NO. 3, OCTOBER 2016

Acid News

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An integrated food and agricultural policy and changes in consumption patterns are holistic approaches needed to tackle emissions from agriculture

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Coal kills across borders

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New watered-down EU air pollution targets

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Many ways to cut ship NOx emissions

Establishing NOx Emission Control Areas would significantly reduce ship NOx emissions by 2040 – introducing economic instruments could cut emissions faster and further.

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OECD warns of rising costs of air pollution

Outdoor air pollution could cause up to nine million premature deaths a year by 2060 and cost US$ 3.3 trillion annually.

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Paris changes everything

The Paris Agreement constitutes a global turning point away from fossil fuels and toward 100% renewable energy.

For the first time in history all countries have agreed to take drastic action to protect the planet from climate change, to jointly pursue efforts to limit temperature rise to 1.5°C and eventually reduce emissions to zero. Following this historic outcome, the next step is to translate these Paris commitments into deep emission reductions in all countries. There is no doubt that implementing the Paris Agreement will require a complete overhaul of the EU's current climate and energy policies.

Since the Paris Summit we have already witnessed the transition to a 100% renewable energy economy speeding up. It is in the EU's own interest to be a frontrunner in the race towards the zero-emission economy.

Increasing action before 2020 is a prerequisite to achieving the long-term goals of the Paris Agreement. Cumulative emissions determine the level of global warming, so in order to be consistent with the long-term goal of 1.5°C adopted in Paris, it is paramount to consider the cumulative emissions budget – the total

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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.

AirClim

Editorial

The UN climate conference in Paris last December decided to limit the temperature increase to well below 2°C/1.5°C above pre-industrial levels. Climate Action Network Europe argues in a new report that "either of these targets would mean eliminating coal completely, and this is what the EU must commit to doing. The Paris Agreement sends a clear signal that there is no viable future for coal anywhere. Coal-fired generation is the quick win: 18% of Europe's greenhouse gases came from the chimneys of just 280 coal power plants."

"no viable future for coal anywhere"

The CAN-E report demands that a full coal phase-out should be one of the EU's stated goals. This phase-out effort needs to be accompanied by dedicated support for mining regions affected by the transition from coal power and the development of clean energy with 100 per cent renewables.

In 2014, for the first time, renewables produced more electricity than coal in the EU. There are good examples from 2016 that goverments have started phasing out coal:

- In March, Scotland witnessed the end to the coal age that fired its industrial revolution, with the closure of Longannet power station. In the UK nearly half of the coal fleet will close this year.
- In May, the EU authorised Spain and Germany to subsidise the closure of significant parts of their coal sectors. Spain was given the green light to spend €2 billion closing 26 coal mines by 2019 and Germany to subsidise the closure of eight lignite-burning installations between 2016 and 2019, representing 13 per cent of Germany's lignite-burning capacity.
- In June 2016 the leaders of the G7 countries (UK, USA, Canada, France, Germany, Italy and Japan) and the EU pledged to eliminate "inefficient fossil fuel subsidies" (for coal, oil and gas) by 2025.
- And in June the Croatian government stopped building a new 400 MW coal power plant.

These are positive signs, but at the same time the coal industry is strongly promoting further coal use. The International Energy Agency is still running a clean coal centre, even though the IEA's own policy conclusion is that no new coal plants should be built from 2016 if UN climate targets are to be reached. This summer, Green Budget Europe criticised the UN Economic Commission Europe (UNECE) for still promoting clean coal policies. Euracoal, which has 34 coal industry members in 20 EU countries, is jointly campaigning with the World Coal Association (WCA) for "a 'clean coal' strategy to fight climate change", relying on what it calls "high-efficiency, low-emissions coal combustion technologies".

Coal is a climate killer whatever its efficiency is, argues WWF in a new report. The argument that high-efficiency coal-fired power plants are a viable solution for reducing CO_2 emissions, the main cause of climate change, is completely discredited by research from Ecofys, among others. It shows that emissions from the global electricity sector need to rapidly reduce and reach close to zero globally by 2050 in order to stay well under 2°C. An even more rapid decline will be needed in order to achieve the commitment taken in Paris to "pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels". As a result, it makes clear that in a post-Paris world, there is simply no role for coal anymore. Demand-side management and renewable energies are the solutions we need, says WWF. FOE Germany has proposed a legally binding phase-out plan for coal in Germany and in this issue of Acid News such a phase-out plan is proposed for the EU (page 12). The trend is clear. There is no more time for the EU to continue experiments with different environmental and economic measures to reduce emissions from fossil fuel plant emissions. The EU must now commit to a phase-out plan of all coal power plants, with complete closure before 2030 to avoid catastrophic climate change and to achieve many co-benefits, including the reduction of ill health and mortality for thousands of Europeans from air pollution.

Reinhold Pape

Paths to a sustainable agricultural system

An integrated food and agricultural policy and changes in consumption patterns are holistic approaches needed to tackle emissions from agriculture.

In the Nordic countries most ammonia emissions and a significant share of greenhouse gas emissions originate from agriculture. AirClim, together with organisations from Finland, Norway and Denmark, has analysed and compared these emissions in the region. This has resulted in the longer report "Pathways to a Nordic food system that contributes to reduced emissions of greenhouse gases and air pollutants" and a shorter policy brief "Paths to a sustainable agricultural system", both financed by the Nordic Council of Ministers.

In terms of total emissions of greenhouse gases in each country, the share of methane and nitrous oxide from agriculture in the Nordic countries is 8 and 9 per cent respectively in Norway and Finland, whereas it is as high as 13 per cent in Sweden and 19 per cent in Denmark. If greenhouse gas emissions from land use and energy consumption related to agriculture are added, the share increases significantly and is as high as 27 per cent in Denmark.

For ammonia, livestock manure accounts for as much as 96 per cent of the total emissions in Denmark and approximately 90 per cent on average in the Nordic countries.

The report notes that the although the Nordic region is to a large extent culturally, social and economically homogenous, agricultural structures, topographic and climate conditions, land use and production figures differ significantly between the countries. For example in Norway, Sweden and Finland, a relatively small proportion (3–8%) of the total land territory is used for agricultural production, while in Denmark more than half of the territory is designated for agricultural production.

These differences make it difficult to come up with single fixes for emission reductions that will work for the whole region. But the report gives some general recommendations for societal and on-farm actions, which include:

- Start working towards an integrated food and agricultural policy, which sufficiently takes into account the various issues and conflicts of interests in a holistic way.
- Work to change consumption behaviour and diets, highlighting all potential benefits, e.g. environmental, health and global equality.
- Promote agro-ecological farming methods that aim to maintain or increase the soil organic matter and limit the use of organic soils for farming, to help bring down carbon emissions from soils.
- Research ways to increase energy efficiency in agricultural and food systems, also at farm level.
- Put in place an adequate regulatory framework and other measures for improved manure management. Small-scale farmers may have to receive some assistance (financial and technical) in taking these measures.
- Apply the polluter pays principle in the agricultural sector. Though there are difficulties, politicians and financial experts need to find ways to internalise the environmental costs.

The analysis also highlights some conflicts of interest that are counterproductive to an agricultural food production system with lower emissions of greenhouse gases and ammonia.

One such area is animal welfare. Short lifecycles for livestock will lead to lower greenhouse gas emissions per kilogram of product, however breeding for fast growth may cause health problems for animals.

Biodiversity is another issue, since grazing animals, especially on permanent grasslands, are of great importance for biodiversity and increase the potential for soil carbon sequestration. Open pastures also have cultural and aesthetic values. However it is debated whether these systems are more or less efficient when it comes to greenhouse gas emissions per kilogram of product. Interventions to decrease consumption of animal products could lead to less areas being grazed, if not combined with other interventions.

The economic situation for farmers is a third area of concern. Technical systems that lead to lower emissions require investments in machinery and housing. Many farmers in the Nordic countries are already struggling to survive economically. New minimum standards might be the straw that breaks the camel's back and lead to the decision to close a farm. In highly productive areas this often leads to the farm being bought by the neighbouring farm, which contributes to the trend towards ever-larger units. In less productive areas, it usually implies that agricultural land will be converted into forest.

These issues, the report suggests, are especially important for further research, so that balanced policy interventions can be developed.

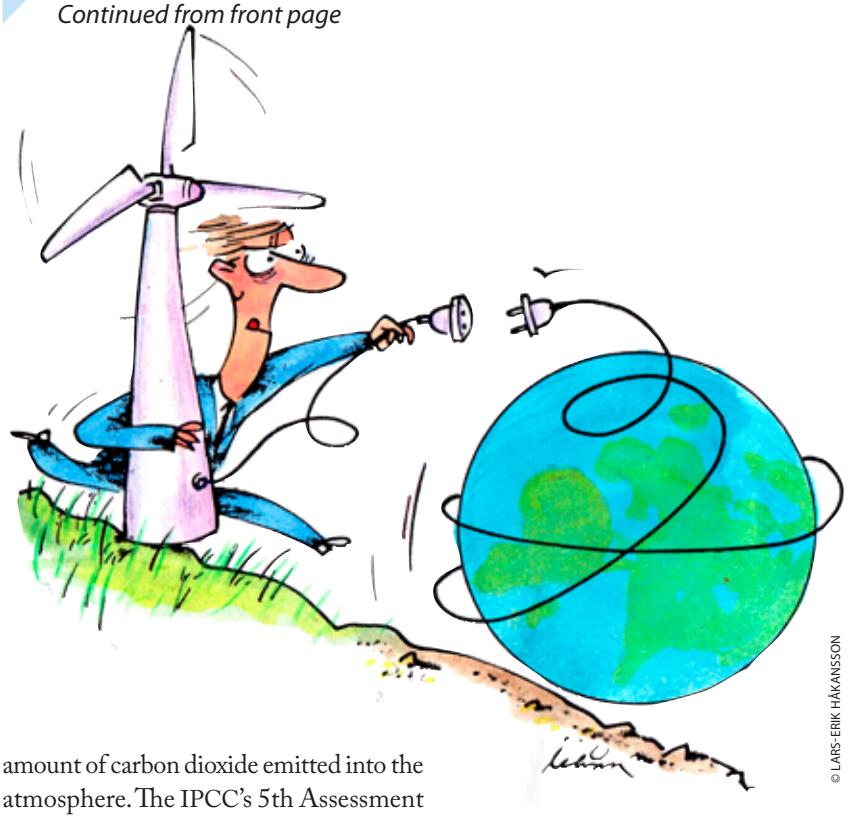
Kajsa Pira

The report "Pathways to a Nordic food system that contributes to reduced emissions of greenhouse gases and air pollutants" and the policy brief can be found on *norden.org*.

SPIKE STITCH/ FLICKR.COM/CC BY NC ND

Paris changes everything

Continued from front page



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amount of carbon dioxide emitted into the atmosphere. The IPCC's 5th Assessment Report provides numbers for different global carbon budgets allowing for different levels of warming. With current emissions of 38Gt of CO_2 per year, the entire carbon budget that would allow a 66 per cent chance of staying below 1.5°C would be completely exhausted in five years. A budget allowing only a 50 per cent chance would be gone in nine years (figure 1).

For any fair likelihood of keeping temperature rise to 1.5°C, global mitigation efforts need to be stepped up between now and 2020, and extended to all sectors, including international shipping and aviation.

Increasing mitigation action before 2020 is vital for achieving the long-term goals of the Paris Agreement, and will be one of the key issues if the UN climate conference COP22 in Marrakech in November 2016 is to succeed. Keeping in mind that the EU has already achieved its -20% by 2020 target several years in advance, and is progressing towards 30 per cent domestic reductions by 2020, the EU can make a significant contribution to this discussion by, among other things, cancelling the surplus of pollution permits under the Emissions Trading Scheme and the Effort Sharing Decision.

We urge the EU to seek solutions that can help drive global emissions to a deep decline as of 2017, both in the context of the Global Climate Action Agenda as well as strengthening the national pre-2020 commitments on mitigation and finance.

