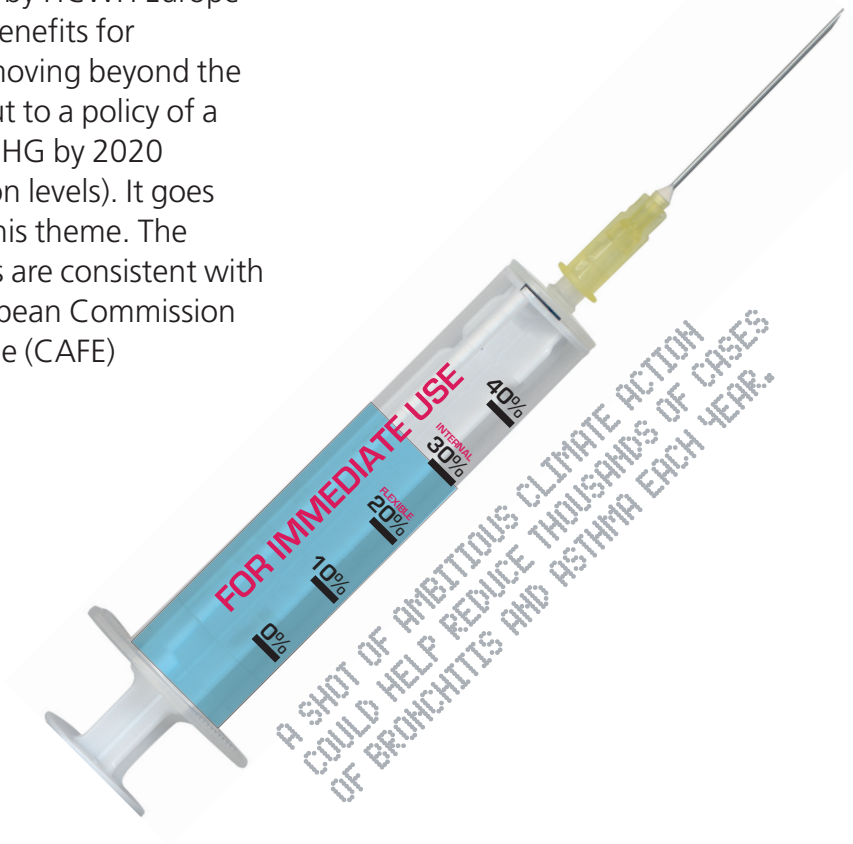
Policy position statement

A new study by Health Care Without Harm Europe (HCWH Europe) and the Health and Environment Alliance (HEAL) quantifies the important health co-benefits of moving to a 30% EU emission reduction target and offers recommendations for European policy makers.

The co-benefits to health measured in the technical report (see page 20) arise through the reduction in emissions of specific air pollutants resulting from measures directed primarily at reducing greenhouse gas (GHG) emissions and hence climate impacts. As GHG emissions fall, levels of other non-GHG air pollutants also reduce. As a result, air quality improves, with recognised, measurable health benefits.

The study was commissioned by HCWH Europe and HEAL to explore the co-benefits for European citizens of the EU moving beyond the current EU policy of a 20% cut to a policy of a 30% domestic reduction in GHG by 2020 (compared with 1990 emission levels). It goes beyond previous reports on this theme. The methods used for the analysis are consistent with those developed for the European Commission under the Clean Air for Europe (CAFE) Programme.

This report provides the first-ever figures on the extent to which health in individual countries would benefit as a result of the European Union showing leadership on climate action.



Findings

EU health benefits

The results show that the health co-benefits of a move from the current European Union target of a 20% emissions reduction to a 30% domestic target are in the range of an additional €10 to €30 billion per year by 2020. This is equivalent to an extra €21 - €60-worth of annual health savings - or ill-health avoided - due to cleaner air for each person in the EU.

These benefits are in addition to those already anticipated for the achievement of the 20% reduction in emissions, estimated at up to €52 billion for the year 2020[5].

The calculation of health benefits takes into account anticipated improvements in life expectancy, respiratory and cardiac health, reductions in hospital admissions, chronic respiratory disease, asthma attacks and various other respiratory and cardiac conditions, and the reduction in days of restricted activity due to respiratory health problems.

Specifically, the monetary estimate is built on cost calculations of the following additional health improvements:

- 140,000 additional years of life (due to an increase in life expectancy)
- 13 million fewer days of restricted activity (including 3 million fewer lost working days annually) for those with respiratory or cardiac diseases
- 1.2 million fewer days of respiratory medication use by adults and children
- 142,000 fewer consultations for upper respiratory symptoms and asthma each year
- 3,776 fewer hospital admissions for respiratory and cardiac conditions.

(See Technical Report, Table 2 for further information.)

The benefits for those with existing respiratory and cardiovascular problems would be significant for both citizens and governments. For example, in terms of working days lost, the estimate indicates annual savings by 2020 of 3 million working days. This is equivalent to an additional 13,000 employees working roughly full time in the EU countries during the year 2020.

The beneficial health effects that contribute most to overall costs are the avoidance of premature death, restricted activity days, chronic bronchitis and other lower respiratory disease.

5 (HEAL, CAN Europe, WWF (2008). The co-benefits to health of a strong EU climate change policy. http://www.env-health.org/IMG/pdf/Co-benefits_to_health_report_-september_2008.pdf)

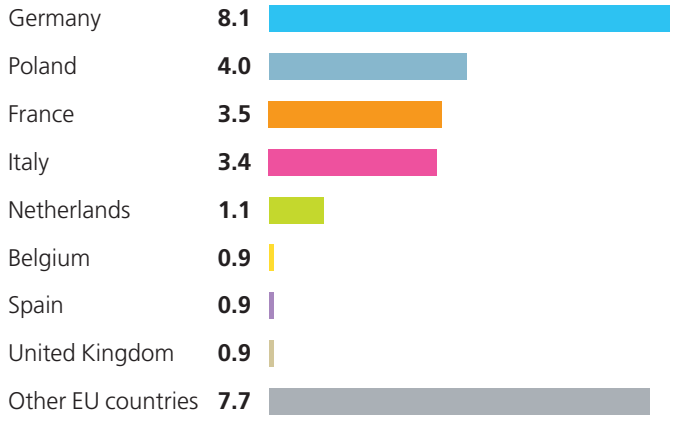
Anticipated health savings are estimated at up to €30.5 billion per year by 2020. This is equivalent to approximately 0.2% of current EU GDP.

National health benefits

Detailed figures are given on the cost savings for both the EU and for eight Member States. Among these countries, France, Germany, Italy, Poland and the Netherlands are estimated to benefit most (from €1.1 billion to €8.1 billion per year by 2020). Belgium, Spain and the United Kingdom are expected to benefit by up to €900 million per year by 2020. Some small countries, such as Luxembourg, would benefit most in terms of benefits per head of population. (See technical report for further details.)

Chart 1: Health benefits for EU27 countries

Benefits per year by 2020 (upper bounds in €billions):



Total **30.5 (all EU Countries)**

ASTHMA ATTACKS ARE MORE FREQUENT WHEN THE AIR IS POLLUTED. REDUCING GREENHOUSE GASES CAN IMPROVE HEALTH.

Greater benefits by acting now

The report also establishes that significantly more benefits can be achieved by implementing a 30% domestic target immediately rather than later. Improvements in air quality, and thus in health, start to accrue as soon as implementation begins. The technical report shows that the cumulative benefits to health by 2020 of starting implementation now are more than twice as high (250%) as if action begins in 2015.

Chart 2: Early action brings more health savings

Achieving 30% domestic reductions in greenhouse gas emissions	Benefits	Percentage benefit
Action starts today	€163 billions	100%
Action starts in 2015	€63 billions	39%

Note: The cumulative benefits range (lower and upper estimates) is from €22-63 billion if action starts in 2015 as against €58-163 billion if action is started in 2010.

The cumulative benefits to health of starting implementation now are more than twice as high as if action begins in 2015.

Health benefits are twice as high if the 30% internal or domestic target is chosen rather than what the EU calls "30% with flexibility."

Importance of 30% 'internal' target

The analysis underlines the European Commission's findings that health benefits for EU Member State are higher if the 30% target is entirely for domestic actions rather than allowing 'offsetting', in which some of the reductions in greenhouse gas emissions occur in countries outside the EU. The technical report shows health benefits are twice as high if the 30% internal target is chosen.

Chart 3: No 'offsetting' is better for health

Health co-benefits of moving to 30% GHG reductions	30% flexible target (allows 5% of reductions to be achieved in non-EU countries)	30% internal (domestic) target
Mortality only	€3.5 to 8.1 billion	€7.3 to 16.7 billion
Mortality and morbidity	€5 to 14.6 billion	€10.5 to 30.5 billion

REDUCTIONS IN EMISSIONS MUST TAKE PLACE INSIDE THE EU TO MAXIMISE THE BENEFITS OF CLEANER AIR FOR HEALTH.

