

Acid News

Industrial air pollution cost up to €169 billion

The cost of damage caused by pollutant emissions, into the air from the largest 10,000 industrial facilities in the EU in 2009 has been estimated as at least €102-169 billion.

► Page 4

Moving towards stricter ship sulphur standards

The European Parliament's environment committee wants EU ship fuel sulphur legislation to be tougher than the global standards agreed by the IMO.

► Page 6

Countdown for Energy Efficiency Directive

Only three months to go before the directive is to be finalised, but the Council is heading in a direction that could even water down existing legislation.

► Page 8

Gothenburg Protocol soon to be agreed

Parties to the Convention on Long-range Transboundary Air Pollution will meet in early May to adopt new non-ambitious national emission limits for major air pollutants.

► Page 16

Twelve countries exceed NEC directive limits

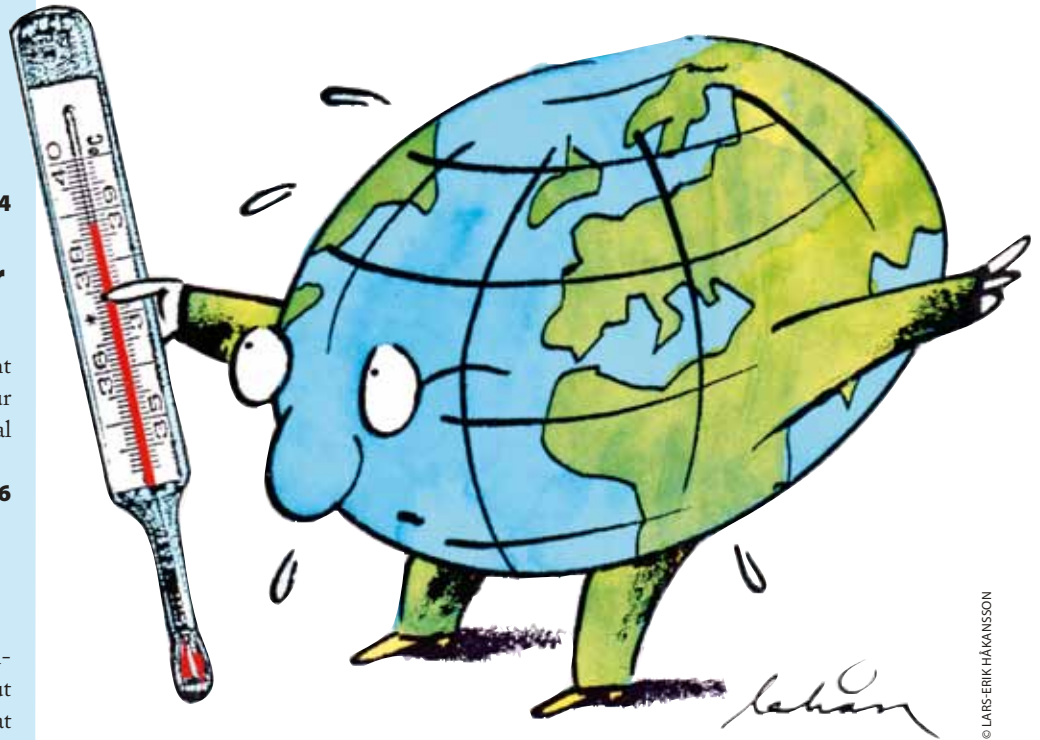
Twelve EU member states exceeded one or more of the emission limits set by the national emission ceilings directive and may now face EU infringement action.

► Page 19

Climate hotspots

Regional food and water security, coral reefs and Arctic sea ice are at risk at warming levels of 1.5–2°C.

► Page 20



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Still possible to stay below 2°C

Global warming can be limited to below 2 degrees according to simulations made for the IPCC 5th assessment report.

The fifth assessment report of the Intergovernmental Panel on Climate Change (IPCC) is now underway and will present next year possible scenarios which show that greenhouse gas emissions can be reduced so that global average temperature increase stays at 1.5 degrees until 2100. In February 2012, scientists from the Max Planck Institute for Meteorology (MPI-M) and the German Climate Computing Centre (DKRZ) made public new climate simulations using MPI-M's new climate model. The new climate

simulations were carried out on DKRZ's supercomputer and occupied one quarter of total computing capacity over a period of two years. The Max Planck Institute for Meteorology is among the world's leading institutes for climate research and the recent results of Hamburg's climate model calculations will be integrated into the fifth assessment report of the IPCC.

"Our results demonstrate the possibility to limit global warming to below two

Acid News

A newsletter from the Air Pollution & Climate Secretariat, the primary aim of which is to provide information on air pollution and its effects on health and the environment.

Anyone interested in these matters is invited to contact the Secretariat. All requests for information or material will be dealt with to the best of our ability. Acid News is available free of charge.

In order to fulfil the purpose of Acid News, we need information from everywhere, so if you have read or heard about something that might be of general interest, please write or send a copy to:

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The Air Pollution and Climate Secretariat

The Secretariat has a board consisting of one representative from each of the following organisations: Friends of the Earth Sweden, Nature and Youth Sweden, the Swedish Society for Nature Conservation, and the World Wide Fund for Nature (WWF) Sweden.

The essential aim of the Secretariat is to promote awareness of the problems associated with air pollution and climate change, and thus, in part as a result of public pressure, to bring about the needed reductions in the emissions of air pollutants and greenhouse gases. The aim is to have those emissions eventually brought down to levels that man and the environment can tolerate without suffering damage.

In furtherance of these aims, the Secretariat:

- ✗ Keeps up observation of political trends and scientific developments.
- ✗ Acts as an information centre, primarily for European environmentalist organisations, but also for the media, authorities, and researchers.
- ✗ Produces information material.
- ✗ Supports environmentalist bodies in other countries in their work towards common ends.
- ✗ Participates in the lobbying and campaigning activities of European environmentalist organisations concerning European policy relating to air quality and climate change, as well as in meetings of the Convention on Long-range Transboundary Air Pollution and the UN Framework Convention on Climate Change.

Editorial

The UN Climate Conference in Durban last December agreed on positive steps to reach an international agreement on reductions of greenhouse gases by 2015. Luckily the European Union had the courage to build an alliance in Durban with developing countries from the Small Island States (AOSIS), the least developed countries (LDCs) and African Nations to secure a second commitment period for the Kyoto Protocol. This coalition also demanded that the new global agreement to be negotiated in the next two years should be legally binding. The developing countries had made generously large concessions in 2010 and 2011 on their demands for industrialised rich countries to start the negotiations on development, financial and technological assistance for climate mitigation and adaptation measures.

It is now very important that the EU builds on the new alliance, otherwise the old confrontations will quickly resurface, as it may appear that the EU's initiatives were simply an alibi process. What is needed is a clear signal from the Kyoto Parties that the agreements for the first commitment period bring real reductions in greenhouse gas emissions and therefore important loopholes in the agreement must be closed during this last year of the commitment period 2008-2012. The European Union should also set a clear signal that it takes the assessments of the IPCC seriously. The IPCC recommended that emissions of greenhouse gases must be reduced by 40 per cent by industrialised nations by 2020 if there is to be a likely chance of reaching the 2-2.4 degree target. The European Union must therefore this year adopt a 40 per cent domestic reduction target for 2020 and agree on substantial support for developing countries. Additionally,



the European Union should maintain the Kyoto Protocol process, including a five-year commitment period from 2013 to 2015, and have the intention to start negotiations for a third commitment period for 2018-2022. This lifeline should be kept until the European Union is sure that the US is really willing to join a legally binding global agreement in 2015, is prepared to ratify it and that important elements of the Kyoto Protocol will be included in the

“This lifeline should be kept until the EU is sure that the US is really willing to join a legally binding global agreement”

agreed text. A five-year commitment period is also important because it keeps open the possibility of stabilising global greenhouse gas emissions before 2020, an absolute necessity if the 2 degree or 1.5 degree target is to remain achievable.

Next year the UN will start a process, agreed at the Copenhagen Climate Summit in 2009, to analyse the possibility of ensuring that the global temperature increase stays

below 1.5 degrees. It is already clear that very steep reductions in greenhouse gases over the next 20 years are required to keep this window open. Emerging economies such as China, India, South Africa and Brazil must also start to prepare for strong reductions in emissions at the end of this decade, which as these countries already appreciate would be good for their own environment and economy. According to studies these countries have taken many steps in recent years to reduce emissions compared with business as usual projections, despite strong economic growth. These countries should therefore join the alliance built by the EU, AOSIS and LDCs as soon as possible.

Reinhold Pape

Still possible to stay below 2°C

Continued from front page

degrees Celsius throughout this century. But it requires a drastic reduction of carbon dioxide emissions,” says Professor Jochem Marotzke, Director at the Max Planck Institute for Meteorology and vice-chair of the World Climate Research Programme.

By using an international model comparison project, researchers were able to simulate the complex carbon cycle as well as vegetation dynamics in climate projections for the 21st century.

In case of an increase in CO₂ emissions the simulations suggest not only an increase in temperature but also a rapid progression of ocean acidification, according to MPI-M. Recent data indicate that, due to carbon dioxide pollution, ocean acidification has increased by 30 per cent compared to pre-industrial times. Scientists doubt that many organisms will be able to cope with environmental change. Oceanic calcifying organisms will be particularly affected.

MPI-M warns that in the event of continuously increasing emissions of carbon dioxide, as assumed in the least favorable scenario, scientists expect a rise in the global mean temperature by up to 4°C by 2100. (Figure).

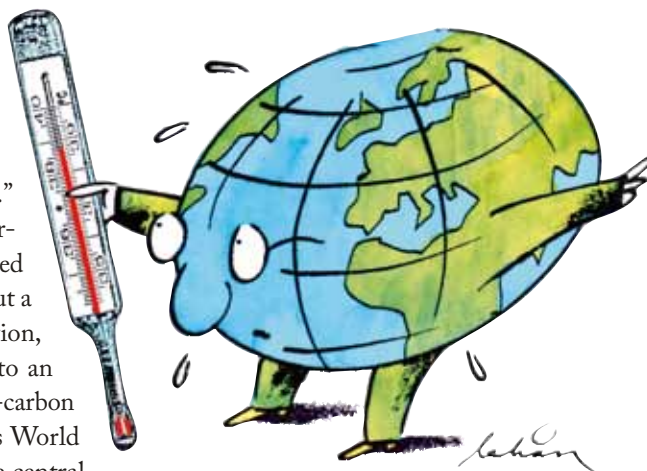
Professor Marotzke said that according to recent calculations Arctic summer sea ice melts faster than predicted. “With a smaller sea ice cover, more sunlight is absorbed by the dark open water of the polar ocean. This water therefore warms efficiently during summer (albedo effect). The melting rate of sea ice is directly con-

nected with global warming.”

In December 2011 the International Energy Agency warned in a press-release that without a bold change of policy direction, the world will lock itself into an insecure, inefficient and high-carbon energy system. “In the IEA’s World Energy Outlook (WEO) the central New Policies Scenario assumes that if recent government commitments are implemented in a cautious manner, primary energy demand increases by one-third between 2010 and 2035, with 90 per cent of the growth in non-OECD economies.”

IEA’s analysis shows that in the New Policies Scenario, cumulative CO₂ emissions over the next 25 years amount to three-quarters of the total from the past 110 years, leading to a long-term average temperature rise of 3.5°C. China’s per-capita emissions match the OECD average in 2035. The IEA concludes if the current energy policy were not changed the world is on an even more dangerous track, to an increase of 6°C.

“As each year passes without clear signals to drive investment in clean energy, the ‘lock-in’ of high-carbon infrastructure is making it harder and more expensive to meet our energy security and climate goals,” said Fatih Birol, IEA Chief Economist. The WEO presents a scenario that traces an energy path consistent with meeting the globally agreed goal of limiting the temperature rise to 2°C. Four-fifths of the total energy-related CO₂ emissions permitted by 2035 in the scenario are



already locked-in by existing capital stock, including power stations, buildings and factories.

IEA warns that without further action by 2017, the energy-related infrastructure then in place would generate all the CO₂ emissions allowed in the 450 Scenario up to 2035. Anything built from now on that produces carbon will do so for decades, and this “lock-in” effect will be the single factor most likely to produce irreversible climate change, the IEA says. “If this is not rapidly changed within the next five years, the results are likely to be disastrous.”

The IPCC is now in full preparation of its Fifth Assessment Report (AR5). The report, which will be finalised in 2014, will be made up of four reports: the three IPCC Working Groups’ contributions dealing respectively with The Physical Science Basis (September 2013), Impacts, Adaptation and Vulnerability (March 2014), and Mitigation of Climate Change (April 2014), and the Synthesis Report (October 2014). Each report will contain its own Summary for Policymakers which is approved in detail by all member countries of the IPCC and represents a formally agreed statement on key findings and uncertainties.

According to the IPCC, in comparison with previous Assessment Reports, the AR5 will put greater emphasis on assessing the socio-economic aspects of climate change and its implications for sustainable development.

Reinhold Pape

The IPCC Assessment Reports

The IPCC Fifth Assessment Report (AR5) follows the overall mandate of the IPCC, the main activity of which is to prepare comprehensive assessment reports about climate change at regular intervals, typically of about five to seven years. The IPCC’s First Assessment Report (FAR) in 1990 played a decisive role in leading to the United Nations Framework Convention on Climate Change (UNFCCC), which was opened for signature at the Rio de Janeiro Summit in 1992. The Second Assessment Report (SAR) of 1995 provided key input for the negotiations of the Kyoto Protocol

in 1997. The Third Assessment Report (TAR) of 2001 provided further information relevant to the development of the UNFCCC and the Kyoto Protocol. The Fourth Assessment Report (AR4) paid greater attention to the integration of climate change with sustainable development policies and the relationships between mitigation and adaptation, and led to a wider awareness of climate change issues in the general public and among decision-makers, inspiring world leaders to agree on the Bali Action Pla

Reference: IPCC

EU industrial air pollution cost up to €169 billion

The cost of damage caused by pollutant emissions into the air from the largest 10,000 industrial facilities in 2009 has been estimated as at least €102-169 billion, and half of the total damage cost was caused by just 191 facilities.