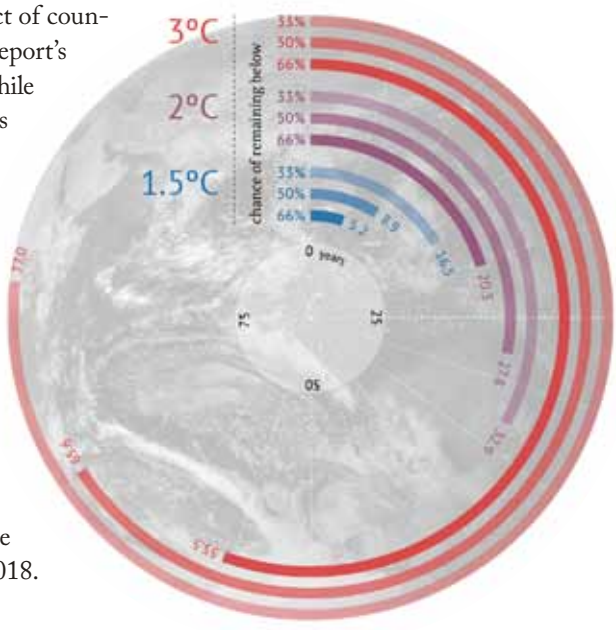
2025 and 2030 targets must be revised in 2018 at COP24. The post-2020 commitments (INDCs) put forward by countries are inadequate for keeping warming to 1.5°C (or even 2°C). Last May the UNFCCC Secretariat published a report assessing the aggregate effect of countries' post-2020 targets. The report's graph below concludes that while most of the carbon budget was already consumed by 2011, countries' unrevised INDCs will entirely consume the remaining 50 per cent chance of achieving a 1.5°C compliant carbon budget by 2025.

All COP22 countries need to commit to prepare their respective assessments on how to raise the level of post-2020 targets to bridge the adequacy gap by COP24 in 2018. To facilitate this process we urge countries to put forward updated and improved post-2020 INDCs as soon as possible and latest by 2018, and to finalise their long-term strategies as soon as possible, and latest by 2018 (figure 2).

The EU's ongoing legislative work on ETS and non-ETS emissions should be used to align the EU's 2030 targets with science and the commitments made in Paris, and make them economy-wide, covering EU-related emissions from international aviation and shipping.

International shipping and aviation currently account for around 5 per cent of global CO_2 emissions, and these emissions are anticipated to have vast growth rates (50–250% by 2050 for shipping, and 270% for aviation). As these sectors' emissions are not counted under national inventories, the 2018 stocktake must ensure that these sectors too are in line with the Paris Agreement and the 1.5°C compatible carbon budget.

Long-term strategies for zero greenhouse gas and 100 per cent renewable energy. The Paris Agreement includes a long-term goal to pursue efforts to limit temperature increase to 1.5°C requires a reassessment of the EU's climate and energy policies, and an increase in action by all. The goal to reduce the EU's domestic emissions by 80 per cent by 2050 is not consistent with the Paris Agreement and has to change to be consistent with the long-term goals governments decided in Paris.



CARBON COUNTDOWN GRAPH BY CARBON BRIEF DATA IPCC AR5 SYNTHESIS REPORT TABLE 2.2.

Figure 1. How many years of current emissions would use up the IPCC's carbon budgets for different levels of warming?

The Paris Agreement also contains a commitment to reduce net global emissions to zero during the second half of the century. Achieving this requires most sectors in the EU to achieve zero emissions earlier, within the next couple of decades. Most urgently, the EU should adopt timelines for fully phasing out the use of coal, gas and oil.

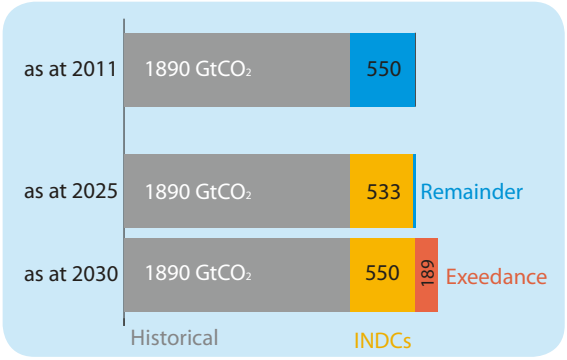


Figure 2. Cumulative CO_2 emissions consistent with the goal of keeping global average temperature rise below 1.5°C, with >50% probability by 2100. INDCs = intended nationally determined contributions. Source: IPCC Fifth Assessment Report scenario database and own aggregation.

In order to facilitate the process of aligning all policies with the long-term targets of the Paris Agreement, all countries should swiftly proceed in the development of their respective 1.5°C compliant mid-century strategy. Having a long-term strategic vision will help to guide their short- and medium-term decisions and will have a positive impact on a long-term framework for innovation and business development. The updated EU 2050 roadmap should be finalised latest by 2018, and take fully into account the recent striking developments in renewable energy. A COP decision in Marrakech setting the deadline of finalised mid-century roadmaps by 2018 would ensure that all countries begin preparations swiftly.

Shifting of financial flows. The Paris Agreement also includes a requirement for making all financial flows consistent with low greenhouse gas emissions and climate resilient development. In the first instance this requires the EU to tackle those financial flows that are obstructing emission reductions, and which hinder progress towards the EU's broader economic and social objectives. They include fossil fuel subsidies, public finance for high-carbon infrastructure through European development banks, and policy frameworks that facilitate financial support of fossil fuels.

The climate finance roadmap to raise 100 billion US dollars by 2020 should be launched in advance of Marrakech COP22. The roadmap must not be an accounting exercise for already existing financial flows, but rather guarantee stronger transparency, as well as adequate and reliable support for tackling the causes and impacts of climate change. It should also explicitly spell out to what level the EU and other donor countries will increase annual adaptation finance by 2020.

The current review of the EU ETS provides a key opportunity to showcase the EU leadership on climate finance, committing to direct a portion of the revenues from auctioning directly to the Green Climate Fund. Setting up an EU ETS International Climate Action Reserve would give a clear signal to developing countries that the EU is committed to continue to provide additional finance for climate needs in predictable and transparent ways. The Financial Transaction Tax should be implemented as soon as possible.

Resilience, adaptation and loss and damage. Even with the existing and future measures to mitigate climate change, the adaptation needs of all countries will continue to grow, undermining the rights of the poorest and most vulnerable communities in particular. The EU should lead efforts to strengthen human rights in all climate action, as mandated in the Paris Agreement.

Ratification of the Paris Agreement and its early entry into force. A rapid entry into force of the Paris Agreement would demonstrate that there is a strong international support for ambitious climate action and would serve as a strong signal to the private sector. All COP22 countries should set 2018 as a deadline for full entry into force of the Paris Agreement, including finalising all the outstanding work on rules and modalities for countries to be able to implement the Agreement.

Ulriikka Aarnio
Climate Action Network Europe

Costs for solar and wind could fall 59% by 2025

IRENA launched a new report revealing that the dramatic cost reductions we've seen in recent years for solar and wind electricity will continue well into the future. It finds that by 2025 – with the right regulatory and policy frameworks in place – average electricity costs could decrease 59 per cent for solar photovoltaics (PV), 35 per cent for offshore wind, 26 per cent for onshore wind, and up to 43 per cent for concentrated solar power compared to 2015. Given that solar and wind are already the cheapest source of new generation capacity in many markets around the world, this further cost reduction will broaden that trend and strengthen the compelling business case to switch from fossil fuels to renewables.

Buildings could become energy producers

Unleashing a fourth industrial revolution in Europe is the bold aim of a new report on how to make the continent's buildings carbon-neutral energy producers.

A renovation programme to cut greenhouse gas (GHG) emissions from buildings in Europe could create a million jobs, provide warmer homes, more comfortable factories and offices, reduce fuel bills across 28 countries, and cut imports of Russian gas, researchers say.

This is because buildings are currently the biggest single emitter of GHGs in Europe. Many have inefficient heating and cooling, combined with poor insulation.

But with existing technology and political will, they could be transformed into energy producers and become carbon-neutral, says a report produced by OpenEXP, an international group of experts helping policymakers to reach sustainable development goals.

Targets aren't enough, but gap can be closed

Europe's solar and wind initiatives, if both implemented, could increase Europe's climate target of 40% below 1990 levels by 2030 to 60%.

The Paris climate agreement saw countries pledge to limit global warming to well below 2°C , and to aim to keep it within 1.5°C . The problem is that countries' current emissions targets are not enough to meet these goals.

In a paper published in Nature, I and my colleagues from Austria, Brazil, China, South Africa, Germany, the Netherlands and Switzerland take a closer look at those pledges, and the studies that have so far evaluated them. The bottom line is that under the existing Paris pledges the world would be facing 2.3–3.5°C of warming by 2100.

The pledges, known as Intended Nationally Determined Contributions, or INDCs, would result in emissions 14 billion tonnes higher than they should be in 2030 under the cheapest pathway to limit warming.

While this path is well below the "business as usual" scenario, it is not yet in the range of the 1.5–2°C objectives we have set ourselves. So it's a first step, but bigger steps are needed.

The less effort we make before 2030, the harder it will be to reduce emissions afterwards. However, my colleagues and I have found there are several ways to close the gap.

Why do the current targets make it harder after 2030?

To limit global warming to any level, we ultimately have to completely stop CO_2 emissions and ramp down other greenhouse gas emissions. For any given warming threshold, we have to limit total emissions to a certain amount, known as the "carbon budget".

It is likely that to keep warming well below 2°C we have a remaining carbon budget of between 750 billion and 1.2 trillion tonnes. For context, global emissions in 2010 were around 50 billion tonnes.

Remaining on the current path, as laid out by the INDCs, would mean the world would have to make very drastic cuts in emissions after 2030 to keep warming below 2°C (and would likely make the 1.5°C limit completely unachievable).

This dramatic cut would mean a lot of stranded investments, as emissions will have continued to rise up to 2030, suggesting continued investment in infrastructure that won't deliver our long-term target. The same potentially goes for any investments in "transition" fuels, such as gas. If current investments cannot be part of a 2050 world that is close to zero emissions, then they would probably have to be retired before their usual use-by date.

If in 2030 there is a sudden realisation that we have to do more, the world would have to cut emissions by 3–4 per cent each year. Countries like Australia would have to cut them by 10 per cent each year. It's like walking slowly up to a cliff and then jumping off it.

This is not the cheapest way to keep warming below 2°C . The least-cost option is to start investing now in the right technology. The International Energy Agency has argued that if we want a zero-carbon economy in 2050, or at least one that is close to zero-carbon, we need to make zero-emission investments today, because it takes a long time to turn over the existing investment stock.

The other problem is carbon capture and storage (CCS). The Paris Agreement pledges net zero greenhouse gas emissions after 2050. There is no pathway to this that doesn't involve "net-negative" emissions, because there will still be some greenhouse gas emissions we can't reduce, and we will have already overshot the carbon budget for keeping warming below 2°C , let alone 1.5°C . So we are going to have to come up with a way to pull CO_2 from the atmosphere.

How can we do that?

The main option is thought to be bioenergy with carbon capture and storage (BECCS). This process involves growing biomass fuel, such as trees, then using the woodchips to produce electricity, then capturing the CO_2 produced, and finally sequestering and storing it underground.

In the past, CCS has been mostly combined with fossil fuels. But the dramatic fall of wind and solar costs will make it easier to decarbonise the electricity sector.

CCS would also likely require a carbon price, to incentivise the necessary investment in CCS by 2030. Retrofitting existing fossil fuel power plants with CCS or keeping coal demand high by supporting new coal power plants with CCS in India and China is hence likely an uphill battle that is lost on economic grounds. However, we would still need CCS and specifically BECCS to remove CO_2 from the atmosphere.

So how can we close the gap?

Our study has found several ways to reduce emissions further before 2030.

The first is to ratchet up the INDCs by using the review mechanism built into the Paris Agreement. This is thought by many to be the single most important element of the agreement, and would see INDCs revised and increased every five years. Of course these increases would have to be underpinned by domestic policies.

Some countries will overachieve their INDCs. China, for instance, has pledged to peak its emissions by 2030, but seems to have the domestic policy in place to get there before 2020 given the concern about clean air.

Other countries have pledged emission levels that are so generously high that they would have to spend serious amounts of money to increase their emissions up to those levels. Turkey, Ukraine and Russia

GREENS MPS/ FLICKR.COM/CC BY NC ND

The cheapest way to keep warming below 2°C is to invest in zero-carbon energy today. Above Australian MPs study the Gemasolar plant in Spain.

are examples. There are likely a billion tonnes of projected emissions that we will hence never get to see. Fortunately.