Comparing health benefits with implementation costs

The results of our study measure the health co-benefits, or 'side effects' for health, of cleaner air resulting from moving from the current 20% target on reducing greenhouse gas emissions to a 30% internal target.

The health gains measured in the study represent only the tip of the iceberg of overall benefits. They do not take into account the wider impacts of climate change on health caused by phenomena such as heat-weaves, floods, droughts and reduced food production. Nor do they take into account a raft of other health co-benefits, such as the health savings associated with climate policy to reduce private car use and more walking and cycling, which would reduce cardiovascular disease, diabetes, cancer and depression[6].

Nevertheless, the estimated savings are significant compared to costs of implementing the rise to a 30% target.

A Communication from the European Commission (May 2010)[7] estimated that the total additional cost for the EU to step up from the 20% to a 30% domestic target in GHG reductions would be around €46 billion by 2020, or 0.3% of GDP. This compares with our estimates of co-health benefits within the EU from reduced air pollution (excluding the direct benefits to health of climate protection) of up to €30.5 billion.

Similarly, the European Commission estimates the costs of moving to a 30% 'flexible' target - the one to which the Commission most frequently refers - at €33 billion. This compares with our study estimate on savings of up to €14.6 billion.

The European Commission makes clear in its Communications that it does not take into account the health co-benefits of climate change in its estimates on costs. It also acknowledges that its current projections are much less than previous estimates. Scientific reviews show that the forecasts for pollution control legislation are frequently overestimated significantly[8].

Our estimated health savings are only the tip of the iceberg of the real health benefits of avoiding climate change.

6 The Lancet Series, Health and Climate Change, November 2009, "Public health benefits of strategies to reduce greenhouse gas emissions: urban land transport", http://www.thelancet.com/series/health-and-climate-change (accessed 13.08.2010)

7 European Commission Communication, May 2010, COM (2010) 265 final. Analysis of options to move beyond 20% greenhouse gas emission reductions and assessing the risk of carbon leakage. http://ec.europa.eu/environment/climat/pdf/2010-05-26communication.pdf (accessed 14.08.2010)

8 Watkiss P, Baggot S, Bush T, Cross S, Goodwin J, Holland M, Hurley F, Hunt A, Jones G, Kollamthodi S, Murrells T, Stedman J and Vincent K (2004) An Evaluation of the Air Quality Strategy, for Defra http://www.defra.gov.uk/environment/quality/air/airquality/publications/stratevaluation/

Key Messages

- **Moving from the current 20% EU emission reduction target to a 30% internal emission reduction target would result in substantial positive effects on public health in the Member States**

The study analysis shows that savings resulting from the avoidance of premature death due to air pollution, days lost to ill-health, hospital admissions, medical consultations and medication would total up to €30.5 billion per year in 2020. Health benefits for individual Member States are estimated at up to €8.1 billion (Germany) and €4 billion (Poland). These savings are more than 50% higher than the benefits already anticipated as a result of the implementation of the 20% emissions cut, estimated at up to €52 billion in 2020. (Figures on national health benefits resulting from the 0-20% emission reductions are not available.)

- **The benefits to public health of action on climate change quantified in this report are roughly two-third the costs of implementing a 30% domestic target on greenhouse gas emissions**

The European Commission estimates the cost of moving from the 20% to the 30% internal target at €46 billion per year in 2020. Our technical report estimates the additional co-benefits for health of the 30% domestic target at up to €30.5 billion per year in 2020[9].

The estimate from our analysis is most conservative; it assesses only a small proportion of overall health benefits arising from climate policies. It does not take into account the health benefits of avoiding climate change nor the co-benefits of other climate change policy, such as 'active transport', which would produce gains for cardiovascular disease, diabetes, cancer and depression[10], which would increase the benefits further.

- **Failure to act now means foregoing potential benefits**

Beginning to move to the 30% target earlier rather than later brings much greater benefits. By way of illustration, if action starts in five years time, instead of today, it will mean the loss of more than half the health benefits. On the basis of the upper estimate of health benefits, €100 billion-worth of health benefits would be lost. The cumulative health benefits of acting immediately will reach €163 billion in 2020 compared with only €63 billion if action is delayed until 2015. Thus, by acting now instead of delaying until 2015, the future health benefits are more than doubled.

- **Health benefits are spread throughout EU countries**

The health benefits of moving to 30% domestic emission cuts in the EU will be spread across EU countries. The analysis shows that some countries stand to benefit more than others and that positive benefits are conclusive for almost all countries. Translated into monetary terms, these could result in important health-cost savings. (For full details, see Technical report, Figure 3 and Appendix 1.)

The findings should prompt much greater focus on the health benefits of stronger EU action on climate change.

9 European Commission Communication, May 2010, COM (2010) 265 final. Analysis of options to move beyond 20% greenhouse gas emission reductions and assessing the risk of carbon leakage. http://ec.europa.eu/environment/climat/pdf/2010-05-26communication.pdf (accessed 14.08.2010)

10 The Lancet Series, Health and Climate Change, November 2009, "Public health benefits of strategies to reduce greenhouse gas emissions: urban land transport", http://www.thelancet.com/series/health-and-climate-change (accessed 13.08.2010)

Air pollution can make existing heart conditions worse and can cause cardiovascular problems amongst vulnerable groups.

- **A 30% domestic or 'internal' reduction in greenhouse gas emissions brings bigger health benefits**

By opting for the internal 30% target on emission reductions (i.e., without offsetting), the future health benefits are doubled. Health benefits for the internal 30% target are estimated to be in the range of €10.5 - €30.5 billion Euros per year in 2020 compared with benefits associated with a 'flexible' 30% target of only €5 - 14.6 billion.

- **Citizens' well-being and the costs of healthcare should be highlighted in climate change discussions**

Protecting public health through strong climate change policy will increase life expectancy and bring about a quality of life in which the air is cleaner and ill-health and discomfort associated with poorer air quality is reduced.

- **Governments can avoid some of the major financial burden of future ill-health**

Currently, healthcare spending on respiratory disease in the EU countries averages €95 per capita per year[11]. According to the European Lung Foundation, the burden from respiratory diseases on the healthcare budgets within the EU is approximately €47.3 billion[12]. These direct costs of respiratory diseases are estimated to make up approximately 6% of the total healthcare budget.

The annual economic burden of respiratory diseases in Europe is estimated to be approximately €102 billion or €118 per person. This figure takes into account work days lost as well as hospital and other medical costs[13]. It does not take into account the value of days of restricted activity due to ill health but which may not be "working days".

The European Commission's recent Communication estimated that 230,000 people would die prematurely following exposure to air pollution each year by 2020. Premature deaths, health care and medication associated with air pollution were estimated at the equivalent of 1.5-4 per cent of EU Gross Domestic Product[14].

Such considerations are important to the design of climate change and other policies, particularly within the context of an aging European population and rising healthcare costs.

11 The four major respiratory diseases: chronic obstructive pulmonary disease (COPD), asthma, pneumonia and tuberculosis (TB). Inpatient costs are estimated at €17.8 billion and outpatient care €9.1 billion; prescription drugs €6.7 billion and premature mortality and rehabilitation €20.0 billion.

12 European Lung Foundation. Lung diseases: Economic impact. http://www.european-lung-foundation.org/index.php?id=155 (accessed 13.08.2010)

13 European Lung Foundation. Lung diseases: Economic impact. http://www.european-lung-foundation.org/index.php?id=155 (accessed 13.08.2010)

14 European Commission Communication, May 2010, COM (2010) 265 final. Analysis of options to move beyond 20% greenhouse gas emission reductions and assessing the risk of carbon leakage . http://ec.europa.eu/environment/climat/pdf/2010-05-26communication.pdf

- **Investment in climate change policy promotes productivity through better health**

Moving to a 30% domestic target will additionally avoid almost 3 million working days lost annually to respiratory disease. Investing in health is investing in long-term human capital.

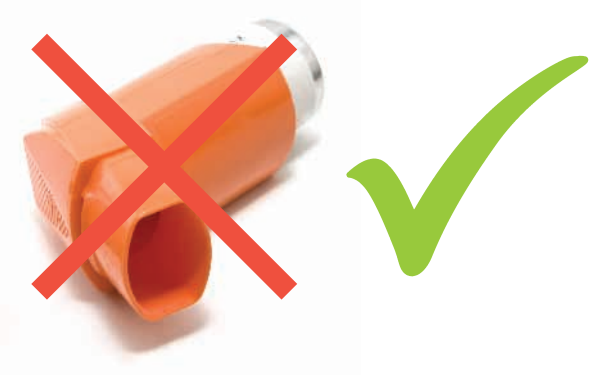
A healthy society and active workforce will be key determinants of sustainable development, productivity and economic growth and thus is a key condition to deliver the EU's 2020 Strategy.

