

## Dirty dozen – biggest polluters

Polish lignite plant Belchatow and British coal plant Drax continue to dominate Europe's most polluting point sources in 2015.

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## Climate law adopted in Sweden

Sweden has decided on a Climate Framework, which requires the government to work towards climate targets and report annually to parliament.

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## Subsidies for fossil fuel

Fossil fuel subsidies support an industry that causes premature deaths and ill-health worldwide – the health costs associated with fossil fuel use are more than sixfold the subsidies.

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## Electric ferries – a revolution underway

Norway got its first battery-powered ferry two years ago. This has set a new benchmark for a sector that has previously been wholly dependent on fossil fuels.

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## Lower carbon footprint from public canteens

The combined measures of buying only organic produce and excluding meat and fish from meals could reduce the carbon footprint from public meals by more than 40 per cent.

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## An untapped resource in south-eastern Europe

There is a 740 GW potential for cost-competitive renewable power generation across South East Europe.

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# Failure to meet NO<sub>x</sub> and NH<sub>3</sub> limits

Eleven EU countries breached at least one of their air pollutant emission ceilings in 2015, preliminary data from the European Environment Agency shows.

**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 (NO<sub>x</sub>), ammonia (NH<sub>3</sub>), sulphur dioxide (SO<sub>2</sub>) and non-methane volatile organic compounds (NMVOCs).

However, final emissions data for 2010–2014 and preliminary data for 2015 shows that a number of countries consistently breached their limits for NO<sub>x</sub>, NMVOCs and NH<sub>3</sub> in all these years.

According to the European Environment Agency (EEA), emissions from road transport were the main reason for

exceedances of the NO<sub>x</sub> limits, while emissions from agriculture – mainly from the use of fertilisers and the handling of animal manure – were responsible for excessive NH<sub>3</sub> emissions.

While total EU emissions of NO<sub>x</sub> have been slowly but consistently coming down since 2010, for the second consecutive year total EU emissions of NH<sub>3</sub> increased, by 1.7 per cent from 2014 to 2015, due to higher reported emissions from the agriculture sector.

In 2015, eleven countries exceeded their national ceilings for one or more

# Acid News

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

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

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

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## The Air Pollution and Climate Secretariat

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

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

In furtherance of these aims, the Secretariat:

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

## Editorial

Between 1990 and 2015 the share of diesel car registrations in the EU increased dramatically, from 15 to more than 50 per cent – a change that in most countries has been stimulated by national financial incentives such as lower excise duties for diesel than for petrol. The lower diesel tax favours the use and ownership of diesel cars and creates an incentive to drive more kilometres. Another reason is the weaker EU air pollution standards for diesel cars, in effect allowing diesels to emit much more toxic particles (PM) and nitrogen oxides.

As a result, European citizens and ecosystems are being exposed to higher levels of air pollution. Last year the European Environment Agency estimated the number of premature deaths in the EU linked to PM<sub>2.5</sub>, NO<sub>x</sub> and ozone at 436,000, 68,000 and 16,000, respectively. Emissions from transport in general, and from diesel vehicles in particular, contribute significantly to this death toll.

Binding air quality standards that are set to protect peoples' health are frequently being exceeded. The Commission is currently pursuing infringement actions for excessive levels of PM<sub>10</sub> against 16 member states, and two of these cases (against Bulgaria and Poland) have been brought before the European Court of Justice. Legal action has also been initiated on nitrogen dioxide (NO<sub>2</sub>), so far involving twelve member states.

National governments may eventually be ordered to pay heavy fines for these transgressions, and in many cases it will be the cities that will have to take action to resolve the problem. In addition, many cities are being brought to local courts by environmental groups. As a result, a number of cities are now moving to phase

out diesel cars, the first step usually being to restrict the use of, or even ban, the oldest and dirtiest diesel cars.

To mark the fact that two years have now passed since the Dieselgate scandal dramatically exposed both the dirtiness

of diesel cars and cheating by the car industry, Transport & Environment on 18 September published a new report: "Diesel – the true (dirty) story".

The report makes clear, among other things, that diesel cars not only pollute the air but also emit more climate-change emissions (primarily carbon dioxide) than other cars, thus refuting carmakers' claim

that diesel cars are needed to meet their CO<sub>2</sub>-reduction targets.

Introducing low-emission zones and banning diesel cars from cities are good for air quality and are necessary to protect people's health, but they are not good enough. The only way to achieve the dual targets of good air quality and limiting global warming in line with the Paris Agreement is a total phase-out of cars with traditional combustion engines.

The future may very well belong to electric and hydrogen/fuel-cell vehicles, provided of course that they are fed by clean, renewable sources of energy. But in densely populated cities even zero-exhaust-emission vehicles may not be enough to completely resolve poor air quality, due to remaining emissions of toxic particles from brakes, tyres and road surfaces. These cities will need clean and well-functioning public transport systems (e.g. buses, trains and underground) and much more walking and cycling.

Christer Ågren

**"The only way  
... is a total  
phase-out  
of cars with  
traditional  
combustion  
engines"**

# Dirty dozen – biggest polluters

Polish lignite plant Belchatow and British coal plant Drax continue to dominate Europe's most polluting point sources in 2015.

According to the recently updated European Pollutant Release and Transfer Register (E-PRTR), the Polish state-owned Belchatow lignite plant remains Europe's biggest carbon dioxide polluter. With an electricity output of 5,400 megawatts (MW), Belchatow is the largest thermal power station in Europe, and in 2015 it emitted 37 million tonnes of CO<sub>2</sub>. It was followed by three German lignite plants, Neurath (32.4 Mt), Niederaussem (27.2 Mt) and Jänschwalde (23.7 Mt). Of the twelve worst CO<sub>2</sub> polluters, six are German lignite plants.

The Drax power station in Yorkshire, United Kingdom – with an electricity output of nearly 4,000 MW – was responsible for emissions of 23.4 Mt CO<sub>2</sub>. It has traditionally been powered by hard coal, but over the last few years it has also been burning more and more biomass, imported primarily from the United States. In 2015 the burning of wood pellets contributed about half of the electricity generated by Drax.

All in all, the dozen dirtiest point sources emitted a staggering 238 million tonnes of CO<sub>2</sub>, more than five times the total national emissions from Sweden.

At the top of the list of the worst nitrogen oxides (NO<sub>x</sub>) polluters, we find once again Belchatow, closely followed by Drax. Each of these plants emitted more than 30,000 tonnes of NO<sub>x</sub> in 2015.

The list of the worst sulphur polluters



Though the Drax power station has been fueled with more and more biomass it still ranks highly on the list of carbon dioxide emitters.

is dominated by lignite plants in eastern Europe, with Serbian plants occupying four of the five top places. Belchatow and Drax can also be found in this list. With emissions of 75,000 tonnes of SO<sub>2</sub>, Belchatow is by far the biggest sulphur polluter in the European Union, followed by Novaky in Slovakia (47,000 tonnes) and Maritsa 2 in Bulgaria (40,000 tonnes).













Implementation of the EU's Industrial Emissions Directive, which includes emission standards for traditional air pollutants (SO<sub>2</sub>, NO<sub>x</sub>, dust) from existing large combustion plants, has resulted in a gradual lowering of these emissions over time and will continue to do so over the next few years. The recent adoption of a new best available techniques (BAT) reference document for large combustion plants will help speed up this process (see page x).


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 (33 countries: EU28, Iceland, Liechtenstein, Norway, Switzerland and Serbia) and includes annual data for 91 substances released from some 35,000 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 2009–2014 see AN2/2011, AN2/2012, AN2/2013, AN2/2014, AN3/16

CO <sub>2</sub>		
Plant		Thousand tonnes
1	Belchatów 	37,000
2	Neurath 	32,100
3	Niederaußem 	27,300
4	Jänschwalde 	23,700
5	Drax 	23,400
6	Boxberg 	19,500
7	Eschweiler 	18,300
8	Schwarze Pumpe 	12,300
9	Kozienice 	11,600
10	Dunkirk 	11,400
11	Maritsa 2 	11,300
12	Agios Dimitrios 	10,600

NO <sub>x</sub>		
Plant		Tonnes
1	Belchatów 	34,100
2	Drax 	34,100
3	Aberthaw 	25,300
4	Neurath 	22,300
5	Jänschwalde 	18,600
6	Nikola Tesla A 	18,200
7	Niederaußem 	18,000
8	Nikola Tesla B 	17,300
9	Kozienice 	17,200
10	Polaniec 	15,400
11	Longannet 	15,300
12	Maritsa 2 	13,700

SO <sub>2</sub>		
Plant		Tonnes
1	Nikola Tesla A 	101,000
2	Belchatów 	74,800
3	Nikola Tesla B 	69,000
4	Kostolac B 	65,400
5	Kostolac A 	49,000
6	Novaky 	46,800
7	Maritsa 2 	39,900
8	Andorra 	36,200
9	Kozienice 	31,000
10	Romag Termo 	21,100
11	Drax 	18,600
12	Oradea 	18,500



## US standards on NO<sub>2</sub> remain

After a review of scientific evidence, the US Environmental Protection Agency (EPA) on 14 July proposed to retain the current national ambient air quality standards (NAAQS) for nitrogen dioxide (NO<sub>2</sub>).

The NAAQS for NO<sub>2</sub> are a 1-hour standard at 100 parts per billion (ppb), based on the 98th percentile of the annual distribution of daily maximum 1-hour NO<sub>2</sub> concentrations averaged over three years, and an annual standard at a level of 53 ppb.

More info at: [www.epa.gov/no2-pollution/primary-national-ambient-air-quality-standards-naaqs-nitrogen-dioxide](http://www.epa.gov/no2-pollution/primary-national-ambient-air-quality-standards-naaqs-nitrogen-dioxide)

## IMO moves slowly on shipping climate plan

Countries meeting in early July at the International Maritime Organization's environment committee (MEPC) managed to agree only on 'headings' to be included in a strategy, which itself will be the first step in a broader plan to cut ships' greenhouse gas emissions. The details of each section are to be decided at a meeting in October, and a draft strategy agreed by 2018. However, the final strategy will not be finalised until 2023.

Shipping is one of the fastest-growing sources of emissions and is projected to account for 17 per cent of global emissions by 2050. But, despite the IMO being first tasked with addressing ship GHG emissions by the Kyoto Protocol some 20 years ago, shipping is the only industry not yet subject to GHG reduction targets.

Source: T&E News, 26 July 2017. [www.transportenvironment.org](http://www.transportenvironment.org)



IMO busy making climate action plans.

## Failure to meet NO<sub>x</sub> and NH<sub>3</sub> limits

*Continued from front page*

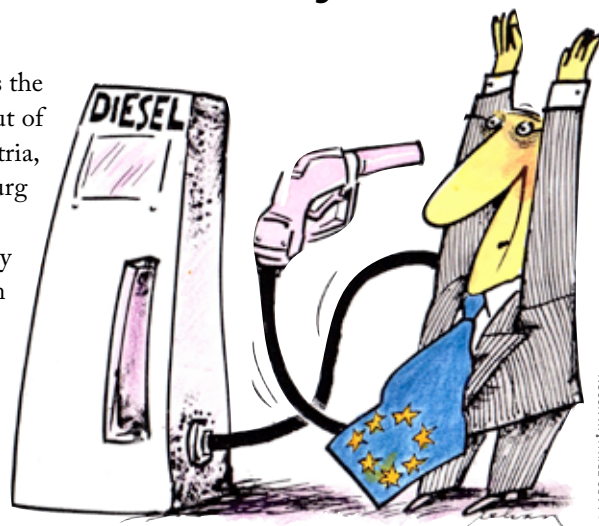
pollutants (see table). Germany was the only country that exceeded three out of the four ceilings in 2015, while Austria, Denmark, Ireland and Luxembourg exceeded two ceilings.

Several countries have persistently failed to meet their national emission limits – for example Austria, Belgium, France, Germany, Ireland and Luxembourg have now breached their NO<sub>x</sub> ceilings for six consecutive years, and Austria, Denmark, Finland, Germany, Spain and Sweden, have all breached their NH<sub>3</sub> ceilings for six years running (2010–2015).

The emission limits are set in the 2001 National Emission Ceilings (NEC) directive and are applicable from 2010 until 2019. Last year, a revised NEC directive was adopted that sets new national emission reduction commitments applicable in two steps, from 2020 and 2030, respectively.

The new NEC directive also introduced a so-called flexibility mechanism that allows member states under certain circumstances to 'adjust' downwards their reported emissions for compliance assessment with the national ceilings. This also includes retroactive adjustment of the ceilings for the 2010–2019 period. In March this year, adjustment applications were submitted by nine countries (Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Luxembourg and Spain). Following a review and possible approval of these applications by the European Commission, the number of countries deemed to exceed one or more emission ceilings in 2015 could decrease from eleven to five.