The INDCs could also be expanded to cover other greenhouse gases (which aren't included by some countries), such as nitrous oxide and methane in China.

International shipping and aviation could also play a huge role. Aviation is one of the hardest nuts to crack because of the difficulties of producing sustainable, carbon-neutral jet fuel. So while the near-term emission reduction options aren't as big as many people think, these high-value sectors are hugely important because they can help to raise resources for mitigation action elsewhere.

For instance, the International Civil Aviation Organisation's pledge of no-carbon growth after 2020 would require large offsets. This could unleash a lot of action, and transfer finance to other sectors.

However, both aviation and maritime transport need to be part of the whole framework – and given that the Paris Agreement mentions all global emissions in its Art. 4.1, they are already included to some extent.

We found other initiatives – in the business sector and at regional and municipal levels – that could reduce emissions by a further one billion tonnes each year by 2030. However, more recent research suggests this could be as high as 6–11 billion tonnes each year, if all those additional initiatives in the solar energy, wind energy, forestry and methane sectors were implemented.

For instance, Europe's solar and wind initiatives, if both implemented, could increase Europe's target of 40 per cent below 1990 levels by 2030 to 60 per cent.

And the United States' Sunshot and wind programmes could overshoot their current emissions target, from 26–28 per cent below 2005 levels to a staggering 60 per cent.

These initiatives would put us well on the path to keeping warming below 2°C. Now we just have to get serious about it.

In Australia, we have neither an ambitious enough 2020 or 2030 target, nor the policies to get there. Current emissions are likely to overshoot the -5 per cent target by 2020 (although accounting options to use previously banked credits will likely keep Australia compliant with its Kyoto Protocol targets).

There are good signs – such as state renewable energy targets, which now add up to more than the national target. And there is an immense opportunity for Australia in a zero carbon world: no other developed country is so blessed with solar and wind resources.

If Australia plays its cards right, it could become the energy superpower in a zero carbon world. But there's still a way to go.

Malte Meinshausen

Prof. Malte Meinshausen is affiliated with the University of Melbourne (Australia) and the Potsdam Institute of Climate Impact Research (Germany).

Source: *theconversation.com*

Coal kills across borders

Every coal-fired power station switched off will bring great benefits that reach beyond national borders, for both human health and the climate.

GREENPEACE POLSKA/ FLICKR.COM/CC BY NC ND

In 2013, air pollutant emissions from coal-fired power stations in the EU were responsible for over 22,900 premature deaths, tens of thousands of cases of ill-health from heart disease to bronchitis, and up to €62.3 billion in health costs. As air pollution travels far beyond national borders, a full coal phase-out in the EU would bring enormous benefits for all citizens across the continent, according to the report "Europe's Dark Cloud: How coal-burning countries make their neighbours sick".

Each coal power plant closed will provide major health benefits, not only for those living nearby, but also for those abroad. For example, the planned UK phase-out of coal by 2025 could save up to 2,870 lives every year, of which more than 1,300 in continental Europe. A German phase-out of coal could avoid more than 1,860 premature deaths domestically and almost 2,500 abroad every year.

The analysis of transboundary impacts shows that the five EU countries whose coal power plants do the most harm abroad are: Poland (causing 4,690 premature deaths abroad), Germany (2,490), Romania (1,660), Bulgaria (1,390) and the UK (1,350). It also shows that the countries most heavily impacted by coal pollution from neighbouring countries, in addition to that from their own plants are: Germany (3,630 premature deaths altogether), Italy (1,610), France (1,380), Greece (1,050) and Hungary (700).

The study used data from 257 (of the total of 280) coal power stations that report SO_2, NOx and particulate matter (PM) emissions to the European Pollutant Release and Transfer Register (EPRTR) and for which 2013 data was available. It is noticeable that the 30 most polluting coal power plants – the "Toxic 30" – alone were responsible for more than half of the premature deaths and health costs (see figure).

"The report underlines the high costs to health that come with our reliance on coal power generation. It also debunks the myth that coal is a cheap energy source. Clearly, no country on its own can solve the problem of air pollution from energy production," said Anne Stauffer, Deputy Director of Health and Environment Alliance (HEAL).

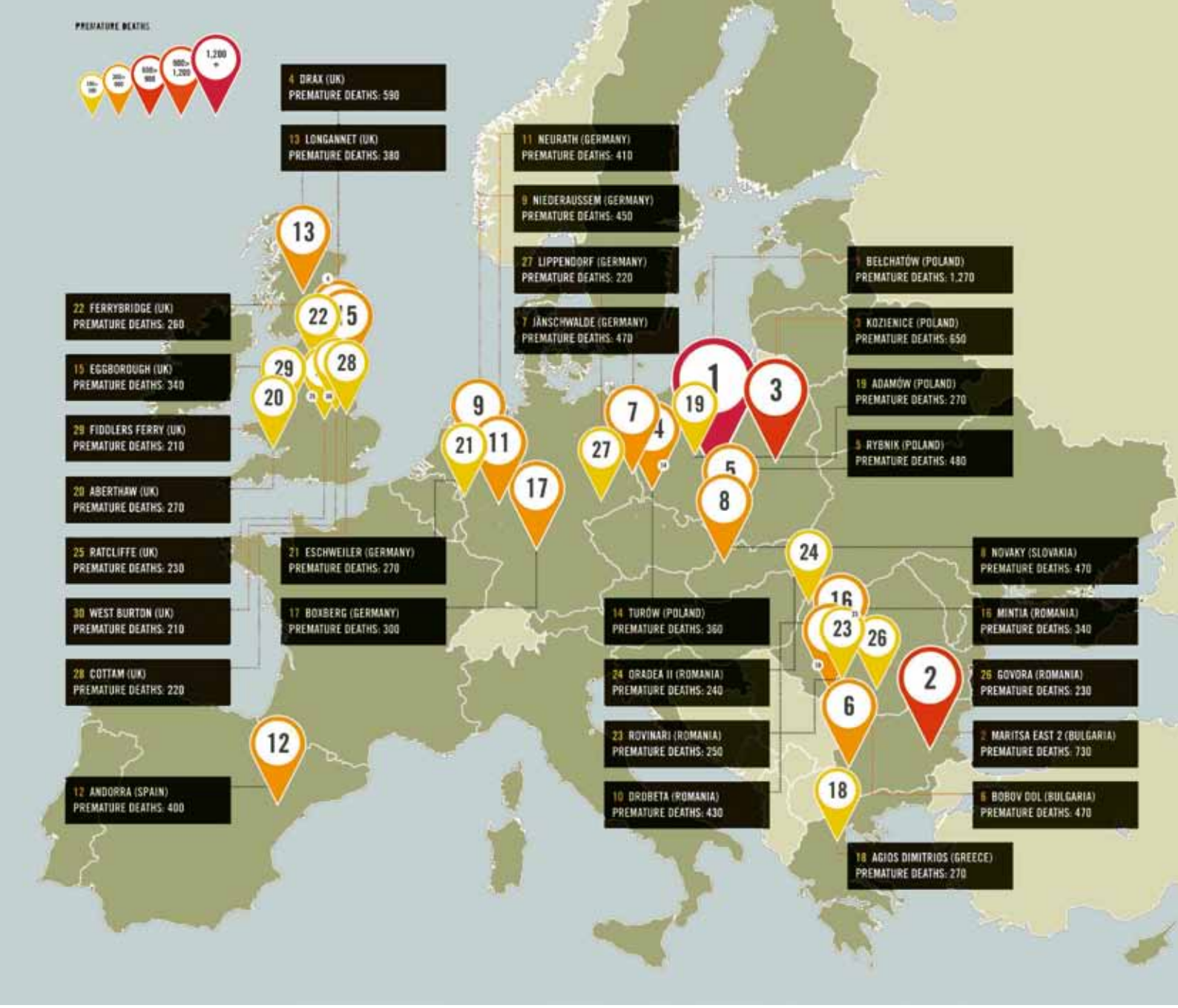


Figure. The "Toxic 30" – the EU coal power plants that do the greatest health damage.

Looking at greenhouse gases, the 280 coal plants released 755 million tonnes of CO_2, which represents around 18 per cent of the total greenhouse gas emissions in the EU. Almost half of these CO_2 emissions (367 million tonnes in 2014) came from the 30 highest-emitting plants – the "Dirty 30". Three countries are home to 19 of the "Dirty 30" plants, namely Germany (eight), Poland (six) and the UK (five).

The report recommends that a full coal phase-out should be one of the EU's stated goals and that speeding up the process of transitioning out coal will require stiffening of specific EU policies, including a rapid and ambitious structural reform of the EU Emissions Trading System in order to put a meaningful price on carbon emissions. This should be accompanied by the introduction of an Emissions Performance Standard (EPS) for CO_2 from power plants to provide a clear investment signal for the decarbonisation of the power sector.

In addition, the Industrial Emissions Directive (IED) and National Emissions Ceilings Directive (NECD) must introduce stricter pollution limits for the emissions they cover, and EU funding instruments need to be reformed so that they aid the transition away from coal and other fossil fuels and support regions and communities with mining region transformation.

"The report shows that every coal-fired power station switched off will bring great benefits reaching beyond national borders, for both human health as well as climate" – Wendel Trio, Director of Climate Action Network Europe concluded. "After the Paris Climate Agreement, EU leaders have even more responsibility to dramatically ramp up efforts to shut down all coal power plants and swiftly move to 100 per cent renewable energy".

Christer Ågren

The report is published jointly by the Health and Environment Alliance (HEAL), Climate Action Network (CAN) Europe, the WWF European Policy Office and Sandbag and can be found at: *http://www.env-health.org/policies/climate-and-energy/europe-s-dark-cloud/*

US regulates for more fuel-efficient trucks

In August, the US Environmental Protection Agency (EPA) published the second phase of greenhouse gas standards for the trucking sector, which are expected to lower CO_2 emissions by approximately 1.1 billion metric tons, save vehicle owners fuel costs of about US$170 billion, and reduce oil consumption by up to two billion barrels over the lifetime of the vehicles sold under the program. Overall, the program will provide US$230 billion in net benefits to society, including benefits to climate and the public health. The benefits outweigh costs by about an 8-to-1 ratio.

Stef Cornelis at Transport & Environment commented: "This is as much about environmental leadership as about innovation. If the EU wants to remain the world's leader in truck manufacturing, then the European Commission should table a fuel efficiency standard for trucks in 2017 with a more ambitious 2025 target than the American phase two target."

US EPA press release 16 August 2016: *https://www.epa.gov/newsreleases/epa-and-dot-finalize-greenhouse-gas-and-fuel-efficiency-standards-heavy-duty-trucks-0*

T&E comment: *http://www.transportenvironment.org/press/us-regulation-more-efficient-trucks-means-europe's-lawmakers-need-speed*

New standards are expected to lower CO_2 emissions from trucks by 1.1 billion metric tons.

BARBARA GILHOOLY/ FLICKR.COM/CC BY NC ND

Health costs of PM

A recent scientific study has made new estimates of the marginal social cost per tonne of air pollutant emitted, focussing on the health damage caused by excessive levels of $PM_{2.5}$ in the air. The pollutants covered are the inert species of primary PM (i.e. elemental carbon and fugitive dust) and the inorganic $PM_{2.5}$ precursors (i.e. SO_2, NOx and NH_3).

Based on 2005 emission levels, the seasonal-average costs in the United States were estimated at US$ 88 000-130 000/tonne $PM_{2.5}$; 14 000-24 000/t SO_2; 3 800-14 000/t NOx; and 23 000-66 000/t NH_3. The aggregated annual cost amounted to more than US$ 1 000 billion, of which 330 billion for $PM_{2.5}$; 320 billion for SO_2; 210 billion for NOx; and 160 billion for NH_3.