- **Investment in climate change policy brings other benefits**

Early action on further reductions in greenhouse gas emissions will also ease the regulatory burden on EU countries. The higher target on climate change policy would contribute to health and environment objectives of the 2005 Thematic Strategy on Air Pollution by bringing forward the date of compliance with existing air quality legislation. The European Commission Communication[15] in May 2010 estimated that the fall in emissions of SO_2, NO_x and fine particles (PM) that are the subject of this report would lead to reductions in air pollution control costs of €5.3 billion per year.

Employment in green jobs and 'environment-friendly' sectors would also expand more quickly.

CLEANER AIR MEANS LESS USE OF INHALANTS - AN IMPORTANT CONSIDERATION IN AN ERA WHEN THE NUMBER OF CHILDREN AND YOUNG PEOPLE WITH ASTHMA IS RISING.



15 European Commission Communication, May 2010, COM (2010) 265 final. Analysis of options to move beyond 20% greenhouse gas emission reductions and assessing the risk of carbon leakage . http://ec.europa.eu/environment/climat/pdf/2010-05-26communication.pdf

Policy Recommendations

1. Show Leadership

The EU can and should take a leadership role to address climate change and keep global temperatures to below 2°C.

The move to a 30% domestic target should be seen as a first step towards an emission reduction target of at least 40% by 2020 for all industrialised countries, consistent with keeping global temperatures to well below 2°C as suggested by the IPCC.

2. Make health central to discussions

EU leaders should formally commit to a domestic target of reducing emissions by 30% by 2020 (compared to 1990 levels) and acknowledge the public health co-benefits of such a move arising from the reduction in emissions of regional air pollutants linked to the cut in GHGs.

3. Act Now!

By starting immediately to implement the 30% target, the EU can increase the health co-benefits by 250% as compared with action in five years' time or later.

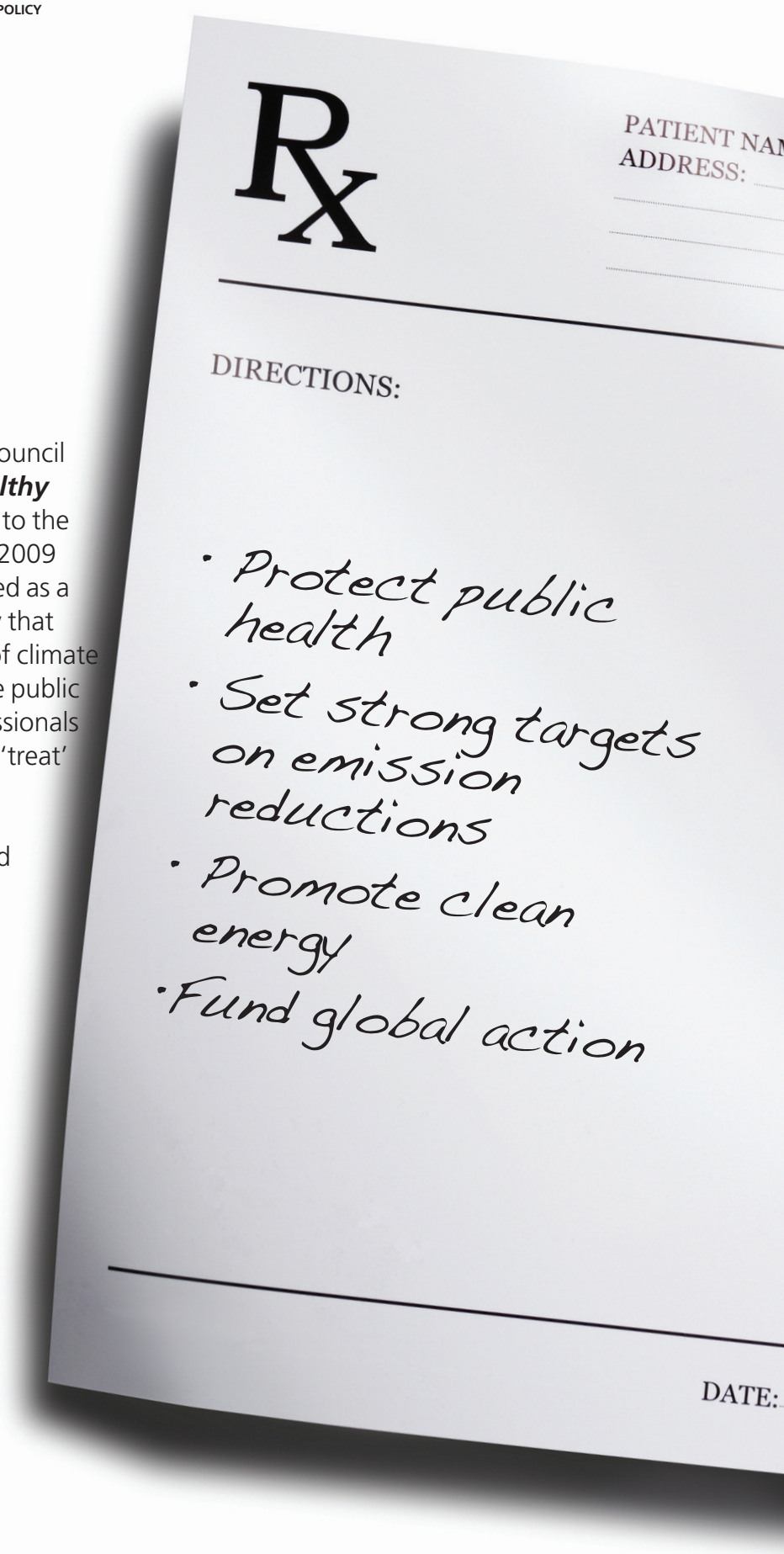
The report shows detailed figures on the cost savings for eight Member States. Among these countries five (France, Germany, Italy, Poland and the Netherlands) are estimated to benefit most. Belgium, Spain and the United Kingdom are expected to benefit by up to €900 million per year by 2020.

Premature deaths, healthcare and medication associated with air pollution are estimated at the equivalent of 1.5 - 4 per cent of EU Gross Domestic Product.

Health groups 'prescribe' on climate change

HEAL, HCWH and Climate and Health Council (CHC) launched ***Prescription for a Healthy Planet*** to bring the health community into the Copenhagen negotiations in December 2009 and beyond. The ***Prescription*** is intended as a clear roadmap for the health community that sets out the magnitude of the problem of climate change, highlights the unique role of the public health community and healthcare professionals in addressing it, and provides options to 'treat' climate change through policy recommendations. Already more than 200 organisations and individuals around the world have signed up.

To protect human and environmental health, the world's governments must take urgent action to drastically reduce worldwide emissions by 2050.



The clock is ticking. The time for action is now!

The following is an extract from the Prescription for a Healthy Planet. For full details visit www.climateandhealthcare.org where you can add your voice to bring health into the climate negotiations!

- **Protect Public Health**: Take into account the significant human health dimensions of the climate crisis along with the health benefits of climate change mitigation policies. In conjunction with this, a portion of climate mitigation and adaptation funds should be targeted for the health sector. This is needed to ensure evidence of the health impacts of climate change is continuously updated and brought to policy makers, so that the health sector can adapt to the health impacts of climate change while reducing its own climate footprint. To ensure a strong voice in the debate, the health sector should also be adequately represented on all national delegations to the climate negotiations.
- **Transition to Clean Energy**: A viable accord must promote solutions to the climate crisis that move away from coal, oil, gas, nuclear power, waste incineration and fossil-fuel-intensive agriculture. The treaty should foster energy efficiency as well as clean, renewable energy to improve public health by reducing both local and global pollution.
- **Reduce Emissions:** In order to protect human and environmental health, the world's governments must take urgent action to drastically reduce worldwide emissions by 2050. Over the next decade, developed countries must significantly reduce their greenhouse gas emissions below 1990 levels. Developing countries must also commit to stabilising and reducing their emissions.
- **Finance Global Action:** A fair and equitable agreement should also provide new and additional resources for developing countries to reduce their climate footprint and adapt to the impacts of climate change.

www.climateandhealth.org

Health & Environment Alliance

Health Care Without Harm

Climate and Health Council

Technical report:

The benefits for public health in Europe of moving to a 30% target for EU climate policy

A Communication from the European Commission in May 2010 provides estimates of the additional costs of moving beyond the current 20% target for reducing EU greenhouse gas (GHG) emissions by 2020 to a reduction of 30%[16]. It also addresses some of the benefits that arise as 'side effects' of a stronger climate change policy, known as 'co-benefits', which are the focus of this report.