Environmental organisations have strongly criticised the lack of ambition of the new NEC directive, especially regarding the 2020 reduction commitments. The EEA analysis now shows that in 2015, the aggregated EU emissions for both NMVOCs and SO<sub>2</sub> were already below their respective targets for 2020 (see figure). Moreover, emissions of NH<sub>3</sub> and particulate matter (PM<sub>2.5</sub>) are already very close to their respective 2020 targets. NO<sub>x</sub> is the only pollutant for which a slightly more significant reduction (of 9%) is



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required by the EU as a whole in order to meet the 2020 commitment.

On top of reporting past emissions, member states must also report projected emissions for future target years, in order to assess whether or not they are on track towards meeting their reduction commitments for 2020 and 2030. According to these projections, 18 countries are not on track to meet their reduction commitments set for 2020 for one or more of the five pollutants. And 22 countries are not on track for one or more of their 2030 commitments.

Following the new NEC Directive, member states have to produce and report by April 2019 national air pollution control programmes (NAPCP) that set out the additional emission abatement measures needed to achieve their future emission reduction commitments.

Christer Ågren

Source: EAA Briefing on the NEC Directive, 3 July 2017. Link: <https://www.eea.europa.eu/themes/air/national-emission-ceilings/nec-directive-reporting-status>

Note: More detailed emission data are published by the EEA in the report "European Union emission inventory report 1990–2015 under the UNECE Convention on Long-range Transboundary Air Pollution (LRTAP)", EEA Report No. 9/2017, which is available at: <https://www.eea.europa.eu/publications/annual-eu-emissions-inventory-report>

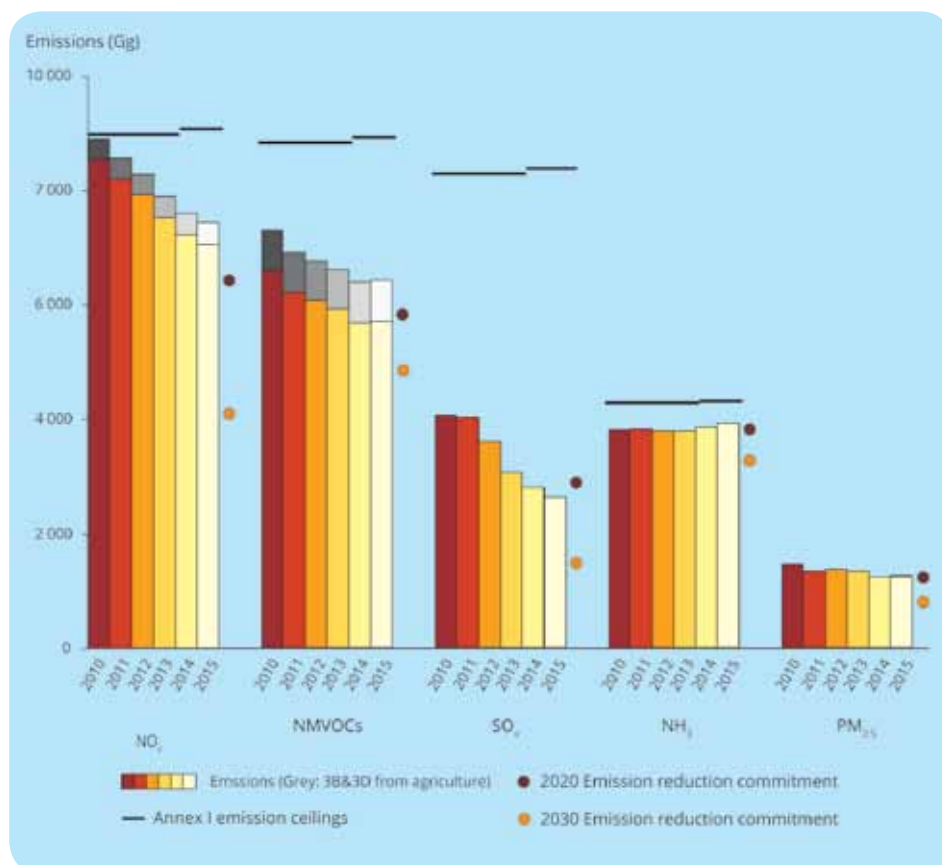
Table: EU member state progress in meeting 2010 NEC directive emission ceilings and 2020/2030 reduction commitments.

Member state	NOx									NMVOCs									SO <sub>2</sub>									NH <sub>3</sub>									PM <sub>2.5</sub>	
	2010	2011	2012	2013	2014	2015	2020	2030	2010	2011	2012	2013	2014	2015	2020	2030	2010	2011	2012	2013	2014	2015	2020	2030	2010	2011	2012	2013	2014	2015	2020	2030	2020	2030				
Austria	X	X	X	X	X	X	✓	X	✓	✓	✓	✓	✓	✓	X	X	✓	✓	✓	✓	✓	✓	✓	✓	X	X	X	X	X	X	X	X	✓	X				
Belgium	X	X	X	X	X	X	✓	X	X	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	✓	✓				
Bulgaria	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	X	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	X				
Croatia					✓	✓	✓	✓						✓	✓	✓	✓					✓	✓	✓	✓				✓	✓	✓	✓	✓	✓				
Cyprus	✓	✓	✓	✓	✓	✓	X	X	✓	✓	✓	✓	✓	✓	X	X	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
Czech Rep.	✓	✓	✓	✓	✓	✓	✓	X	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	✓	✓	✓	✓	✓	✓	X	X	✓	✓			
Denmark	X	X	X	✓	✓	✓	✓	✓	X	X	X	X	X	X	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	X	X	X	X	X	X	X	X	✓	X			
Estonia	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	✓	✓	✓	✓	✓	✓	X	X	✓	✓				
Finland	X	X	✓	✓	✓	✓	X	✓	✓	✓	✓	✓	✓	✓	✓	X	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	X	X	X	X	X	X	✓	✓				
France	X	X	X	X	X	X			✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓							
Germany	X	X	X	X	X	X	✓	X	X	X	X	X	X	X	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	X	X	X	X	X	X	X	X	✓	X				
Greece																																						
Hungary	✓	✓	✓	✓	✓	✓			X	X	X	X	✓	X			✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓							
Ireland	X	X	X	X	X	X	✓	X	X	X	X	X	X	X	X	X	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	X	✓	✓			
Italy	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	X	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	✓	X			
Latvia	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓							
Lithuania	✓	✓	✓	✓	✓	✓	X	X	✓	✓	✓	✓	✓	✓	X	X	✓	✓	✓	✓	✓	✓	X	X	✓	✓	✓	✓	✓	✓	✓	X	X	X	X			
Luxembourg	X	X	X	X	X	X	X	X	✓	✓	X	X	✓	X	X	X	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	X	X	X			
Malta	X	✓	X	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓							
Netherlands	X	X	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	X	X	✓	✓	✓	✓	✓	✓	✓	✓	✓			
Poland	✓	✓	✓	✓	✓	✓	✓	X	✓	✓	✓	✓	✓	✓	X	X	✓	✓	✓	✓	✓	✓	✓	X	✓	✓	✓	✓	✓	✓	✓	✓	X	✓	X			
Portugal	✓	✓	✓	✓	✓	✓	✓	✓	X	✓	✓	✓	✓	✓	✓	X	✓	✓	✓	✓	✓	✓	✓	X	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X			
Romania	✓	✓	✓	✓	✓	✓	✓	X	✓	✓	✓	✓	✓	✓	✓	X	✓	✓	✓	✓	✓	✓	✓	X	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X			
Slovakia	✓	✓	✓	✓	✓	✓	X	X	✓	✓	✓	✓	✓	✓	✓	X	✓	✓	✓	✓	✓	✓	✓	X	✓	✓	✓	✓	✓	✓	✓	✓		X	X			
Slovenia	X	X	X	✓	✓	✓	X	X	✓	✓	✓	✓	✓	✓	✓	X	✓	✓	✓	✓	✓	✓	✓	X	X	✓	✓	✓	✓	✓	✓	✓	✓	✓	X			
Spain	X	X	X	✓	✓	✓	✓	X	✓	✓	✓	✓	✓	✓	✓	X	✓	✓	✓	✓	✓	✓	✓	✓	X	X	X	X	X	X	X	X	✓	✓				
Sweden	X	✓	✓	✓	✓	✓	✓	X	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	X	X	X	X	X	X	X	✓	✓				
UK	✓	✓	✓	✓	✓	✓	X	X	✓	✓	✓	✓	✓	✓	✓	X	✓	✓	✓	✓	✓	✓	✓	X	✓	✓	✓	✓	✓	✓	✓	X	X	X	X			
✓	13	15	16	20	21	21	16	8	20	22	21	21	24	22	15	7	26	26	26	26	27	27	22	11	18	19	20	20	21	21	11	7	18	9				
X	13	11	10	6	6	6	7	15	6	4	5	5	3	5	8	16	0	0	0	0	0	0	1	12	8	7	6	6	6	6	12	16	5	14				

Notes: '✓' indicates that the emission ceiling or reduction commitment has been, or is anticipated to be, attained. 'X' indicates that the ceiling or reduction commitment has not been, or is not anticipated to be, attained. Greece did not report data in 2017. The 2020 and 2030 columns represent projections calculated by member states on the basis of adopted policies and measures currently in place.

Figure: EU progress in meeting the 2010 emission ceilings and the 2020/2030 reduction commitments for the EU as a whole.

Notes: Croatia joined the EU in mid-2013; therefore, for the years 2010-2013 emissions and ceilings are not considered for this country. Greece did not report data in 2017; therefore, the aggregated EU emissions are incomplete. The distance to ceilings was calculated based on unadjusted emissions. For assessing future attainment with the 2020 and 2030 reduction commitments, NO<sub>x</sub> and NMVOC emissions from two main agricultural activities, manure management (3B) and agricultural soils (3D) are not considered. The magnitude of these emission sources is indicated by the top part of the NO<sub>x</sub> and NMVOCs columns. Thus only the lower part of the NO<sub>x</sub> and NMVOCs columns should be considered for comparing with the 2020 and 2030 reduction commitments.



# Below 1.5°C the only hope for coral reefs

**The Guardian reports** that UNESCO has concluded that the only hope for coral reefs is to keep global temperature increases below 1.5°C. Countries with responsibility over world heritage-listed coral reefs should adopt ambitious climate change targets, aiming to cut greenhouse gas emissions to levels that would keep global temperature increases to just 1.5°C, the UN agency responsible for overseeing world heritage sites has said.

At a meeting of Unesco's world heritage committee in July 2017 a decision was adopted that clarified and strengthened the responsibility of countries that have

custodianship over world heritage-listed coral reefs. Until now, most countries have interpreted their responsibility over such reefs as implying they need to protect them from local threats such as water pollution and overfishing. But between 2014 and 2017, reefs in every major reef region bleached, with much of the coral dying, in the worst global bleaching event in recorded history. Over those three years, 21 of the 29 listed sites suffered severe or repeated heat stress.

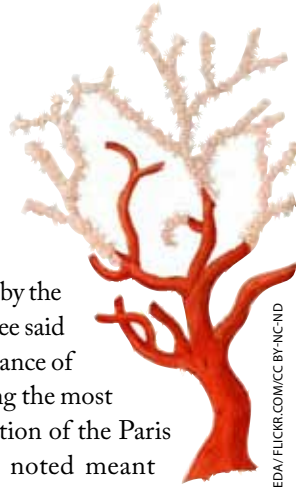
Last June, Unesco published the first global assessment of climate change's impacts on world heritage-listed reefs and it concluded that local efforts were "no longer sufficient" – stating that the only hope was to keep global temperature increases below 1.5°C. The new decision builds on that assessment, clarifying

the responsibility of countries with custodianship over world heritage-listed coral reefs.

The decision adopted by the world heritage committee said it "reiterates the importance of state parties undertaking the most ambitious implementation of the Paris agreement", which it noted meant pursuing efforts to limit global average temperature increase to 1.5°C above pre-industrial levels.

<https://www.theguardian.com/environment/2017/jul/11/countries-with-coral-reefs-must-do-more-on-climate-change-unesco>

<https://www.theguardian.com/environment/2017/jun/24/paris-agreements-15c-target-only-way-to-save-coral-reefs-unesco-says>



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# Climate change will force mass migration

**Asia Pacific** is the most vulnerable region to climate change, Bangladesh is the country most at risk, and poor people are to be hit the hardest, prompting migration on a massive scale, a sobering report by the Asian Development Bank has found according to Eco-Business and other newspapers.

Massive migration is foreseen all over the world by the end of the century, with

the Asia-Pacific region identified as the most vulnerable if the current climate change scenario does not improve.

"Migration is happening all the time, but with unabated global warming ... we'll have to move over a billion [people]," said Professor Hans Joachim Schellnhuber, director of climate science research at the Potsdam Institute for Climate Impact Research (PIK) in a press conference last July.