Based on data from the European Pollutant Release and Transfer Register (E-PRTR), a recent study¹ published by the European Environment Agency (EEA) assessed the damage cost to health and the environment from pollutants emitted from industrial facilities in the EU 27 member states and Norway.

Many different air pollutants were covered, including the traditional regional air pollutants (sulphur dioxide, nitrogen oxides, particulate matter, ammonia and volatile organic compounds), heavy metals, organic micro-pollutants and the greenhouse gas carbon dioxide.

Facilities covered by the analysis include large power plants, refineries, manufacturing combustion and industrial processes, waste and certain agricultural activities. It

was found that power plants contributed the largest share of the damage costs (€66–112 billion). Other significant contributions came from production processes (€23–28 billion) and manufacturing combustion (€8–21 billion).

Emissions from several sectors, such as transport, households and most agricultural activities, were excluded from the study. If these are included, the cost of air pollution would be even higher.

For comparison, the EU's Clean Air For Europe (CAFE) programme estimated the damage costs from traditional air pollutants emitted from all sectors in the then EU 25 member states to amount to €280-794 billion for the emission levels of year 2000.

For traditional air pollutants, the EEA

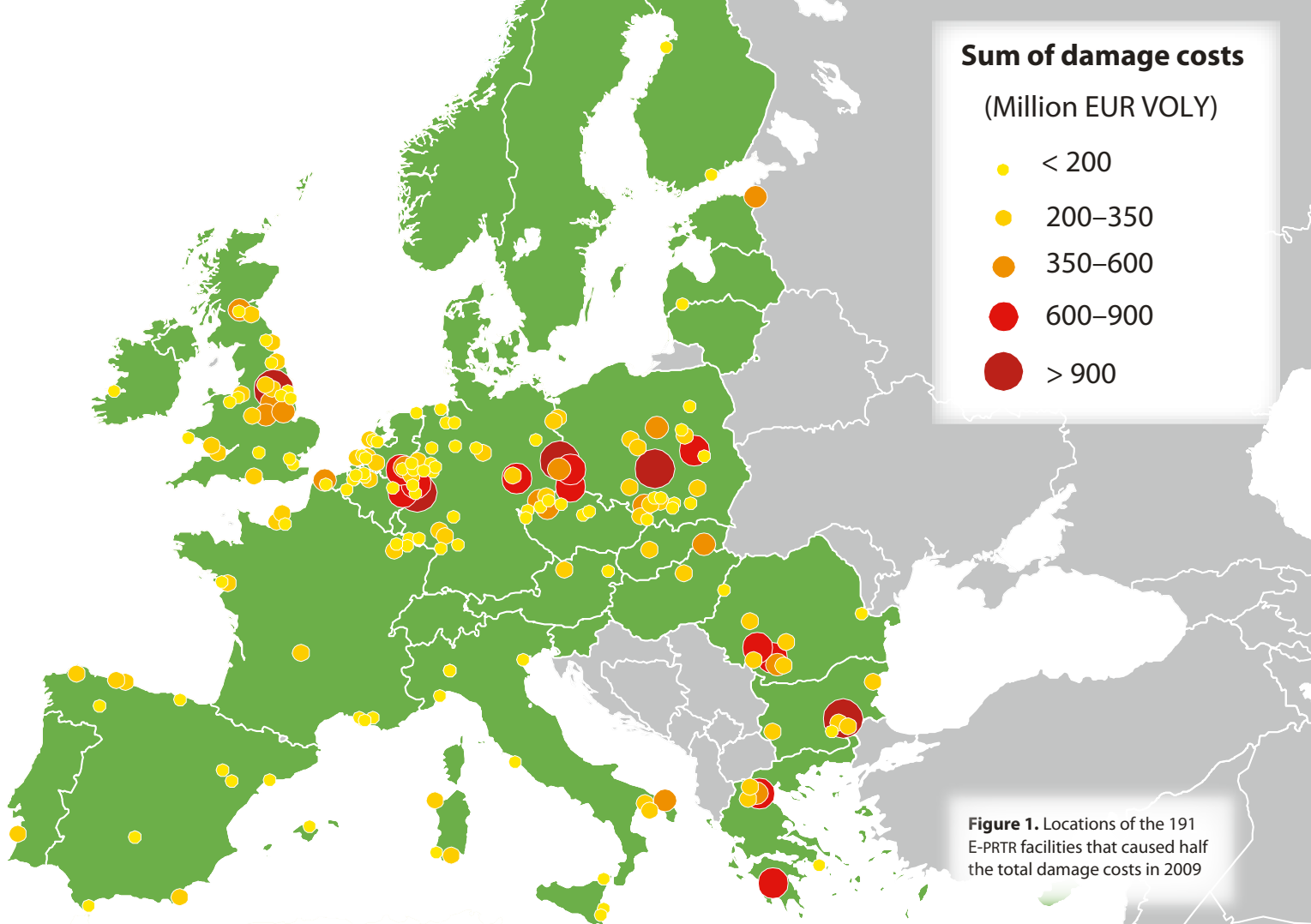
study estimated damage costs using the same methodology as in the CAFE programme, with damage costs per tonne emitted for each pollutant as a national average for each country. Specifically for mortality impacts, this results in a lower and a higher value, the former being based on the value of a life year lost (VOLY) and the latter on the value of a statistical life (VSL).

As it has proven very difficult to value damage to ecosystems in monetary terms, ecological damage from acidification, eutrophication or ground level ozone was not accounted for. Neither was air pollution damage to the cultural heritage.

Valuation of carbon dioxide (CO₂) emissions was based on a UK methodology,

Table: The top twenty plants estimated to have the greatest damage costs from air pollutant emissions in 2009.

			Reported emissions (tonnes)				Damage cost (million €)
			CO ₂	NO _x	SO ₂	PM ₁₀	
1	PGE Elektrownia Bełchatów S.A.	Poland	29,500,000	42,900	50,700	1810	1550-2518
2	TETs Maritsa iztok 2' EAD	Bulgaria	9,630,000	11,700	290,000	N.R.	1432-3339
3	Vattenfall AG Kraftwerk Jänschwalde	Germany	23,600,000	18,200	21,400	675	1232-2002
4	RWE Power AG Bergheim	Germany	26,300,000	15,400	6420	440	1130-1560
5	Drax Power Limited	UK	20,500,000	38,400	27,800	362	1026-1625
6	Complexul Energetic Turceni	Romania	6,070,000	15,400	106,000	1320	889-2082
7	RWE Power AG Eschweiler	Germany	19,200,000	12,300	3360	396	824-1135
8	RWE Power AG Kraftwerk Neurath	Germany	17,900,000	12,300	3630	281	781-1095
9	RWE Power AG Kraftwerk Frimmersdorf	Germany	16,800,000	10,500	5280	289	742-1051
10	PGE Elektrownia Turów S.A.	Poland	11,700,000	11,800	40,600	1400	722-1299
11	Vattenfall AG Kraftwerk Boxberg	Germany	15,300,000	9790	8170	180	713-1059
12	PPC S.A. SES Megalopolis A'	Greece	4,460,000	3090	184,000	5590	692-1609
13	Elektrownia 'Kozienice' S.A.	Poland	10,900,000	21,200	32,200	711	688-1246
14	Vattenfall AG Kraftwerk Lippendorf	Germany	12,800,000	8590	14,000	95	677-1107
15	PPC S.A. SES Agioy Dhmhtrioy	Greece	12,900,000	24,800	58,000	471	629-944
16	Complexul Energetic Rovinari	Romania	5,110,000	11,800	63,500	2400	611-1376
17	Elektrárny Pruněřov	Czech Rep	9,070,000	17,100	15,800	628	541-949
18	Centrale Termoelettrica Federico II (BR Sud)	Italy	13,000,000	7300	6540	473	536-707
19	Longannet Power Station	UK	7,390,000	15,200	32,200	459	527-1018
20	Vattenfall AG Kraftwerk Schwarze Pumpe	Germany	10,700,000	4190	8200	91	495-731



Sum of damage costs

(Million EUR VOLY)

- < 200
- 200–350
- 350–600
- 600–900
- > 900

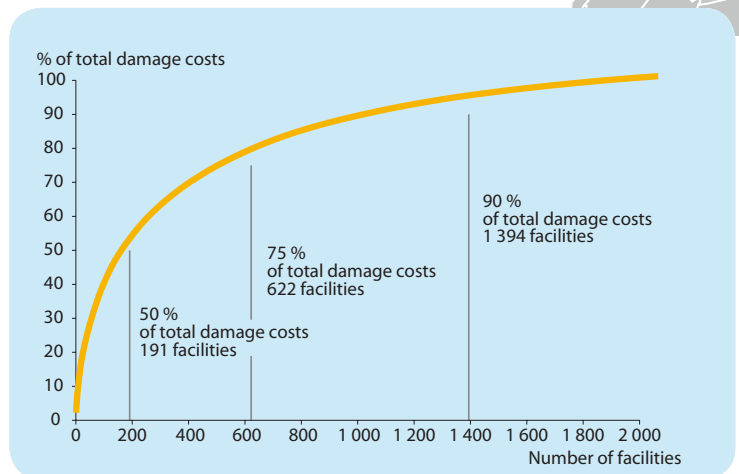
Figure 1. Locations of the 191 E-PRTR facilities that caused half the total damage costs in 2009

and set at €33.6 per tonne. While this figure is within the range of US\$4-95 per tonne identified by the IPCC in 2007, it is significantly lower than figures calculated recently by the Stockholm Environment Institute (SEI). According to the SEI's worst-case calculations, the social cost of CO₂ could be almost US\$900 per tonne in 2010, rising to US\$1,500 in 2050.

Some key findings:

- Air pollution from the facilities covered by the analysis cost every European citizen approximately €200-330 on average in 2009.
- A small number of individual facilities cause the majority of damage costs. Three quarters of the total damage costs were caused by the emissions from just 622 industrial facilities – six per cent of the total number (see figure 2).
- The dirtiest plants are all coal-fired power stations, including Belchatow in Poland, Maritsa 2 in Bulgaria, Jämschwalde and Bergheim in Germany, Drax in the UK and Turceni in Romania (see table).
- CO₂ emissions account for about €63 billion, a significant proportion of the total costs, while damage caused by

Figure 2. Cumulative distribution of the 2,000 E-PRTR facilities with the highest damage costs



traditional air pollutants such as SO₂, NO_x and PM, is estimated at up to €105 billion.

Professor Jacqueline McGlade, EEA Executive Director, said: “Our analysis reveals the high cost caused by pollution from power stations and other large industrial plants. By using existing tools employed by policy-makers to estimate harm to health and the environment, we revealed some of the hidden costs of pollution. We cannot afford to ignore these issues.”

The results of this analysis are expected to feed into ongoing EU discussions on resource efficiency, air quality and the low-carbon roadmap. Later this year, the EEA plans to publish an assessment of the potential for further reducing air pollutant emissions from large combustion plants.

Christer Ågren

¹ The EEA report “**Revealing the costs of air pollution from industrial facilities in Europe**” and a “**Summary for policy makers**” can be downloaded at: <http://www.eea.europa.eu/pressroom/newsreleases/industrial-air-pollution-cost-europe>



Can we hope for a Disney ending to the sulphur story?

RENNETT STOWE / CREATIVE COMMONS

EU moving towards stricter ship sulphur standards

The European Parliament's environment committee wants EU ship fuel sulphur legislation to be tougher than the global standards agreed by the International Maritime Organization.

Seagoing ships burn extremely dirty fuels that on average contain almost 3000 times as much sulphur as road fuel in Europe, resulting in high emissions of air pollutants that are particularly harmful both to human health and the environment. Shipping air pollution is estimated to cause around 50,000 premature deaths per year in Europe, and the emissions of sulphur dioxide (SO₂) cause widespread acidification of soil and freshwater ecosystems and damage to biodiversity.

On 16 February the environment committee of the European Parliament voted in support of a European Commission proposal from July 2011 to implement the international sulphur standards agreed by the International Maritime Organization (IMO) in October 2008 into EU legislation.

During the weeks leading up to the vote,

political groups that represent a wide majority in the Parliament agreed and signed up to a set of compromise proposals. This wide support was reflected in the vote, in which the report by the Parliament's rapporteur, Satu Hassi, (Greens/EFA, Finland) was adopted with 48 votes in favour and 15 against.

In brief, the environment committee voted in support of:

- That the stricter rules that already apply in the sulphur emission control areas (SECAs), namely the Baltic Sea and the North Sea including the English Channel, should be further tightened in line with IMO standards and also in line with the proposal from the Commission. This means a lowering of the current limit of 1.0 per cent to 0.1 per cent by 2015.
- The Commission's proposal to set a 0.1 per cent sulphur limit for passenger ships operating between European Union ports beginning in 2020. The present EU limit is 1.5 per cent.
- That fuels used in all EU coastal waters (within 12 nautical miles) shall not exceed 0.1 per cent sulphur as from 2015. This is a new approach, since a coastal water limit was not included in the Commission's proposal.
- Lowering the sulphur limit in EU seas outside of sulphur control areas to 0.5 per cent in 2015 and 0.1 per cent in 2020, from the current level of 3.5 per cent. This goes further than the Commission's proposal, which was limited to incorporating into European law the IMO agreement to reduce the global sulphur limit to 0.5 percent in 2020.

- That the Commission should assist with the groundwork towards designating new SECAs in the Mediterranean, North Atlantic and Black Sea.

Some members of the environment committee had tabled proposals for improving enforcement of the law by requiring a minimum level of inspections or installation of equipment for continuous emissions monitoring, but these proposals were not approved.

Satu Hassi commented: “The committee has today voted to endorse tougher limits on sulphur emissions from shipping, in line with the internationally agreed IMO standards. Crucially, it also voted to extend limits to areas outside the designated sulphur emissions control areas. This would not only deliver significant health benefits, it would also ensure a more harmonised environment for the economic actors affected.”

Environmental groups welcomed the outcome. Antoine Kedzierski at Transport & Environment said: “This vote brings Europe a step closer to a significant improvement in air quality. It’s great to see the parliament telling the EU to catch up with the United States by requiring the lowest sulphur fuels to be used near our coastlines.”