This paper considers the co-benefits from reduced levels of air pollution on human health. These arise through a reduction in emissions of air pollutants - fine particles (PM), nitrogen oxides (NO_x) and sulphur dioxide (SO_2) - linked to reductions in CO_2 emissions. As CO_2 emissions fall, these three pollutants, which, like CO_2, are associated primarily with energy use by sectors such as industry (including power generation) and transport, also fall. The Communication estimates the associated reduction in mortality effect at between €7.3 and €16.7 billion/year more for a 30% internal GHG cut in the EU (see Table 1) compared to a 20% cut. Two alternate scenarios are described for the 30% case. In the first, described as '30% with flexibility', there is a 25% cut in GHG emissions within the EU whilst the remaining 5% is achieved by financing equivalent cuts in other regions of the world. The second case deals with a 30% cut in GHG emissions within the EU (the '30% internal' case).

Table 1. Impacts on air pollution and air pollution control costs. Source: European Commission

Change compared to reference case	30% with flexibility	30% internal
SO_2 emissions, kilotonnes (kt)	-199	-424
NO_X emissions (kt)	-171	-350
$PM_{2.5}$ emissions (kt)	-27	-54
Air pollution reduction (sum SO_2, NO_X and $PM_{2.5}$)	4%	9%
Health co-benefit (€$_{08}$ billion/year) (mortality only)	€3.5 to 8.1	€7.3 to 16.7
Reduced air pollution control costs (€$_{08}$ billion/year)	€2.8	€5.3

16 Commission Staff Working Document accompanying the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, May 2010, COM (2010) 265 final. *Analysis of options to move beyond 20% greenhouse gas emission reductions and assessing the risk of carbon leakage. Background information and analysis.* Analysis of options to move beyond 20% greenhouse gas emission reductions and assessing the risk of carbon leakage.

Evidence that the health co-benefits from improved air quality are real and substantial comes from an extensive and growing literature which has been reviewed by the World Health Organization (WHO), the United States Environmental Protection Agency (US EPA) and other bodies, all of which have reached broadly similar conclusions and informed the positions taken in the current paper. Some of the clearest demonstrations of the link between health and air quality comes from 'intervention studies' in which a sudden reduction in air pollution affecting a city or region is mirrored by an improvement in health. Notable examples include studies in Dublin and Hong Kong[17]. Particularly compelling are the results of population health monitoring in Dublin after the ban on coal burning in 1990, which showed substantial reductions in respiratory ill-health. Improvements in air quality in parts of the USA during the 1980s and 1990s have been estimated to be responsible for as much as 15% of the overall increase in life expectancy observed for the studied populations[18].

The Commission's paper also shows a co-benefit to industry of the stricter target on emissions. These reduced costs for air pollution control are estimated at up to €5.3 billion per year. The estimate of reduced emissions of NO_x shown in Table 1 is also of significant policy interest as Member States are currently struggling to meet existing legislation on this pollutant. Information gathered by the European Environment Agency[19] suggests that, overall, the EU27 will overshoot the NO_x ceiling by 522 kt. The 350 kt saving seen above in the 30%-internal GHG scenario would compensate for two-thirds of this figure.

A previous report produced for HEAL in late 2008 made successful use of the earlier European Commission assessment (published in February 2008) to estimate the co-benefits to health of a 30% emissions target rather than the 20% emissions target investigated by the Commission[20]. It estimated health co-benefits of between €6 and €25 billion per year from 2020 onwards for a 30% target, additional to benefits of between €13 and €52 billion/year by adopting the 20% target. It is notable that the results from the Commission paper in May 2010 indicate that our original estimates were too cautious and, as the results below will show, underestimated the latest estimates of the change in health impacts by approximately 25%[21].

What this Technical Report provides

The Commission's new Communication covers health co-benefits of mortality but not of morbidity (diseased condition or state). Nor does it provide a breakdown of impacts by Member State.

This Technical Report provides the added health benefits of moving from the 20% cut to the '30% with flexibility' and '30% internal' cases. It also provides additional information to that presented in the EC's new communication, as follows:

1. Estimates of health impacts including morbidity (ill health) as well as mortality
2. The economic equivalent of these effects
3. A breakdown of economic impact by Member State
4. Estimates of the cumulative health co-benefits of taking early action.

17 Dublin: Clancy L, Goodman P, Sinclair H and Dockery DW (2002). *Effect of air-pollution control on death rates in Dublin, Ireland: an intervention study.* Lancet, 360, 1210-4.

Hong Kong: Hedley AJ, Wong CM, Thach TQ, Ma SLS, Lam TH, Anderson HR (2002). *Cardio-respiratory and all-cause mortality after restrictions on sulphur content of fuel in Hong Kong: an intervention study.* Lancet 360, 1646-1652.

18 Pope CA III, Ezzati M and Dockery DW (2009). *Fine-particulate air pollution and life expectancy in the United States.* New England Journal of Medicine 360, 376-386.

19 European Environment Agency (2009). *Reporting by the Member States under Directive 2001/81/EC of the European Parliament and of the Council of 23 October 2001 on national emission ceilings for certain atmospheric pollutants.* Technical report No 11/2009. http://www.eea.europa.eu/publications/nec-directive-status-report-2008

20 HEAL, CAN Europe, WWF (2008). *The co-benefits to health of a strong EU climate change policy.* http://www.env-health.org/IMG/pdf/Co-benefits_to_health_report_-september_2008.pdf

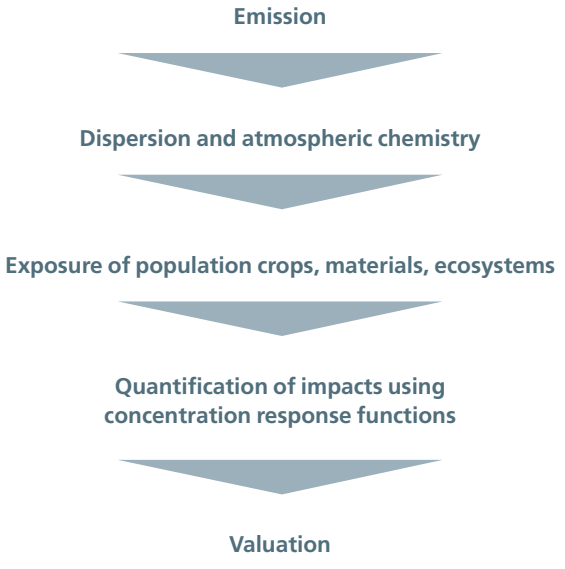
21 This underestimation is based on comparison of mortality impact estimates. For valuation we apply a broader range than the Commission (though one that better reflects the Commission's own approved methodology), so the earlier underestimation is not obvious when economic estimates of damage are compared.

Methodology: Refining and building on previous analyses

The methods that underpin this study for quantification and valuation of the impacts arising from a change in emissions of $PM_{2.5}$, NO_x and SO_2 are based on those developed under the European Commission's Clean Air For Europe (CAFE) Programme. Method development for the CAFE work was performed in partnership with WHO and various other European experts and involved extensive discussion with stakeholders and an independent peer review. The methods have since been subject to some minor revision under the EC4MACS project[22], which is funded under the European Commission's LIFE+ Programme.

The general methodology for evaluating the effects of changes in air pollutant emissions proceeds logically through the steps between emission, impact and valuation (Figure 1). This is the approach used to quantify mortality impacts in the Commission's Communication of May 2010.

Figure 1. The impact pathway approach for quantifying benefits of emission reductions, from emission to valuation



The analysis of the co-benefits through to economic valuation is more developed for health impact assessment, on which the present paper is focused, than assessment of effects on other receptors (most notably ecosystems). For the pollutants of interest here, health impacts are quantified against changes in the concentration of particulate matter accounting for:

- primary particles (particles directly emitted), and
- secondary particles (sulphate and nitrate aerosols formed in the atmosphere following release of SO_2 and NO_x respectively).

Separate quantification of the direct effects of exposure to SO_2 and NO_2 (as distinct from the secondary sulphate and nitrate particles) is not performed as it is considered likely to double count some part of the effects attributed to particle exposure. Following WHO advice, the methodology assumes that the different types of particle are equally damaging per unit mass and that there is no threshold for impacts at the level of the population (though noting this does not preclude thresholds for individuals in good health).

To quantify an impact it is necessary to combine the following data:

1. Population exposure to the pollutant of interest, as calculated in the preceding stages from knowledge of emissions, the dispersion and chemistry of pollutants following release, and the distribution of the population across Europe.
2. A response function that links a change in air pollution to a change in the incidence of the impact under investigation.
3. The fraction of the population that the response function was derived for (e.g., children or adults).
4. The incidence rate of the impact being considered for the relevant sector of the population.
5. The impacts so quantified are then valued using European-average data on medical costs, the cost of lost productivity and estimates of willingness to pay to protect against ill-health.