The Asian Development Bank (ADB) and the PIK released a joint report called "A Region at Risk: the Human Dimensions of Climate Change in Asia and the Pacific", which showed that the region faces severe consequences for the environment, economy and human living conditions as a result of climate change.

<http://www.eco-business.com/news/climate-change-will-force-mass-migration-of-1-billion-by-2100/>

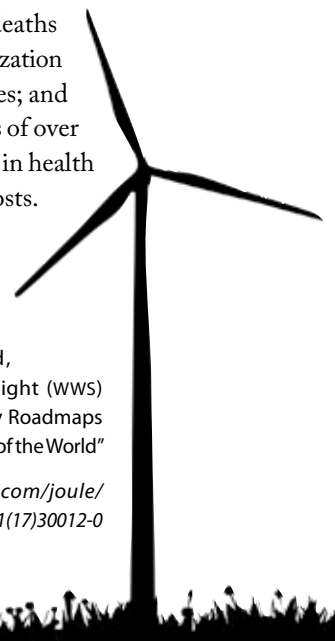
<https://www.adb.org/sites/default/files/publication/325251/region-risk-climate-change.pdf>

## 139 countries could be powered by renewables

The roadmap to a 100 percent renewable energy future has been set by scientists from Stanford University and the University of California, Berkeley, and is the most specific global vision yet. The study outlines infrastructure changes that 139 countries can make to become entirely powered by wind, water, and sunlight by 2050 after electrification of all energy sectors. Such a transition could mean less worldwide energy consumption due to the efficiency of clean, renewable electricity; a net increase of over 24 million long-term jobs; an annual decrease in 4-7 million air pollution deaths per year; stabilization of energy prices; and annual savings of over US\$20 trillion in health and climate costs.

Joule, Jacobson et al.: "100% Clean and Renewable Wind, Water, and Sunlight (WWS) All Sector Energy Roadmaps for 139 Countries of the World"

[http://www.cell.com/joule/fulltext/S2542-4351\(17\)30012-0](http://www.cell.com/joule/fulltext/S2542-4351(17)30012-0)



ASIAN DEVELOPMENT BANK / FLICKR.COM/CC BY-NC-ND



# Climate law adopted in Sweden

Sweden has decided on a Climate Framework, which requires the government to work towards climate targets and report annually to parliament. One target is climate neutrality by 2045, and “negative emissions” after that.

On June 15, 2017, the Swedish parliament made several decisions on climate policy.

The Climate Act requires the government to present a climate report in its budget bill, each October, and an action plan every four years in accordance with the various climate targets.

Hopefully, this will maintain focus on climate policy, and embarrass governments whose policy does not follow the dotted line towards the targets and timetables.

One target is that by 2030, non-ETS emissions will be at least 63 per cent lower than emissions in 1990, at least 75 per cent lower by 2040, and zero by 2045.

“Supplementary measures” are permitted, such as increased uptake of carbon dioxide by forests or by investing in various climate projects abroad. But they are limited to a maximum of 8 percentage points by 2030 and 2 percentage points by 2040.

There is a specific goal for domestic transport (except aviation, which is covered by ETS). Emissions will have to be reduced by at least 70 per cent by 2030 compared to 2010.

The transport target sounds demanding, but emissions dropped from 19 Mton of CO<sub>2</sub>e in 2010 to 16 Mton in 2016, due to a combination of rapidly increasing biofuels and improved vehicle efficiency (from a very low starting point). So the target is not unreachable if there is a rapid uptake of electric cars (or hydrogen cars). Some measures will soon be implemented, such as fuel quotas for forcing in more biofuels and the bonus-malus vehicle taxation system, which rewards efficient cars and punishes gas guzzlers.

One reason to believe that the climate law, and associated targets, really binds the government to the mast is that all major parties are behind it, except a right-wing populist party, the Sweden Democrats.

This means that whatever government emerges from the election due by September 2018, it will be held responsible for delivering a climate policy that does not deviate far from the dotted line to 2030.

The first four-year Action Plan will

be submitted to parliament in 2019 and will contain the following elements:

- Emission data since latest inventory (which seems to mean quarterly or monthly data)
- Prognosis of emission reductions
- Results of previous measures to reduce emissions
- Planned measures for emission reductions, with a timetable
- Estimates of results of decided and planned measures and how they can contribute to target achievement
- An assessment of additional policy measure options to achieve goals (global and national)

**The law is specific.** It will be hard for a government to come to Parliament without a plan.

One flaw is that targets leave out emissions under the ETS, as if the emissions in this sector are either a solved problem or outside national control.

ETS emissions in Sweden were 19.7 Mton CO<sub>2</sub> out of an estimated total GHG emission of 53.6 Mtons of CO<sub>2</sub>e, or 37 per cent of the total.

It is however not true that this sector is a no-go area for politics. The power and heat sectors, and the paper and pulp industry, have been largely decarbonised thanks to several national and local policy measures before and after the ETS was introduced. One of them is the green certificate system, which has paved the way for a lot of bio-CHP and wind power. Several energy-saving programmes have involved ETS industries. And in August 2017 the government announced the Industrial Climate Leap, which will spend 30 million euros per year between 2018 and 2040 on feasibility studies and



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The new legislation will ensure that Swedish governments stay on track with the climate targets.

investments in carbon-intensive industries such as steel, cement and refineries.

Obviously promises for spending in the 2030s cannot be taken at face value. But at least there is a plan B if ETS does not work.

Sweden had more nuclear power per capita than any other nation in 2016, but nuclear is not seen as a part of the climate solution. It is not even mentioned in the 66-page Climate Framework bill. There is severe disagreement on nuclear power in Swedish politics, but by 2020, at most 6 of the original 12 reactors will be operative.

Fredrik Lundberg

# Dirty diesel also worse for the climate than petrol cars

Whilst EU regulations create an uneven playing field for diesel, fuel and vehicle taxes set at a member state level incentivise their purchase.

**Two years after** the Dieselgate scandal exposed the dirty nature of diesel cars, a new study by Transport & Environment (T&E) shows that diesel cars not only pollute the air but also emit more climate-change emissions (CO<sub>2</sub>) than petrol cars. A lifecycle analysis of vehicle emissions proves that over their lifetime diesel cars emit 3.65 tonnes of CO<sub>2</sub> more than a petrol equivalent. Diesel's higher climate impact is due to more energy being needed to refine diesel fuel; more materials required for the production of heavier and more complex engines; higher emissions from the biodiesel blended in the diesel fuel; and higher mileage because fuel is cheaper – see infographics below.

The study debunks carmakers' claim that diesel cars are needed to meet their climate targets. A glance at carmakers' marketing brochures and websites demonstrates that the difference between comparable diesel and petrol engines is negligible: from zero to a few grams of CO<sub>2</sub>. But diesel cars typically cost €2,000–3,000 more than petrol ones. Currently available alternatives such as petrol hybrid vehicles are priced similarly to diesel but emit around 20–25 per cent less CO<sub>2</sub>.

Julia Poliscanova, clean vehicles manager, said: "Dieselgate already exposed diesel

cars to be the dominant cause of toxic nitrogen dioxide across European cities that is killing 68,000 Europeans annually. Contrary to industry claims, we have learned diesel cars are also worse for the climate than petrol versions and are not needed to meet car CO<sub>2</sub> targets, Europe must now look forward and accelerate the transition to clean, electrified vehicles and consign dirty diesels to museums."

In the EU, the car market is skewed in favour of diesels through biased regulations and unfair taxes. Whereas the diesel share in the EU is around 50 per cent, it is a niche product in the rest of the world. The EU buys 7 out of 10 diesel cars and vans sold globally, while less than one per cent of new vehicles sold in the US are diesel, and in China, the world's largest vehicle market, diesel represents less than two per cent.

The study finds three causes for the EU's addiction to diesel:

1. Distorted national fuel and vehicle taxes. Diesel fuel is taxed between

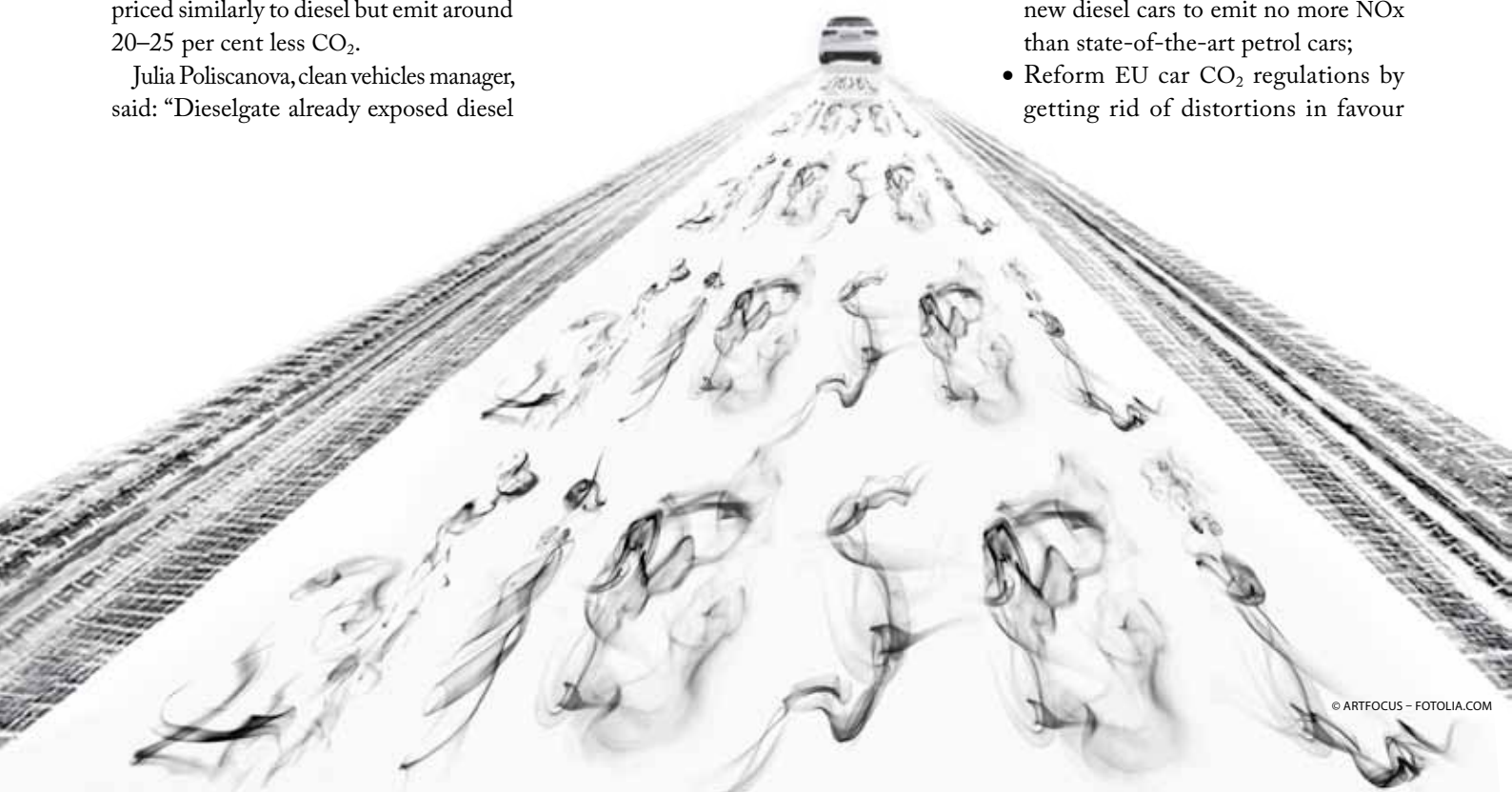
10 and 40 per cent less than petrol in most countries. This "diesel bonus" cost national budgets almost €32 billion in lost tax revenue in 2016 alone.

2. Unfair EU Euro emission standards that for decades allowed diesel cars to emit more NOx than petrol. This has been exacerbated by the use of obsolete tests (recently updated) and ineffective regulatory oversight that has allowed carmakers to fit cheap, ineffective exhaust controls that they turn down or off most of the time.