The study: "Public health costs of primary $PM_{2.5}$ and inorganic $PM_{2.5}$ precursor emissions in the United States." By J. Heo, P.J. Adams and H.O. Gao. Published in Environmental Science & Technology, 6 May 2016. *http://pubs.acs.org/doi/abs/10.1021/acs.est.5b06125*

UNEP: Actions on air quality

A new report by the United Nations Environment Programme (UNEP) lists ten basic measures to improve air quality. It shows that the majority of countries worldwide are still to adopt these air quality policy actions, but highlights many good examples that can be followed to spark worldwide action. It points out that while policies and standards on clean fuels and vehicles could reduce emissions by 90 per cent, only 29 per cent of countries worldwide have adopted Euro 4 emission standards or above.

The report "Actions on Air Quality" and infographics: *www.unep.org/transport/airquality*

Most countries worldwide have not yet adopted Euro 4 emission standards.

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IEA: Strategies for cleaner air

The International Energy Agency (IEA) in June released a report that highlights the links between energy, air pollution and health, and identifies contributions the energy sector can make to curb poor air quality.

Based on new projections to 2040, the report provides a global outlook for energy and air pollution as well as detailed profiles for the US, Mexico, the EU, China, India, Southeast Asia and Africa. It also identifies contributions the energy sector can make to improve air quality. Energy production and use are the most important man-made sources of key air pollutant emissions, responsible for 85 per cent of PM and almost all of the sulphur and nitrogen oxides.

The report presents strategies tailored to various national circumstances to deliver cleaner air for all. A new Clean Air Scenario demonstrates how energy policy choices backed by just a seven per cent increase in total energy investment through 2040 produce a sharp improvement in health. Under such a scenario, premature deaths from outdoor air pollution would decline by 1.7 million in 2040 compared with the main scenario, and those from household pollution would fall by 1.6 million annually.

According to the study, the EU could cut annual air-pollution-related premature deaths from 340,000 in 2015 to 180,000 in 2040 under the Clean Air Scenario, compared to 230,000 in 2040 in the baseline scenario.

The report "World Energy Outlook 2016 Special Report on Energy and Air Pollution": *http://www.iea.org/publications/freepublications/publication/weo-2016-special-report-energy-and-air-pollution.html*

Europe's biggest polluters

Polish lignite plant Belchatow and British coal plant Drax dominate Europe's most polluting point sources in 2014.

The European Pollutant Release and Transfer Register (E-PRTR) was recently updated with figures for emissions from industrial installations in 2014.

According to the new data, the Polish state-owned Belchatow lignite plant – the largest thermal power station in Europe, with an electricity output of 5400 megawatts (MW) – remained Europe's biggest carbon dioxide polluter, emitting nearly 37 million tonnes of CO_2. It was followed by two German lignite plants, Neurath (32.4 Mt) and Niederaussem (27.2 Mt). Of the twelve worst CO_2-polluters, seven are German lignite plants.

Drax in the United Kingdom, which occupies sixth place, is mainly powered by hard coal. Over the last few years, Drax has also been burning more and more biomass, imported primarily from the United States, and in 2014 the burning of wood pellets contributed about one third of the electricity generated by Drax.

All in all, the dozen dirtiest point sources emitted a staggering 255 million tonnes of CO_2, more than five times the total national emissions from Sweden.

At the top of the list of the worst nitrogen oxides (NOx) polluters, we find once again Belchatow, closely followed by Drax. Each of these plants emitted some 36,000 tonnes of NOx in 2014. It is notable that five of the twelve worst NOx-polluters are located in the UK. However, Longannet will not appear in future lists, since it was shut down in March this year.

The list of the worst sulphur polluters is dominated by lignite plants in eastern Europe, with four plants in Serbia, and two each in Poland and Bulgaria. Belchatow and Drax can also be found in this list. With emissions of more than 70,000 tonnes of SO_2, Belchatow is by far the biggest sulphur polluter in the EU, followed by Maritsa 2 in Bulgaria (50,000 tonnes).

Implementation of the EU's Industrial Emissions Directive, which includes emission standards for existing large combustion plants, in the new EU member states in eastern Europe is reflected in the list of sulphur polluters, although some derogations from the emission standards were still in place in 2014. The four Serbian lignite plants are not covered by this directive as the country is not a member of the EU.

The E-PRTR is a service managed by the European Commission and the European Environment Agency (EEA). The online register contains information on emissions of pollutants released into the air, water, land and wastewater by industrial facilities throughout Europe (32 countries: EU28, Iceland, Liechtenstein, Norway, Switzerland and Serbia) and includes annual data for 91 substances released from 33,000 facilities. It also provides maps of some non-industrial sources of emissions.

Christer Ågren

The European Pollutant Release and Transfer Register can be found at: *http://prtr.ec.europa.eu*

Note: For lists from 2009–2012 see AN2/2011, AN2/2012, AN2/2013, AN2/2014.

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Neurath lignite plant, one of Europe's biggest point sources of carbon dioxide and nitrogen oxides.

	Plant	CO_2 Thousand tonnes
1	Bełchatów	36,800
2	Neurath	32,400
3	Niederaußem	27,200
4	Patnow II	24,900
5	Jänschwalde	24,500
6	Drax	23,700
7	Eschweiler	18,800
8	Boxberg	18,700
9	Goldenberg	12,800
10	Federici II, Brindisi	12,000
11	Lippendorf	11,900
12	Agios Dimitrios	11,800

	Plant	NOx Tonnes
1	Bełchatów	36,000
2	Drax	35,900
3	Neurath	22,600
4	Aberthaw	22,500
5	Jänschwalde	19,500
6	Niederaußem	18,000
7	Nikola Tesla A	18,000
8	Longannet	17,300
9	Kozienice	17,200
10	Nikola Tesla B	15,400
11	West Burton	15,300
12	Ratcliffe-on-Soar	14,800

	Plant	SO_2 Tonnes
1	Nikola Tesla B	104,000
2	Nikola Tesla A	101,000
3	Bełchatów	72,700
4	Maritsa 2	50,200
5	Kostolac A	39,900
6	Romag-Termo	37,300
7	Andorra	36,200
8	Kostolac B	34,500
9	Kozienice	34,400
10	Bobov Dol	31,700
11	Novaky	24,700
12	Drax	24,700

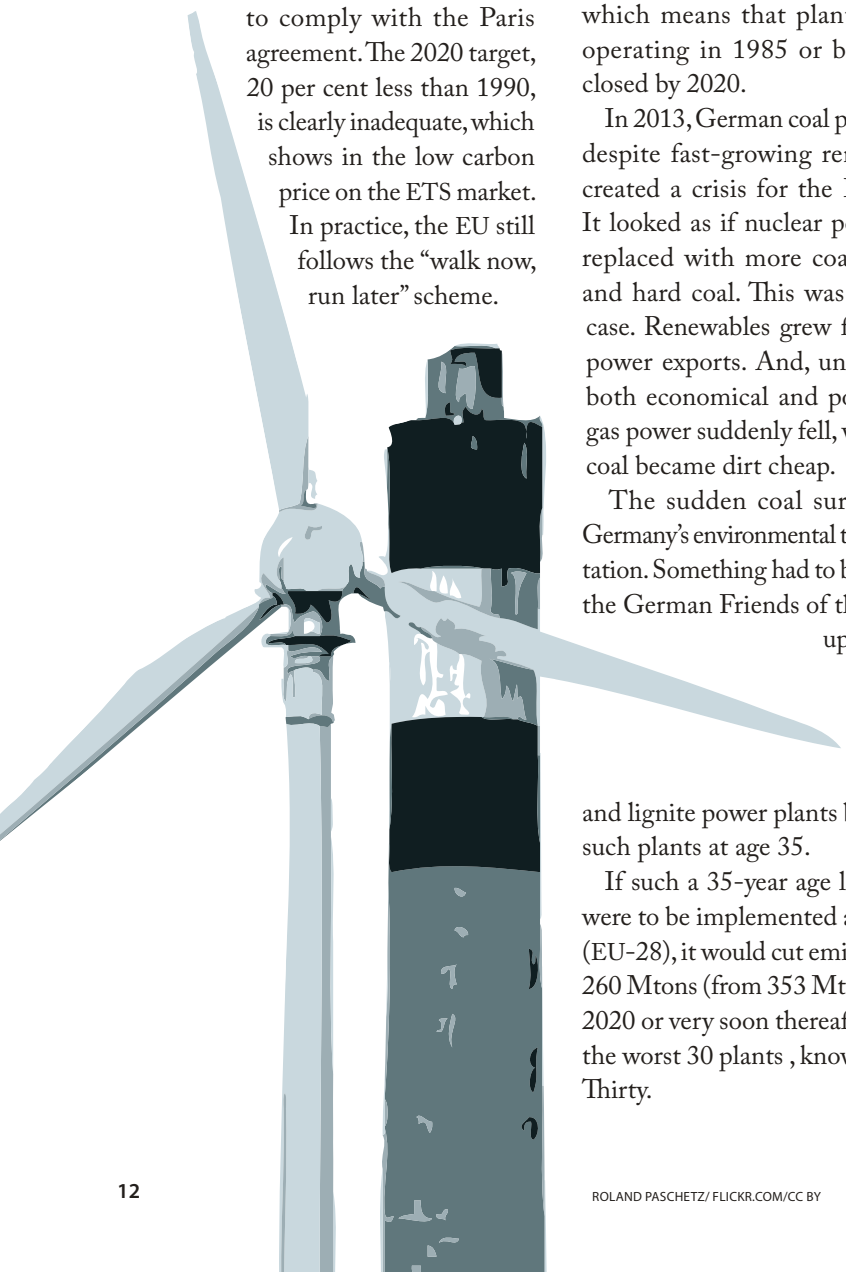
A phase-out plan for coal in Europe

Very old and high-emitting plants are easy to replace with renewables and improvements in energy efficiency.

The worst 30 coal and lignite power plants in Europe (EU-28) emitted 353 million tons of CO_2 in 2015, more than 10 per cent of EU emissions. A phase-out plan for coal in Europe could start with a mandatory age limit of 35 years, along the lines earlier presented for Germany by the Society for Environment and Nature Conservation BUND/FOE Germany.

Such an age limit would reduce CO_2 emissions by almost 262 million tonnes per year just among the 30 worst.

CO_2 emissions in Europe are dropping, but no way near fast enough to comply with the Paris agreement. The 2020 target, 20 per cent less than 1990, is clearly inadequate, which shows in the low carbon price on the ETS market. In practice, the EU still follows the "walk now, run later" scheme.



ROLAND PASCHETZ/ FLICKR.COM/CC BY

One of the lowest hanging fruits is the power sector, where very old and high-emitting plants are easy to replace with renewables and improvements in energy efficiency, which have no direct emissions at all. The worst lignite plants emit 1.35 kg of CO_2/kWh, more than three times more than a gas power plant, which is also fossil-fuelled.

One path to deal with the worst plants has been developed by BUND/FOE Germany, as reported earlier in Acid News 3/14. It is a ban on all plants older than 35 years, which means that plants that started operating in 1985 or before must be closed by 2020.

In 2013, German coal power increased, despite fast-growing renewables. This created a crisis for the Energiewende. It looked as if nuclear power had been replaced with more coal, both lignite and hard coal. This was not really the case. Renewables grew fast, but so did power exports. And, unexpectedly, for both economical and political reasons gas power suddenly fell, while imported coal became dirt cheap.

The sudden coal surge threatened Germany's environmental targets and reputation. Something had to be done. BUND, the German Friends of the Earth, came up with a plan in 2014, aiming at phasing out the oldest and dirtiest coal and lignite power plants by 2020 and all such plants at age 35.

If such a 35-year age limit phase-out were to be implemented all over Europe (EU-28), it would cut emissions by about 260 Mtons (from 353 Mtons in 2015) by 2020 or very soon thereafter, just among the worst 30 plants , known as the Dirty Thirty.

About 140 Mtons of this reduction would come from lignite plants and the remainder from hard coal power plants.

This is calculated by taking the 2015 emissions from each of the Dirty 30 plants, their capacity and the share of that capacity that will have reached 35 years by 2020, or in a few cases by 2021 or 2022.

Some of these 260 Mtons will obviously be cut for other reasons.

Longannet in the UK closed in 2015 and there are plans for other plants to either close some units or to use them less, by downgrading them from baseload to peak or reserve operation. This can make a big difference; a baseload power plant is supposed to be operated for about 90 per cent of the year at full capacity, or 8,000 hours, but a peak/reserve plant may operate in the order of 100 hours per year, decreasing emissions proportionally.