22 European Consortium for Modelling of Air Pollution and Climate Strategies. http://www.ec4macs.eu/home/benefits.html?sb=12

The Commission's mortality estimates are derived using transfer matrices generated by the Unified EMEP Model for Stage 1[23], the GAINS model for quantification of years of life lost for Stages 2 to 4[24], and valuation data from the CAFE CBA work for Stage 5[25]. The results obtained by the Commission show the costs and impacts that are expected to arise first under a baseline scenario for the year 2020 that defines European conditions following implementation of all current legislation (including the 20% cut in GHG emissions agreed for 2020), and second the additional benefit that would arise from a 30% cut in GHG emissions. The analysis does not model a build-up period during which emissions are gradually reduced, but instead provides a comparison of conditions for the single year of 2020 with and without the additional 10% reduction. The Commission can therefore be seen as providing information on the effects of its climate policy at a particular point in time, rather than generating an estimate of the net present value of the changes resulting from its policy, as may be done elsewhere.

In the earlier work on the Commission's Clean Air for Europe (CAFE) Programme, stakeholders requested that mortality be valued using two approaches: one based on the loss of life expectancy and valued using the value of a life year (VOLY); the other based on the number of deaths linked to pollution exposure and valued using the value of a statistical life (VSL). These methods ascribe value by establishing the amount of money that people are willing to pay (WTP) to reduce the risk of death by a defined probability or prolong life by a given amount. This can be done by various methods, such as examining expenditure on safety equipment, using questionnaires to assess WTP to change risk by a small but policy-relevant amount, or assessing the wage premium for people in more dangerous occupations. The results do not value people's 'worth' as such but instead indicate the amount of money that they are willing to allocate for health protection. The expression of mortality in economic terms has, not surprisingly, been criticised by some as extending monetisation into areas that are beyond economics. However, this criticism ignores the fact that policy makers routinely make decisions that affect health on an economic basis, for example when setting national healthcare or international development budgets. The monetary estimates simply make the weighting of impacts more explicit than it would otherwise be.

The Commission's analysis for the move to a 30% emission cut (with or without flexibility) only includes assessment using the VOLY (low and high estimates of which are used to generate the reported ranges). This is a consequence of the method used for quantifying mortality impacts in the GAINS (Greenhouse gas-Air pollution Interactions and Synergies) model, which was used by the Commission. However, the Commission's current analysis does not fully reflect the methodology initially recommended in the CAFE study. The CAFE methodology was used for the 2008 HEAL study. For the ranges presented in this report both VOLY and VSL approaches have been used. The present author's strong preference is for the VOLY approach from the perspectives that air pollution is most likely to be a contributing factor rather than the single cause of death, and that a change in air pollution can only affect when, rather than whether, people die. However, as noted above, some stakeholders are unconvinced by these arguments and retain a preference for application of the VSL. Therefore, for full consistency with the CAFE methods, we apply both VOLY and VSL.

It is possible to use the results provided in the Commission's Communication to expand the analysis to include additional impacts without repeating all five stages of the analysis listed above. Here we have taken the Commission's mortality results and applied the factors used to quantify mortality in reverse to 'back-calculate' aggregate European exposure to pollution levels in 2020 under the current legislation baseline (including the agreed 20% GHG emission reduction), and the changes arising from the 30% cuts in GHG emissions with and without flexibility (in other words, the output of stage 1, above). Response functions, fraction of population affected and incidence data can then be applied to these exposure data to quantify morbidity effects, such as hospital admissions, lost working days, incidence of respiratory ill-health and so on, and their economic equivalent. There is some added uncertainty in making these calculations at an aggregated EU level rather than on a country by country basis (e.g., because of differences in population age structure between countries) but this is unlikely to be significant compared to other uncertainties that are present, for example in the valuation of mortality. A clear advantage in basing the analysis so closely on the Commission's is that the two sets of analysis consider exactly the same set of measures for reducing emissions.

23 The Unified EMEP Model: http://www.emep.int/OpenSource/index.html

24 The GAINS Model: http://gains.iiasa.ac.at/index.php/home-page

25 Health Impact Assessment report from CAFE-CBA: http://www.cafe-cba.org/assets/volume_2_methodology_overview_02-05.pdf

For consistency with the Commission's analysis, the ranges that are presented here account for uncertainty only in the valuation of mortality. The full CAFE methodology provides a much more thorough methodology for assessing uncertainties, which accounts for variation in response functions, data on the incidence of ill health and so on in more detail. This permits, for example, a probabilistic assessment of the likelihood of the benefits of an air pollution control policy exceeding the costs. We also note that whilst WHO Europe have approved use of the CAFE methods, other expert bodies, such as COMEAP in the United Kingdom and the US Environmental Protection Agency[26], have different views on some parts of the analysis, which would change both the best estimates and surrounding distributions of impacts and benefits. However, it is also important to note that there is much agreement between the bodies mentioned with respect to:

- air pollution expressed through exposure to particles and ozone being damaging to health;
- effects across the population being significant in Europe and North America as well as in areas of the world where pollution levels are higher; and
- the selection of response functions for the most significant effects.

Having quantified impacts at the EU level, we go further to seek to define impacts at the national level. The Commission's analysis does not provide a breakdown of the types of measures implemented or the extent of controls in each country. However, it is possible that the resulting uncertainties are not too severe for the purposes of the present analysis because of the long-range, transboundary nature of the air pollutants of interest here, which reduces to a significant extent the specificity of damage according to the precise site of emission.

To assess the consistency in the share of benefits for each country for various scenarios of air pollutant and greenhouse gas controls, results of the following studies have been reviewed:

- The European Commission's Communication of May 2010
- Policy studies by IIASA for the European Commission using the GAINS model[27]
- Policy studies by AEA Technology and EMRC for the Commission, particularly the CAFE-CBA work, using the ALPHA (Atmospheric Long-range Pollution Health Environment Assessment) model[28].

It was found that the geographic distribution of emission reduction benefits across the different scenarios reviewed, including those for the original Climate and Energy Package, is broadly consistent for most countries. On this basis, it is reasonable to extrapolate the share of total damage occurring in each country to the new scenarios. However, results for countries at the edges of the EU (e.g., the United Kingdom, Estonia, Finland, Ireland, Latvia and Malta) were found to be more sensitive to the geographic distribution of emission reductions than those for countries towards the centre. This added uncertainty for geographically peripheral countries needs to be considered when inspecting the results of the study.

26 COMEAP – Committee on the Medical Effects of Air Pollutants: http://www.dh.gov.uk/ab/comeap/index.htm. USEPA (ongoing) Second Prospective Study on the Benefits and Costs of the Clean Air Act: http://www.epa.gov/air/sect812/prospective2.html

27 http://gains.iiasa.ac.at/index.php/policyapplications/gothenburg-protocol-revision

28 http://www.cafe-cba.org/reports/

Results

Results are provided in the following tables and figures. The baseline scenario describes the total impact on health of improved air pollution (due to reductions in SO_2, NO_x and fine particles) for European Union Member States 2020 assuming full implementation of current legislation including the 20% reduction in GHGs under the existing Climate and Energy Package of the EU.

Table 2. Health benefits to the EU Member States of cutting EU27 GHG emissions by more than 20% for 2020

Units: life years lost, cases, days lost to ill-health (as appropriate) per year.

Impact assessment, all figures per year	Baseline in 2020 Takes into account the current 20% emissions cut	Benefit from agreed 20% cut	Additional annual health benefit in 2020 of moving from 20%-30% emissions reduction	
Health impacts - cases attributed to change in air pollution exposure			Cut of 30% with flexibility	30% internal cuts
Mortality - Life years lost, people aged >29	2,361,000	218,182	67,308	**140,385**
Deaths in infants (1 to 11 months)	376	36	11	**23**
Chronic bronchitis, cases	119,361	11,078	2,949	**6,151**
Cardiac and respiratory hospital admissions	63,456	5,869	1,811	**3,776**
Restricted activity days (RADs), working age population Of which, working days lost	207,539,966 47,526,656	19,194,869 4,395,625	6,270,471 1,435,938	**13,078,412** **2,994,956**
Days with respiratory medication use by adults and children	21,204,130	1,960,163	595,725	**1,242,512**
Days with lower respiratory symptoms among adults and children	275,334,406	25,362,686	8,372,396	**17,462,427**
Consultations for asthma and upper respiratory symptoms	2,374,300	218,711	68,302	**142,458**

Table 2 describes the health impacts avoided by moving to the '30% with flexibility' and '30% internal' cuts in GHG emissions across the EU27 by 2020. The units vary between the impacts - for example, they relate to the loss of life expectancy, cases of bronchitis, or days of ill health. The rationale for selecting these endpoints from the epidemiological literature is provided in the Health Impact Assessment Methodology volume of the CAFE-CBA reports[29].

Estimated benefits arising from the current target of a 20% emission cut, which are taken from the earlier HEAL report[30], are shown for comparison.