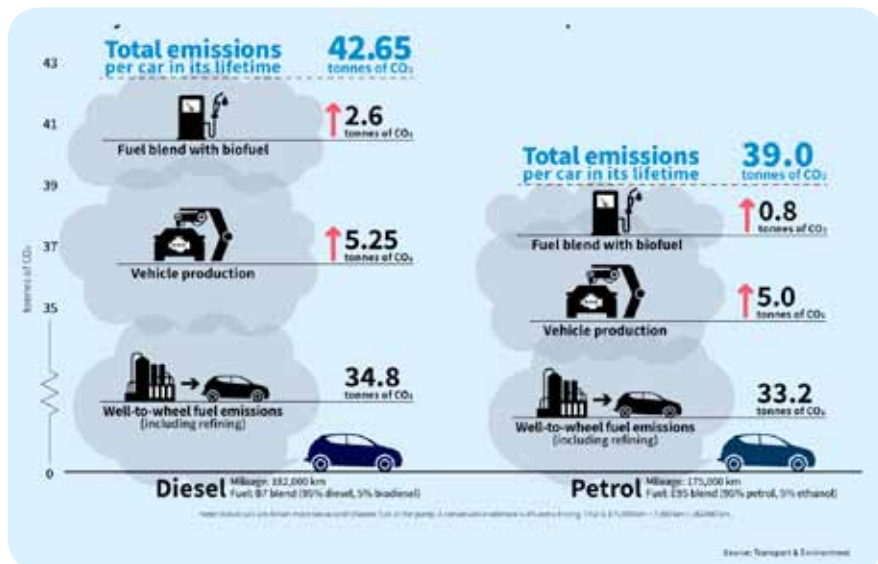
3. Biased CO<sub>2</sub> regulations that set weaker targets for carmakers that produce bigger and heavier diesel vehicles.

From an environmental perspective there is no justification to continue the preferential treatment diesel currently enjoys that has created the bloated EU diesel market, and now is the time to support and incentivise the shift to clean electric solutions. To create fair competition between technologies, EU policy needs to:

- End biased vehicle emissions standards and propose a technology-neutral Euro 7 emission standard that would allow new diesel cars to emit no more NOx than state-of-the-art petrol cars;
- Reform EU car CO<sub>2</sub> regulations by getting rid of distortions in favour







Lifecycle CO<sub>2</sub> emissions from diesel and petrol cars.

of heavier diesels, including accounting for vehicle km and introducing a zero-emission vehicles sales target to incentivise industry to increase the supply of electric vehicles and market them effectively;

- Remove the diesel bonus and other biases in national tax regimes, and introduce fair fuel and vehicle taxes based on real-world CO<sub>2</sub> emissions with an air quality increment.

Moreover, in response to the Dieseltgate crisis, regulators must ensure there is a harmonised and effective approach to clean up 37 million dirty diesel cars and vans already on the road that is offered to all consumers EU-wide, and cities must put in place effective vehicle circulation restrictions when air pollution is above the recommended limits and ensure future low-emission zones are designed based on vehicles' real-world performance.

Julia Poliscanova concluded: "The legacy of Dieseltgate are the 37 million grossly polluting diesel cars still on Europe's roads. While some of them will be taken off German roads, these dirty cars will soon end up in Central and Eastern Europe choking citizens there. We need concerted and coordinated action EU-wide to ensure these cars stop belching toxic fumes for another 10–15 years. It is time for the carmakers to take responsibility for their clean up and cash out for the local measures to tackle the urban air pollution crisis they have largely caused. National vehicle regulators must ensure this happens or the European Commission step in and sort out the mess."

Source: T&E press release and study "Diesel – The true (dirty) story", 18 September 2017. Link: <https://www.transportenvironment.org/press/dirty-diesel-also-worse-climate-petrol-cars-study>

## Real-world diesel car emissions

A new study has compared official laboratory-test and on-road nitrogen oxides (NO<sub>x</sub>) and carbon dioxide (CO<sub>2</sub>) emissions for 541 Euro 5 and Euro 6 diesel passenger cars, representing 145 of the most popular European models.

For the Euro 5 diesel cars tested, the actual NO<sub>x</sub> emissions were on average more than four times the legal limit of 180 mg/km and for Euro 6 cars, the average emission level was 4.5 times the legal limit of 80 mg/km. The difference between individual vehicle models is particularly remarkable, with some Euro 6 diesel cars emitting less NO<sub>x</sub> than the limit, while others exceed the regulatory limit by a factor of 12. Only 10 per cent of tested Euro 6 vehicles would meet the Euro 6 limits on the road.

Looking at CO<sub>2</sub> performance, the average divergence for both Euro 5 and Euro 6 cars was approximately 30 per cent. The discrepancy among newer vehicles was even higher, with 2015 cars on average emitting 40 per cent more CO<sub>2</sub> and consuming 40 per cent more fuel than advertised.

Source: ICCT, 3 September 2017. <http://www.theicct.org/road-tested-sep2017>



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Nine out of ten Euro 6 models exceeded the emissions limits on the road.

## Current air quality standards do not protect the public

A nationwide US study of more than 60 million senior citizens linked long-term exposure to two main smog pollutants – ozone (O<sub>3</sub>) and fine particulate matter (PM<sub>2.5</sub>) – to an increased risk of premature death. The analysis found no sign of a "safe" level of pollution, below which the risk of dying early tapered off.

Harvard University scientists who conducted the study calculated that reducing fine particle pollution by 1 microgram per cubic metre (µg/m<sup>3</sup>) nationwide would

save about 12,000 lives each year. Another 1,900 lives would be saved annually by lowering ozone pollution by 1 part per billion (ppb), they found.

For PM<sub>2.5</sub>, which has a legal limit of 12 µg/m<sup>3</sup>, they found that seniors faced an increased risk of premature death when exposed to as little as 5 µg/m<sup>3</sup>, the lowest amount they measured. For ozone, which has a limit of 70 ppb, they detected increased mortality at levels as low as 30 ppb, also the smallest concentration they measured.

The findings suggest that even though federal limits on the nation's most widespread air pollutants are updated periodically based on scientific reviews required under the Clean Air Act, they are not strict enough to fully protect the public.

Source: LA Times, 28 June 2017

The article "Air pollution and mortality in the medicare population". New England Journal of Medicine, June 2017. DOI: 10.1056/NEJMoa1702747

# Huge benefits from ending subsidies to fossil fuel

**Fossil fuel subsidies support an industry that causes premature deaths and ill-health worldwide – the health costs associated with fossil fuel use are more than sixfold the subsidies.**

**Despite the fact** that burning fossil fuels causes deadly air pollution and climate change, governments spend huge amounts of taxpayers' money on supporting the oil, gas and coal industry.

Back in 2009, the G20 group of major economies committed to phasing out fossil fuel subsidies, but failed to set a deadline. A new study by the Health and Environment Alliance (HEAL) now reveals that on average, in G20 countries, the health costs associated with emissions from fossil fuels are over six times higher than the subsidies. In 2014, the figures were €2,600 billion vs €416 billion.

In the preface of the report, Dr Gro Harlem Brundtland concludes that: "The true cost of fossil fuel powered energy remains hidden by artificially low prices that do not take into account the environmental and health costs these fuels cause. All of us pay twice for fossil fuel subsidies – once when scarce public funds are used to subsidise fossil fuel energy and secondly when society deals with the health costs associated with burning fossil fuels. Ultimately fossil fuel subsidies pay the polluter instead of making the polluter pay."

Air pollution from mostly fossil fuel combustion contributes to the premature deaths of an estimated 6.5 million people worldwide every year because of respiratory tract infections, strokes, heart attacks, lung cancer and chronic lung disease. The resulting health costs are not carried by the industry but paid by society.

The report examines the costs of the health impacts that arise from fossil fuel subsidies in a number of selected countries: China, Germany, India, Poland, South Africa, Turkey and the UK, as these are seven economically powerful countries which continue to subsidise fossil fuels, despite all of them suffering high costs from air pollution. For example, in Germany a quarter of premature deaths caused by air pollution could be prevented if fossil fuel subsidies were eliminated and corrective taxes implemented. That figure rises to 41 per cent in the UK, 51 per cent in Poland and 74 per cent in Turkey.

In China, fossil fuels cause a staggering 1,790 billion USD in health costs from air pollution, more than 18 times what the nation hands out to oil, gas and coal producers, helping to fuel a public health crisis that is already causing 1.6 million premature

deaths every year.

HEAL calls on policy-makers to phase out fossil fuel subsidies at the latest by 2020 for developed nations and by 2025 for low-income economies, to decrease premature deaths, poor health and climate chaos, and pave the way for renewable, clean energy choices and their multiple health benefits.

The organisation also provides recommendations as to how the funds could be re-allocated to boost health in the report's seven spotlighted countries. For example, in Germany, the €5.1 billion of fossil fuel subsidies represent taxpayer money that is sufficient to provide more than 300,000 households with a solar installation, powering their homes with clean energy, as well as to fund the transition for all of Germany's 15,000 coal power plant workers for the coming five years. In countries such as Turkey and Poland, fossil fuel subsidies represent valuable public funds that could greatly strengthen the countries' health systems.

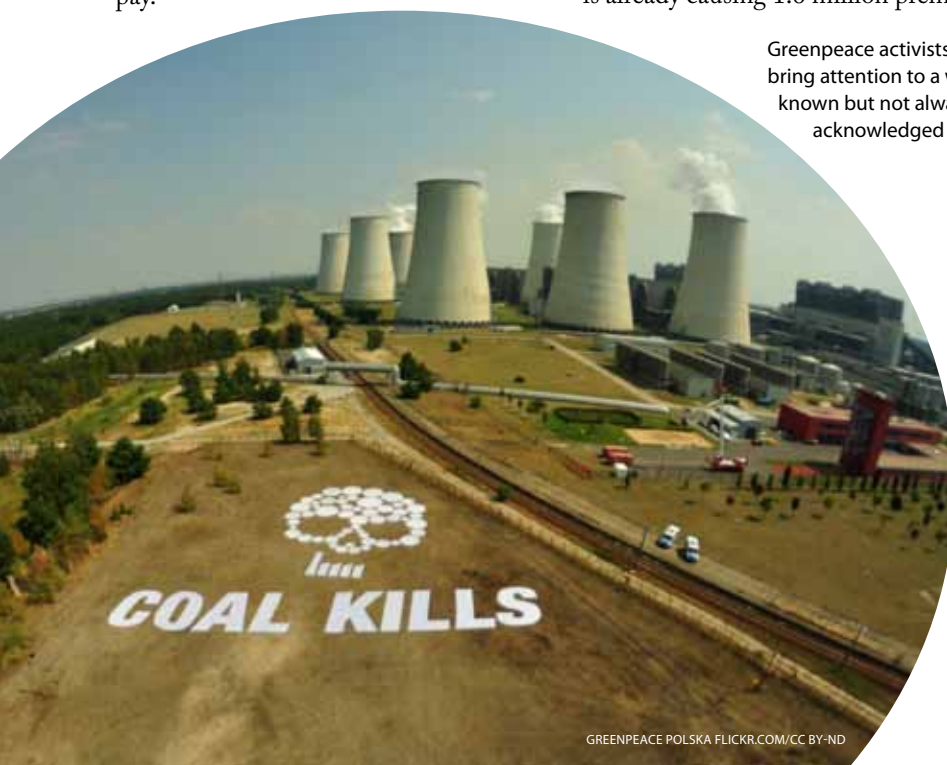
Genon K. Jensen, HEAL's Executive Director said: "European and global leaders continue to pledge to tackle climate change and decarbonise our economy. However, they still give out billions of euros and dollars which lead to global warming and fuel early death and ill-health including heart and lung disease. It is time to seize the opportunity to improve the health of millions of people worldwide by abandoning subsidies to the deadly fossil fuel industry. They should walk the talk and end fossil fuel subsidies now."

Christer Ågren

The report: "Hidden price tags: How ending fossil fuel subsidies would benefit our health."

Link: [http://env-health.org/IMG/pdf/healthandenvironmentalliance\\_hidden\\_price\\_tags\\_report.pdf](http://env-health.org/IMG/pdf/healthandenvironmentalliance_hidden_price_tags_report.pdf)

Greenpeace activists bring attention to a well-known but not always acknowledged fact.







# Ozone causes one million premature deaths

**Because ozone is transported over long distances, action to reduce ozone precursor pollutants is needed at local, national, regional and global scales**

**According to** a new study by the Stockholm Environment Institute (SEI), long-term exposure to ozone air pollution contributed to about one million premature respiratory deaths globally – or approximately one in five of all respiratory deaths in 2010. This figure is more than twice as high as previous estimates of the global health impacts of ozone.

Findings from the study were based on results from a recent US analysis of the association of long-term ozone exposure and respiratory mortality in 670,000 adults, which is a substantially larger number of included study participants and observed deaths than an earlier estimate published in 2009, on which previous global ozone health impact calculations have been based.

The largest contribution to global ozone-attributable respiratory deaths was from Asia, which accounted for about 79 per cent of the total. India accounted for about 400,000, and China for about another 270,000. Africa, Europe and North America each had between 50,000 and

60,000 ozone-attributable deaths, with fewer in Latin America and Oceania.

“There is a degree of uncertainty in these estimates because the concentration-response function we used is based on analysis from the United States,” said Chris Malley, lead author of the study and SEI researcher at the University of York. “We don’t know whether the relationship is the same in other regions, such as in India and China, where the prevalence of other risk factors for respiratory diseases varies considerably. We also estimated people’s ozone exposure using a global atmospheric chemistry transport model, which means that we could not account for differences in ozone exposure at small geographic scales.”