Some plants may also switch from coal to biomass. Drax in the UK used more biomass than coal in the first six months of 2016. It is difficult to tell whether enough biomass will be available at justifiable cost five years from now and what the political conditions will be.

The age structure of the plants – at least among the Dirty 30 – is such that many plants are old, a few new, but not so many in between.

A 35-year limit is not a panacea, as a number of big coal power plants have been commissioned very recently, and unwisely from every perspective. Under a serious climate policy, they cannot be allowed to operate anywhere near the lifetime expected by the investors.

Big change does not, however, necessarily mean a long time scale. Japan had 54 nuclear power reactors that supplied 30 per cent of the nation's electricity in 2010. Since the Fukushima disaster in 2011 almost all nuclear power has been

shut down, with just 0-3 reactors operating between 2013 and now. This happened without any previous planning and, except for the first two summers, without any rationing or other exceptional measures. The demise of all coal mining and much coal power in the UK has also happened very fast.

The problem is not whether dirty coal can be phased out, using existing technology and without requiring big economic and administrative burdens. It can. The problem is whether it can win political acceptance by being done in an equitable way, without undue burdens on certain groups and regions.

The German Green Party has developed a Road Map for Coal Exit in Germany , a 10-point plan, which gives a picture of how stumbling blocks can be overcome.

1. Start a dialogue about the coal exit (until the end of 2017).
2. Resolve the coal exit (by June 2018).
3. Establish an oversight commission (April to December 2018).
4. Prohibit new open-cast mines (by June 2018).
5. Introduce CO_2 budgets for fossil fuel plants (by June 2018).
6. Enforce environmental and health protection (by October 2018).
7. Protect funding of subsequent cost (by December 2018).
8. Shape the structural change (by December 2018).
9. Get emission trading (EU) into motion (by June 2019).
10. Economic and social safeguarding (starting June 2019).

The devil is indeed in the details, but so are his opponents.

Fredrik Lundberg

		Main fuel	GWe	start	share closed c. 2020	CO_2 2015, Mton	cut Mton
Bełchatów	PL	Lignite	5,400		84%	37.1	31.3
Bełchatow 1-12			4,560	1981			
Bełchatow 13			858	2011			
Neurath	DE	Lignite	4,168		49%	32.1	15.8
Neurath A-E			2,056	1970s			
Neurath F-G			2,120	2012			
Niederaussem	DE	Lignite	3,430		71%	27.3	19.5
Niederaussem C-H			2,452	1965-74			
Niederaussem K			944	2003			
Jänschwalde	DE	Lignite	2,988		100%	23.3	23.3
Jänschwalde A-B			996	1981-82			
Jänschwalde C-D			996	1984-85			
Jänschwalde E-F			996				
Boxberg	DE	Lignite	2,427		38%	19.4	7.4
Boxberg N-P (Werk III)			930	1979-80			
Boxberg Werk IV			900	2000			
Boxberg R			675	2012			
Weisweiler	DE	Lignite	1,800	1965-75	100%	18.1	18.1
Drax	UK	Hard coal, bio	3,960	1974-86	100%	13.2	13.2
Brindisi Sud	IT	Hard coal	2,428	1991-93	0%	13.1	
Schwarze Pumpe	DE	Lignite	1,500	1997-98	0%	12.2	
Kozienice	PL	Hard coal	2,919	1972-79	100%	11.4	11.4
Maritsa East 2	BG	Lignite	1,450	1966	100%	11.3	11.3
Torrevaldaliga	IT	Hard coal	1,821	1984-86 or 2010	0%		
Agios Dimitrios	GR	Lignite	1,595		76%	10.6	8.1
Agios Dimitrios 1-4			1,220	1984-86			
Agios Dimitrios 5			375	1997			
Lippendorf	DE	Lignite	1,750	1999	0%	10.3	
Kardia	GR	Lignite	1,110	1975-1981	100%	8.9	8.9
Sines	PT	Hard coal	1,192	1985-87	100%	8.7	8.7
West Burton	UK	Hard coal	1,924	1967	100%	7.7	7.7
Turów	PL	Lignite	1,305	1962-71	100%	7.6	7.6
Aboño	ES	Hard coal	916		100%	7.5	7.5
Aboño 1			360	1974			
Aboño 2			556	1985			
As Pontes	ES	Lignite	1,403	1976-79	100%	7.5	7.5
Longannet	UK	Hard coal	2,260		100%	7.5	7.5
Mannheim	DE	Hard coal	2,137		22%	7.3	1.6
unit 6			280	2005			
unit 7			475	1983			
unit 8				1993			
unit 9				2015			
Cottam	UK	Hard coal	2,008	1969-70	100%	6.8	6.8
Aberthaw	UK	Hard coal	1,586	1971-79	100%	6.7	6.7
Rybnik	PL	Hard coal	1,775	1972-78	100%	6.5	6.5
Litoral	ES	Hard coal	1,066	1985	100%	6.4	6.4
Mátrai Eromu	HU	Lignite	812	1969	100%	6.4	6.4
Połaniec	PL	Hard coal	1,657	1979-83	100%	6.3	6.3
Centrale Maasvlakte 1-2	NL	Hard coal	1,040	1973-74	100%	5.9	5.9
Opole	PL	Hard coal	1,532	1993-97	0%	5.8	
total						**353**	**262**
of which lignite							***140***

Lignite power developments in Europe

Several European countries are investing in lignite mining, despite the fact that the industry faces declining profit margins in competition with low-carbon energy production.

Lignite exhibits a thermal value of typically 10 MJ/kg, far less than hard coal, natural gas, or even firewood. Considerably more lignite must therefore be burned to produce the same amount of energy. With only about one-third carbon (atomic weight 12) in a tonne of lignite, about a tonne of CO_2 (44) is emitted together with high levels of mercury, particulate matter, and other contaminants.

Mining lignite in densely populated European countries brings extensive environmental detriments. Surface extraction strips away productive agricultural land, destroys rural communities, depletes groundwater tables for decades, and alters regional topography.

Acid runoff from exposed lignite seams also reduces pH levels in drainage lakes to as low as 2 units. Rivers may be polluted by brown iron ochre – ferrous hydroxide $Fe(OH)_3$ – that precipitates from both abandoned and active mines.

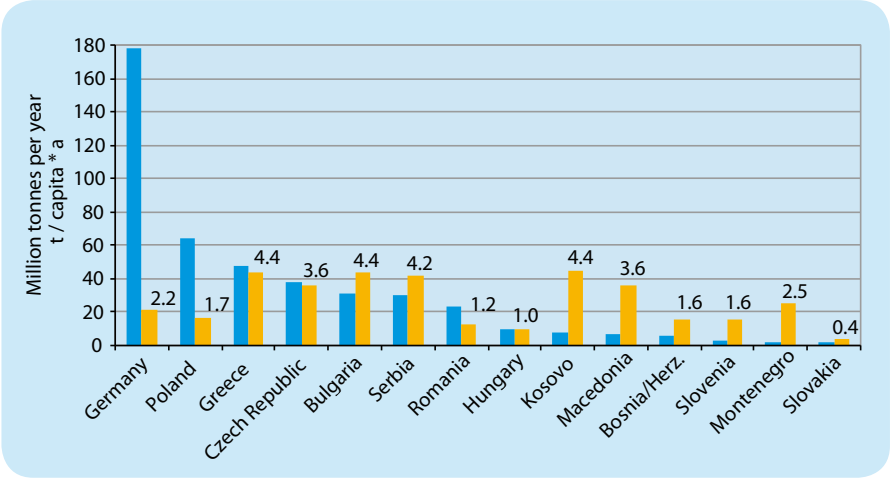


Figure 1. European lignite production, mining output total (blue) and per capita (yellow). Data from 2012-2015.

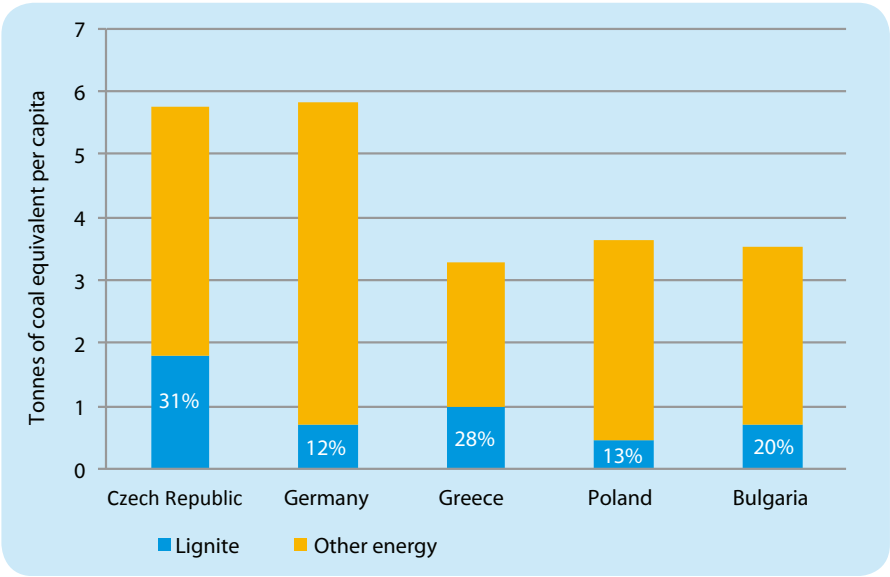


Figure 2. Lignite to primary energy demand in coal equivalents per capita.

Although reducing lignite dependency benefits the environment, its continuing usage alleviates the need for fossil fuel imports. Europe currently mines around 450 million tonnes (Mt) of lignite per year, which is about half of global production.

In 2015, Germany extracted 39 per cent (178 Mt) of total EU output from twelve opencast mines. (figure 1) Nearly three million tonnes of lignite and overburden soil (equivalent to the Great Pyramid of Giza in volume) are excavated per day. Lignite provides nearly one-fourth of German electricity and fulfils 12 per cent of overall energy demand (figure 2).

Other national economies are even more dependent than Germany on lignite for grid power and heating services. The Czech Republic and particular southern EU countries extract up to twice the amount per inhabitant.

Poland relies primarily on hard coal but also on lignite for nearly 90 per cent of electrical power generation and 56 per cent of total energy services. Despite this market dominance, however, sales revenues have been declining in the coal sector.

To improve industry prospects, an advanced 500 MW lignite power plant is currently under construction at the 1,900 MW Turów mine-mouth site in the former Black Triangle region. Europe's largest lignite power station with a capacity of 5,298 MW is located farther east at Belchatów. Poland's "opencast mines in place" would enable lignite usage to continue until mid-century.

A new 100-square-kilometre opencast mining site has also been proposed by Polska Grupa Energetyczna (PGE) at

TIM WAGNER/ FLICKR.COM/CC BY

In May this year more than 3500 activists from all over Europe shut down the opencast mine Welzow-Süd in the Lusatia lignite fields in Germany. On a normal day in the twelve German opencast mines three million tonnes of lignite and overburen soil are excevated.

Gubin-Brody near the eastern German Jänschwalde lignite power station. Three 830 MW generating plants with a design efficiency of 40 per cent would use 17 Mt of lignite annually. Serious environmental concerns prevail on both sides of the border, however, regarding 49 years of planned extraction at a depth of 140 m. In consequence, the required environmental licensing procedures have been suspended for an indefinite period.

The Czech Republic extracts soft lignite and dense hard brown coal in North Bohemia to cover nearly one-third of national energy demand, primarily for electricity and heating services. The Bílina surface mine near Litvínov is being expanded for the new 660 MW Ledvice lignite plant, revoking excavation limits imposed in 1991 by Parliamentary Resolution 444. Electricity exports could be increased in the future to western Germany, where nuclear power will be phased out by 2022. Lignite has been occasionally imported, on the other hand, from nearby eastern German and Polish mines, notably to the 363 MWe Opatovice power and district heating plant.

In Bulgaria, the 660 MW AES Galabovo power plant began operation in 2011. Lignite production grew by 14 percent to 32.6 Mt, but later declined to 31.2 Mt/a in 2014. Additional generation capacities currently await approval in Kosovo near Přistina (2 x 300 MW) and in Serbia at Kolubaru (2 x 375 MW). Europe's largest lignite reserves outside of Poland and Germany are located in these two Balkan countries.