Two comments relating to the quantification of mortality in the population aged over 29 years are necessary. First, the omission of effects in those aged under 29 (who were not covered in the original epidemiological study from which the response function used was derived) is unlikely to add greatly to the results because of the low mortality rate of the population aged under 30 in Europe. Second, additional calculations estimated the number of deaths attributable to the change in pollution levels, a result that is used below to quantify the upper bound valuation of impacts following application of the VSL. The estimated number of deaths brought forward is not shown in Table 2 as it could imply that results were additive to the estimate of lost life years, which they are not. The results for infant mortality are, however, not covered in other estimates shown in the table.

29 HEAL, CAN Europe, WWF (2008). The co-benefits to health of a strong EU climate change policy. http://www.env-health.org/IMG/pdf/Co-benefits_to_health_report_-september_2008.pdf

30 European Commission Communication, May 2010, COM (2010) 265 final. Analysis of options to move beyond 20% greenhouse gas emission reductions and assessing the risk of carbon leakage . http://ec.europa.eu/environment/climat/pdf/2010-05-26communication.pdf

EU health co-benefits

Results are converted to economic value in Table 3 based on a price year of 2005 (consistent with the European Commission's analysis). Economic value is here an aggregate of the costs to health services, productivity of the economy and willingness to pay to avoid ill health and the pain, suffering and loss of life expectancy that goes with it.

Total health co-benefits of moving from a 20% to a '30% internal' cut in EU27 GHG emissions by 2020 are estimated to be between €10.6 and €30.5 billion per year (the range showing sensitivity to use of a lower bound estimate of the VOLY and an upper bound estimate of the VSL). The effects that contribute most to this are: premature death, chronic bronchitis, restricted activity days, and lower respiratory symptoms.

The benefits shown in Table 3 are in addition to those associated with achieving the 20% emission reductions target, estimated in HEAL's previous report at €13 to €52 billion per year in 2020.

Table 3. Economic value of the co-benefits described in Table 2. €millions/year

Economic assessment, €millions	Added benefit from 30% with flexibility by 2020	Added benefit from 30% internal cut by 2020
Mortality (range: lower bound VOLY, upper bound VSL) €million	€3,516 – 13,062	**€7,334 – 27,245**
Morbidity €million	€1,545	**€3,222**
Total health benefit, €million, low	€5,061	**€10,556**
Total health benefit, €million, high	€14,607	**€30,466**

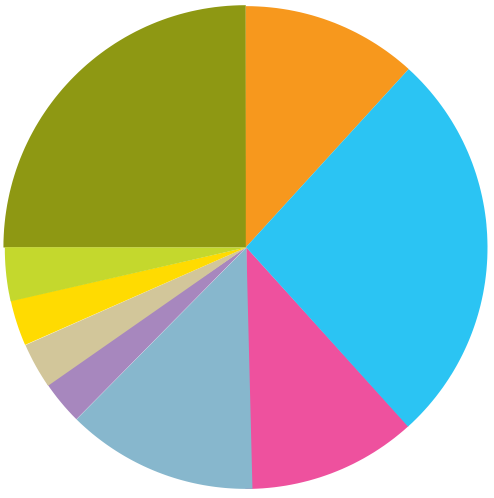
Benefits for individual EU Member States

Allocation of these benefits to various EU Member States is shown in Figure 2. Benefits are partly a function of the size of each country and are partly a function of their location within the EU, with countries towards the centre having larger benefits than those at the edges. The country with the greatest benefits is Germany, with particularly large total benefits also observed for France, Italy and Poland because of their location relative to other EU Member States and high populations. Whilst acknowledging the uncertainty inherent in the method for allocating benefits to each country, particularly in cases where, for example, power plant emissions may diverge significantly from the European average, we are confident that the figures given are a broadly reasonable reflection of the distribution across different countries.

Figure 2. Allocation of benefits for the EU27 to countries

Total benefit of moving from a 20% to a 30% cut by 2020 = €10.5 to - €30.5 bn/yr

Scenario: 30% internal cut in EU GHG emissions

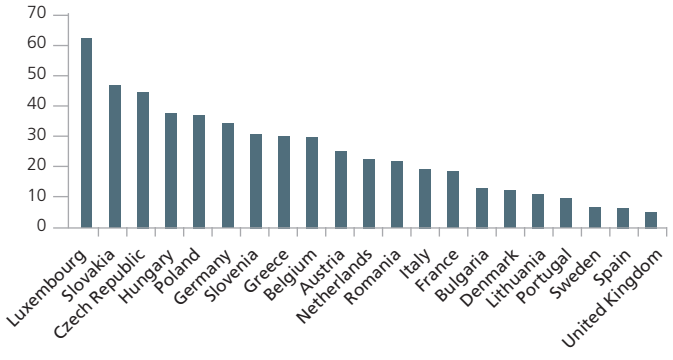


Germany	€2.8 - € 8.1bn/yr
Poland	€1.4 - €4bn/yr
France	€1.2 - €3.5bn/yr
Italy	€1.2 - €3.4bn/yr
Netherlands	€0.4 - €1.1bn/yr
Belgium	€0.3 - €0.9bn/yr
Spain	€0.3 - €0.9bn/yr
United Kingdom	€0.3 - €0.9bn/yr
Other countries	€2.6 - €7.7bn/yr

Benefits for smaller EU countries

Another way to consider the allocation between countries is to quantify health benefits per head of population (See Figure 3. NB The results are based on the lower bound for mortality valuation: results for the upper bound would be nearly a factor of 3 times greater).
This has the advantage of demonstrating how some smaller countries stand to benefit from strong climate policies. For example, Luxembourg is estimated to have the highest benefits per head of population of any country as it would gain from emission reductions in the industrial countries that surround it, such as France, Belgium, the Netherlands and Germany. Other smaller countries with high benefits per head of population are Slovakia, Czech Republic and Hungary. Note that some of the smaller countries at the edges of the EU27 have been omitted from the figure (Cyprus, Estonia, Finland, Ireland, Latvia and Malta) because of uncertainty in the way that total benefits would be distributed between countries.

Figure 3. Health benefit per capita for a '30% internal' reduction in GHG emissions relative to a 20% cut by 2020



Cumulative benefits

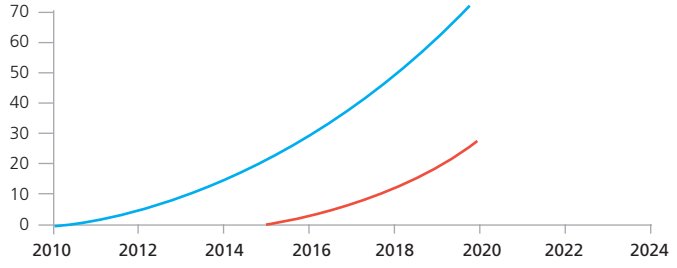
It is also appropriate to consider how co-benefits may accumulate over time. A key issue here concerns when controls are brought in. This is illustrated in Figure 4, again taking the case with the lower bound mortality valuation. The upper line shows how benefits of moving to the new 30% target would accumulate assuming that action commences in 2010 and is phased in linearly through to complete implementation by 2020. This generates a total benefit of €58 billion over the 10 year period.

The lower line, in contrast, assumes that no action occurs before 2015, but that the same level of control is reached by 2020 generating a total benefit of only €22 billion.

Accumulated co-benefits are more than twice as high in the first case compared with the second (€58 billion as compared with €22 billion). In the case of the upper bound mortality valuation, the cumulative benefit would be €63 billion if action starts in 2015 as against €163 billion if action is started in 2010.

Of course, were action to be delayed to the end of the period all of the potential co-benefits in the years prior to 2020 shown would be lost.

Figure 4. Consequences of delaying the start of action for the '30% internal' case



A further factor to consider is the added benefit of starting early in terms of bringing forward the date of compliance with existing air quality legislation. Air quality standards on NO_2 and PM, and national emission ceilings for NO_x otherwise appear unlikely to be met for sometime. These co-benefits are considered below.

Other co-benefits of a strong EU climate policy

The analysis presented in this report covers only one element of the benefits of climate policy, namely the impacts on health in the European Union of reducing several air pollutants (fine particles, NO_x and SO_2). These indirect effects linked to the reduction of air pollutants are not covered under the Kyoto Protocol. Nevertheless, even in addressing this limited set of indirect effects, the following have not been considered:

- Unquantified health effects of the pollutants listed, noting that quantification in epidemiological studies is focused on those elements that are relatively easy to measure.
- Impacts on the natural environment, including rivers and lakes, forests and other terrestrial ecosystems.

Small increases in the productivity of EU and national workforces are quantified in the study and included in the estimates of health benefits. Figures are shown in Table 2 and in Appendix I which shows results by country.

As mentioned above, early action on moving to the 30% target would help speed up the date of compliance with existing air quality legislation, easing the regulatory burden on national authorities. Industry involved in air pollution control would also benefit. The 2010 European Commission Communication highlights the co-benefits to industry of the reductions in these three air pollutants. They are estimated at €5.3 billion on the basis of the 30% cut in internal emissions. (See Table 1, though it is unclear to what extent these savings are additional to the health benefits quantified in this report.)