Recently the United States and Canada introduced legislation – through the designation of a combined sulphur and nitrogen oxides emission control area – that forces all ships operating around its coastline to use fuels with maximum 0.1 per cent sulphur content from 2015. The European Parliament’s environment com-

mittee now wants to introduce such a zone all around Europe, albeit applying only within 12 nautical miles (22 kilometres) of the coast, instead of North America’s 200 nautical miles (370 kilometres).

Louise Duprez at the European Environment Bureau said: “Now member states should give their full support to these changes so we can start cleaning up dirty ship emissions around our coasts.”

Legislative proposals must be adopted by the European Council and the Parliament before they can become law, and the full Parliament is scheduled to vote on the resolution in May. Member states meeting in the Council will also need to approve the rules, and here discussions are ongoing but no date has yet been set for discussions at ministerial level.

There is a possible fast-track decision process through a first reading agreement. This would require negotiations between the Parliament, the Council and the Commission in the coming months, and could lead to final EU approval by summer.

Christer Ågren

Information: See also articles in Acid News 3, 2011 pp. 18-19 and 4, 2011 pp. 1-5.

European Parliament press release: <http://www.europarl.europa.eu/news/en/pressroom/content/20120130IPR36511/html/Shipping-fuels-on-course-for-better-health-and-environment-protection>

EEB and T&E press release: <http://www.eeb.org/index.cfm/news-events/news/european-parliament-backs-cleaner-ship-fuels/>

International ship emission regulations

The International Maritime Organization (IMO), under ANNEX VI of MARPOL 73/78 (the International Convention for the Prevention of Pollution from Ships), in October 2008 unanimously adopted stricter controls on ships’ emissions of air pollutants.

The global fuel sulphur limit is currently 3.50% and shall be lowered to 0.50% by 2020 (or 2025, subject to a review in 2018). In specially designated sulphur emission control areas (SECAs), the current limit is set at 1.00% sulphur. It will be tightened to 0.10% by 2015.

There are currently only two existing

SECAs in Europe, the Baltic Sea and the North Sea, including the English Channel. In addition most of the coastal waters – within 200 nautical miles of the coast – of USA and Canada have been designated as “combined” ECAs for both sulphur and nitrogen oxides (NOx). It should be noted that exhaust gas cleaning systems (e.g. scrubbers) or alternative fuels (e.g. gas or biofuels) that achieve equivalent sulphur emission reductions may be used as an alternative to low-sulphur fuel oils to fulfil the sulphur requirements.

Huge benefits of lower ship speeds

Speed controls on shipping could save billions in lower ship fuel bills and at the same time cut emissions of carbon dioxide and other air pollutants, according to a new report commissioned by environmental groups Seas At Risk and Transport & Environment.

Reducing average speeds by 10 per cent will reduce emissions by 19 per cent across the world fleet even after building and operating new ships to make up for lost capacity. Emission cuts due to slower speeds are immediate, don’t require prior investment, and have no adverse impact on ship operations.

The report’s presentation coincided with the resumption at the International Maritime Organization of deliberations on measures to tackle greenhouse gas emissions from shipping.

Source: Transport & Environment, 28 February 2012

Hong Kong exploring regional ECA

The Hong Kong government is exploring the potential for setting up an Emission Control Area (ECA) within the Pearl River Delta (PRD).

“We have started discussion with the relevant authorities of Guangdong, Shenzhen and Macao on the regional cooperation initiatives on reducing marine emissions within the PRD waters set out in the 2011 Policy Address,” said the Secretary for the Environment, Edward Yau.

Proposed measures in the Policy Address include exploring the feasibility of requiring ocean-going vessels to switch to low-sulphur fuel while berthing at ports of Hong Kong and the PRD, exploring the setting up of an Emission Control Area in PRD waters over the longer term, and a study in collaboration with the relevant trade associations on the feasibility of selling lower sulphur fuels locally to reduce emissions from vessels.

Source: Sustainable Shipping News, 14 December 2011

Final countdown for Energy Efficiency Directive

Only three months to go before the directive that could mean thousands of green jobs is to be finalised, but the Council is instead heading in a direction that could even water down existing legislation.

In June 2011 the European Commission proposed to the Parliament and the Council a new directive for energy efficiency. This directive is intended to replace the Energy Service Directive from 2006 and the Combined Heat and Power Directive from 2004. EU member states are negotiating at the moment with the European Parliament on this new Energy Efficiency Directive (EED), in accordance with the request of the European Council, which in January called for the finalisation of negotiations by the end of June 2012.

According to Martin Lidegaard, climate and energy minister for Denmark, which currently holds EU presidency, the European Council has emphasised that the Energy Efficiency Directive can contribute to growth and job creation in Europe. According to the Commission the directive can create up to two million jobs – mostly local jobs that cannot be outsourced. Through enhanced energy efficiency, the EU can save billions of euro on imported energy. Money that can instead be channelled towards energy efficiency measures, jobs and growth in Europe.

Environmental NGOs such as Climate Action Network Europe (CAN Europe) and many independent research studies argue that energy savings will increase European GDP and jobs. CAN Europe has the following analysis: “According to the Commission’s Impact Assessment accompanying the EED, Europe’s GDP will be higher if the 20 per cent savings target is met. This is besides the other benefits listed in the March 2011 Energy Efficiency Plan (e.g. two million new jobs, €1000 annual savings per household on energy bills). The whole point is to save energy by investing in energy efficiency within the EU. Europe spends roughly €400 billion a year importing energy. This represents a flow of wealth and jobs out of Europe.

Investing as much of that as possible in efficiency improvements within the EU is clearly much better for our GDP, and it creates domestic jobs which can’t be outsourced. The German KfW energy efficiency scheme is a good example of the impact on the economy: the Juelich Research Centre recently estimated that every euro invested by the state brings in €4 to €5 in tax revenues, for instance from previously unemployed workers now employed in the building sector.

The Commission has also stated that the EU is failing to meet its energy efficiency target with current policies. The Commission, Council and Parliament all agree the EU is currently on track to save only nine per cent of its energy consumption by 2020. The Commission, in its Impact Assessment to the EED, says a binding target is needed to meet the 20 per cent target.

The CO₂ target is not strong enough to drive energy efficiency. Many member states – under industry pressure – deliberately overestimated 2005 emissions levels and therefore got many more Emissions Trading System allowances than needed. Studies by research group Sandbag suggest that there will be a 1.9 Gt oversupply of permits in Phase III of the ETS (running from 2013–2020). This means the cap is far too high and the carbon price far too low to adequately drive energy efficiency. Furthermore, the ETS and the effort sharing decision allow up to 50 per cent offsets, meaning that half of all reductions in emissions can take place outside the EU, further weakening the incentive for energy efficiency.

Regarding the claim that the renewables target is causing higher energy prices, CAN Europe argues that: “as the European Commission’s 2050 Energy Roadmap

shows, the cost of decarbonising our energy system in all scenarios, including high renewable energy sources (RES), is no more expensive than remaining with fossil fuels. This is because regardless of the scenario, Europe’s aging energy infrastructure must be replaced. The real story is the way that energy efficiency can make the renewables target easier to meet. The 20 per cent RES target is defined as a share of final energy demand in 2020. Current final energy demand is 1200 million tonnes of oil equivalents (Mtoe), so 20 per cent RES would mean 240 Mtoe. If final energy demand in 2020 is 1000 Mtoe the RES target would need to be 200 Mtoe (this reduces RES investment costs). If final energy demand is 1400 the RES target would need to be 280 Mtoe. This shows the RES target has no real impact on energy savings, but energy savings make meeting the proportional RES target much easier”.

The negotiations on the package for the Energy Efficiency Directive in the European Parliament took a big step forward at the end of February 2012. The Industry, Research and Energy Committee (ITRE) of the Parliament voted in the draft Energy Efficiency Directive and voted by a large majority in support of a binding 20 per cent energy savings target.

Before the vote, the political groups in the Parliament had agreed to give member states more flexibility to achieve the efficiency target of 20 per cent by 2020. “If the member states accept a binding target, they should be allowed to deviate from fixed EU rules on energy turnovers or building renovations,” said Markus Pieper MEP, responsible for the dossier for the EPP Group in the leading ITRE Committee.

CAN Europe was cautiously positive about the following results:

- binding, effort-shared savings targets for member states immediately upon entry into force of the Directive, which will aggregate to a consumption of not more than 1474 Mtoe by 2020, which is the original Commission definition of the 20 per cent target;
- national trajectories marking out the path that member states must take to 2020;
- cumulative 1.5 per cent annual savings to be delivered by energy suppliers or distributors, across all end use sectors including transport;
- a 2.5 per cent renovation rate for all public buildings, with a definition of deep renovation as 75 per cent improvement in energy performance;
- a requirement for national roadmaps for deep renovation of the entire building stock by 2050;
- national financing facilities to aggregate funds and direct them to projects;
- decent requirements for CHP, with clear statement that this should not be at the expense of renewables;
- a mandate for the Commission to come forward with a proposal to fix the ETS “if appropriate” once the Directive enters force.

The developments are less positive in the Council according to CAN Europe. The Danish

There is still some time to make the Energy Efficient Directive efficient.

Presidency text contains some improvements, but is still very far from acceptable, and estimates by CAN Europe conclude that it would still only close about half of the gap to the 20 per cent target. Problems include:

- No binding targets, watered-down references to the 20 per cent target, and no reference to the Commission bringing forward binding targets even in 2014;
- Article 6: early (past) actions allowed to count towards the 1.5 per cent savings; also supply side savings (whereas this is meant to be an end use measure);
- Article 4: public building renovation rate limited to central government buildings with many exemptions, and only weak requirements as to the level of the renovations;
- Article 10: many exemptions and opt-outs on CHP provisions.

In fact the problems are so severe that the text as it stands may even represent a rollback on existing legislation (the Energy Services Directive and the CHP Directive). Essentially all countries apart

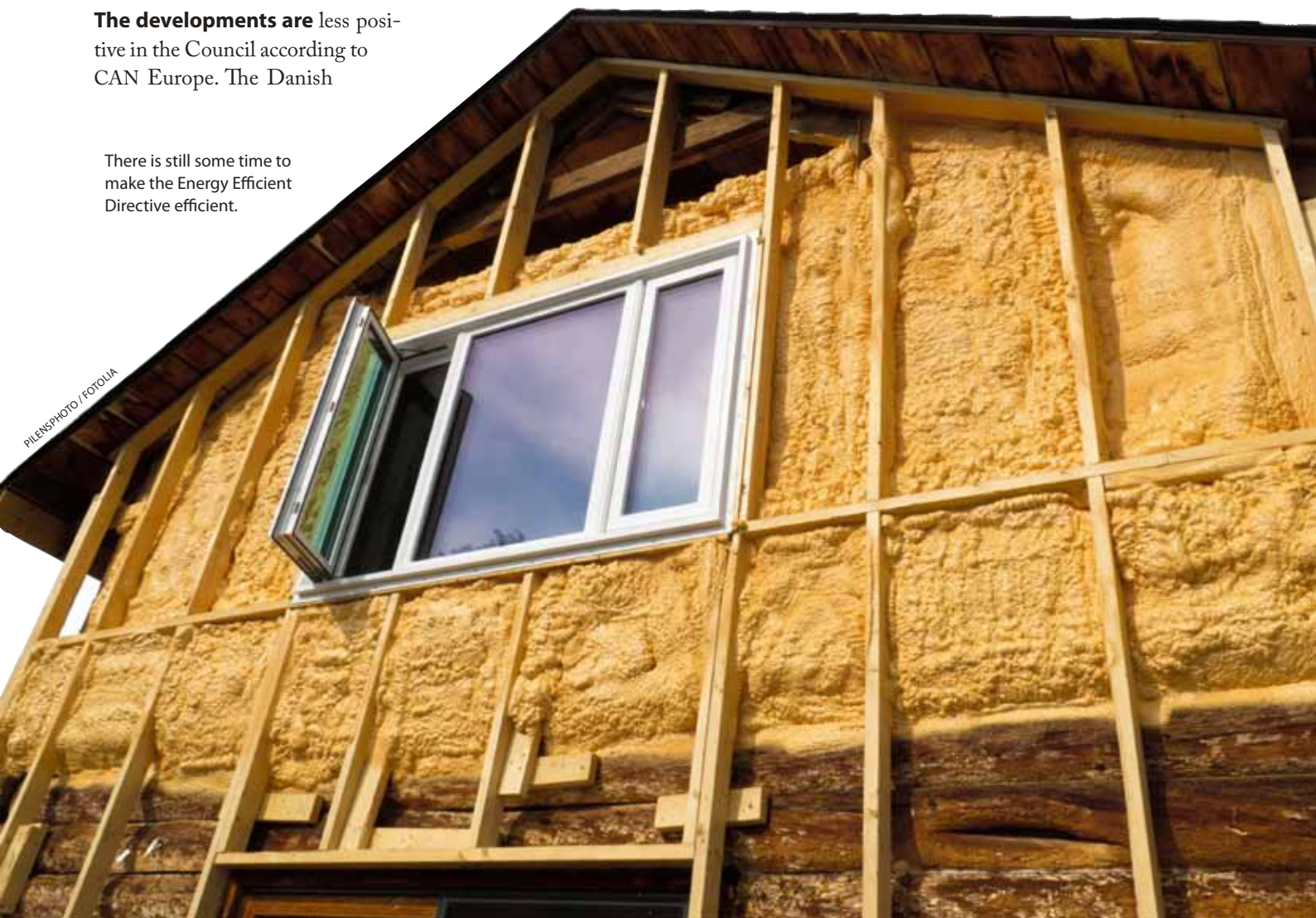
from Denmark, Belgium, Ireland and Greece have very bad positions according to CAN Europe. The UK in particular is the key player in weakening references to the 20 per cent target and the Commission review. Germany has no position yet due to disagreement between the Environment and Economics ministries. France is very opposed to the 1.5 per cent savings requirement in Article 6. Austria is pushing hard for early action references – back as far as 2000.

Direct negotiations between the Parliament and the Council have now started and must be finalised in June 2012. The European Union must this spring ensure that the EU will reach its goal of reducing the level of energy consumption by 20 per cent by 2020.