Ozone is not directly emitted but is formed in the atmosphere from emissions of pollutants like nitrogen oxides (from vehicles and other types of combustion), volatile organic compounds (from solvent use and fuel combustion), and methane (from agriculture, waste treatment, and

fossil fuel extraction and distribution). Once formed, ozone can stay in the atmosphere for a few weeks and travel long distances from the emission sources, across countries and continents.

“To reduce ozone pollution, you need to control emissions of different precursors from many different sources,” SEI’s Policy Director Johan C.I. Kuylenstierna, co-author of the study said. “This includes emissions from road transport, household energy use, as well as methane emissions from agriculture.”

“It is important to realize that action needs to be taken on all the major sources,” Kuylenstierna added. “The long-range transport of ozone means that to reduce ozone, action is needed on local, national, regional and global scales. That means that regional cooperation often is needed to solve the problem.”

Source: SEI press release 28 August 2017. Link: <https://www.sei-international.org/-news-archive/3748>

# Fossil gas must be phased out along with coal

The report by the research organisation Climate Action Tracker (CAT) contradicts projections that forecast an increase in natural gas consumption and criticises the fact “that governments and companies are staking significant investments in natural gas infrastructure on them, ignoring the increasing role of low-carbon alternatives, and the need to reduce emissions to combat climate change”.

“One example is China, where in 2016 the IEA projected renewables would rise to 7.2% of the power supply by 2020—but by the end of 2016 they had already reached 8%. Additionally, India and the Middle East are also seeing renewables rising



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much faster than mainstream projections,” says Niklas Höhne from the NewClimate Institute.

“Natural gas is often perceived as a ‘clean’ source of energy that complements variable renewable technologies. However, there are persistent issues with fugitive emissions during gas extraction and transport that show that gas is not as ‘clean’ as often thought,” according to Bill Hare of Climate Analytics. “Natural gas will disappear from the power sector in a Paris Agreement-compatible world, where emissions need to be around zero by mid-century.”

The report analysis states that “despite these developments, massive invest-

ments into LNG pipelines and terminals continue, even as the utilisation rates of such infrastructure are decreasing. For example, utilisation rates in US natural gas infrastructure are at 54%, and are even lower in Europe at 25%”.

“This overinvestment in natural gas infrastructure is likely to lead to either emissions overshooting the Paris Agreement’s 1.5°C and 2°C goals – or a large number of stranded assets as the shift to cheaper renewables takes place,” concludes Andrzej Ancygier of Climate Analytics.

Compiled by Reinhold Pape

The report, titled “Foot off the gas: increased reliance on natural gas in the power sector risks an emissions lock-in” can be downloaded at: [http://climateactiontracker.org/assets/publications/briefing\\_papers/CAT-2017-06-16-DecarbonisationSeries-NaturalGas.pdf](http://climateactiontracker.org/assets/publications/briefing_papers/CAT-2017-06-16-DecarbonisationSeries-NaturalGas.pdf)

## Who owns the world’s coal?

Phasing out the use of coal for power has been singled out as a vital step to meet the Paris Agreement – to date, over US\$5 trillion of assets under management (AUM) has been committed to divest from coal under the banner of the global divestment movement.

A new study analyses in detail the ownership chains of the world’s thermal coal. It tracks the links between the coal reserves (the mines), the operating coal companies and the shareholders who own these companies. It shows roughly US\$185 billion in shareholder value associated with 117 listed thermal coal producers/owners – including widely held

shares such as BHP Billiton, Glencore and Berkshire Hathaway.

The report breaks down trends in ownership: divestment and pension funds, and coal-heavy investors. Over 500 investors have made pledges to divest from coal over the last decade. The study also looks at some of the largest pension funds that have made the most specific coal divestment statements and assesses their progress, finding good compliance with the coal-specific divestment statements from investors aggregating US\$1.4 trillion AUM.

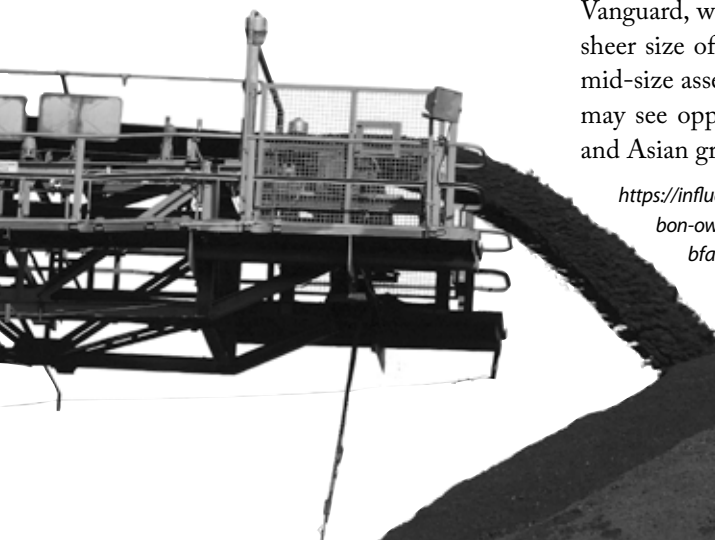
The remaining shareholders of thermal coal fit in three categories: strategic investors from Asia; BlackRock and Vanguard, who own assets through the sheer size of their global holdings, and mid-size asset managers and funds that may see opportunity in US resurgence and Asian growth.

<https://influencemap.org/report/Clarifying-carbon-ownership-8cb210f5b6643c8e58037dbfaa28d7ae>

## Effects of coal mining in Bulgaria

For years Pernik, in southwestern Bulgaria, has topped the charts for the city with the highest air pollution in the EU. People suffer diseases and complain about the high levels of particulate matter in the atmosphere, but still continue to burn the cheap local “kyumyur” coal in winter. Bulgarian journalist Dimitar Sabev has investigated the impact of ill-regulated coal mining on life in Pernik. The city, famous for its metallurgy, suffocates in smoke while ghostly concessionaires trample the law and pocket millions, writes Sabev. Locals say that there are at least 300 colliery holes in the abandoned mines in the outskirts of the city.

Read the full story here: <http://www.novinite.com/articles/178396/Bulgaria's+Pernik%3A+Abandoned+by+the+State>





# Three years left to stop dangerous climate change

Former UN climate chief Christiana Figueres is one of the signatories, together with leading scientists, of a letter published in the science magazine “Nature” warning that the next three years will be crucial to stopping the worst effects of global warming.

**The authors claim** that the next three years will be crucial and have calculated that if emissions can be brought permanently lower by 2020 then the temperature thresholds leading to runaway irreversible climate change will not be breached.

Figueres, the executive secretary of the UN Framework Convention on Climate Change, under whom the Paris agreement was signed, said: “We stand at the doorway of being able to bend the emissions curve downwards by 2020, as science demands, in protection of the UN sustainable development goals, and in particular the eradication of extreme poverty. This monumental challenge coincides with an unprecedented openness to self-challenge on the part of sub-national governments inside the US, governments at all levels outside the US, and of the private sector in general. The opportunity given to us over the next three years is unique in history.”

The authors point to signs that the trend of upward emissions is being reversed, and to technological progress that promises

lower emissions for the future.

In the past three years, global emissions of carbon dioxide from the burning of fossil fuels have levelled after rising for decades. This is a sign that policies and investments in climate mitigation are starting to pay off and creating a foundation for permanently lowering emissions. Coal use is showing clear signs of decline in key regions, including China and India. Governments, despite Trump’s pronouncements, are forging ahead with plans to reduce greenhouse gases.

The authors set out six goals for 2020. These include increasing renewable energy to 30% of electricity use; plans from leading cities and states to decarbonise by 2050; 15% of new vehicles sold to be electric; and reforms to land use, agricul-

ture, heavy industry and the finance sector, to encourage green growth.

The year 2020 is crucially important for another reason, one that has more to do with physics than politics. When it comes to climate, timing is everything. According to a report prepared by Carbon Tracker in London, the Climate Action Tracker consortium, the Potsdam Institute for Climate Impact Research in Germany and Yale University in New Haven, Connecticut,

should emissions continue to rise beyond 2020, or even remain level, the temperature goals set in Paris become almost unattainable.

After roughly 1°C of global warming driven by human activity, ice sheets in Greenland and Antarctica are already losing mass at an increasing rate. Summer sea ice is disappearing in the

Arctic and coral reefs are dying from heat stress – entire ecosystems are starting to collapse. The social impacts of climate change from intensified heatwaves, droughts and sea-level rise are inexorable and affect the poorest and weakest first.

“There is a mean budget of around 600 gigatonnes carbon dioxide left to emit before the planet warms dangerously. At the current emission rate of 41 Gt of CO<sub>2</sub> per year, the lower limit of this range would be crossed in 4 years, and the midpoint of 600 Gt of CO<sub>2</sub> would be passed in 15 years”, the authors explain. “If the current rate of annual emissions stays at this level, we would have to drop them almost immediately to zero once we exhaust the budget. Such a ‘jump to distress’ is in no one’s interest. A more gradual descent would allow the global economy time to adapt smoothly. The good news is that it is still possible to meet the Paris temperature goals if emissions begin to fall by 2020 (see ‘Carbon crunch’ graphic)”, the authors conclude.

Compiled from Nature and the Guardian  
by Reinhold Pape

Source: Three years to safeguard our climate, Nature 28 June 2017, <https://www.nature.com/news/three-years-to-safeguard-our-climate-1.22201>



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Time is running out.

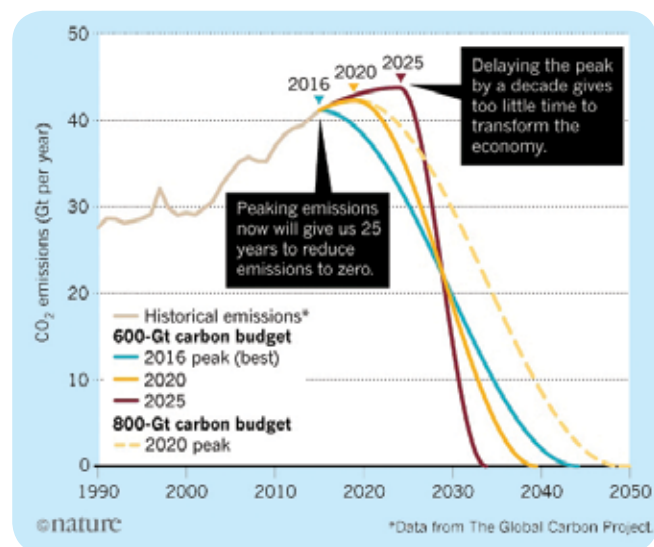


Figure: Carbon crunch. There is a mean budget of around 600 gigatonnes (Gt) of carbon dioxide left to emit before the planet warms dangerously, by more than 1.5-2°C. Stretching the budget to 800 Gt buys another 10 years, but at a greater risk of exceeding the temperature limit.

Sources: Stefan Rahmstorf/Global Carbon Project; <http://go.nature.com/2RCPCRU>

## New NOx deal in Norway

A new NOx Agreement between 15 business organisations and the Norwegian Ministry of Climate and Environment has been set up for the period 2018–2025. It is an extension of previous agreements, dating back to 2008. Companies that join the business organisations' NOx Fund are entitled to an exemption from paying a tax of NOK 21.59 (€2.3) per kg of NOx emitted. Instead most companies pay a much smaller fee of NOK 4 per kg NOx (€0.43) to the NOx Fund.

The NOx Fund grants support to cost-effective NOx-reducing measures such as the installation and operation of NOx catalysts (SCR) on ships, the shift to gas and electricity in shipping, and energy efficiency in the oil and gas industry. Through the agreement, companies are committing to jointly achieve agreed annual NOx emission reductions – in the new agreement these reductions are getting gradually stricter, reaching 16,000 tonnes per year in 2024–2025.

The NOx Fund: [www.nho.no/Prosjekter-og-programmer/NOx-fondet/The-NOx-fund/](http://www.nho.no/Prosjekter-og-programmer/NOx-fondet/The-NOx-fund/)

## Public consultation on MRV for shipping

EU regulation 757/2015 on monitoring, reporting and verification (MRV) of carbon dioxide emissions from maritime transport was adopted in 2015, and sets an EU-wide scheme for reporting monitored and verified data on shipping CO<sub>2</sub> emissions applying to activities carried out from January 2018.

As the International Maritime Organization (IMO) in July 2017 completed a new legal framework for a global data collection system (DCS) by adopting guidelines on data verification and database management, the European Commission is now considering alignment of the EU MRV with the IMO DCS by developing and presenting a legislative proposal to amend the EU MRV in 2018.

A stakeholder consultation is now open from 8 September to 1 December 2017, allowing parties to give their opinions on the effectiveness and potential impacts of such alignment.