Wider benefits of action to control climate change

On top of these, of course, should be considered the added benefits of avoided climate change. These include health effects such as reduced temperature stress and limiting the spread of infectious disease to reduced flooding and landslides. It also includes economic effects, such as the creation of new job opportunities in green energy and reductions in oil and gas imports, and improved energy security for the EU Member States.

Conclusions

This study has assessed the co-benefits to public health across the EU of a move to a 30% GHG emission reduction target rather than 20% (as currently agreed) by 2020.

The main findings are:

- The achievement of a 30% rather than a 20% reduction in GHG emissions across the EU27 by 2020 would result in better health and lower health costs.
- Health benefits would be higher if a 30% internal (domestic) target on emissions were adopted rather than 30% with flexibility. (In the latter case, there would be a 25% cut in GHG emissions within the EU whilst the remaining 5% is achieved by financing equivalent cuts in other regions of the world.)
- The co-benefits to health quantified in this report are expected to be particularly large (>€100 million/year, extending to several billion €/year) in eight Member States. Appendix I gives a detailed breakdown of the health benefits for Belgium, France, Germany, Italy, the Netherlands, Poland, Spain and United Kingdom. Benefits tend to be lower in some of the smaller Member States, largely on account of population size, though some of these (Luxembourg being a prime example) have very high benefits per head of population (see Figure 3).
- Benefits are reduced the longer action is delayed.
- Cleaner air resulting from the achievement of a 30% rather than 20% reduction in emissions would result in a more productive workforce. This is highlighted in the estimates of the health benefits to EU Member States (Table 2). It shows the reduction in days of restricted activity (due to better health) among the working population and the proportion of those days which are 'working days' in paid employment.
- The analysis presented here shows that our previous report on this theme did not exaggerate health co-benefits. On the contrary, the recent European Commission report on which this study is based suggest that our previous figures underestimated the EU health co-benefits of moving to the 30% internal target.
- Finally, it is stressed that the study assesses only a small proportion of overall health benefits arising from climate policies. Most obviously, we have not considered the direct benefits of reducing climate change. We have also not quantified some of the co-benefits of the non-GHG pollutants addressed in this report, of which impacts on ecosystems may be especially important.

Appendix

This appendix provides results for the following EU Member States:

Belgium

France

Germany

Italy

The Netherlands

Poland

Spain

United Kingdom

Belgium

It is estimated that cleaner air in Belgium resulting from the achievement of a '30% internal' rather than a 20% reduction in emissions would result in public health benefits of between €320 million and €923 million per year from 2020.

Annual health benefits include:

- An increase in life expectancy of 4,000 years spread across the population.
- Better health and lower health costs: 396,000 fewer days of restricted activity; 38,000 fewer days when people need to use respiratory medication; 4,000 fewer consultations for upper respiratory symptoms and asthma.

Other benefits: A more productive workforce - 91,000 fewer working days lost annually due to cardiac and respiratory problems.

Impact assessment, all figures per year	Baseline in 2020	Reduction in EU damage in 2020 compared to the baseline for	
	Following 20% cut	Cut of 30% with flexibility	-30% internal cut
Mortality - Life years lost, people aged >29	85,240	2,039	4,253
Deaths in infants (1 to 11 months)	14	0	1
Chronic bronchitis, cases	4,309	89	186
Cardiac and respiratory hospital admissions	2,291	55	114
Restricted activity days (RADs), working age population	7,516,858	189,960	396,202
Of which, working days lost	1,653,709	43,501	90,730
Days with respiratory medication use by adults and children	767,983	18,047	37,641
Days with lower respiratory symptoms among adults and children	9,972,241	253,637	529,013
Consultations for asthma and upper respiratory symptoms	90,622	2,069	4,316

Economic assessment, €millions/year	Benefit from 30% with flexibility cut in GHGs in 2020	Benefit from 30% internal cut in GHGs in 2020
Mortality – lower bound (lower estimate of VOLY applied)	107	222
Mortality – upper bound (upper estimate of VSL applied)	396	825
Morbidity	47	98
Total, lower bound mortality valuation	153	320
Total, upper bound mortality valuation	442	923

France

It is estimated that cleaner air in France resulting from the achievement of a '30% internal' rather than a 20% reduction in emissions would result in public health benefits of between €1.2 billion and €3.5 billion per year from 2020.

Annual health benefits include:

- An increase in life expectancy of 16,000 years spread across the population.
- Better health and lower health costs: 1.5 million fewer days of restricted activity; 142,000 fewer days when people need to use respiratory medication; 16,000 fewer consultations for upper respiratory symptoms and asthma.

Other benefits: A more productive workforce - 342,000 fewer working days lost annually due to cardiac and respiratory problems.

Impact assessment, all figures per year	Baseline in 2020	Reduction in EU damage in 2020 compared to the baseline for	
	Following 20% cut	Cut of 30% with flexibility	-30% internal cut
Mortality - Life years lost, people aged >29	279,569	7,691	16,042
Deaths in infants (1 to 11 months)	45	1	3
Chronic bronchitis, cases	14,132	337	703
Cardiac and respiratory hospital admissions	7,513	207	432
Restricted activity days (RADs), working age population	24,653,629	716,521	1,494,458
Of which, working days lost	5,423,798	164,083	342,231
Days with respiratory medication use by adults and children	2,518,814	68,073	141,981
Days with lower respiratory symptoms among adults and children	32,706,740	956,706	1,995,416
Consultations for asthma and upper respiratory symptoms	297,220	7,805	16,279

Economic assessment, €millions/year	Benefit from 30% with flexibility cut in GHGs in 2020	Benefit from 30% internal cut in GHGs in 2020
Mortality – lower bound (lower estimate of VOLY applied)	402	838
Mortality – upper bound (upper estimate of VSL applied)	1,492	3,113
Morbidity	176	368
Total, lower bound mortality valuation	578	1,206
Total, upper bound mortality valuation	1,669	3,481

Germany

It is estimated that cleaner air in Germany resulting from the achievement of a '30% internal' rather than a 20% reduction in emissions would result in health benefits of up to €8.1 billion per year from 2020 (estimated range €2.8 billion to 8.1 billion).

Health benefits include:

- An increase in life expectancy of 38,000 years spread across the population.
- Better health and lower health costs: 3.5 million fewer days of restricted activity; 332,000 fewer days when people need to use respiratory medication; 38,000 fewer consultations for upper respiratory symptoms and asthma.

Other benefits: A more productive workforce - 801,000 fewer working days lost annually due to cardiac and respiratory problems.

Impact assessment, all figures per year	**Baseline in 2020**	**Reduction in EU damage in 2020 compared to the baseline for**	
	Following 20% cut	Cut of 30% with flexibility	-30% internal cut
Mortality - Life years lost, people aged >29	431,868	17,995	37,533
Deaths in infants (1 to 11 months)	69	3	6
Chronic bronchitis, cases	21,831	788	1,645
Cardiac and respiratory hospital admissions	11,606	484	1,010
Restricted activity days (RADs), working age population	38,084,027	1,676,468	3,496,633
Of which, working days lost	8,378,486	383,911	800,729
Days with respiratory medication use by adults and children	3,890,972	159,272	332,197
Days with lower respiratory symptoms among adults and children	50,524,178	2,238,437	4,668,739
Consultations for asthma and upper respiratory symptoms	459,135	18,261	38,088

Economic assessment, €millions/year	**Benefit from 30% with flexibility cut in GHGs in 2020**	**Benefit from 30% internal cut in GHGs in 2020**
Mortality – lower bound (lower estimate of VOLY applied)	940	1,961
Mortality – upper bound (upper estimate of VSL applied)	3,492	7,283
Morbidity	413	861
Total, lower bound mortality valuation	1,353	2,822
Total, upper bound mortality valuation	3,905	8,144

Italy

It is estimated that cleaner air in Italy resulting from the achievement of a '30% internal' rather than a 20% reduction in emissions would result in public health benefits of between €1.2 billion and €3.4 billion per year from 2020.

Annual health benefits include:

- An increase in life expectancy of 16,000 years spread across the population.
- Better health and lower health costs: 1.5 million fewer days of restricted activity; 138,000 fewer days when people need to use respiratory medication; 16,000 fewer consultations for upper respiratory symptoms and asthma.

Other benefits: A more productive workforce - 333,000 fewer working days lost annually due to cardiac and respiratory problems.