Reinhold Pape

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PILENSPHOTO / FOTOLIA

Bringing justice through the air quality directive

Suing countries and municipalities that fail to comply with the EU air quality standards is a way to speed up the otherwise rather slow enforcement process by the EU bureaucracy.

EU legislation on air quality has been around since the eighties, but the early writings were more of a recommendatory nature, with little legal space to act on countries that were in non-compliance. In the air quality framework directive from 1996 (1996/62/EC) the basic conditions for legally binding air quality standards were introduced, but it was not until 2005 that air quality standards for particulate matter (PM₁₀) came into full effect and any legal claims could be made. For nitrogen dioxide (NO₂) the standard entered into effect in 2010 (with the option for countries to request a time extension until 2015). Limits for PM_{2.5} will not be binding until 2015.

In 21 of the EU member states at least one of their air quality zones exceeded the 24-hour limit for PM₁₀ in 2009. The regular routine is for the European Commission to report countries that fail to comply with the directive to the European Court of Justice (ECJ). So far, only two countries, Sweden and Slovenia,

have been condemned for exceeding the PM₁₀ limits in 2005, 2006 and 2007, but not given any penalties. Cyprus, Italy, Portugal, Spain, France and Belgium have all been referred to the ECJ but are still awaiting court decisions. Another group of countries have received warnings.

However not all of the 20 per cent of the EU urban population that lives in areas where PM levels are too high have the patience to wait for years for the EU bureaucracy to run its course. By suing a city, using the national legislation that follows the transposition of EU legislation, or if needed going all the way to the ECJ, civil society has the possibility to take action.

Munich was one of the first cases of this type. According to German law, environmental organisations cannot appeal against environmental legislation – this can only be done by affected citizens. A

Mr Dieter Janecek, who lives near the central ring road in Munich, volunteered to be this individual. Close to his home was one of the municipality's monitoring stations. In 2005 and 2006, high levels of PM₁₀ were recorded there, for more than the 35 days allowed in the directive.

Mr Janecek demanded that the city should adopt an action plan to deal with the air quality problems in his district. The application was dismissed in the court of first instance. He continued to a higher administrative court, which stated that a citizen has the right to require an action plan, but cannot insist on measures that would guarantee compliance in the short term.

Both Mr Janecek and his counterpart, the state of Bavaria, appealed against this



JESS LOUGHBOROUGH / CREATIVE COMMONS

judgement to the Federal Administrative Court, which stated that national law alone cannot entitle an individual to have an action plan drawn up. The court however directed a question to the European Court of Justice (ECJ), asking whether conditions were different under Community law. In 2008 the ECJ confirmed that individuals directly concerned can require local authorities to develop short-term action plans when there is a risk that alert thresholds or limit values are exceeded.

With the outcome of the ECJ behind them, German citizens have pursued cases against several other cities that exceed air quality standards, thus forcing them to develop or renew action plans.

A similar case occurred in Sweden, where the Swedish Society for Nature Conservation (SSNC) has pursued a court case on behalf of five members living near one of central Stockholm's main streets, known for having the worst air quality in the country. Due to the heavy transit traffic and poor air circulation the air quality limits for PM₁₀ and NO₂ are exceeded every year.

In January 2008, SSNC handed a complaint to the City of Stockholm, with a demand to act on the high levels of air pollution. In April 2009, the municipality rejected the complaint on the grounds that further investigations were needed. A month later, SSNC lodged an appeal to the County of Stockholm. In June 2011 the County Administrative Board set aside the City of Stockholm's decision to reject complaints without further action regarding the levels of PM₁₀. The city has however appealed against the decision.

A third example comes from the United Kingdom, where several cities are struggling with the NO₂ limits. Because 40 (out of 43) air quality zones were exceeding the limits in 2010, the Commission required action plans to be drafted to show how they were going to ensure compliance by 2015 at the latest. After reading the draft action plans, Client Earth, an environmental law organisation, noted that 17 of them did not demonstrate sufficient measures and did not expect to be in compliance until 2020, and in the case of London not until 2025.

In late July 2011, Client Earth decided to launch a judicial review against the UK Secretary of State for Environment, Food and Rural Affairs for failing to protect the health and lives of people through the inadequate NO₂ plans. However, a High Court judge dismissed the case at a hearing in London in December, saying that it was up to the European Commission, not a national court, to take corrective action.

The national conditions for pursuing legal cases to improve air quality vary considerably across member states. There are several other countries where, as in Germany, environmental organisations cannot be stakeholders. A recent precedent-setting ruling in the ECJ might however have changed these circumstances completely.

A Slovakian environmental group got the right to be party in a case concerning habitat protection for bears, through the Aarhus convention, which the European Union has signed and ratified. This can probably, though it has not been tried yet, open up the right for environmental groups to be a party in court cases concerning national law that follows under the EU air quality legislation.

The financial risk for the pursuer is another factor that varies. In some countries there is a risk of having to pay all trial costs (which can amount to hundreds of thousands of euro), while in other countries trial costs are either paid by the state or there are other legal devices that protect financially weaker parties.

One way to avoid these costs is to threaten to pursue legal action, put the air pollution problem in the public eye and hope that the resulting pressure will be enough to settle an agreement with the local authority. This strategy was proven successful in Denmark in 2008, when four environmental groups prepared a lawsuit against the Danish government for not doing enough about PM₁₀ levels in the capital. This caused headlines in some of the leading newspapers, and the Environmental Protection Agency subsequently came up with the necessary action plans.

Kajsa Lindqvist

Poland faces heavy fine for air quality failure

The European Commission is referring Poland to the European Court of Justice and asking for financial penalties to be imposed. Despite earlier warnings, Poland has failed to notify the Commission about the transposition of legislation on the Ambient Air Quality Directive, which should have been in place since 11 June 2010. The Commission is asking the Court to impose a penalty payment of €71,521 per day, to be paid from the date of the judgment (assuming that there is no compliance by then) until transposition is completed.

Source: European Commission, 24 November 2011

California gets stricter car emission standards

The California Air Resources Board on 27 January unanimously approved new emissions rules for cars and light trucks for model years 2017 through 2025. The package of car rules is intended to save drivers money on fuel, cut smog and greenhouse gases and make the state a world leader in clean car technology.

The Advanced Clean Cars program will clean up gasoline and diesel-powered cars and ease the way for zero-emission technologies, such as battery electric, plug-in hybrid and hydrogen fuel cell cars. By 2025, new cars are expected to emit 34 per cent less global warming gases and 75 per cent less smog-forming emissions as compared to 2014 levels.

The Advanced Clean Cars program is composed of four separate components: Greenhouse gas standard for cars and light trucks (model years 2017-2025); Reducing smog-forming emissions; Zero emissions vehicle regulation; and Clean fuels outlets.

Under the new regulations, consumer savings on fuel costs would average \$6,000 over the life of the car – more than offsetting the average \$1,900 increase in vehicle price for the ultra-clean, high-efficiency technology.

Source: Environmental News Service, 30 January 2012

Legal complaint to EU against UK air quality failure

Forty out of forty-three air quality zones were in breach of the NO₂ limit value in 2010.

In February, Clean Air in London (CAL) wrote to the European Commission filing a two-part complaint against the UK for infringements of EU air quality law and requesting infraction action before the London 2012 Olympics to enforce PM₁₀ and NO₂ limit values.

Part one of the complaint is that the UK unlawfully obtained a time extension to comply with the daily limit value for airborne particulate matter (PM₁₀) in London and that, even if a time extension is sustained, this limit value was again breached in Neasden Lane in London in 2011. The UK had failed to consult the public on the updated air quality plan for London that it submitted to the Commission to obtain the time extension.

Part two of the complaint is that the UK breached the annual mean and hourly limit values for nitrogen dioxide (NO₂) in London and 16 other zones in 2010 (and 2011), and it has not applied for a time extension for those zones.

According to CAL, the UK and London in particular have some of the worst air pollution in Europe. For example, the World Health Organisation (WHO) estimated in September 2011 that the number of premature deaths attributable

to long-term exposure to particles in 2008 was higher in the UK than in any other country in the EU27.

The UK has a higher percentage of zones exceeding the NO₂ annual limit value plus margin of tolerance than any other country in the European Union (i.e. 40 out of 43 zones). Official data shows that nearly 700,000 London inhabitants were exposed to unlawful levels of NO₂ in London in 2010.

In an official UK submission to the Commission, dated 22 September 2011, it is stated that:

“However, parts of 40 of the 43 UK zones have not achieved full compliance with the annual NO₂ limit value in 2010. Parts of three of the 40 zones are also non-compliant with the hourly limit value in 2010. The UK is therefore submitting to the European Commission air quality plans with a view to postponement of the compliance date to 2015 where attainment by this date is projected.” CAL considers this wording misleading in the context submitted.

The UK’s submission went on to say “The table shows that of the 40 zones with exceedances in 2010, compliance may be

achieved by 2015 in 23 zones, 16 zones are expected to achieve compliance between 2015 and 2020 and that compliance in the London zone is currently expected to be achieved before 2025.”

On 16 December 2011, the UK submitted a report titled “Air Pollution in the UK 2010 – Compliance Assessment Summary” to the Commission. This report confirmed the UK had breached the NO₂ limit value in London and 39 of 42 other zones in 2010.

In its complaint CAL urges the Commission to launch an infraction process against the UK by no later than 30 April 2012 to enforce the PM₁₀ daily limit value and the NO₂ annual mean and hourly limit values. London is hosting the Olympics from 27 July to 12 August and the Paralympics from 29 August to 9 September.

Christer Ågren

The full complaint: <http://www.cleanairinlondon.org/>

Winter smog over London.



Emission standards for light and heavy road vehicles

Introduction

Between 1990 and 2009, greenhouse gas emissions from road traffic within the EU increased by 27 per cent, rising from 12 to 17 per cent of total EU emissions (16 to 22 per cent excluding international bunkers).¹ Emissions of most other air pollutants have decreased since 1990, but many cities still exceed the concentration limits set by the EU legislation.² To overcome the emission problems caused by road traffic there are two main approaches, both of which are necessary: to reduce the total amount of road traffic and to reduce emissions from individual vehicles. Common emission requirements for vehicles are an important tool for the latter.

Emission requirements for light road vehicles have existed in the EU since the early 1970s, while the first requirements for heavy vehicles came in at the end of the 1980s. Requirements have been repeatedly tightened over the years, a process that is ongoing. Today, vehicle emissions are controlled under two basic frameworks: the “Euro standards” and the regulation on carbon dioxide emissions.

The “Euro standards” regulate emissions of nitrogen oxides (NO_x), hydrocarbons (HC), carbon monoxide (CO), particulate matter (PM), and particle numbers (PN). There are separate regulations for light vehicles (under 3.5 tonnes) and heavy-duty vehicles. The standards for both light and heavy vehicles are designated “Euro” and followed by a number (usually Arabic numerals for light vehicles: Euro 1, 2, 3..., and Roman numerals for heavy vehicles: Euro I, II, III...). Compliance is determined by running the vehicle or the engine in a standardised test cycle. Non-compliant vehicles cannot be sold in the EU, but new standards do not apply to vehicles already on the roads. Euro standards also exist for two and three-wheeled vehicles (motorcycles and mopeds) and for engines for non-road machinery, but these are not covered here.

The regulation on carbon dioxide (CO₂) emissions is more recent and so far only covers passenger cars and vans. There are as yet no limits for CO₂ emissions from heavy-duty vehicles. The carbon dioxide directive differs from the Euro standard

in that compliance is not required for a single vehicle but for the weighted performance of the entire fleet produced by a manufacturer (or a group of manufacturers) in a year.

Test cycles

Emissions are measured using a standardised test cycle that is designed to simulate real driving. For light vehicles the entire vehicle is tested and emissions are measured in grams per kilometre (g/km). For heavy vehicles the engine is bench-tested and the results are expressed in relation to the engine power, as grams per kilowatt-hour (g/kWh). A vehicle or engine that is tested and approved in one EU country may then be sold throughout the union without any requirement for further testing.

Light vehicles are subjected to a transient cycle (ECE+EUDC) in which the vehicle follows a prescribed driving pattern that includes accelerations, decelerations, changes of speed and load, etc. The first part of the cycle simulates urban driving with a maximum speed of 50 km/h, while the second part simulates motorway driving with a maximum speed of 120 km/h.

In the case of heavy vehicles both a transient cycle and a stationary cycle are used. The two cycles that have been used since 2000 are the European Stationary Cycle (ESC), which consists of a sequence of constant engine speed and load modes, and the European Transient Cycle (ETC), which simulates typical driving patterns (2005/55/EC). As from 2013 the World Harmonised Transient Cycle (WHTC) and the World Harmonised Stationary Cycle (WHSC) will replace these. The two new cycles are developed by a United Nations body known as the UN ECE GRPE to simplify registration of a new model in several parts of the world.

One dilemma with test cycles is that they never can totally simulate true driving. Cars will be designed

- 1 Laying the foundations for greener transport. TERM 2011: Transport indicators tracking progress towards environmental targets in Europe, EEA Report No 7/2011 <http://www.eea.europa.eu/publications/foundations-for-greener-transport> and EU Energy and transport in figures Statistical pocketbook 2010 http://ec.europa.eu/energy/publications/statistics/statistics_en.htm
- 2 Air quality in Europe – 2011 report. EEA Technical report No. 12/2011.



Table 1. Emission standards for passenger cars in mg/km.

	NO _x		THC ¹		THC ¹ + NO _x		PM		PN ²	
	Diesel	Petrol	Diesel	Petrol	Diesel	Petrol	Diesel	Petrol	Diesel	Petrol
Euro 1 1992.07	-	-	-	-	970	970	140	-	-	-
Euro 2 1996.01	-	-	-	-	700/900 ³	500	80-100	-	-	-
Euro 3 2000.01	500	150	-	200	560	-	50	-	-	-
Euro 4 2005.01	250	80	-	100	300	-	25	-	-	-
Euro 5a 2009.09	180	60	-	100	230	-	5	5	-	-
Euro 5b 2011.09	180	60	-	100	230	-	5	5	6x10 ¹¹	-
Euro 6 2014.09	80	60	-	100	170	-	5	5	6x10 ¹¹	-

¹ THC = Total hydrocarbons

² Particle number is expressed as the maximum allowed number of particles per kilometre (#/km).