Greece had earlier used an annual six metric tons per inhabitant of particularly low-grade (3.8–9.6 MJ/kg) lignite to cover over a quarter of total energy demand. A recent report of Greece's power utility LAGIE, however, indicates a one-quarter demand reduction (48 Mt in 2014). Investments in lignite usage efficiency could contribute to reducing national indebtedness. A €793 million loan has recently been approved by the German KfW Bank for the enhanced-performance 660 MW Ptolemaida V lignite power plant, with equipment supplied by Mitsubishi Hitachi Power Europe.

With the exception of regions with substantial district heating networks, European lignite faces declining profit margins in competition with low-carbon energy. In a June 2016 study on the lignite industry, Green Budget Germany (FÖS Berlin) has questioned whether sufficient financial means will be available to cover the follow-up costs of mining operations. Public diligence is now essential to preclude the necessity of taxpayer bailouts resulting from corporate or political neglect of this issue.

Jeffrey H. Michel

New watered-down EU air pollution targets

Compared to the Commission's proposal, the relaxed targets finally agreed by member states and parliament will result in thousands of additional cases of premature death.

On 30 June, the last day of the Dutch EU Presidency, the Council and the European Parliament reached a provisional agreement on a new National Emission Ceilings (NEC) directive.

The new directive establishes national limits for the emissions of five pollutants: sulphur dioxide, nitrogen oxides, non-methane volatile organic compounds (NMVOC), ammonia and fine particulate matter ($PM_{2.5}$). The limits are set as binding National Emission Reduction Commitments (NERC), expressed as percentage reductions from the base year 2005.

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The NERCs for 2020 to 2029 are identical to those to which the member states are already committed in the revised Gothenburg protocol under the Convention on Long-Range Transboundary Air Pollution. Since these limits in many cases allow emissions that are even higher that what is expected to result from countries implementing already adopted legislation, they have widely been criticised for their weakness.

More importantly, new stricter NERCs from 2030 have now been agreed. These are set to reduce the health impacts of air pollution by 49.6 per cent in 2030, compared to 2005. While the Commission and the Parliament aimed for an ambition level that would result in a 52 per cent reduction in premature deaths from air pollution, the Council (i.e. the member states) argued for a significantly less ambitious target of 48 per cent. The compromise now agreed has been estimated to result in some 10,000 additional annual premature deaths in 2030, on top of more than a quarter of a million annual premature deaths that are expected to remain if the Commission's proposal was to be implemented.

Looking at the specific NERCs for each member state, and comparing these with the Commission's proposal, it was agreed to lower 79 of the 140 targets for 2030, while agreeing to keep 40 at the level proposed by the Commission, and setting more ambitious targets in just 21 cases (see Table).

At the bottom of the league among member states we find Bulgaria, Greece and Romania, who have all chosen to weaken their NERCs for all five pollutants, while Austria, Denmark, Italy, Poland and the UK lowered targets for four of the pollutants.

In contrast, Finland accepted all its targets, closely followed by Belgium, France and Sweden, which stick to four out of the five targets. As icing on the cake, Finland has opted for a tougher target for ammonia, and Sweden has opted for tougher targets for both sulphur dioxide and $PM_{2.5}$.

For the EU as a whole, ammonia and NMVOC are the pollutants for which the ambition level has been downgraded the most, by six percentage points. This outcome for ammonia is particularly remarkable as the emission cuts achieved so far for this pollutant have been very modest compared to those for the other pollutants, especially considering that the proposed reduction target for 2030 was much less ambitious than for the other pollutants.

Member states managed to remove the ozone precursor methane completely from the directive, despite objections from the Parliament and the Commission. Here, the industrial farming lobby was instrumental in pushing through both the drastically

Table: Country-by-country national emission reduction commitments (NERC) for 2030 in per cent as compared to the base year 2005. Left column shows the Commission's proposal, as adjusted in early 2015; Right column shows the final outcome, as agreed on 30 June 2016.

	SO_2		NOx		VOC		NH_3		$PM_{2.5}$	
	Proposed	Final	Proposed	Final	Proposed	Final	Proposed	Final	Proposed	Final
Austria	-41	-41	-71	-69	-40	-36	-18	-12	-49	-46
Belgium	-66	-66	-59	-59	-35	-35	-13	-13	-41	-39
Bulgaria	-93	-88	-63	-58	-69	-42	-18	-12	-66	-41
Croatia	-86	-83	-62	-57	-50	-48	-23	-25	-62	-55
Cyprus	-95	-93	-70	-55	-50	-50	-21	-20	-78	-70
Czech Republic	-73	-66	-64	-64	-50	-50	-38	-22	-50	-60
Denmark	-62	-59	-66	-68	-49	-37	-32	-24	-56	-55
Estonia	-72	-68	-46	-30	-28	-28	-1	-1	-41	-41
Finland	-34	-34	-47	-47	-48	-48	-15	-20	-34	-34
France	-77	-77	-69	-69	-52	-52	-23	-13	-56	-57
Germany	-57	-58	-64	-65	-35	-28	-38	-29	-42	-43
Greece	-92	-88	-69	-55	-64	-62	-31	-10	-71	-50
Hungary	-73	-73	-66	-66	-58	-58	-43	-32	-64	-55
Ireland	-82	-85	-71	-69	-32	-32	-10	-5	-39	-41
Italy	-71	-71	-68	-65	-49	-46	-22	-16	-54	-40
Latvia	-42	-46	-41	-34	-42	-38	3	-1	-46	-43
Lithuania	-65	-60	-51	-51	-47	-47	-2	-10	-48	-36
Luxembourg	-45	-50	-85	-83	-49	-42	-24	-22	-43	-40
Malta	-95	-95	-79	-79	-27	-27	-24	-24	-76	-50
Netherlands	-58	-53	-61	-61	-22	-15	-21	-21	-40	-45
Poland	-77	-70	-51	-39	-55	-26	-22	-17	-46	-58
Portugal	-83	-83	-61	-63	-44	-38	-19	-15	-68	-53
Romania	-92	-88	-62	-60	-67	-45	-28	-25	-69	-58
Slovakia	-82	-82	-48	-50	-32	-32	-43	-30	-63	-49
Slovenia	-88	-92	-65	-65	-59	-53	-26	-15	-76	-60
Spain	-87	-88	-66	-62	-39	-39	-21	-16	-62	-50
Sweden	-14	-22	-66	-66	-39	-36	-17	-17	-17	-19
United Kingdom	-89	-88	-74	-73	-39	-39	-24	-16	-53	-46
EU28	**-81**	**-79**	**-65**	**-63**	**-46**	**-40**	**-25**	**-19**	**-54**	**-49**

lowered ambition for ammonia and the removal of methane.

Moreover, member states succeeded in introducing a variety of additional flexibilities in order to make it easier for them to comply. While the Commission had already included three flexibilities in its proposal, five more have now been added to the final text. Environmental organisations have strongly criticised these flexibilities, claiming that they will result in higher emissions; delayed reductions; more avoidable deaths and environmental damage; more unnecessary administration; and an unenforceable directive.

Because of the lax 2020 targets, and to better ensure that countries really are on track to meet their 2030 NERCs, the Parliament had also pushed for binding targets for the intermediate year 2025. The Commission's proposal included only indicative (i.e. non-binding) targets for that year. Here, member states succeeded in watering down even the already weak Commission proposal, so that now there are only vague guiding figures for 2025.

Commenting on the outcome, Louise Duprez, senior air quality policy officer at the EEB, said: "EU action to cut air pollution is welcome and will help Europeans breathe more easily. But all in all this is a missed opportunity that will still leave tens of thousands of citizens exposed to avoidable air pollution. The Parliament and the Commission were defeated by member states, including the UK, France, Italy, Poland, Romania and Bulgaria, which preferred to allow industry and agriculture to carry on polluting rather than focusing attention on measures to save people's lives."

On 12 July, the Parliament's environment committee voted to support the provisional NEC deal, with 43 votes in favour and 14 against. Before it comes into force, the NEC proposal will go to the Parliament for a vote in plenary in November, and after that the Council will need to officially endorse the text.

Christer Ågren

The EEB's press release: *http://www.eeb.org/index.cfm/news-events/news/eu-member-states-overrule-efforts-for-ambitious-air-pollution-deal/*

The draft NEC directive: *http://data.consilium.europa.eu/doc/document/ST-10607-2016-INIT/en/pdf*

10 countries still breach EU's air pollution limits

Nitrogen oxides from transport and ammonia from agriculture are still being emitted above the legal limits of the NEC directive.

As of 2010, all EU member states are required to meet national emission limits for their total emissions of four important air pollutants: nitrogen oxides (NOx), ammonia (NH_3), sulphur dioxide (SO_2) and non-methane volatile organic compounds (NMVOCs).

However, final emissions data for 2010–2013 and preliminary data for 2014 shows that a number of countries consistently breached their limits for NOx, NMVOCs and NH_3 in all these years.

According to the European Environment Agency (EEA), emissions from road transport were the main reason for exceedances of the NOx limits, while emissions from agriculture – mainly from the use of fertilisers and the handling of animal manure – were responsible for excessive NH_3 emissions.

High concentrations of nitrogen dioxide (NO_2) can cause direct damage to health through inflammation of the airways, leading to respiratory conditions and cardiovascular disease. In addition, NOx contributes to elevated levels of fine particulate matter ($PM_{2.5}$) and ozone (O_3) in the atmosphere, and both of these pollutants have adverse effects on human health. Ammonia also forms particulate matter in the atmosphere. Moreover, both nitrogen oxides and ammonia impact negatively on the natural environment as they contain nitrogen, which causes eutrophication (over-fertilisation) of terrestrial and marine ecosystems.

Germany was the only country that exceeded three out of the four emission ceilings in 2014, while Austria, Denmark, Ireland and Luxembourg exceeded two ceilings.

Several countries have persistently failed to meet their national emission limits – for example Austria, Belgium, France, Germany, Ireland and Luxembourg have now breached their NOx ceilings for five consecutive years, and Austria, Denmark, Finland, Germany, the Netherlands and Spain have all breached their NH_3 ceilings for five years running (2010–2014).

Nitrogen oxides

Six countries exceeded their NOx ceilings in 2014, with Austria and Luxembourg exceeding the most, by 26 and 29 per cent, respectively. The largest emitters of NOx in 2014 were Germany, the UK, and France. Between 2013 and 2014, total EU NOx emissions came down by 4.7 per cent.

Sulphur dioxide

All member states complied with the emission ceilings for SO_2. The largest emitters of SO_2 were Poland, Germany and the UK. Between 2013 and 2014, the

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EU air pollutant emissions 1990–2014

Emissions in the EU of most air pollutants continue to gradually decline, according to a new report by the European Environment Agency (EEA) that documents trends in emissions between 1990 and 2014 and constitutes the EU's annual report to the Convention on Long-range Transboundary Air Pollution (LRTAP).

The 1999 Gothenburg Protocol to the LRTAP Convention contains national emission ceilings for four pollutants – SO_2, NOx, NMVOC and NH_3 – that parties to the protocol must meet by 2010 and thereafter. In addition to ceilings for individual countries, the protocol also specifies ceilings for the EU, itself a party to the protocol.

The EEA report includes country-by-country data as well as information on which sectors are responsible for the emissions. It also provides emissions data for a number of other air pollutants that are covered by various protocols under the LRTAP Convention, such as particulate matter (PM), heavy metals and persistent organic pollutants.

According to the report, ammonia emissions came down by 24 per cent since 1990, but increased in the EU28 between 2013 and 2014 by 0.9 per cent. In 2014, ammonia emissions from the EU15 were 0.2 per cent higher than the 2010 limit set in the Protocol, the first time the EU15 has exceeded its emission ceiling for this pollutant. The rise in NH_3 emissions in 2014 was mainly due to increases in France, Germany and Spain.

Emissions of the other main pollutants covered by LRTAP have dropped considerably since 1990, especially for SO_2, which has fallen by 88 per cent. The three air pollutants primarily responsible for the formation of ground-level ozone (O_3), i.e. carbon monoxide, NMVOCs and NOx, were reduced by 65, 60 and 55 per cent, respectively.