Link: [https://ec.europa.eu/clima/consultations/articles/0032\\_en](https://ec.europa.eu/clima/consultations/articles/0032_en)

# Shipping can and must do more

**Greenhouse gas emissions from shipping could be cut by more than three-quarters with current technologies.**

In 2012, international shipping was responsible for emitting 938 million tonnes of carbon dioxide (CO<sub>2</sub>), corresponding to 2.6 per cent of global emissions. According to the third greenhouse gas study by the International Maritime Organisation (IMO), shipping activity could double or even triple by 2050 under business-as-usual scenarios. Consequently, greenhouse gas emissions from ships could increase by between 150 and 250 per cent by 2050, if no further action is taken in this area.

However, a new scientific review of around 150 studies reveals that major potential exists for shipping to cut its emissions, and that many of the measures available would actually save the industry money because of the fuel savings incurred.

Together, if implemented, these measures could increase efficiency and reduce the emissions by more than 75 per cent against a 2050 baseline scenario. In terms of emissions per freight unit transported, emissions could come down by a factor of 4–6.

The authors identified a whole range of measures, which they grouped under five main categories: Hull design; Power and propulsion; Alternative fuels; Alternative energy sources; and, Operation (see figure).

Hull design measures focus primarily on utilising economies of scale and reducing resistance during operation, while power



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and propulsion includes e.g. hybrid drivetrains.

The highest CO<sub>2</sub> reduction potential was found for the use of biofuels, but the authors point out that there are several issues around biofuels that need to be resolved, such as variations in CO<sub>2</sub>-reduction potential, the carbon neutrality assumption, and competition for scarce land resources.

While switching to LNG as a fuel could somewhat reduce CO<sub>2</sub> emissions, it would increase emissions of the potent greenhouse gas methane. Moreover, a one-sided focus on LNG – which is

a fossil fuel – risks lock-in of the sector into a high-carbon infrastructure.

Regarding alternative energy sources, the authors observe a high reduction potential for wind power but a low one for solar power. Shore-side electricity (cold ironing) has some potential, but it depends on how the electricity is produced. There is still little data available on fuel cells for power generation on-board ships.

Speed optimisation is classified as a measure that can achieve relatively high reductions in fuel consumption and emissions.

**The different measures** can be combined in many ways. One practical and

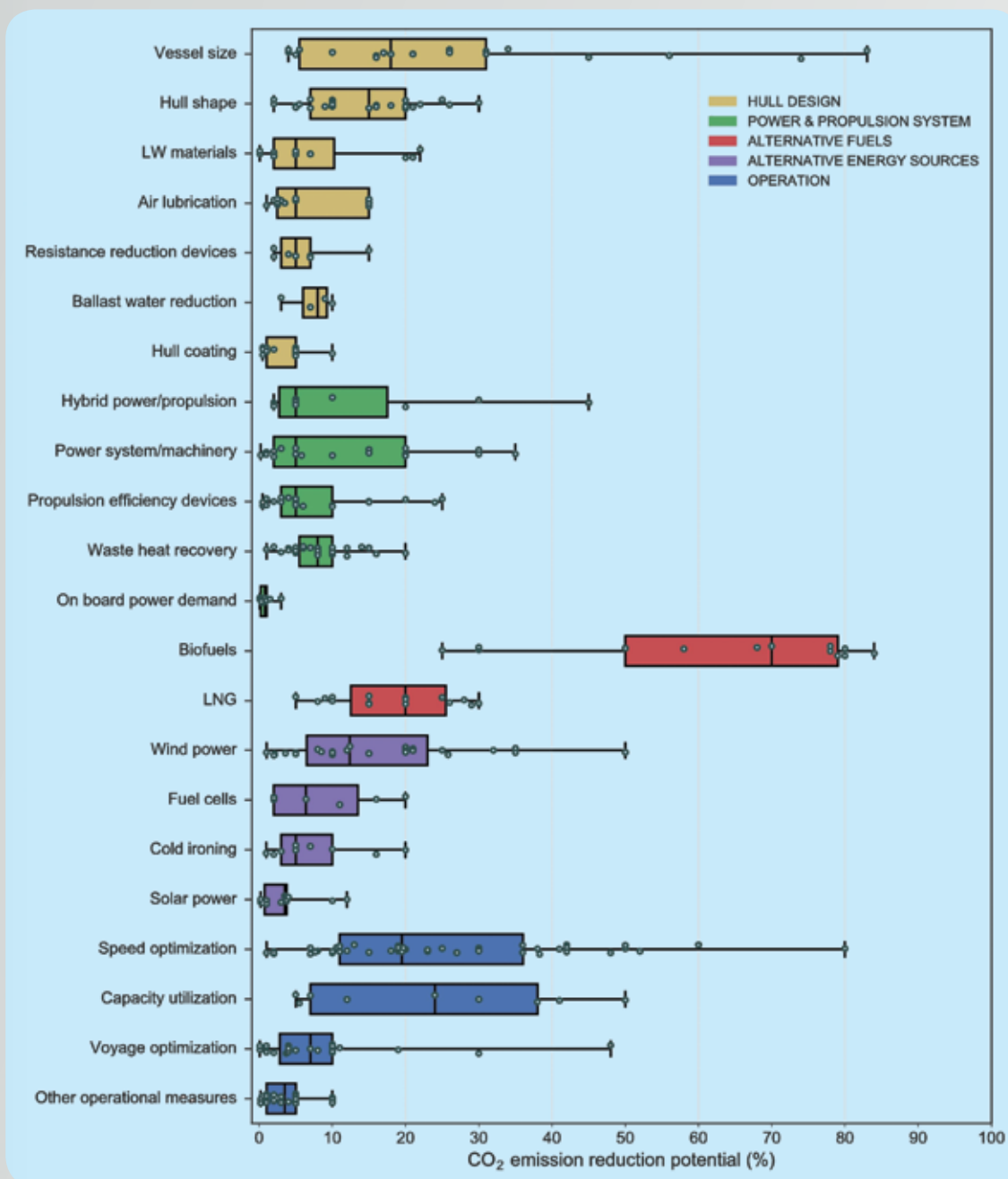


Figure: CO<sub>2</sub> emission reduction potential from individual measures, sorted into five main categories

economically feasible example is given in the study that would result in a 78 per cent emission reduction (using third-quartile reduction potential data). If biofuels are also included, the reduction potential increases to 85–96 per cent.

The authors conclude that there is potential for reducing ship emissions of CO<sub>2</sub> by 75–85 per cent, i.e. a factor of 4–6 per freight unit transported, with current technologies and based on third-quartile values. If median values are used instead, an emission reduction of 50–60 per cent is said to be more realistic.

The IMO has for many years been under pressure from the European Union and the UN Framework Convention on Climate

Change (FCCC) to come forward with concrete proposals to reduce the sector's greenhouse gas emissions. The issue will be discussed further at a meeting with the IMO's Marine Environment Protection Committee in April next year.

Christer Ågren

State-of-the-art technologies, measures and potential for reducing GHG emissions from shipping – a review. By Evert Bouman et al. Published in May 2017 in Transportation Research Part D. Link: <http://www.sciencedirect.com/science/article/pii/S1361920916307015>

# Lowered speed – less emissions

Research has shown that fleet-wide operational speed reductions can cut ship emissions of CO<sub>2</sub> and other harmful air pollutants by as much as 35 per cent.

In 1866 a fleet of clippers took part in the Great Tea Race, a competition to sail from China to London with the year's new tea crop. The result is contested to this day: the crews of Ariel and Taiping shared the prize after arriving at virtually the same time. They had covered 14,000 miles in 99 days.

These days shipping is considerably faster. A cargo from Shanghai takes around a month to reach Southampton, depending on its route and the number of ports it needs to stop at. The advent of vast and powerful ships together with the Suez and Panama canals, not to mention new Arctic routes opening as polar sea ice melts, means cargo loads by ship are getting faster and faster.

Yet as the shipping industry faces up to its biggest challenge yet, this obsession with speed needs to be tempered with environmental realism.

Shipping accounts for around three per cent of global greenhouse gas emissions, which is on a par with Germany. Continued failure to address the sector's rampant pollution could see its CO<sub>2</sub> footprint grow 20–120 per cent by 2050.

New logistics technologies such as blockchain, cleaner propulsion technologies like battery/hydrogen fuel cell hybrids, sails, Flettner rotors, better propellers and more efficient operation are ways in which the industry can start to meet this challenge.

But there's an additional and altogether faster – and easier – way it can take immediate action: slow down.

We've already seen how this works following the 2008 global financial crisis and ensuing slump in freight rates. To save money, container vessels in the range 12,000–14,500 TEU slowed on average to 16 knots in 2012 from a usual speed of 21 knots in 2007.

The results were dramatic. A 22 per cent cut in average sea speed resulted in a 49 per cent drop in required engine power, slashing energy use per day by a whopping

53 per cent. As a result, emissions from the sector in 2012 were considerably lower than in 2007.

This is no surprise; due to the high frictional resistance of water, the relationship between speed and required energy is cubic (or quadratic when you consider it takes longer to reach the destination at lower speed). The implications are simple: reduce sailing speed by 10 per cent and energy demand will slump by 27 per cent (or 19 per cent in quadratic function).

Research compiled by CE Delft illustrates how fleet-wide operational speed reduction can cut emissions of ship CO<sub>2</sub> and other harmful air pollutants by as much as 35 per cent. And given that this does not affect the installation of powerful engines (hence higher design speed), ships will still have enough reserve power to sail against the waves in adverse weather conditions.

**The ultimate benefit** of speed management is the potential to peak and reduce GHG emissions in the short term, in addition to delivering fuel savings for the shipping companies. As a result, the shift towards decarbonisation can take longer and be less burdensome within the available carbon budget, as more time will be available to test and deploy new technologies.

While the initial speed cuts have been voluntary, local authorities mindful of air pollution and their own carbon footprint have started to take affirmative action.

For instance, Los Angeles, San Diego

and Long Beach are among ports to have asked visiting ships to slow to 12–15 knots, depending on the vessel, as they approach the coastline. These practices need to be extended to whole journeys to avoid speeding up on the high seas to recover lost time.

Ship engines are designed for certain continuous operating loads, not only because of their optimal efficiency, but also because of safety and engine health considerations. Still, with nearly 10 years of slow steaming experience under their belts, and data aplenty, there seems little cause for major concern provided engineers take care of their ships.

Of more concern is the impact low oil prices are having on the sector, and the widespread practice of slow steaming. New evidence suggests owners are cranking up the speeds once again, which endangers the planet and the sector's impending UN climate goal – due to be agreed next April in London.

In the absence of a binding rule it's understandable that many captains will speed up: hands up who hasn't broken the speed limit on a motorway?

And it's not only a firm global rule we need, but also differentiations for various classes and maybe even specific routes that could accommodate concerns of countries at the end of long supply chains.

Tracking ship movements via satellite data makes recording speeds and ensuring compliance straightforward. The advent of blockchain makes verifying and recording this easy and trustworthy.

What the sector needs is predictable rules for everyone, and a pathway that allows it to make CO<sub>2</sub> cuts in an efficient and economic fashion. Should ships start speeding up that challenge becomes all the more difficult. Shipping needs to wise up, smell the roses and pay its fair share of the climate bill. Otherwise it will cost the Earth.

Faig Abbasov

Transport & Environment



Cut emissions with a simple move.





# Electric ferries – a revolution underway

Norway got its first battery-powered ferry two years ago. This has set a new benchmark for a sector that has previously been wholly dependent on fossil fuels.

**Norway has** a very long coastline, with countless fiords, sounds and islands. Today, the many stretches of water have to be crossed by a huge number of ferries. Up till recently these have been powered exclusively by marine diesel engines, with the exception of a small number of ferries running on liquefied natural gas – LNG. The first of these were introduced in 2000.

In February 2015, the battery-powered ferry “Ampere” was introduced at a ferry link in the county of Sogn and Fjordane in Western Norway. This is only the beginning. More than 50 car ferries with battery systems will be in active duty by 2020, according to the Norwegian State Highways Authority. A great number of contracts for new battery-operated ferries and conversion of old diesel ferries to battery operation have been signed. The government has put in place much stricter environmental regulations on new contracts for ferry services. Without these, the development would probably not have been so rapid.

In November 2014, The Norwegian Parliament asked the government to ensure that all future contracts for ferry services should require zero-emission and low-emission technologies as soon as the technology was available.

The many new and converted ferries are called electric ferries, but in reality they will be hybrids, with a combination of electric and diesel engines for propulsion. The diesel engine will only be used as a back-up, and will run on

bio-diesel. A hydrogen-electric ferry between Hjelmeland-Nesvik-Skipavik in the county of Rogaland will be Norway’s and the world’s first. This was announced by the transport minister Ketil Solvik Olsen on 13 July 2017.