³ Indirect Injection (IDI) and Direct Injection (DI) engines respectively.

to have low emissions in the test, but how they perform on the road can be a different story. However over the years the test cycles have gradually improved and this is not such a great problem as it used to be. It is also worth noting that car models are tested without any extra equipment. When air conditioners and music systems are in use emissions can be significantly higher.

Euro standards for light vehicles

The light category of vehicles covers road vehicles under 3.5 tonnes, i.e. both passenger cars and light commercial vehicles such as vans. Standards vary depending on whether the vehicle uses petrol or diesel, as well as on the class of the vehicle within the broader light-duty vehicle category.

The first Euro standard, Euro 1 (91/441/EEC) entered into force in 1992-93, and these requirements forced manufacturers to install three-way catalytic converters in petrol vehicles. Since then, the emissions limits have been progressively tightened, and the standards have subsequently been updated several times.

Most recently, a regulation adopted in December 2006 (715/2007/EC) established the currently applicable Euro standards. The Euro 5 standard applies to the approval of new vehicles as of September 2009, and to the sale of all new vehicles as from January 2011, while the Euro 6 standard will apply from September 2014 (new approvals) and September 2015 (all sales) onwards.

Table 1 shows the evolving standards for passenger cars for the substances of main concern. The standards for light vehicles are defined by driving distance, and expressed in milligrams per kilometre (mg/km). The limit values for light commercial vehicles are generally slightly higher than for passenger cars and are dependent on the weight class – the heavier the vehicle, the higher the permissible emissions.

As shown in Table 1, the main effect of the Euro 5 standard has been to reduce the amount of particulate matter (PM) emitted from diesel engines by 80 per cent, while also tightening NO_x emission requirements. The main change contained within the Euro 6 standard is the further reduction of NO_x emissions from diesel engines to a level closer to that currently required of petrol engines. Also new is a standard for particle numbers (PN). The number limit will prevent the possibility that the tougher mass limit for PM is met using technologies (such as “open filters”) that would enable a high number of ultra-fine particles to pass.

Prior to Euro 5, particulate matter from petrol engines was not regulated, as emissions are low compared to diesel engines. However, some direct-injection petrol engines can create PM emissions of a level comparable to diesel engines, and under the Euro 5 and 6 standards the same limit of 5 mg/km is imposed on both diesel and direct-injection petrol engines.

The Commission had originally proposed a Euro 5 limit of 200 mg/km for NO_x emissions from diesel engines, which was reduced to 180 mg/km in negotiations between the Parliament and Council. However, this level of reduction limit does generally not require the use of NO_x after-treatment technologies. Further reductions to 80 mg/km under the Euro 6 standard in 2014 will likely require such technologies to be fitted.

The future Euro 6 standard is still substantially weaker than standards currently in force in the United States. There, the so-called Tier II standards limit fleet average NO_x emissions close to 40 mg/km (70 mg/mile) for both diesel and petrol engines. The Tier II standards have already been in force for several years in California and several other states.

Under the current framework, large personal vehicles with a weight of over 2.5 tonnes – that is, sports utility vehicles (SUVs) – are subject to the less strict rules applicable to vans. While the Commission had proposed to close this concession under the Euro 5 standard, a compromise between the Parliament and the Ministers extended it until September 2012. From this date, SUVs are subject to the same limits as other personal vehicles.

New legislation on durability was introduced along with the Euro 3 and 4 standards, making manufacturers responsible for the emissions from light vehicles for a period of five years or 80,000 km (Euro 3) and five years or 100,000 km (Euro 4), whichever comes first. Euro 5 and 6 standards maintain the five year or 100,000 km durability requirement for ‘in-service conformity’, but require an extended durability of five years or 160,000 km in the durability testing of pollution control devices for type approval.

Euro standards for heavy vehicles

The first EU directive to regulate emissions from heavy vehicles, i.e. road vehicles heavier than 3.5 tonnes, came in 1988 (88/77/EEC). Before that there had been a common standard within the UN Economic Commission for Europe (ECE R49).

The Euro I standards for medium and heavy engines were introduced in 1992-93 (91/542/EC). The same directive also

Table 2. Emission standards for heavy-duty vehicles.

	NOx (g/kWh)		THC ¹ (g/kWh)	NMHC ² (g/kWh)		PM (mg/kWh)		PN (#/kWh)	
	Diesel	Gas/Petrol	Diesel	Gas/Petrol	Diesel	Gas/Petrol	Diesel	Gas/Petrol	
Euro I 1992	8.0	-	1.23	-	360/612	-	-	-	-
Euro II a 1996.10	7.0	-	1.1	-	250	-	-	-	-
Euro II b 1998.10	7.0	-	1.1	-	150	-	-	-	-
Euro III 2000.10	5.0 ³	5.0	0.66 ⁴	0.78	100/160 ⁵	-	-	-	-
Euro IV 2005.10	3.5 ³	3.5	0.46 ⁴	0.55	20/30 ⁵	-	-	-	-
Euro V 2008.10	2.0 ³	2.0	0.46 ⁴	0.55	20/30 ⁵	30	-	-	-
Euro VI 2013.01	0.4/0.46 ⁶	0.46	0.13/0.16 ⁶	0.16	10/10 ⁶	10	6x10 ¹¹ /8x10 ¹¹ ⁶	-	-

¹Total hydrocarbons (methane included); ²Non-methane hydrocarbons; ³Both ESC and ETC test cycle; ⁴ESC test cycle only; ⁵ESC and ETC test cycle respectively; ⁶WHTC and WHSC test cycle respectively

laid down standards for Euro II, which took effect in 1995–96. Another directive (1999/96/EC) was adopted in 1999 giving standards for Euro III (2000), IV (2005) and V (2008). In 2013 the Euro VI standard (defined in regulation 595/2009) will be put in to effect.

The way in which the emission standards for heavy road vehicles in the EU have been stiffened over the years is shown in table 2. There are different standards for compression ignition engines (diesels) and positive ignition engines (gas and petrol), however among heavy-duty vehicles there is only a tiny fraction that does not run on diesel. The standards for heavy-duty vehicles are defined by energy output (g/kWh) and cannot be directly compared with the standards for light vehicles where standards are defined by distance.

The present Euro V standard differs from Euro IV in its stricter emission requirement for NOx. Euro VI is a step forward towards global harmonisation since the limit values are similar to those of the United States, where the limit for NOx is 0.27 g/kWh and the limit for PM is 13 mg/kWh.

The Euro VI regulation also includes an ammonia (NH₃) concentration limit of 10 parts per million (ppm) for both compression ignition and positive ignition engines. In June 2011 a particle number (PN) limit was defined for diesels, in addition to the mass limit (582/2011). A corresponding limit for positive ignition engines is yet to be defined.

The Commission also have the right to define a maximum limit for the NO₂ component of NOx emissions in future implementing regulation. In “traditional” diesel engines the NO₂ content in the total NOx emissions is about 5 per cent. Modern engines may, however, bring this share up to 50 per cent, strongly depending on the technology used.

CO₂ standards

Within the context of the EU’s commitment to reducing greenhouse gas emissions, limits on CO₂ emissions from cars have long been discussed. As early as 1994, Angela Merkel, then environment minister in Germany, proposed to cap car CO₂ emissions at 120 g/km from 2005.³

³ Howarth, David, (2009) Greening the internal market in a difficult economic climate, *The Journal of Common Market Studies*, Volume 47 pp133-140

However, the first binding limits for CO₂ emissions from vehicles were only agreed in 2009, when the EU set a legally binding CO₂ standard for new cars (443/2009). In May 2011 a similar EU legislation for vans was passed (510/2011).

Since there is currently no after-treatment technology that can reduce CO₂ emissions from road vehicles, the standards can also be seen as fuel efficiency standards.

CO₂ standard for passenger cars

The CO₂ emission standard for cars is designed to ensure that the average car sold by 2015 should emit no more than 130 g/km of CO₂, and by 2020 no more than 95 g/km. In 2013 the EU will review how the 2020 target should be reached. The Commission also considers targets beyond 2020, including a target of 70 g/km by 2025 as suggested by the European Parliament. Transport & Environment (T&E) believes that this is not enough and argues for a 80 g/km target by 2020 to be tightened to 60 g/km by 2025.

The core of the present regulation is a linear limit curve, where the weight of the car is a variable. The equation for the line has been set so that the fleet average for all new cars registered in the EU will be 130g/km. The slope of the line is designed so that greater improvements are required for heavier cars than lighter ones. This is supposed to encourage an increase in production of lighter, more fuel-efficient cars.

However the weight-based model has been criticised for inhibiting producers from developing lighter cars with the same capacity as existing heavy models. Instead, a footprint (track width times wheelbase) model is proposed in which the area between the wheels should determine the emissions allowed.⁴

A single manufacturer does not need to meet the requirements itself but can instead team up and form a pool with other manufacturers who must then jointly meet the emission targets. Manufacturers that sell less than 10,000 vehicles per year and who cannot or do not wish to join a pool can instead apply to the Commission for an individual target.

From 2012 until 2015 there will be a period of phasing in the new legislation. In 2012 the 130 g/km limit will apply to 65 per cent of all cars a manufacturer or a pool of manufacturers produces, in 2013 to 75 per cent, in 2014 to 80 per cent, and

⁴ How clean are Europe’s cars? Transport & Environment September 2011 http://www.transportenvironment.org/Publications/prep_hand_out/lid/653

in 2015 the regulation will apply to all new cars.

In addition, fines for non-compliance will also be phased in. Manufacturers will incur a penalty payment of €5 for the first g/km of exceedance, rising to €15 for the second g/km, €25 for the third g/km, and €95 for each subsequent g/km. Only from 2019 onwards, will the penalty be levied at €95 from the first gram.

The agreement also allows up to 7 g/km of credit to be given for 'eco-innovations' that produce emission reductions not currently identified by vehicle testing procedures, such as LED lights or solar sunroofs.

According to the European Environment Agency, CO₂ emissions from new cars sold in the EU in 2010 averaged 140.3 g/km, which is 5.4 g/km less than the previous year.⁵ Critics of the resulting regulation believe that a majority of this decrease is due to changes that would happen anyway and that car manufacturers will be technologically capable of meeting the 130 g/km target well before the 2015 deadline. It was on the basis of technological limitations that the industry had earlier successfully lobbied to weaken the regulation.

CO₂ standard for vans

This category of vehicles includes vans and car-derived vans weighing up to 3.5 tonnes that are being used to carry goods, and which weigh less than 2610 kg when empty. These account for around 12 per cent of the market for light-duty vehicles. In 2007 the average van sold emitted 203 g/km.

The standard will ensure that CO₂ emissions from new sales average 175 g/km by 2017, by using a similar limit curve as the one for passenger cars. The regulation is phased in so that by 2014 70 per cent of each manufacturer's newly registered vans must comply with the limit value curve. This will rise to 75 per cent in 2015, 80 per cent in 2016, and 100 per cent from 2017 onwards. A long-term target of 147 g/km is set for 2020 (subject to review in 2013). According to research commissioned by T&E the target for 2017 can be achieved by simply ending the trend towards more powerful engines and returning to the engine power levels of 1997.⁶ They argue that a target of 125 g/km by 2020 would be both feasible and more in line with the present target for passenger cars.

As for passenger cars it is possible for two or more van manufacturers to join a common pool and reach the target jointly. Manufacturers that sell fewer than 22,000 vehicles per year

and do not wish to join a pool can apply to the Commission for an individual target.

The same arrangement for 'eco-innovations' as in the passenger car regulations applies to vans. For vans there is also a special credit construction for vehicles with emissions below 50 g/km. They will be counted as 3.5 vehicles in 2014 and 2015, 2.5 in 2016 and 1.5 vehicles in 2017. Manufacturers will be able to claim this 'super credit' for a maximum of 25,000 vans over the 2014-17 period. The penalties for exceedance are the same as for passenger cars, including the penalty discounts between 2014 and 2018.

Fuels/fuel quality

The Directive on the quality of petrol and diesel fuels was passed in 1998 (98/70/EC) and sets maximum levels on sulphur, lead and aromatics allowed in fuels. In the latest amendment (2009/30/EC) the maximum sulphur content permitted in fuels was set at 10 parts per million (ppm) – a level that was a technical prerequisite for the use of the PM filters needed to meet the stiffer requirements for particulate matter in the Euro 5 standard.

Fuel suppliers are also required to gradually reduce life cycle greenhouse gas emissions by at least 6 per cent per unit of energy from fuel and energy supplied by the end of 2020 compared to the average levels in 2010. This reduction should be achieved through the use of biofuels, alternative fuels and reductions in flaring and venting at production sites.

Further Information

The European Commission Environment:

<http://ec.europa.eu/environment/air/transport/road.htm>

The European Commission Climate Action:

http://ec.europa.eu/clima/policies/transport/vehicles/index_en.htm

The European Commission Enterprise and Industry:

http://ec.europa.eu/enterprise/sectors/automotive/environment/index_en.htm

The European Union law

<http://eur-lex.europa.eu/>

Transport & Environment:

<http://www.transportenvironment.org/>

Articles in Acid News:

<http://www.airclim.org/acidnews/>

5 Monitoring the CO₂ emissions from new passenger cars in the EU: summary of data for 2010, EEA, June 2011 <http://www.eea.europa.eu/data-and-maps/data/co2-cars-emission>

6 Potential CO₂ reduction from optimal engine sizing for light commercial vehicles, TNO, June 2010, http://www.transportenvironment.org/Publications/prep_hand_out/lid/586

Biodiversity loss costs 450 billion euro a year

A silent crisis of biodiversity loss is costing the EU €450 billion a year, adding to the stress of the ongoing financial crisis, according to a draft report to the European Parliament's Environment Committee by Dutch MEP Gerben-Jan Gerbrandy.

"A quarter of the plants and animals in Europe are in danger of extinction," Gerbrandy told the committee. "This destruction of nature will cost about three percent of annual economic growth – equivalent to that which Europe needs at present to rescue the euro. Biodiversity loss, though, continues year after year."

In June 2011, the Council endorsed the EU Biodiversity Strategy 2020, as presented by the Commission. The Parliament is drafting and adopting its own report on the strategy to put forward its own recommendations to the Commission.