Emissions of primary particulate matter PM_{10} and $PM_{2.5}$ have fallen by 23 and 25 per cent, respectively since 2000, and black carbon (BC) by 42 per cent.

Source: EEA, 6 July 2016

The report "European Union emission inventory report 1990–2014 under the UNECE Convention on Long-range Transboundary Air Pollution (LRTAP)", EEA Report No 16/2016, is available at: *http://www.eea.europa.eu/publications/lrtap-emission-inventory-report-2016/*

Table: Comparison of reported member state emissions with respective NEC directive ceilings.

Member state	NOx					NMVOCs					SO_2					NH_3				
	2010	2011	2012	2013	2014	2010	2011	2012	2013	2014	2010	2011	2012	2013	2014	2010	2011	2012	2013	2014
Austria	✗	✗	✗	✗	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✗	✗	✗	✗
Belgium	✗	✗	✗	✗	✗	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Bulgaria	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Croatia					✓					✓					✓					✓
Cyprus	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Czech Rep.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Denmark	✗	✗	✗	✓	✓	✗	✗	✗	✗	✗	✓	✓	✓	✓	✓	✗	✗	✗	✗	✗
Estonia	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Finland	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✗	✗	✗	✗
France	✗	✗	✗	✗	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Germany	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓	✓	✓	✓	✓	✗	✗	✗	✗	✗
Greece	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Hungary	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ireland	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Italy	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Latvia	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Lithuania	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Luxembourg	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Malta	✗	✓	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Netherlands	✗	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✗	✗	✗	✗
Poland	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Portugal	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Romania	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Slovakia	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Slovenia	✓	✗	✗	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Spain	✗	✗	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✗	✗	✗	✗
Sweden	✗	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
UK	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
✓	15	16	17	21	22	22	22	23	23	24	27	27	27	27	28	21	21	21	21	22
✗	12	11	10	6	6	5	5	4	4	4	0	0	0	0	0	6	6	6	6	6

total reduction for SO_2 in the EU28 was 7.7 per cent.

Ammonia

Six countries exceeded their NH_3 ceilings in 2014, and the highest exceedance was reported for Germany (35%). The largest emitters of NH_3 were Germany, France and Spain. Between 2013 and 2014, total EU emissions of NH_3 actually increased by 1.3 per cent.

Non-methane volatile organic compounds

In 2014, four member states (Denmark, Germany, Ireland and Luxembourg) did not attain their ceilings. Ireland had the highest exceedance, with emissions 58 per cent above its limit. The largest emitters of NMVOCs were Germany, Italy and the UK. The total EU emissions of NMVOCs came down by 3.1 per cent between 2013 and 2014.

EU aggregated ceilings

The EU itself has two different sets of emission ceilings for 2010 and onwards, as set out in the NEC directive. With respect to the aggregated emission ceilings of the directive's Annex I, the combined reported emission data are lower than the respective ceilings for all four pollutants.

The stricter EU emission ceilings in Annex II of the directive were designed to ensure that specific environmental objectives were met, such as targets limiting the acidification and eutrophication of ecosystems. (However, Annex II does not include a ceiling for NH_3 emissions.) The aggregated NOx emissions for EU28 were above the Annex II limit for the 2010 to 2012 period. Similarly the aggregated NMVOC emissions were above the Annex II ceiling for 2010. In 2014, the EU28 as a whole achieved all its Annex I and II emission ceilings.

In December 2013 the European Commission proposed a revised NEC directive, including new 2020 and 2030 emission reduction commitments for the four currently covered pollutants, as well as new ceilings for two additional pollutants – fine particulate matter ($PM_{2.5}$) and methane (CH_4). The proposal was negotiated by the European Parliament and the Council for almost half a year, and a compromise was finally reached in late June (see separate article on p. 16).

Christer Ågren

Source: EEA, 10 June 2016

Link to the report "NEC Directive reporting status 2015": *http://www.eea.europa.eu/themes/air/national-emission-ceilings/nec-directive-reporting-status-2015*

Note: In some cases, the ceiling could have been attained on the basis of adjusted emission inventories as approved under the 2012 Gothenburg Protocol of the Convention on Long-Range Transboundary Air Pollution (LRTAP). In particular for 2013 and 2014, the number of exceedances above the emission ceilings would become fewer. Had adjusted emissions been applied under the NEC directive, the following member states would not have exceeded their ceilings: Belgium NOx 2010–2014 and NMVOCs 2010; Denmark NMVOCs 2011–2014 and NH3 2012–2014; France NOx 2014; Germany NOx 2014 and NMVOCs 2010–2014; Luxembourg NOx 2013–2014.

Many ways to cut ship NOx emissions

Establishing NOx Emission Control Areas would significantly reduce ship NOx emissions by 2040 – introducing economic instruments could cut emissions faster and further.

A new study has given projections of ship NOx emissions in the Baltic Sea, the North Sea and the English Channel up to 2040, and estimated the potential of various measures to reduce NOx emissions from international shipping.

Ships emit significant amounts of air pollution, including sulphur dioxide (SO_2), nitrogen oxides (NOx) and small particles ($PM_{2.5}$), causing serious damage to health and the environment. As a result of both EU and global regulations, sulphur emissions from ships are expected to gradually come down, but there is currently no regulation that will ensure any significant cuts in their NOx emissions.

The only existing regulation of NOx from international shipping is in Annex VI of the MARPOL Convention under the International Maritime Organization (IMO). However, the NOx emission standards in this regulation solely apply to newly constructed ship engines, and the currently (since 2012) applicable Tier II standard accomplishes just a modest 15 to 20 per cent emission reduction compared to an unabated Tier I engine.

There is however a stricter Tier III standard that requires emission reductions of about 80 per cent compared to a Tier I engine, but this applies only to newly built ships in designated NOx Emission Control Areas (NECA) which currently only exist in North America.

While the Tier II standard can be achieved by internal engine modifications that adjust combustion parameters, bigger changes are needed to reach the Tier III standard.

There are several different abatement options for reducing emissions of NOx from marine engines, including:

- Exhaust gas after-treatment, where the main option is selective catalytic reduction (SCR).
- Combustion modification using techniques such as exhaust gas recirculation (EGR) or methods where water is introduced in the engine.
- Switching from marine fuel oils to, for example, liquefied natural gas (LNG) or methanol.
- Reduced fuel consumption, e.g. through slow steaming.

According to the study, SCR, EGR and using LNG as fuel can all reduce NOx emissions to Tier III levels. Of these, SCR has the longest history of marine applications, LNG is increasingly being used as a marine fuel, and while EGR is said by engine manufacturers to live up to the standard, so far there is limited data from practical applications.

In terms of costs, EGR and the SCR have comparable costs per kg of NOx reduced, while the costs for LNG depend largely on whether an existing ship is rebuilt or the LNG system is installed on a new ship – the latter being considerably less costly than the former. Fluctuations in the LNG price also affect the potential return on investment.

In order to analyse the potential for reducing NOx emissions from shipping, the study made new projections of emissions up to 2040 in the Baltic Sea, the North Sea and the English Channel. Regarding activity levels, ship traffic was assumed to increase by 1.5 per cent per year for all ship types except container ships, where the increase was set at 3.5 per cent per year. The average lifetimes of ships were assumed to stay the same up to 2040, i.e. 25 to 28 years.

Expected improvements in transport efficiency will result in lower fuel consump-

NOx emissions in the Baltic Sea could fall significantly if a levy and fund system was introduced.

Table: NOx emissions from international shipping in the Baltic Sea, the North Sea and the English Channel 2005–2040 (thousand tonnes).

	2005	2010	2015	2020	2025	2030	2035	2040
BAU	930	906	830	798	768	741	716	715
NECA					644	524	404	306
Levy & fund					250	230	230	220

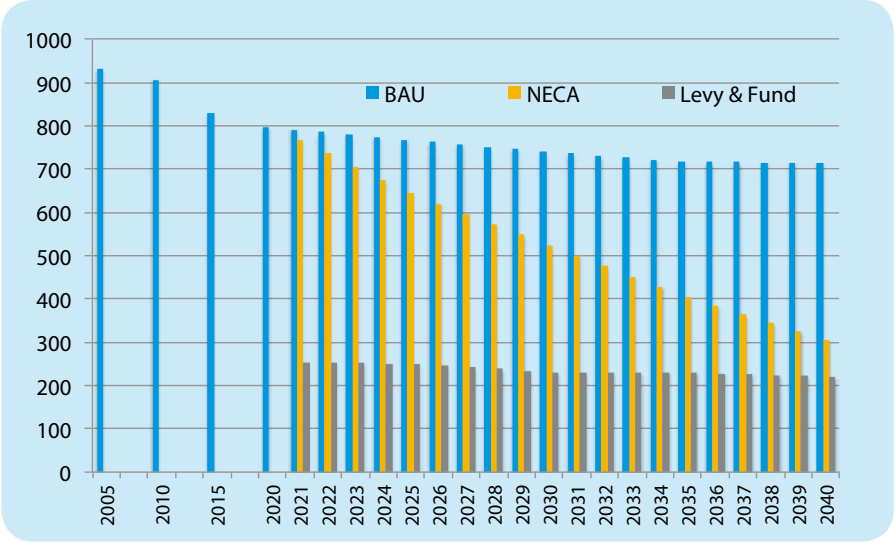

Figure: NOx emissions from international shipping in the Baltic Sea, the North Sea and the English Channel 2005–2040 under a) business-as-usual (BAU); b) a NOx emission control area (NECA), and; c) a NOx levy and fund system.

tion for comparable volumes of freight transport, and in this study efficiency is assumed to increase between 1.3 and 2.25 per cent per year for the different ship types. The authors point out that these values are quite optimistic and result in fuel consumption that is stable over time despite an increase in ship traffic.

Projections were given for two scenarios – one business-as-usual (BAU), i.e. with no NOx Emission Control Area (NECA), and another with a NECA in place from 2021.

Current (2015) emissions were estimated to amount to 830,000 tonnes of NOx. Under the BAU scenario, emissions in 2040 are expected to come down by about 14 per cent, to 715,000 tonnes. Assuming that a NECA is in place from 2021, emissions in 2040 would instead be reduced by nearly two-thirds, to 306,000 tonnes.

In addition to estimating the impact of a NECA, the study evaluated several policy instruments that could be implemented in addition or as an alternative to the NECA. These policy instruments would address NOx emissions from the entire fleet, not only from newly built ships.

Three policy instruments were shortlisted as the most promising for use in addition or as an alternative to a NECA:

- The first option is a levy that ships have to pay for NOx emissions in the area. The revenue from the levy would be used to fund the uptake of NOx abatement measures in the sector.
- The second option requires ships to reduce their speed by 15 per cent under the baseline speed when sailing in the area. As an alternative compliance option, the ships that prefer to stick to their baseline speed can pay a levy, depending on their NOx emissions in the area. The income from this levy would be used to fund NOx abatement measures in the sector.
- The third option is a stand-alone levy that ships have to pay for their NOx emissions in the area. The revenue from this instrument is assumed to go to the member states and not to be earmarked.

These three instruments were evaluated regarding their NOx reduction potential and the associated costs for the sector if the levy rate was either set at €1, €2 or €3 per kg NOx. It was found that two of the three instruments were better at meeting the two criteria, firstly a levy & fund and secondly regulated slow steaming combined with a levy & fund.

Introducing a levy & fund instrument could quickly and significantly reduce ship NOx emissions. In 2025 emissions could be cut by two-thirds (67%) in the case of no NECA and by 61 per cent with a NECA in place (see table). In 2040, reductions would amount to about 70 per cent in the absence of a NECA, and about 30 per cent if a NECA is established. This is roughly twice the reduction achieved with regulated slow steaming combined with a levy & fund if the baseline speed is reduced by 15 per cent. However, costs for the sector of a levy & fund are also roughly twice the costs of regulated slow steaming combined with a levy & fund.

Expressed in tonnes, this means that even with a NECA in place, the use of economic instruments could cut annual NOx emissions by about 400,000 tonnes on average throughout the 2020s. For comparison, this is more than the total land-based NOx emissions of Sweden, Denmark and Finland combined, which in 2014 amounted to 385,000 tonnes.