Impact assessment, all figures per year	Baseline in 2020	Reduction in EU damage in 2020 compared to the baseline for	
	Following 20% cut	Cut of 30% with flexibility	-30% internal cut
Mortality - Life years lost, people aged >29	303,653	7,486	15,614
Deaths in infants (1 to 11 months)	48	1	3
Chronic bronchitis, cases	15,350	328	684
Cardiac and respiratory hospital admissions	8,160	201	420
Restricted activity days (RADs), working age population	26,777,506	697,417	1,454,613
Of which, working days lost	5,891,051	159,709	333,106
Days with respiratory medication use by adults and children	2,735,807	66,258	138,195
Days with lower respiratory symptoms among adults and children	35,524,381	931,199	1,942,215
Consultations for asthma and upper respiratory symptoms	322,826	7,597	15,845

Economic assessment, €millions/year	Benefit from 30% with flexibility cut in GHGs in 2020	Benefit from 30% internal cut in GHGs in 2020
Mortality – lower bound (lower estimate of VOLY applied)	391	816
Mortality – upper bound (upper estimate of VSL applied)	1,453	3,030
Morbidity	172	358
Total, lower bound mortality valuation	563	1,174
Total, upper bound mortality valuation	1,624	3,388

Netherlands

It is estimated that cleaner air in the Netherlands resulting from the achievement of a '30% internal' rather than a 20% reduction in emissions would result in public health benefits of between €380 million and €1.1 billion per year from 2020.

Annual health benefits include:

- An increase in life expectancy of 5,000 years spread across the population.
- Better health and lower health costs: 471,000 fewer days of restricted activity; 45,000 fewer days when people need to use respiratory medication; 5,000 fewer consultations for upper respiratory symptoms and asthma.

Other benefits: A more productive workforce - 108,000 fewer working days lost annually due to cardiac and respiratory problems.

Impact assessment, all figures per year	Baseline in 2020	Reduction in EU damage in 2020 compared to the baseline for	
	Following 20% cut	Cut of 30% with flexibility	-30% internal cut
Mortality - Life years lost, people aged >29	115,228	2,424	5,056
Deaths in infants (1 to 11 months)	18	0	1
Chronic bronchitis, cases	5,825	106	222
Cardiac and respiratory hospital admissions	3,097	65	136
Restricted activity days (RADs), working age population	10,161,293	225,816	470,988
Of which, working days lost	2,235,484	51,712	107,856
Days with respiratory medication use by adults and children	1,038,160	21,454	44,746
Days with lower respiratory symptoms among adults and children	13,480,481	301,512	628,868
Consultations for asthma and upper respiratory symptoms	122,503	2,062	5,130

Economic assessment, €millions/year	Benefit from 30% with flexibility cut in GHGs in 2020	Benefit from 30% internal cut in GHGs in 2020
Mortality – lower bound (lower estimate of VOLY applied)	127	264
Mortality – upper bound (upper estimate of VSL applied)	470	981
Morbidity	56	116
Total, lower bound mortality valuation	182	380
Total, upper bound mortality valuation	526	1,097

Poland

It is estimated that cleaner air in Poland resulting from the achievement of a '30% internal' rather than a 20% reduction in emissions would result in public health benefits of between €1.4 billion and €4 billion per year from 2020.

Annual health benefits include:

- An increase in life expectancy of 19,000 years spread across the population.
- Better health and lower health costs: 1.7 million fewer days of restricted activity; 164,000 fewer days when people need to use respiratory medication; 19,000 fewer consultations for upper respiratory symptoms and asthma.

Other benefits: A more productive workforce - 397,000 fewer working days lost annually due to cardiac and respiratory problems.

Impact assessment, all figures per year	**Baseline in 2020**	**Reduction in EU damage in 2020 compared to the baseline for**	
	Following 20% cut	Cut of 30% with flexibility	-30% internal cut
Mortality - Life years lost, people aged >29	218,885	8,933	18,631
Deaths in infants (1 to 11 months)	35	1	3
Chronic bronchitis, cases	11,065	391	816
Cardiac and respiratory hospital admissions	5,882	240	501
Restricted activity days (RADs), working age population	19,302,292	832,172	1,735,674
Of which, working days lost	4,246,504	190,567	397,469
Days with respiratory medication use by adults and children	1,972,078	79,060	164,897
Days with lower respiratory symptoms among adults and children	25,607,388	1,111,125	2,317,489
Consultations for asthma and upper respiratory symptoms	232,706	7,598	18,906

Economic assessment, €millions/year	**Benefit from 30% with flexibility cut in GHGs in 2020**	**Benefit from 30% internal cut in GHGs in 2020**
Mortality – lower bound (lower estimate of VOLY applied)	467	973
Mortality – upper bound (upper estimate of VSL applied)	1,733	3,615
Morbidity	205	428
Total, lower bound mortality valuation	672	1,401
Total, upper bound mortality valuation	1,938	4,042

Spain

It is estimated that cleaner air in Spain resulting from the achievement of a '30% internal' rather than a 20% reduction in emissions would result in public health benefits of between €303 million and €873 million per year from 2020.

Annual health benefits include:

- An increase in life expectancy of 4,000 years spread across the population.
- Better health and lower health costs: 375,000 fewer days of restricted activity; 36,000 fewer days when people need to use respiratory medication; 4,000 fewer consultations for upper respiratory symptoms and asthma.

Other benefits: A more productive workforce - 86,000 fewer working days lost annually due to cardiac and respiratory problems.

Impact assessment, all figures per year	Baseline in 2020	Reduction in EU damage in 2020 compared to the baseline for	
	Following 20% cut	Cut of 30% with flexibility	-30% internal cut
Mortality - Life years lost, people aged >29	130,576	1,929	4,024
Deaths in infants (1 to 11 months)	21	0	1
Chronic bronchitis, cases	6,601	85	176
Cardiac and respiratory hospital admissions	3,509	52	108
Restricted activity days (RADs), working age population	11,514,744	179,725	374,856
Of which, working days lost	2,533,244	41,157	85,842
Days with respiratory medication use by adults and children	1,176,439	17,075	35,613
Days with lower respiratory symptoms among adults and children	15,276,036	239,971	500,511
Consultations for asthma and upper respiratory symptoms	138,820	1,641	4,083

Economic assessment, €millions/year	Benefit from 30% with flexibility cut in GHGs in 2020	Benefit from 30% internal cut in GHGs in 2020
Mortality – lower bound (lower estimate of VOLY applied)	101	210
Mortality – upper bound (upper estimate of VSL applied)	374	781
Morbidity	44	92
Total, lower bound mortality valuation	145	303
Total, upper bound mortality valuation	419	873

United Kingdom

It is estimated that cleaner air in the United Kingdom resulting from the achievement of a '30% internal' rather than a 20% reduction in emissions would result in public health benefits of between €326 million and €941 million per year from 2020.

Annual health benefits include:

- An increase in life expectancy of 4,000 years spread across the population.
- Better health and lower health costs: 404,000 fewer days of restricted activity; 38,000 fewer days when people need to use respiratory medication; 4,000 fewer consultations for upper respiratory symptoms and asthma.

Other benefits: A more productive workforce - 93,000 fewer working days lost annually due to cardiac and respiratory problems.

Impact assessment, all figures per year	Baseline in 2020	Reduction in EU damage in 2020 compared to the baseline for	
	Following 20% cut	Cut of 30% with flexibility	-30% internal cut
Mortality - Life years lost, people aged >29	246,039	2,080	4,339
Deaths in infants (1 to 11 months)	39	0	1
Chronic bronchitis, cases	12,437	91	190
Cardiac and respiratory hospital admissions	6,612	56	117
Restricted activity days (RADs), working age population	21,696,859	193,796	404,202
Of which, working days lost	4,773,309	44,379	92,562
Days with respiratory medication use by adults and children	2,216,727	18,412	38,401
Days with lower respiratory symptoms among adults and children	28,784,141	258,758	539,695
Consultations for asthma and upper respiratory symptoms	261,574	1,769	4,403

Economic assessment, €millions/year	Benefit from 30% with flexibility cut in GHGs in 2020	Benefit from 30% internal cut in GHGs in 2020
Mortality – lower bound (lower estimate of VOLY applied)	109	227
Mortality – upper bound (upper estimate of VSL applied)	404	842
Morbidity	48	100
Total, lower bound mortality valuation	156	326
Total, upper bound mortality valuation	451	941

The Health and Environment Alliance (HEAL) aims to raise awareness of how environmental protection improves health. It brings together more than 60 organisations working at the European level.

Génon Jensen
Executive Director

Health & Environment Alliance
28 Boulevard Charlemagne
B-1000 Brussels
Tel: +32 2234 3641 (direct)
Fax: +32 2234 3649
E-mail: genon@env-health.org
Website: www.env-health.org

Health Care Without Harm (HCWH) is a global coalition of more than 484 organisations in 53 countries working with the health sector to reduce its impact on human health and the environment while advocating for global environmental health.

Anja Leetz
Executive Director

Health Care Without Harm Europe
Rue de la Pépinière 1,
1000 Brussels, Belgium
Tel: + 32 2503 4911
Fax: + 32 2402 3042
Email: anja.leetz@hcwh.org
Website: www.noharm.org

Report websites:

www.env-health.org and www.noharm.org/europe