Source: Environmental News Service, 26 January 2012

More effort needed to reduce summer ozone

Ground-level ozone causes health problems, decreases crop yields and damages the environment. A new report from the European Environment Agency (EEA) shows that the long-term objective for the protection of human health (maximum daily eight-hour mean concentration of 120 µg/m³) was exceeded in all EU member states and it is likely many of them will not meet the target value, applicable as of 2010.

The report "**Air pollution by ozone across Europe during summer 2011**" is available at: <http://www.eea.europa.eu/publications/air-pollution-by-ozone-2011>



JASON A. SAMFIELD/CREATIVE COMMONS

Mercury affects wildlife

Songbirds and bats suffer some of the same types of neurological disorders from mercury as humans and especially children, says the study "Hidden Risk" by the Biodiversity Research Institute. New US federal standards limiting pollution from power plants are meant to safeguard human health, but they should have an important side benefit to also protect a broad array of wildlife that has been harmed by mercury emissions.

Songbirds with blood mercury levels of just 0.7 parts per million (ppm) generally showed a 10 per cent reduction in the rate at which eggs successfully hatched. As mercury increases, reproduction decreases. At mercury levels of greater than 1.7 ppm, the ability of eggs to hatch is reduced by more

than 30 per cent. Overall, birds at contaminated sites were found to be three times as likely to abandon their nests or exhibit abnormal incubation or feeding behaviour.

Mercury, which occurs naturally in the earth, is released into the air when coal is burned in power plants. The gaseous mercury can drift hundreds of miles before settling back to earth, sometimes along with rain. The organic form, methylmercury, is a neurotoxin that can enter the food chain. Small insects, worms and snails that feed on forest litter absorb the mercury. They in turn are eaten by birds and other small animals, and so on through the food chain.

Source: The New York Times, 23 January 2012

Protecting US ecosystems requires 80-90 per cent emission cuts

Further emissions cuts from the utility sector are needed to allow for ecological recovery in acid-sensitive areas in the United States, according to the 2011 National Acid Precipitation Assessment Program Report to Congress.

Power sector emissions of sulphur dioxide (SO₂) and nitrogen oxides (NO_x) must be reduced to below 1.1 and 0.44 million tonnes per year, respectively, by 2020 to reduce the number of lakes with acute acid deposition issues. To fully protect

the lakes in the northeast, SO₂ emissions would have to come down to 0.44 million tons per year or less.

The Cross-State Air Pollution Rule would, if implemented fully, cut SO₂ emissions from 23 eastern states to 3.24 million tons per year (TPY) in 2012. NO_x emissions would come down to 1.16 million TPY.

Power sector SO₂ emissions would have to be cut by an additional 90 per cent to reach 0.44 million TPY relative to the

emission level expected to be achieved under existing air quality legislation. To cut NO_x emissions to 0.44 million TPY power sector emissions would have to fall by about 80 per cent. Sources outside of the power sector such as industrial boilers would have to reduce emissions by an additional 50 per cent, according to the report.

Source: Argusmedia 20 January 2012

Fight over US EPA air pollution rules

Industry pressure to relax new air pollution control legislation – challenges to EPA's final power plant transport and air toxics rules in courts, Congress.

Air pollution from power plants in the United States could be substantially reduced in the coming years if two new power plant rules are implemented, but industry is fighting to delay and even kill them. The US Environmental Protection Agency (EPA) finalised the first rule in July 2011, the second in December 2011.

The new Cross-State Air Pollution Rule (CSAPR) addresses power plant pollution that is transported in the atmosphere downwind across state lines. CSAPR replaces and strengthens the 2005 Clean Air Interstate Rule (CAIR), which the US Court of Appeals ordered EPA to revise in 2008. By 2014, this rule and other state and EPA actions are expected to reduce power plant SO₂ emissions by 73 per cent from 2005 levels, and NO_x emissions by 54 per cent.

According to the EPA, the new rule, which affects 27 states in the eastern half of the country, will reduce air pollution, such as smog and soot, in communities that are home to 240 million Americans. Health benefits include the prevention of up to 34,000 premature deaths, 15,000 non-fatal heart attacks, 19,000 cases of acute bronchitis, 400,000 cases of aggravated asthma, and 1.8 million sick days a year beginning in 2014. These health benefits are valued at US\$280 billion per year in 2014.

Moreover, the emission reductions will help to improve visibility in state and national parks and give better protection to sensitive ecosystems, such as Appalachian streams, Adirondack lakes, estuaries, coastal waters, and forests.

The benefits far outweigh the US\$800 million projected to be spent annually on this rule in 2014 and the roughly US\$1.6 billion per year in capital investments already underway as a result of CAIR.

Despite the huge public health benefits and the low cost of CSAPR, since its publication last summer, over 40 separate petitions seeking judicial review of the rule have been filed in the US Court of Appeals by industry and their allies. Many of these seek to prevent the rule from being implemented until the lawsuits are decided, which could take a year or longer. At the end of 2011, the court granted a stay of the rule, but ordered an expedited schedule for hearing arguments on the rule's validity. The court will hear the case

in April, and likely issue its decision by this summer.

Various attempts to overturn the rule in Congress have failed.

In December 2011 the EPA also finalised the first nationwide emission limits for mercury and other toxic airborne pollutants emitted by existing coal- and oil-fired power plants. Under the US Clean Air Act, the existing power plants will have up to three years, and in some limited cases, four years, to comply with these new requirements.

The new standards are expected to prevent 11,000 premature deaths and 4,700 heart attacks a year. They will also prevent 130,000 cases of childhood asthma

symptoms and about 6,300 fewer cases of acute bronchitis among children each year.

EPA has calculated that for every dollar spent to reduce pollution from power plants, the American public will see up to US\$9 in health benefits. The total health and economic benefits of this standard are estimated to be as much as US\$90 billion annually.

According to a modelling analysis by the EPA, the power plant rules will force pollution control installations on many plants that are currently uncontrolled. Additionally, industry's economic choices could potentially drive decisions to retire some older, under-utilised coal-fired power plants, on the order of 10 gigawatts (GW) of capacity (leaving 95 per cent of the current coal fleet still in operation, by EPA estimates).

By contrast, some industry sources argue that the combined



Frosty response to EPA's air pollution standards, despite huge public benefits.

LET IDEAS COMPLETE / CREATIVE COMMONS

effect of the new EPA rules could result in the early retirement of up to 80 GW of coal-fired electricity generation nationwide over the next ten years.

In a more recent analysis, reported by Platts last October, consultancy ICF International estimates that there could be coal plant retirements of up to 40 GW over the next two decades due to EPA regulations. Most of the retirements are expected to take place among smaller and older plants.

While some in industry complain, others support the rules. Exelon Corporation, for example, has advocated quick adoption of the EPA rules. And environmental groups support the EPA's regulations. Ann Weeks, of Clean Air Task Force, the lead attorney in the deadline suit forcing the power plant pollution rules, says "Industry has been on notice since 2000 that these rules were pending – under the law they should have been issued by EPA in 2002. As such they are already almost ten years overdue, and industry arguments about needing more time ring exceptionally hollow."

Moreover, Mary Anne Hitt, director of the Sierra Club's Beyond Coal Campaign, said to the Environmental News Service (ENS), "The coal plants targeted for phase-out lack modern pollution controls and contribute to thousands of premature deaths, asthma attacks and heart attacks every year. It is time to replace these dirty

and dangerous energy sources with clean, safe and reliable forms of production that will create thousands of jobs and revitalise local communities."

In early October, an industry lobbying group, backed by 24 states and a territory, urged a federal court to take the extraordinary step to override a consent decree to which the groups and states were not parties. The motion sought to require the EPA to delay its proposed air pollution rules for power plants by 12 months, asserting that EPA needed more time to finalise the rules. The court denied the motion.

Once the rule was published this winter, industry and their allies immediately filed three petitions seeking judicial review in the same US Court of Appeals as CSAPR. No schedule for hearing this latest industry challenge has yet been set.

Adding to the pressure on the EPA to relax and delay its proposals, the Republicans in the US House of Representatives have passed several bills aiming to block the EPA rules. However, the US Senate has thus far turned away each of these bills presented to it. Even were a subsequent bill to pass in the Senate, it would need to be signed by President Obama, whose administration has strongly supported these rules to date.

Christer Ågren

David Marshall (Clean Air Task Force)

Web links: <http://www.epa.gov/crossstaterule/> and <http://www.epa.gov/mats/>

Eleven states sue EPA for new PM standards

A coalition of 11 states led by the state of New York, have taken legal action after the United States Environmental Protection Agency (EPA) failed to meet an October 2011 deadline to revise the existing air quality standards for fine particulate matter pollution (PM_{2.5}), as required by the federal Clean Air Act. The lawsuit asks the court to order the EPA to adopt new air pollution standards promptly and by a fixed date.

The federal Clean Air Act requires the EPA every five years to review and, if warranted by advances in public health science, revise the national air quality standards for common air pollutants. EPA last revised the standards in 2006. New York and 15 other states challenged those standards as lax, alleging that they were adopted against the advice of EPA's own air pollution experts and the agency's independent scientific advisors.

Source: Environmental News Service, 14 February 2012

Biggest GHG emitters in the United States listed

The largest single emitters of greenhouse gases in the United States are two coal-fired power plants in Georgia, followed by another in Alabama, all with emissions exceeding 20 million tonnes of carbon dioxide-equivalents in 2010, according to recently published data from the US Environmental Protection Agency (EPA). The three plants are all owned by subsidiaries of the Southern Company.

Industries with emissions greater than 25,000 tonnes a year have to report their emissions to the EPA, and in total more than 6700 facilities have reported. Power plants were responsible for 72 per cent of the greenhouse gases reported. Of the greenhouse gas emissions, carbon dioxide accounted for 95 per cent, followed by methane at four per cent. Plant-specific emissions are to be found in a database at the EPA website.

Sources: US EPA, 11 January 2012

Wide public support for air pollution control

A nationwide public opinion poll carried out in September 2011 showed that voters of both political parties and in all regions of the United States support the EPA's new rules to limit air pollution from coal-burning power plants. Two-thirds of the respondents oppose Congress delaying implementation of the air pollution rules.

The poll found that support for the air pollution rules extends across the political spectrum. Three-quarters of the public believe that the EPA, not Congress, should determine whether stricter limits are needed on air pollution from electric power plants, and this is a view supported by members of all parties, with 85 per cent of Democrats, 62 per cent of Republicans, and 79 per

cent of Independents in agreement.

Among the poll's key findings were that:

- ✗ 67% of voters polled support the Cross-State Air Pollution Rule and 77% of voters support the Mercury and Air Toxics Standards Rule.
- ✗ 65% of voters surveyed are confident that the health and environmental benefits of air pollution standards outweigh the costs of complying with them.
- ✗ 79% of voters surveyed agree that the rules are important to enact for health reasons.

75% of voters polled believe a compelling reason to implement these rules is the boost to local economies and thousands of new jobs that will be created from investments in new technology.

Source: ENS, 12 October 2011

New Gothenburg Protocol soon to be agreed

Parties to the Convention on Long-range Transboundary Air Pollution will meet in early May to adopt new non-ambitious national emission limits for major air pollutants.

On 30 April to 4 May 2012, the parties to the Convention on Long-range Transboundary Air Pollution (CLRTAP), including the EU's 27 member states and countries in eastern Europe and North America, will meet in Geneva in order to arrive at a final agreement on amendments to the Gothenburg Protocol on air pollution.

The Gothenburg Protocol covers sulphur dioxide (SO₂), nitrogen oxides (NO_x), volatile organic compounds (VOCs) and ammonia (NH₃). It sets binding national emission ceilings for each of these four pollutants, that were to be met by 2010 and not exceeded thereafter, and it also contains a series of technical annexes setting emission limit values for key sources of these pollutants. It has so far been ratified by 24 European countries, the EU and the United States. (See Box.)

Negotiations for a revised Gothenburg Protocol started in 2007 and have proceeded much slower than anticipated. As late as December 2010 all parties agreed that the revised protocol was to be finalised and adopted before the end of 2011. But now this is expected by May.

It has been particularly difficult to get parties to come forward with specific proposals on their preferred level of ambition, and this was again the case at the last negotiation session in December last year. (For an overview of the ambition levels investigated, see AN 3/11, pp12-14.)

There is however a general agreement to extend the protocol by adding fine particles (PM_{2.5}) to the four pollutants that are currently covered, and that black carbon should also be included in the revision as a component of PM_{2.5}. Since the current protocol has been ratified by only 26 of the convention's 51 parties, there is also a general aim to get more countries to sign, especially those in Central and East Europe.

Another change is that the new emission ceilings for the target year 2020 will be relative, rather than absolute, i.e. countries will sign up to a specific emission reduction percentage calculated from emission levels in the base year 2005. There are also intentions to allow a three-year averaging of emissions in the target year (i.e. over 2019-21). Moreover, submitted emission data for the base year should be able to be retroactively corrected, taking into account improvements in inventory methodology.

While the choice of ambition level will strongly influence the final outcome regarding the emission reduction commitments, it should be noted that these are complemented by a general requirement to implement best available techniques and apply binding emission limit values (ELVs) for a number of specific emission source categories, including large combustion plants and road vehicles. Therefore the level of ambition of the ELVs, the emission sources covered by these, and the deadlines set for their implementation are also of great importance for the overall outcome.

Technical experts had initially pre-

sented three ambition levels for ELVs, of which the stricter Option 1 was said to be "demanding but technically feasible", which in practice meant it was largely in line with best available techniques. Option 2 was said to "pay greater attention to the costs of measures", which in practice meant it was largely in line with current EU minimum standards. Option 3 was said to "reflect current practices of a number of parties", which in effect meant it reflected current emission levels in eastern European countries.

The ELVs currently under consideration in the draft texts are certainly not very ambitious. After the negotiation meeting in September 2012, there were only two ambition levels left – Option 2, which is largely in line with already adopted EU legislation, and Option 3, with even more lenient standards. The latter option will however most probably be removed before the final adoption.