Because the Tier III NECA standard applies only to newly built ships and ships have a very long lifetime, the introduction of economic instruments such as a levy & fund would provide a very useful complement to the NECA, by also ensuring significant emission cuts in the short term. Assume, for example, that a levy & fund is adopted and put into practice in the Baltic Sea and the North Sea in 2021, this would achieve an accumulated additional emission reduction over the ten years up to 2030 amounting to nearly four million tonnes of NOx.

Christer Ågren

The study "NOx controls for shipping in EU seas" (June 2016) was commissioned by Transport & Environment and prepared jointly by the consultants IVL Swedish Environmental Research Institute and CE Delft. It can be downloaded at: *http://www.transportenvironment.org/publications/nox-pollution-sea-europe-must-run-tighter-ship*

Cruising causes pollution in Europe...

An environmental ranking of European cruise ships concludes that none of these can currently be recommended. German green group NABU has analysed the European cruise ships focussing on emissions of air pollution. As in previous years' rankings, the fuel used, the installation of exhaust gas cleaning systems and the use of shore power supply was checked.

They found that all ships are still burning heavy fuel oil, which is the dirtiest type of fuel available, and eighty per cent of the cruise ships sailing in Europe do not use any exhaust gas cleaning system. By using scrubbers to reduce the sulphur emissions some ships just meet the minimum legal standard, but to cut the very harmful pollutants like soot, ultra-fine particles or nitrogen oxides no effective measures are implemented on board these ships.

NABU press release 31 August 2016: *https://en.nabu.de/news/21159.html*

... and in North America

In June, Friends of the Earth US released its new Cruise Ship Report Card, documenting the environmental footprint of the cruise industry and grading 17 cruise lines and their 171 ships. The report card shows an ongoing lack of initiative by cruise companies to reduce their air and water pollution impact on travel destinations and local peoples.

Cruise ships are responsible for significant amounts of air pollution from the dirty fuel they burn. Even at the dock, cruise ships often run dirty diesel engines to provide electrical power to passengers and crew. According to the US Environmental Protection Agency, each day an average cruise ship is at sea it emits more sulphur dioxide than 13 million cars and more soot than 1 million cars.

More information: *http://www.foe.org/cruise-report-card*

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Ships pollute in East Asia

A Chinese-led study has estimated that sulphur dioxide emissions from ships caused an estimated 24 000 premature deaths a year in East Asia, mainly from heart and lung diseases and cancer. About three-quarters of deaths were in China, and others mainly in Japan, Taiwan, Hong Kong, Macau and South Korea. China, where Shanghai is the world's busiest container port, will start demanding cleaner fuels for ships in coastal regions from 2019.

The study "Health and climate impacts of ocean-going vessels in East Asia" was published online in the journal Nature Climate Change 18 July 2016.

Source: PlanetArk/Reuters 19 July 2016

LNG as marine fuel

A recent information paper from the German Nature and Biodiversity Conservation Union (NABU) discusses the role of LNG (liquefied natural gas) as an alternative fuel for shipping. It concludes that while LNG will significantly reduce emissions of traditional air pollutants (SO_2, NOx, PM), there are still questions regarding the overall environmental performance – for example, it has to be ensured that methane slip is minimized. Moreover, the use of fossil gas does not have a place in a future decarbonised transport sector – renewable energy sources must be given preference as soon as possible.

The report "LNG as marine fuel - Hype or useful option to reduce air pollutant and greenhouse gas emissions?" can be downloaded at: *nabu.de/*

Air Convention: More measures needed

Despite recent improvements in air quality in Europe and North America, air pollution is still the primary environmental cause of premature death and ecosystem biodiversity is threatened by nitrogen deposition, according to the report "Towards Cleaner Air" from the Convention on Long-Range Transboundary Air Pollution (LRTAP), released in Brussels on 31 May.

Over the last few decades, average life expectancy in Europe has increased by one year and hundreds of thousands of premature deaths every year have been avoided as a result of policy-driven actions to reduce air pollutant emissions. In addition, soil acidification has been halted in most parts of Europe, and fish stocks are recovering in freshwaters where they had largely disappeared.

The cost of damage to human health from air pollution (excluding damage to crops or buildings) is about €1,100 billion per year in Europe and over US$ 1,000 billion in the United States. For half the UN ECE countries, the total health costs of air pollution represent more than 10 per cent of GDP. The report finds that air pollution control costs are significantly lower than the health costs, which makes abatement measures a sound investment.

"Specific action will be needed to abate ammonia emissions, which principally come from agriculture. Abatement options will need to include reducing livestock densities in and around sensitive nature areas and encouraging low-meat diets," said Anna Engleryd, Chair of the Executive Body for the LRTAP Convention.

Created in 1979, the LRTAP Convention now has 51 parties in the UN Economic Commission for Europe (ECE) region, covering North America and almost the entire European continent.

More information: *http://www.unece.org/?id=42880*
The report: *http://www.unece.org/env/lrtap/welcome.html*

OECD warns of rising costs of air pollution

Outdoor air pollution could cause up to nine million premature deaths a year by 2060 and cost US$ 3.3 trillion annually as a result of sick days, healthcare expenditure and reduced agricultural output, unless action is taken.

In 2010, outdoor air pollution caused more than three million premature deaths worldwide, with elderly people and children most vulnerable. New projections presented in an OECD report "The Economic Consequences of Outdoor Air Pollution" imply a doubling, or even tripling, of premature deaths from particulate matter ($PM_{2.5}$) and ozone (O_3) – or one premature death every four or five seconds – by 2060.

The projected increase in concentrations of $PM_{2.5}$ and ozone will result in significant economic costs to society. The direct market impact of air pollution in terms of lower worker productivity due to illness, higher spending on health care, and lower crop yields, could exceed US$ 3,000 billion annually by 2060, equal to one per cent of GDP. For example, between now and 2060, the number of annual work days lost to air-pollution-related illness is expected to jump from 1.2 to 3.7 billion.

These estimates of economic market impacts do not however reflect the true costs of air pollution because shortening of people's lives and pain and suffering from respiratory and cardiovascular diseases do not really have a market price. The OECD has therefore also estimated the non-market welfare costs by using economic studies on how people value their health and how much they would be prepared to pay to reduce the health risks, i.e. by introducing policies and measures that would cut air pollutant emissions.

Based on this data, the current (2015) annual global welfare costs of mortality and morbidity from outdoor air pollution are estimated at US$ 3,440 billion, and by 2060 they would amount to between US$ 20,000 and 27,000 billion a year (see table).

It should be noted that air pollution damage to ecosystems, biodiversity and our cultural heritage has not been assigned any monetary value and is therefore not included in these economic estimates.

According to the projections, the biggest rises in air pollution mortality rates are expected in India, China, Korea and Central Asian countries, where rising populations and congested cities mean more people are exposed to high levels of pollution. The premature death rates are forecast to be up to three times higher in 2060 than in 2010 in China and up to four times higher in India. Mortality rates are however seen to be stabilising in the United States and falling in much of Western Europe thanks in part to efforts to move to cleaner energy and transport.

Projected GDP losses will be biggest in China, Russia, India, Korea and countries in Eastern Europe and the Caspian region, as health costs and lower labour productivity hit output.

"The number of lives cut short by air pollution is already terrible and the potential rise in the next few decades is terrifying," said OECD Environment Director Simon Upton. "If this is not motivation enough to act, this report shows there will also be a heavy economic cost to not taking action. We must prevent these projections from becoming reality."

"It is time for governments to stop fussing about the costs of efforts to limit air pollution and start worrying about the much larger costs of allowing it to continue unchecked. Their citizens' lives are in their hands," concluded Simon Upton.

V.T. POLYWODA/ FLICKR.COM/CC BY NC ND

Premature deaths caused by air pollution in China are expected to increase by 300 per cent by 2060.

Table: Total global welfare costs of air pollution (billions US$)

	2015	2030	2060
Market impacts (health expenditures; labour productivity; and agriculture)	330	730	3,300
Non-market impacts (mortality and morbidity)	3,440	6,610–6,900	20,540–27,570

Christer Ågren

Read the report: *http://www.oecd.org/environment/the-economic-consequences-of-outdoor-air-pollution-9789264257474-en.htm*

The policy briefing: *http://www.oecd.org/environment/indicators-modelling-outlooks/Policy-Highlights-Economic-consequences-of-outdoor-air-pollution-web.pdf*

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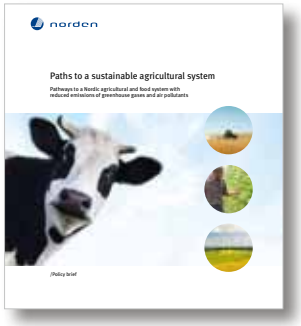


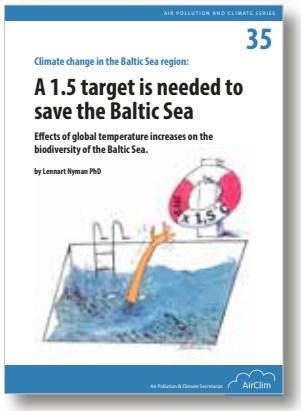
Paths to a sustainable agricultural system

This policy brief constitutes one of the main outputs from the project "Pathways to a Nordic food system that contributes to reduced emissions of greenhouse gases and air pollutants". It contains an analysis of agricultural emissions, regulatory frameworks, food production systems, consumption trends, policies for the agricultural sector and the overall environmental impact in terms of air pollutants and greenhouse gas emissions from agriculture. It also covers conflicts of interest that are counterproductive to an agricultural food production system with lower emissions of greenhouse gases and ammonia.

Phasing out fossil gas in Europe

Is natural gas a "bridge" to a sustainable energy system? That is what the gas industry has been saying for decades. But the bridge is not needed. Sustainable technology is here now.

In many European countries natural gas is seen as a necessary part of the fuel mix. However most of Sweden has no natural gas. The combined pressure of environmental NGOs and farmers stopped gas and led to the development of biomass instead.



A 1.5 target is needed to save the Baltic Sea

The Baltic Sea covers an area slightly larger than Finland, but its drainage area is more than four times as large. After the Black Sea it is the second largest brackish-water body in the world.

Two degrees warming will increase erosion of shore ecosystems, wild salmon river populations in the Baltic Proper will face severe survival problems. Decreased winter ice cover in the Baltic Sea will disfavour the reproduction of ringed seals.

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Coming events

Air quality: A European challenge. Strasbourg, France, 4 October 2016. Conference at the Council of Europe about actions in French and European cities and exchange of good practices. Information: *http://www.strasbourg.eu/environnement-qualite-de-vie/qualite-air/colloque-2016;jsessionid=994D10F83EBC1BF118A0E303E4A8AD48*

IMO MEPC 70 (Marine Environment Protection Committee). London, UK, 24 - 28 October 2016. Information: *www.imo.org*

EU Environment Council. 27 October 2016. Information: *http://europa.eu/newsroom/events/*

UNFCCC Conference of the Parties (COP) 22. Marrakesh, Morocco, 7 - 18 November 2016. Information: *http://unfccc.int/*

7th International Nitrogen Initiative (INI 2016). Melbourne, Australia, 4 - 8 December 2016. Information: *http://www.ini2016.com/*

CLRTAP Working Group on Strategies and Review + Executive Body. Geneva, Switzerland, 13 - 16 December 2016. Information: *www.unece.org/env/lrtap/welcome.html*

EU Environment Council. 19 December 2016. Information: *http://europa.eu/newsroom/events/*

Air Pollution 2017. 25th International conference on modelling, monitoring and management of air pollution. Cadiz, Spain, 25 - 27 April 2017. Information: *http://www.wessex.ac.uk/conferences/2017/air-pollution-2017*

CLRTAP Working Group on Strategies and Review. Geneva, Switzerland, 31 May - 2 June 2017. Information: *www.unece.org/env/lrtap/welcome.html*

IMO MEPC 71 (Marine Environment Protection Committee). London, UK, 8 - 12 May 2017. Information: *www.imo.org*

UNFCCC First sessional period in 2017. Venue to be decided. 8 - 18 May 2017. Information: *http://unfccc.int/*

European Biomass Conference and Exhibition (EUBCE). Stockholm, Sweden, 12 - 15 June 2017. Information: *http://www.eubce.com/home.html*