**There are 138** ferry services in the data bank kept by the State Highway Authority. A report by DNV GE shows that if the 52 most important ferry services where electrified CO<sub>2</sub> emissions could be reduced by up to 40% compared to the present levels. The electrification of these ferry services would require investment in new electricity connections, but the amount of electricity needed for their operation would be negligible compared to Norway’s total generation. The report stipulates that the ferries should be able to fast-charge in five minutes at either ferry terminal.

Investment in new grid capacity to power the ferries could be a barrier. A battery bank in the harbour can store electricity from the grid and make rapid charging of the ferries possible without heavy investments in new power lines.

Another calculation made by the organisation Bellona has calculated that the CO<sub>2</sub> emissions from 127 ferry services could be reduced by 300,000 tons (per year) if today’s diesel ferries were substituted and replaced by new ferries, and if 84 of these were 100% battery-powered.

Today, the ferry services suited for battery-operated ferries are mainly stretches that take no more than 30 minutes to cross.

However, longer ferry stretches such as the ferry lines between Norway and Sweden and between Denmark and Germany may also become electric in the future. The ferry company Color Line is building a new diesel-electric ferry to run between Sandefjord in Norway and Strömstad in Sweden. The “Color Hybrid” will have a battery pack big enough to operate for 60 minutes. The ferry will recharge the battery pack by cable from shore in the harbour, or if necessary the batteries could be charged from the ship’s generators. The result will be zero emissions of CO<sub>2</sub>, NO<sub>x</sub> and particles in the harbour and in the approaches, a significant improvement for the environment. The present ferry takes 2.5 hours to cover the stretch between Norway and Sweden. If the ferry could be run for one hour with electric propulsion, the goal of a 100% electric ferry service may be within reach with the next generation of ferries.

The ferry between Helsingborg in Sweden and Helsingør in Denmark has already been electrified, and plans are underfoot for the electrification of the stretch between Rødbyhavn in Denmark and Puttgarden in Germany. Norwegians who want to travel to the countries further south by ferry may be able to do so in the future with zero or much lower emissions of CO<sub>2</sub> than previously in case the electricity is produced from renewable energy.

Tore Braend



"I spy with my little eye...  
... vehicles that are quiet and clean"

EU2017EE ESTONIAN PRESIDENCY/FLICKR.COM/CC BY

## Demands for ban on combustion engine

German Chancellor Angela Merkel has voiced support for the idea of banning cars with internal combustion engines sometime in the future. A non-binding resolution of the German Bundesrat has called for a prohibition of new sales by 2030. Greenpeace Germany demands, that the sale stop should be introduced already in 2025. This is possible according to a study by Wuppertal Institute, titled "Mobility Szenario 2035".

<https://wupperinst.org/p/wi/p/s/pd/701/>

## Global ship emissions calculated

A new study by the Finnish Meteorological Institute provides detailed information on ship emissions by using real-time data on international shipping traffic. It calculated that global ship emissions in 2015 amounted to 831 million tonnes (Mt) of CO<sub>2</sub>; 21 Mt of NO<sub>x</sub>; 9.7 Mt of SO<sub>2</sub> and 1.5 Mt of PM<sub>2.5</sub>.

The highest emissions per unit area occurred in the following sea regions: Eastern and Southern China Seas; the sea areas in the south-eastern and southern Asia; the Red Sea; the Mediterranean; the North Atlantic near the European coast; the Gulf of Mexico and the Caribbean Sea; and along the western coast of North America.

The study also considered emission hotspots, by evaluating the highest emission densities within limited areas, and found the highest emissions (within circles of 10 km) to occur in Singapore, Hong Kong, Antwerp, Shanghai, Los Angeles and Rotterdam.

The study "Global assessment of shipping emissions in 2015 on a high spatial and temporal resolution" by L. Johansson et al., was published in Atmospheric Environment in August 2017.



And the final number was 831 million tonnes of carbon dioxide.

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## EU ratifies the Gothenburg Protocol

On 17 July, the EU ratified the 2012 amendments to the 1999 Gothenburg Protocol of the Convention on Long-range Transboundary Air Pollution (CLRTAP). The amendments establish national emission reduction commitments for five main air pollutants, and the EU must reduce its emissions from 2005 to 2020 as follows: sulphur dioxide -59%; nitrogen oxides -42%; ammonia -6%; volatile organic compounds -28%; and fine particulate matter -22%. In addition, emission limit values for several different air pollution sources have been updated.

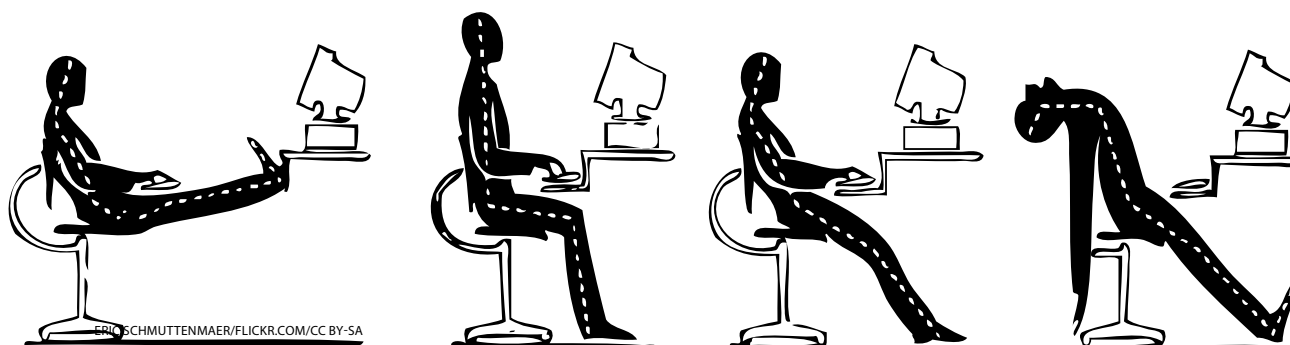
Ratification by the EU has been on hold since 2013 pending the revision of the National Emission Ceilings (NEC) directive, which was adopted in December last year. The directive has been aligned with the amended protocol by integrating the new emission standards into EU law and by matching the national emission reduction commitments from 2020 to 2029. Moreover, the revised NEC directive includes more ambitious reductions from 2030 onwards.

The amendments will enter into force on the 90th day after its ratification

by two-thirds of the 26 parties to the protocol. Member states are expected to individually ratify the protocol, but the only EU countries that have so far done so are Sweden and Slovakia.

Council statement: <http://www.consilium.europa.eu/en/press/press-releases/2017/07/17-agri-improving-air-quality/>

The LRTAP Convention: <http://www.unece.org/env/lrtap/welcome.html>



The fine art of ratification.

ERIC SCHMUTTENMAER/FLICKR.COM/CC BY-SA



# Climate protection through a coal phase-out

A immediate start to phasing power will help Germany to reach its threatened climate target to reduce emissions by 40 per cent by 2020.

**On behalf of** Greenpeace Germany, energy analyst Brainpool has outlined a coal phase-out in Germany with the focus on achieving the climate goals while ensuring supply security.

In order to reduce the transition costs it is necessary to drastically increase the implementation of cost-effective technologies on the market such as solar PV and wind power. Germany can reach its threatened climate targets if the federal government quickly starts the gradual exit from coal, which must be complete by the year 2030. The core component is a road map showing which power plant block has to be switched off in which year in order to reduce CO<sub>2</sub> emissions by 40 per cent by 2020 as the federal government has said. "With the 40 per cent goal, the chancellor's credibility stands and falls in international climate protection," says Greenpeace climate expert Karsten Smid, who coordinated the study. "Only when coal plants go well planned off the net can the climate targets from Germany be reached."

Greenpeace summarises the plan as follows: "This study showcases a road map for decarbonisation assuming a coal and lignite phase-out and a share of 80% renewables in the electricity sector by 2030, while also taking into account the effects on the heating sector through combined heat and power from coal. Consequently, a yearly list for the decommissioning of coal and lignite power plants has been originated, allowing for the ecological merit order; already planned decommissions; years of commissioning alongside other individual aspects. Within this decade 17.8 GW of overall 46.6 GW can be decommissioned without harming security of energy supply. A slower rate of decommissioning is being proposed during the nuclear phase-out in the early 2020s to avoid a capacity gap. From 2023 to 2029 the list forecasts



Graffiti close to the city of Duisburg, Germany: "no more coal in the Pott", "Pott" means Ruhrpott, the "Ruhr Region", a former centre of coal mining.

yearly decommissions of 3.5 to 5.4 GW of net capacity. An additional 116.7 GW of wind, 115.0 GW of solar and 28.4 GW of gas power plants need to be built by 2030 to ensure supply security during the phase-out (and to supply the surplus electricity consumption of 56 TWh for electric vehicles). This road map leads to 80 percent of renewables in electricity consumption by 2030 assuming a normal hydrologic year. The later Germany executes the coal phase-out the more carbon budget will be used up. If continuing with today's coal-based electricity production, Germany's energy sector would use up the respective share of the carbon budget within 12 years. Even the proposed coal phase-out till 2030 results in additional 1.217 Mt CO<sub>2</sub> emissions from lignite and 1.157 Mt CO<sub>2</sub> emissions from hard coal and other solids between 2015 and 2030. In this scenario the targets defined in the climate protection plan are fulfilled by 2025 as the heating (power) plants must reduce emissions by 175 to 183 Mt CO<sub>2</sub> per year in the run up to 2030 in order

to reach the target. The scenarios' results show a yearly decrease of emissions by 88 Mt of CO<sub>2</sub> from 2015 to 2020. The monitoring report on energy transition proposes a reduction between 47 to 58 Mt of CO<sub>2</sub> in order to reach the 40% reduction goal by 2020. The proposed phase-out makes the achievement of both political goals possible. In addition, electric vehicles run by 80 percent renewables reduce the emissions of the mobility sector. Investments in new renewable capacities and rising commodity prices increase the overall cost of electricity for consumers by approx. 20% compared to the anticipated level in 2020."

Compiled by Reinhold Pape

The study "Climate protection through coal exit" online: <https://www.greenpeace.de/sites/www.greenpeace.de/files/publications/20170628-greenpeace-studie-klimaschutz-kohleausstieg.pdf>



# Why agriculture fails to take climate action

Abolish harmful support and subsidies, differentiate policy and communicate on-farm benefits, are some of the recommendations in a new report from OECD.

**The OECD report** “Overcoming barriers to the adoption of climate-friendly practices in agriculture”, begins by noting that the agricultural sector is not fulfilling its climate mitigation potential. By scanning the scientific literature, the authors have found eighteen barriers to the implementation of “climate-friendly” measures, both at farm level and at sector and policy level.

Out of these, eight are considered as high priority or relative priority “unless contradictory evidence is found in the relevant context” and they are:

*At farm level*

- Lack of financial benefits; effects on production
- Cost of adoption
- Hidden and transaction costs
- Access to credit
- Cultural and social capital

*At sector and policy level*

- Effect of practices on production
- Information and education
- Limited extent of climate policy

It is easy to see that the different barriers are not so distinct but rather interact in a variety of ways; here follows a short review.

Financial benefits are found to be a strong driver for farmers to adopt new

agricultural practices. For many mitigation measures (though not all) these private economic benefits carry the greatest incentive. However, in some cases there might financial benefits, but these are unknown to the farmer.

Related and also of importance to the farmer is the cost of adoption. Some measures such as precision farming technologies require investments in specialised machinery, GPS systems and modifications to existing machinery. Even practices that do not involve capital costs may involve entry costs such as the cost of planting a cover crop.

Another economic barrier is hidden transaction costs. Many farmers are time-constrained. Learning and adopting new management practices takes time. Taking part in different agro-environmental schemes can involve monitoring and paper work that also can be seen as a hidden cost. Many of these costs are independent of the size of the farm, which means they are of particular importance for small farms.

Access to credit is the final economic barrier of importance, especially for measures that imply initial investments. There is also another side to it. Measures that are associated with lower yields may have

a negative effect on the relationship with lenders.

Cultural and social capital is quite a different type of barrier. It is about farmers’ strong identification with the job, the farm, the land and the animals. This identity comes along with status in the community as well as social and cultural capital. Obviously, farmers will be reluctant to any change that may threaten this paradigm. For example, in some countries farmers are sceptical of woodland planting; reflecting a big cultural divide between farming and forestry.

Many farmers also display “deeply embedded psychological and moral reasons for focusing on food production”. Measures that will result in lower yields are likely to threaten the concept of what is a good farmer. The existence of this phenomenon is shown by farmers being more likely to adopt certain measures if their neighbours have a positive attitude towards the practice, and they are likely to keep on adopting such practices if the neighbours are also determined to do so.

**At policy and sector level** there is also concern about production levels. This applies in particular to countries where



agriculture is an important part of the economy and it is common that their focus shift towards efficiency i.e. reducing emissions per unit of product. The authors argue that though efficiency certainly is part of the solution there is a great risk that the emissions saving achieved will be offset by increased production.