While the national emission reduction commitments are to be achieved by all parties by 2020, eastern European countries, led by Russia and Belarus, have persistently claimed they will need a transition period of 15-20 years to implement the ELVs for existing stationary sources,

The Gothenburg Protocol

The Convention on Long-Range Transboundary Air Pollution (CLRTAP) dates back to 1979 and covers 51 parties in Europe and North America. Cooperation under the convention includes development of policies and strategies to cut emissions of air pollutants through protocols with emission control obligations, exchanges of information, consultation, research and monitoring. The Gothenburg Protocol to Abate

Acidification, Eutrophication and Ground-level Ozone was signed in 1999 and entered into force in 2005. It sets binding national emission ceilings for 2010 for four pollutants (SO₂, NO_x, VOCs and NH₃), contains emission limit values for a number of specific emission source categories such as large combustion plants, industry and road vehicles, and requires the use of best available techniques.

For more information, see: <http://www.unece.org/env/lrtap/>



Parties at work – all happy to stay at the lowest level.

UGARDENER / CREATIVE COMMONS

such as power plants. Rather surprisingly, the request for such a generous transition period seems so far to be acceptable to both the EU and the US.

In the EU, the European Commission and the member states have met several times under the Council's working party on international environment issues in order to arrive at a coordinated EU position, including the level of ambition when establishing commitments. In this context, the Commission has made tentative proposals for new national emission reduction obligations for 2020.

A group of ten leading environmental organisations in the EU has reacted to the slow pace in negotiations and the apparent lack of ambition to protect human health and the environment by sending a joint letter to the Council and the Commission, urging them to take all necessary steps towards an ambitious agreement.

In doing so, they point to the fact that every year air pollution causes nearly half a million premature deaths in the EU, corresponding to an annual loss of almost 4.5 million years of life. Additional health impacts include increased hospital admissions, extra medication, and millions of lost working days. Air pollution also causes significant damage to ecosystems, agricultural crops, modern materials and our cultural heritage.

Scenario analyses have shown that by

aiming for a level of ambition in line with the so-called High* scenario, the implementation of an amended Gothenburg Protocol could by 2020 bring annual health benefits valued at up to €110-290 billion in Europe, of which €50-150 billion in the EU. The economic value of the health benefits has been calculated to be up to 55 times higher than the estimated costs involved.

According to the environmental groups, the negotiations for revising the Gothenburg Protocol have so far been a great disappointment as most EU member states and non-EU countries appear to aim only for a very low level of ambition, with some member states even hesitating to accept emission reduction obligations for 2020 in line with business-as-usual, i.e. based on solely implementing already existing legislation.

They call for the EU to agree to strict emission reduction obligations for the EU member states, thereby also pushing non-EU countries in the same direction, which is of great importance since air pollutant emissions in non-EU countries markedly impact ambient air quality and depositions in many EU member states. Moreover, air pollutants such as NO_x and VOCs (which are precursors to ground-level ozone) or black carbon (a component of PM) also contribute to global climate change, and cutting these emissions will therefore benefit both climate and air quality.

In brief, the environmental groups recommend the EU to aim to establish a high level of ambition for national emission reduction obligations for 2020 (i.e. one that is at least in line with the High* scenario), and to adopt ambitious binding emission limit values for specific sources of pollution, preferably at least in line with Option 1.

Overall the EU should ensure the achievement of levels of air quality that do not give rise to significant negative impacts on and risks to human health and the environment, in line with already agreed objectives in the EU's Sixth Environmental Action Programme.

Last year the European Commissions started a review of its air pollution policy (see AN 2/11, pp. 4-5) that among other things will result in a revised National Emission Ceilings (NEC) directive setting stricter emission limits for 2025 or 2030. Legislative proposals are expected to be presented in 2013, which according to the EU's Environment Commissioner, Janez Potocnik, has been announced as the "Year of Air".

Christer Ågren

More information on the Gothenburg Protocol and meeting documents are available at the LRTAP Convention's website: <http://www.unece.org/index.php?id=28153>

Letter from environmental organisations: <http://www.eeb.org/EEB/?LinkServID=A1520CE4-5056-B741-DBCF2C7A392D0439&showMeta=0>

Energy efficiency standards to save Americans US\$1.1 trillion by 2035

National efficiency standards for appliances, lighting and other equipment will save consumers and businesses more than US\$1.1 trillion by 2035, according to the report “The Efficiency Boom: Cashing In on Savings from Appliance Standards”, by the American Council for an Energy-Efficient Economy (ACEEE) and the Appliance Standards Awareness Project (ASAP). A typical household will save about US\$10,000 between 2010 and 2025 by purchasing products compliant with today’s minimum standards.

Germany’s air quality worsened last year

Levels of particulate matter (PM₁₀) in German cities in 2011 were in many cases higher than in previous years, according to preliminary air quality data published by federal environment agency UBA.

The EU limit of 50 micrograms per cubic metre (µg/m₃) for PM₁₀ for no more than 35 days a year was exceeded at 42 per cent of monitoring stations located near roads in urban areas. Nitrogen dioxide (NO₂) levels also remained high, with concentrations above the annual average limit of 40 µg/m₃ at many monitoring stations.

Source: ENDS Europe Daily, 7 February 2012

A quarter of energy emissions from homes

Households account for a quarter of the energy-related greenhouse gas emissions in Europe, according to a report from the European Environment Agency, which calculates emissions based on their “end use”, or the sector using the energy.

When the indirect emissions are considered, greenhouse gas emissions from the residential sector double (from 12 to 25 per cent) and the commercial sector trebles (from 5 to 15 per cent). Industry jumps from 15 to 26 per cent, while transport causes relatively small indirect emissions, pushing transport emissions from 25 to 29 per cent.

Source: European Environment Agency, 15 December 2011

To assess the potential impact of future standards, the report evaluates 34 products for which new or updated standards could be adopted within the next four years. New and updated standards that could be completed by 2015 would reduce 2035 electricity use by another seven per cent, the study found.

The researchers found that existing standards reduced US greenhouse gas (GHG) emissions by about 200 million tonnes in 2010. They calculate that the annual reduction level will grow to 470 million tonnes by 2035, or roughly the output of 120 coal-fired power plants. It is estimated that new and updated standards would



Saving dollars.

RICHARD MASONER / CREATIVE COMMONS

reduce 2035 GHG emissions by another 200 million tonnes, or the equivalent of another 50 coal-fired power plants.

Source: Environmental News Service, 12 March 2012

Escalating conflict over aviation in the ETS

The inclusion of aviation in the EU emissions trading scheme (ETS) at the beginning of this year has been met by strong reactions from several countries, including China, the United States, India and Russia. In February they met in Moscow to sign a declaration that lists nine measures, including prohibiting their

national airlines from contributing to the ETS and pursuing a lawsuit against the EU within the UN’s International Civil Aviation Authority (ICAO).

“We will not allow any discriminatory retaliation action to happen,” countered Jos Delbeke, European Commission Director

General for Climate Action, at a meeting with the European Parliament’s Transport Committee the following week.

The Declaration also emphasises the importance that emissions from aviation are regulated globally, through the ICAO. Since the inception of the Kyoto Protocol the ICAO has been commissioned to establish an international framework for reducing greenhouse gas emissions from aviation, but has so far failed to do so.

Source: Reuters 23 February 2012, European Commission press release 1 March 2012



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Turbulence in international aviation relations.

Twelve countries exceed NEC directive limits

Twelve EU member states exceeded one or more of the emission limits set by the national emission ceilings directive and may now face EU infringement action.

A new assessment of compliance with the National Emission Ceilings (NEC) directive, published by the European Environment Agency (EEA) shows that twelve EU member states exceeded one or more of their emission ceilings for 2010. In some instances the limits were exceeded significantly (see table 1).

The NEC directive covers four main air pollutants: sulphur dioxide (SO₂), nitrogen oxides (NOx), non-methane volatile organic compounds (NMVOCs) and ammonia (NH₃). These pollutants can damage human health, cause acidification and eutrophication of terrestrial and aquatic ecosystems, damage vegetation and harm biodiversity. The emission ceilings set in the NEC directive were designed to reduce such adverse impacts by an agreed amount.

Most exceedances were registered for NOx and the analysis shows eleven countries not complying with their respective NOx ceilings, namely Austria, Belgium, Denmark, France, Germany, Ireland, Luxembourg, Malta, Netherlands, Spain and Sweden.

Road transport contributes approximately 40 per cent of the NOx emissions in the EU and is one of the main causes behind the large number of NOx exceedances. Emission reductions from this sector have not been as large as originally anticipated, partly because traffic has grown more than expected and partly due to inadequate emission control measures. Moreover, EU's emission standards for diesel vehicles have not delivered the anticipated level of NOx reductions.

Spain was the only member state to have exceeded three of its four emission ceilings, followed by Germany with two exceedances. Finland exceeded its ammonia ceiling.

Three EEA member countries that are not members of the EU (Liechtenstein, Norway and Switzerland) have similar emission ceilings for 2010 set under the Gothenburg Protocol of the Convention on Long-range Transboundary Air Pollution (LRTAP). Liechtenstein reports it has missed its NOx and NH₃ emissions ceilings, Norway its NOx emission ceiling, while Switzerland has achieved its four ceilings (Table 2).

It is expected that the current review of EU air pollution policy (see AN 2/11, pp. 4-5) will among other things lead to a revised NEC directive setting stricter emission ceilings for 2025 or 2030 in order to further improve protection of health and the environment. For the first time, ceilings for emissions of particulate matter (PM_{2.5}) could be introduced. Until such new legislation is in place, however, the current NEC directive remains in force and requires countries to keep their emissions below the current national ceilings in years to come.

Christer Ågren

Information: European Environment Agency, Feb 22, 2012

<http://www.eea.europa.eu/highlights/air-pollutant-emission-limits-exceeded>

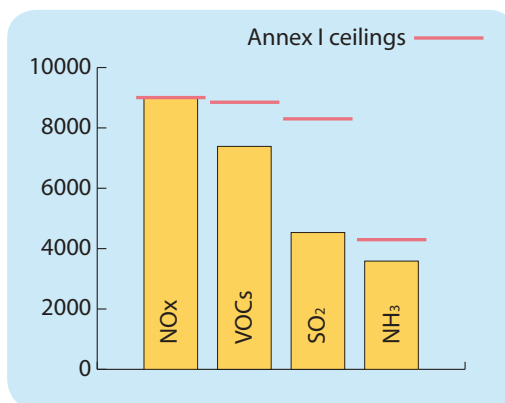


Figure 1: Aggregated emissions for 2010 as reported by member states, compared with the ceilings defined in Annex I of the directive, measured in kilotonnes.

Table 1: EU countries' emissions in 2010 compared to the national emission ceilings of the NEC directive.

Country	NOx	VOCs	SO ₂	NH ₃
Austria	140%	83%	48%	94%
Belgium	125%	75%	68%	93%
Bulgaria	49%	53%	46%	47%
Cyprus	78%	81%	57%	59%
Czech Rep.	84%	70%	64%	86%
Denmark	101%	99%	25%	100%
Estonia	61%	78%	83%	35%
Finland	97%	88%	61%	120%
France	133%	81%	70%	83%
Germany	126%	106%	86%	100%
Greece	92%	70%	51%	89%
Hungary	80%	78%	6%	72%
Ireland	112%	80%	62%	91%
Italy	98%	95%	44%	90%
Latvia	58%	48%	7%	39%
Lithuania	53%	75%	26%	36%
Luxembourg	187%	98%	42%	58%
Malta	101%	21%	90%	52%
Netherlands	105%	81%	68%	95%
Poland	100%	82%	69%	59%
Portugal	72%	94%	42%	53%
Romania	62%	84%	41%	77%
Slovakia	68%	45%	63%	63%
Slovenia	99%	84%	38%	87%
Spain	106%	102%	59%	104%
Sweden	109%	82%	51%	91%
UK	95%	66%	69%	96%
Sum EU27	100%	83%	55%	84%
Sum achieved	16	25	27	25
Sum not met	11	2	0	2

Note: Based on preliminary emission data for 2010.

Table 2: Three non-EU countries' emissions in 2010 compared to the national emission ceilings of the Gothenburg Protocol.

Country	NOx	VOCs	SO ₂	NH ₃
Liechtenstein	171%	46%	28%	180%
Norway	118%	72%	88%	99%
Switzerland	100%	62%	49%	99%

Note: Liechtenstein has signed but not ratified the Gothenburg Protocol.

Humans behind 74 per cent of global warming

Yet another scientific study shows that the global increase in temperature that has been observed in recent decades is the result of human activity, accounting for at least 74 per cent of the change. According to the paper published in *Nature Geoscience*, greenhouse gases have contributed to 0.6–1.1°C of the warming since the 1950s. Around half of this has been offset by cooling effects from aerosols.

According to the study it is highly unlikely that natural variations in temperature and changes in solar radiation could be the cause of global warming. The study differs from previous attempts through the use of a much simpler model of Earth's energy balance.

Source: *Nature Geoscience*, 5 December 2011

Birds and butterflies are lagging behind

Bird and butterfly communities in Europe have shifted rapidly northward in the past two decades, but compared to the change in average temperatures they are lagging behind. To be in step with climate change, butterfly communities should have spread a further 135 km and bird communities a further 210 km. These are the findings of a Dutch study based on data collected from 9,490 bird and 2,130 butterfly communities distributed across Europe.

The shorter life cycles of butterflies might be one explanation why they tend to be faster than birds in adapting to climate change. Fragmentation of the landscape is given as a partial explanation why neither of the two groups manage to keep up with the pace of climate change.

Sources: *Science Daily*, 18 January and *Nature Climate Change*, 10 January 2012.

Climate hotspots identified

Regional food and water security, coral reefs and Arctic sea ice are at risk at warming levels of 1.5–2°C.

A new report has been published recently which comprises a compilation of local and regional cases where near-term projected climate change is of high relevance to human livelihoods. The report also discusses assessments of “dangerous” climate change, referring to Article 2 of the Climate Convention.

According to Dr. W. L. Hare, one of the the authors, the report looks at four areas of possible dangerous climate change – adverse declines in regional food and water security, loss of Arctic sea ice with projected extinction of species, large-scale sea-level rise and loss of coral reef systems. These issues affect a number of different regions including Africa, South Asia, and Small Island Developing States. Dr Hare reports that significant risks to vulnerable regions and systems at warming levels of 1.5–2°C above pre-industrial are identified. The direct effects of CO₂ concentration increases in terms of ocean acidification are identified as relevant to Article 2 because of the risks posed to coral reefs. Hare states that the ultimate CO₂ stabilisation levels that allow for the long-term viability of coral reefs likely are below 350 ppm CO₂.

The report further argues that defining and implementing Article 2 of the UN-FCCC remains a challenge. “The question of what is dangerous climate change is not a purely scientific one, as danger necessarily has a subjective dimension and its definition requires judgment and precaution. The report attempts to navigate this problem, by offering an overview of the latest scientific findings in the context of risks and uncertainties, and assesses some key vulnerabilities that might lead to dangerous climate change.”

The report gives numerous detailed case studies of large-scale projected damage to ecosystem values, food security

and human rights in China, Nepal, the Himalayas, South Asia, Sahelian Africa, Southern Africa, Tunisia, tropical Andes, Australia, coral reef ecosystems, Pacific Islands, ecosystems in the high Arctic, Alaska's North Slope and Russia. Here are some of the comments:

- “With about a 2°C warming the endemic flora of southern Africa has an average reduction by about 40 per cent in habitat-specific species richness. For a higher warming of 3–3.5°C, projections for 5,197 African plant species show that 25–42 per cent could lose all suitable range by 2085.”
- “For Australia, high risks for warming are in the range of 1.5–2°C for the Australian Alpine region, the Great Barrier Reef, World Heritage rainforests and wetlands.”
- “In Europe an increasing and substantial risk of extinction with increasing warming, so that by around 3°C warming, 25 per cent of the species are projected to disappear from Mediterranean Europe and Northern European ecosystems are transformed with 35 per cent of species there newly introduced.”
- “Ecosystem changes in China show that large and rapid movements in ecosystems are projected. The loss of grasslands, high-elevation meadows and steppe in particular could lead to losses of biological diversity.”
- “The Tibetan Plateau is one of the more sensitive regions containing many unique environments that are very sensitive and vulnerable to climate change and human disturbances. Warming of this region will accelerate the loss of permafrost and thereby contribute to the process of desertification.”
- “Unmitigated climate change is projected to threaten sustainable economic development in a number of regions, causing significant problems in areas



JPS/ FOTOLIA



Climate change will lead to human rights' violations specifically in relation to the Inuit people.

as diverse as health, water supply, agriculture, infrastructure damages and financial and other economic services.”

- “Projected adverse impacts on the economic development of small islands are dangerous. Direct threats to communities in mountain regions were identified for the Andes and for the Himalayas. Glacial retreat is causing an enhanced risk of glacial lake outbursts and reducing water security during dry seasons. These changes threaten livelihoods directly through increased natural hazards and indirectly due to negative economic impacts on water security.”
- “Climate change will lead to human rights' violations specifically in relation

to indigenous people and communities, particularly in polar and mountain regions.”

The report discusses in depth very important attempts to define dangerous climate change and the widely endorsed goal from climate policy of limiting global warming to 2 degrees.

Reinhold Pape

Reference: **Regional Environmental Change**; Volume 11, Supplement: Hare W. L., Cramer W., Schaeffer M., Battaglini A., & Jaeger C. C. **Climate hotspots: key vulnerable regions, climate change and limits to warming**. Published 2011. 274 pages.

Greenland ice may melt with 1.6°C increase

The Greenland ice sheet may disappear permanently at a much lower global temperature increase than previously thought, according to research recently published in *Nature and Climate Change*. Researchers have modelled how the ice melts during a longer period of warming and found that the threshold for an ice-free Greenland is in the range of 0.8 to 3.2°C with 1.6°C as the most likely figure, which is 1.5°C less than previous estimates.

“The more we exceed the threshold, the faster it melts,” says Alexander Robinson, lead author of the study.

The research also shows that the melting under certain conditions is irreversible and a so-called tipping point in the Earth system.

Andrey Ganopolski, team leader for the research group, commented: “If the global temperature significantly overshoots the threshold for a long time, the ice will continue melting and not regrow – even if the climate would, after many thousand years, return to its preindustrial state.”

Source: Potsdam Institute for Climate Impact Research and *Nature and Climate Change*

Major ecosystem shift to be expected

Tundra will be afforested and forest will become grassland. These are the types of changes we can expect in nearly 40 per cent of Earth's land-based ecosystems within the next 100 years, according to a NASA study. The greatest ecosystem shifts are expected at high altitudes and in the temperate region. Not all species will be able to migrate at the speed required, or will be blocked by human activities such as agriculture and urbanisation.

Jon Bergengren, a scientist who led the study said: “The surprising degree of ecological sensitivity of Earth's ecosystems predicted by our research highlights the global imperative to accelerate progress toward preserving biodiversity by stabilizing Earth's climate”.

Source : NASA, 14 December 2011

Ocean acidification may be fastest in 300 million years

Oceans get more acidic when more carbon gets into the atmosphere. Human activities, including the burning of fossil fuels, have increased the level of atmospheric carbon dioxide (CO₂) from about 280 parts per million (ppm) at the start of the industrial revolution to 392 ppm now. Carbon dioxide is one of several heat-trapping gases that contribute to global warming.

Researchers at the US National Oceanic and Atmospheric Administration viewed the 5,000-year hot spell 56 million years ago, likely due to factors such as massive volcanism, as the closest parallel to current conditions at any time in the last 300 million years. During that span, the amount of CO₂ in the atmosphere doubled and average temperatures rose by 6 degrees C. The oceans became more acidic by about 0.4 of a unit on the 14-point pH scale over that 5,000-year period, the researchers said.



The shell pictured here is a victim of ocean acidification. The normally-protective shell is so thin and fragile, it is transparent.

That represents a rapid rate of warming and acidification, but is small compared to what has happened on Earth since the start of the industrial revolution. During the warming period 56 million years

ago, acidification in each century was about 0.008 pH units. Back then, many corals went extinct, as did many types of single-celled organisms that lived on the sea floor, which suggests that other plants and animals higher on the food chain died out too.

By contrast, in the 20th century, oceans acidified by 0.1 pH unit, and are projected to get more acidic at the rate of 0.2 or 0.3 pH units by the year 2100, according to the study. "Given that the rate of change was an order of magnitude smaller compared to what we're doing today, and still there were these big ecosystem changes, that gives us concern for what is going to happen in the future," commented the author of the study, Baerbel

Hoenisch of Columbia University.

Source: PlanetArk/Reuters, 2 March 2012

Worst in the Caribbean

The largest increase in ocean acidification compared to pre-industrial variation is found in the Caribbean, according to regional modelling of tropical oceans. Calcification rates are estimated to have dropped by about 15 per cent over the past century, which is more than 70 times the amplitude of variation occurring during the years 900–1750. The western Pacific Ocean was also an area where the change in calcification rates has been significant.

Ocean acidification is caused when carbon dioxide in the atmosphere dissolves in the oceans and forms carbonic acid. Increased acidification is just one of several stress factors that marine organisms are exposed to. Key groups such as corals are also suffering from surface warming and coastal pollution.

Source: Nature and Climate Change, 22 January 2012

Consultation on climate change and shipping

The European Commission has opened a public consultation on shipping and climate change, with the intention to collect opinions and background information to shape a possible Commission proposal. The online consultation will be open until 12 April.

Source: European Commission, 19 January 2012
http://ec.europa.eu/clima/consultations/0014/index_en.htm

Wind power continues to grow

In 2011 more than 9,600 megawatts of wind power was installed in the European Union, which is an increase in the total capacity by about 10.5 per cent compared to 2010. This marks a slight slow-down in a sector that has grown by about 15 per cent annually in recent years, mostly due to fewer installations in countries that already had a relatively large proportion of wind power, such as France and Spain. This was partly offset by growth in onshore installations in Germany and Sweden, and offshore in the UK.

“Despite the economic crisis gripping Europe, the wind industry is still installing solid levels of new capacity,” commented Justin Wilkes, Policy Director of EWEA. “But to achieve the EU’s long-term targets we need strong growth again in future years.”

The European leader in wind power is still Germany, with more than 29,000 megawatts installed, followed by Spain with 21,000 megawatts. Altogether 2011



Offshore wind turbine installation.

YOBIDABA / FOTOLIA

was a good year for renewables, which accounted for 71.3 per cent of all new energy capacity – the highest share so far.

Source: Press release European Wind Energy Association, 6 February 2012

Food crops damaged by ozone pollution

Ozone pollution causes millions of tonnes of crop losses each year – not just in the regions where the air pollutants causing increased ozone levels are emitted, but across continents: Pollutants from North

America reduce wheat yields in Europe by 1.2 million tonnes each year. On a global scale, pollution from Southeast Asia has the biggest impact, causing the loss of 6.7 million tonnes of wheat and about 11.6 million tonnes of rice each year.

Ozone damages vegetation by damaging plant cells and inhibiting plant growth, and is also harmful to human health, particularly the respiratory system. Earlier studies have valued ozone-induced crop production losses globally at US\$11–18 billion per year in 2000, expected to rise to US\$12–35 billion per year in 2030.

This new study by the University of Leeds, UK, highlights the need for air pollution impacts on crops to be taken more seriously as a threat to food security in the coming decades.

Source: Stockholm Environment Institute, 1 February 2012



Ozone causes losses of millions of tonnes a year.

TONI VERDU CARRO / CREATIVE COMMONS

Opinion on environment action programme?

Environment Action Programmes (EAP) have guided the development of EU environment policy since the early seventies. With the 6th EAP from 2002 now in its final year, it is high time to replace it. The purpose of this consultation is, according to the Commission, to collect the views of all stakeholders, at EU and national level, and the public at large on the environment policy priorities up to 2020. Informed opinions are sought on the priority areas to be addressed and on the most effective tools for the EU to employ in addressing the challenges described in the consultation document. The consultation is open until 1 June and the Commission is expected to publish legislative proposals in the autumn.

Source: European Commission.

Information: http://ec.europa.eu/environment/consultations/7eap_en.htm



New publication:

Governing the Air – The Dynamics of Science, Policy, and Citizen Interaction, Edited by Rolf Lidskog and Göran Sundqvist

Environmental scientists from around the world discuss the interplay between science, citizens and policy in international negotiations on environmental issues. The book focuses on the political processes around the Convention on Long-range Transboundary Air Pollution (CLRTAP) during the eighties and nineties and what can be learned from them.

Published at MIT Press: <http://mitpress.mit.edu/catalog/item/default.asp?ttype=2&tid=12690>

Recent publications from the Secretariat

Reports can be downloaded in PDF format from www.airclim.org



For Clean Air Everywhere

A new brochure from Transport & Environment, European Environmental Bureau and AirClim. Target readers are regional and local decision makers, local authorities, environmental organisations and the interested general public. It starts off with a short guide to the effects of major air pollutants on human health, recommended guidelines and current EU standards. Followed by twelve practical steps for cleaner air in our cities.



Ship emissions

Shipping is a major cause of harmful air pollution in Europe and by 2020 shipping emissions of SO₂ and NO_x could exceed the emissions of these pollutants from all other EU sources. This pollution must be reduced dramatically to protect health and the environment and to make shipping a more sustainable form of transport. Technical measures exist that could cut the level of pollution from ships by at least 80-90 per cent and doing so would be much cheaper than cutting the same amount from land-based sources.



Boreal Forest and Climate Change

The fate of the vast boreal forest belt of the northern hemisphere is crucial for global climate. Regional perspectives on this issue are given in "Boreal Forest and Climate Change - regional perspectives" (by Roger Olsson, April 2010). The expected rate of warming varies considerably within the Arctic region, as does the state of the forest. This means that the possible climate effects - and the possibilities to mitigate them - will be different. Our possibilities to protect and manage these forests for climate mitigation are presented in "To Manage or Protect" (by the same author, October 2011). Turning old-growth boreal forest into managed forest has a negative impact on climate in the short and medium term. Reducing consumption of paper and using more of the harvested wood for timber and fuel would be one option.

Coming events

Health Effects Institute 2012 Annual Conference, Chicago, United States, 15-17 April 2012. Information: www.healtheffects.org

CLRTAP Executive Body, Geneva, Switzerland, 30 April-4 May 2012. Information: www.unece.org/env/lrtap/

UN FCCC meeting of the subsidiary bodies, Bonn, Germany, 14-25 May 2012. Information: <http://unfccc.int/>

World Bioenergy: Conference and exhibition, Jönköping, Sweden 29-31 May 2012. Information: www.worldbioenergy.com

EU Environment Council, 11 June 2012. Information: <http://europa.eu/eucalendar/>

Emissions to Address Science and Policy Needs - 2012 ACCENT-IGAC-GEIA Conference, Toulouse, France, 11-13 June 2012. Information: www.geiacenter.org/

4th MinNox Conference, Berlin, Germany, 12-13 June 2012. Information: www.iav.com/termine/iav-tagung/4-tagung-minnox

2nd Urban Environmental Pollution Conference, Amsterdam, Netherlands, 17-20 June 2012. Information: www.uepconference.com

RIO+20 United Nations Conference on Sustainable Development, Rio de Janeiro, Brasil, 20-22 June 2012. Information: www.uncsd2012.org/rio20/

Worlds within reach - from science to policy. IIASA 40th Anniversary Conference, Luxenburg, Austria, 27-29 June 2012. Information: <http://www.iiasa.ac.at/conference2012/>

11th World Wind Energy Conference & Renewable Energy Exhibition "Community Power - Citizens' Power", Bonn, Germany, 3-5 July 2012. Information: www.wvec2012.net/wvec2012/

4th International Symposium on Air Quality Management at Urban Regional and Global Scale & IUAPPA Regional Conference, Istanbul, Turkey, 4-7 September 2012. Information: <http://aqm2012.itu.edu.tr>

CLRTAP Working Group on Strategies and Review, Geneva, Switzerland, 10-14 September 2012. Information: www.unece.org/env/lrtap/

27th European Photovoltaic Solar Energy Conference and Exhibition, Frankfurt, Germany, 24-28 September 2012. Information: www.photovoltaic-conference.com/

CLRTAP Executive Body, Geneva, Switzerland, 11-13 December 2012. Information: www.unece.org/env/lrtap/

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