Opponents will then lift the argument of carbon leakage – if we introduce environmental standards, these products will be produced somewhere with laxer regulation and emissions will just move to another country. In line with this the New Zealand government have stated that they will only regulate biological emissions if there are technological measures available and international competitors also take sufficient action. However, there is mixed evidence to what degree carbon leakage actually happens. One study showed that if agriculture was to be part of the European Emissions Trading Scheme, this would reduce greenhouse gas emissions in the European Union by 19.3 per cent, but emissions in the rest of the world would increase by only 6 per cent.

We know today that information is not enough for people and institutions to take rational environmental action. But lack of information will still work as a barrier. In two studies from Scotland and Spain it was for instance found that a deficit in information and education was a barrier to farmers adopting certain practices, such

as growing nitrogen-fixing crops to reduce the need for artificial nitrogen fertilisers.

There is also an issue of how information is framed and from whom it is provided. The authors suggest a positive approach focusing on empowering farmers to take climate action to avoid defensive reactions. Communicating on-farm benefits and showing case role models in the farming community has proven to be a successful method.

The presence and structure of farm advisory services vary between countries. For instance, in some countries, the fertiliser industry is the main provider of information to farmers. It does not have to be said that they normally have other priorities that come higher than climate mitigation.

Then there is the issue of policy, or rather the absence of policy. The report highlights the lack of explicit references to agriculture in international climate policy – most recently in the Paris Agreement. This could act as an indirect barrier to agriculture mitigation practices, in that it does not encourage countries to take action in this area.

At national level it is also uncommon to have policy instruments that specifically target greenhouse gas emissions from agriculture. One reason for this is the inherent complexity of the sector, with heterogeneous large and small businesses that are based on uncertain biological

systems. However, without policy incentives, farmers are unlikely to implement measures that are not profitable in the relatively short term. The report suggests that the way forward is differentiated policy, which considers farmers' different local conditions and motivations for change.

Another problem is poor policy coherence. Policy that is designed to support production, such as subsidies and tax exemptions, often works directly in opposition to climate mitigation. One example is electricity and grain subsidies in India that lead to both ground water overdraft and greenhouse gas emissions. The report recommends countries to decouple the support from production and consider conditioning support based on environmental performance.

Finally, the OECD urge countries to embrace a systematic approach by mapping, prioritising and removing barriers, before designing new policy. It should not be that difficult.

Kajsa Pira

Source: "Overcoming barriers to the adoption of climate-friendly practices in agriculture" by OECD [http://www.oecd-ilibrary.org/agriculture-and-food/overcoming-barriers-to-the-adoption-of-climate-friendly-practices-in-agriculture\\_97767de8-en](http://www.oecd-ilibrary.org/agriculture-and-food/overcoming-barriers-to-the-adoption-of-climate-friendly-practices-in-agriculture_97767de8-en)

# CAP not fit for purpose

**Normally the European** Commission conducts fitness checks on current policy to ensure that it delivers what it was designed for. However for the current Common Agricultural Policy (CAP) no fitness check has been conducted. For this reason the European Environmental Bureau (EEB) and BirdLife Europe have commissioned their own fitness check based on the same principles as the official audits: effectiveness, efficiency, internal coherence, external coherence, relevance and EU added value.

After scanning 275 scientific papers and reports they found that the CAP does show some positive effects, for example on farmers' standard of living, and specific

instruments show local and regional successes on biodiversity, ecosystem services, soil and water quality. However, the greater picture is one of an inefficient policy, where the most effective instruments are the least funded and their effects often cancelled out by other non-designated instruments.

They specifically note that the CAP has very limited effect on climate change mitigation, since livestock farming is over-proportionally subsidised and the policy does not consider the impacts on land-use change outside the EU, particularly through imported feedstock.

The lead author of the study, Guy Pe'er, concludes: "While the design and implementation of CAP instruments fails to meet current sustainability challenges, the good news is that the knowledge and tools needed to move towards a better and smarter CAP are available. What's needed now is the political will to use them."

Source: Is the CAP Fit for purpose? An evidence-based, rapid Fitness-Check assessment – Preliminary Summary of Key Outcomes Link: [http://eeb.org/wp-admin/admin-ajax.php?juwpfisadmin=false&action=wpfd&task=file.download&wpfd\\_category\\_id=53&wpfd\\_file\\_id=17992&token=0b4eec4f49becfb17766319a4b86a5bf&preview=1](http://eeb.org/wp-admin/admin-ajax.php?juwpfisadmin=false&action=wpfd&task=file.download&wpfd_category_id=53&wpfd_file_id=17992&token=0b4eec4f49becfb17766319a4b86a5bf&preview=1)



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# How public canteens can minimise their carbon footprint

The combined measures of buying only organic produce and excluding meat and fish from meals could reduce the carbon footprint from public meals by more than 40 per cent.

**Public catering services** is a large sector in Europe, serving meals in schools, hospitals and other public institutions. Around half of them are self-managing public bodies and the other half are businesses contracted through public procurement.

In a recent Italian study, researchers compared different interventions that could be incorporated as criteria in a green public procurement procedure and ranked them after their impact on the carbon footprint (see table). As their baseline, they used the existing school catering services in the city of Turin.

In the baseline, the production of the ingredients was responsible for 78 per cent of the carbon footprint of a meal. Unsurprisingly, interventions that altered the ingredients or the way they were produced had the greatest impact. The most effective measure, reducing the carbon footprint by 32 per cent, was to exclude meat and fish from the menu and replace them with eggs,



What you put in the wraps is of greatest importance for the carbon footprint.

cheese, and protein-rich vegetables. It must be noted that the carbon footprint from cheese was on the same order as meat, but no vegan or non-dairy option was considered in this study.

Second best, reducing emissions by 11 per cent, was to use only organic ingredients.

If these two measures were combined the carbon footprint was estimated to shrink by as much as 42 per cent. The weakness of these two proven effective interventions is that they can encounter resistance within the organisation. The former because of social and cultural concerns and the latter because the higher price of organic produce might strain the budget.

## Green public procurement for food and catering

The EU criteria for green public procurement criteria for food and catering services date from 2008 and are currently under revision. A third draft of a technical report was published in July and the final version is expected to be published in December or January. Some of the proposed improvements include:

- ✗ A higher level of ambition for purchasing organic products
- ✗ Clear guidance on the promotion of plant-based meals in catering services
- ✗ Good provisions for food/beverage waste

prevention, including the recommendation of a system that allows customers to provide their feedback on the size of food portions and the quality of prepared meals

- ✗ Mandatory provision of tap water
- ✗ A mandatory provision to allow for reusable cups in vending machines

Documents for the revision process can be found here: [http://susproc.jrc.ec.europa.eu/Food\\_Catering/stakeholders.html](http://susproc.jrc.ec.europa.eu/Food_Catering/stakeholders.html)

**Some of the** easier apples to pick were several interventions in waste management. Serving tap water is such a fundamental and simple measure that it should not require green procurement to happen. Composting and recycling are also easy once the routines are in place.

Another area for interventions is to reduce the impact from energy used for cooking, storing and serving meals. Simply buying certified renewable energy was proven to be the most effective measure, second to the more hands-on project of installing local solar photovoltaic panels



Table: Summary of the of the 11 interventions assessed. Listing their the relative reduction of the carbon footprint compared to the baseline scenario for the full catering service

Intervention	Reduction of carbon footprint	Difficulties in application
<b>Food production</b>		
100 per cent organic	–11.39%	Medium (difficulties related to the certification schemes)
Exclude meat and fish	–32.14%	High (difficulties related to social, economic and nutritional issues)
<b>Food transport</b>		
Buying local food	–0.20%	Medium (difficulties in providing enough local food of the requested quality)
Improvements in local distribution of food	–0.74%	High (difficulties in the urban dimensions and need for facilities)
<b>Cooking, storage, and serving</b>		
Adoption of energy efficient appliances	–1.88%	Medium (difficulties related to the labelling of professional appliances)
Installing solar PV to cover electricity need	–4.81%	High (difficulties related to economic and logistic issues)
Certified electricity exclusively from renewable sources	–6.02%	Medium (difficulties related to economic issues)
<b>Waste management</b>		
Washable tableware	–1.97%	Medium (difficulties related to costs and to the creation of facilities for cleaning)
Disposable bio-based tableware	–0.88%	Low (no significant difficulties revealed)
Tap water	–2.34%	Low (no significant difficulties revealed)
Optimisation (80%) of the recycling of inorganic waste	–3.03%	Low (difficulties can be overcome by the training of operators)
Optimisation (90%) of the composting of organic waste	–3.04%	Low (difficulties can be overcome by the training of operators)

to generate one's own electricity. In addition, the latter could have an educational advantage not taken into consideration by this study. In comparison, it is not that effective to invest in new, more energy-efficient appliances. This is because the study is based on the fact that most kitchens have already installed relatively energy-efficient appliances and upgrading a fridge with an energy efficiency standard of A+ to the next level of A++ only gives a limited effect. But for this measure there can be great variation, if a kitchen has old appliances significant energy savings can be achieved if they are replaced.

The transportation of food is the field where there is the least potential to have an impact on carbon emissions, according to the study. Improving the local distribution of food is more important than buying locally produced food. It is worth pointing out that this study only ranks the impact on greenhouse gas emissions. There might be other sustainability gains

from buying local produce, not least of social and economic nature. This actually implies to all of the interventions.

Some of the interventions studied cannot be combined, for example you cannot use both washable and bio-based disposable tableware at the same time. But if all the measures that can, in theory, be combined, are actually implemented, there is an estimated net potential to reduce the carbon footprint by 63 per cent – almost two-thirds.

Kajsa Pira

Source: Modelling, assessing, and ranking public procurement options for a climate-friendly catering service. The International Journal of Life Cycle Assessment, INPRESS 1-21 <https://link.springer.com/article/10.1007/s11367-017-1306-y>

## New regulation for organic farming

On 28 June the European Parliament and member states reached a preliminary agreement on new regulations for labelling of organic farming that will apply from 1 July 2020. This marked the end of three years of elaborate negotiations. One of the results was harmonised rules for imports from outside the EU, levelling the playing field for producers within the EU.

The compromise was made possible after scrapping a threshold for pesticide residues in crops. Several member states have been worried that producers would not dare convert to organic, because of fear of contamination from conventional neighbouring farms.

At the time, there were still several details to solve. A final approval in the Council and the Parliament is expected later this autumn.

ENDS Europe Daily, 29 June 2017

## Beans for beef

What if everyone in the United States ate beans instead of beef? This quite simple dietary change would result in reducing greenhouse gas emissions by up to 334 million tonnes, which corresponds to 75 per cent of the 2020 US reduction target. The researchers behind the calculation also found that it would free up 42 per cent of US crop land, which is approximately 1.6 times the size of California.

Replacing beef with cooked black beans would also reduce chronic disease burdens by improving micronutrient and fibre intakes, and reducing saturated fat intakes. The researchers conclude: "While not currently recognized as a climate policy option, the 'beans for beef' scenario offers significant climate change mitigation and other environmental benefits, illustrating the high potential of animal to plant food shifts."

Source: FCRN Newsletter 7 September 2017, <http://www.fcrn.org.uk/research-library/substituting-beans-beef-can-contribute-towards-us-climate-change-targets>



# Grass-fed cattle not a climate solution

Whether grass-fed beef is good or bad for the climate is the focus of a new report from the Food Climate Research Network, entitled “Grazed and Confused?”. The report finds that while grazing of grass-fed animals can boost the sequestration of carbon in some locally specific circumstances, that effect is time-limited, reversible, and at the global level, substantially outweighed by the greenhouse gas emissions they generate.

The report is a response to claims made by different stakeholders in the debate about grass-fed beef, the greenhouse gases the animals emit, and the possibility that, through their grazing actions, they can help remove carbon dioxide from the atmosphere.

The lead author Tara Garnett concludes: “Grass-fed livestock are not a climate solution. Grazing livestock are net contributors to the climate problem, as are all

livestock. Rising animal production and consumption, whatever the farming system and animal type, is causing damaging greenhouse gas release and contributing to changes in land use. Ultimately, if high consuming individuals and countries want to do something positive for the climate, maintaining their current consumption levels but simply switching to grass-fed beef is not a solution. Eating less meat, of all types, is.”

Source: Food Climate Research Network, 3 October 2017, “Grazed and Confused?”. [http://www.fcrn.org.uk/sites/default/files/project-files/fcrn\\_gnc\\_report.pdf](http://www.fcrn.org.uk/sites/default/files/project-files/fcrn_gnc_report.pdf)

## 11% higher methane emissions from livestock

New estimates of methane emissions from livestock are 11 per cent higher than figures obtained using established methods for calculations based on the IPCC 2006 emission factors. The reasons for this is that the size and numbers of cattle has changed in many regions, as well as management practices. There has been an 8.4 per cent increase in enteric fermentation methane, and a 36.7 per cent increase in manure management methane.

The study includes updated information for cattle and swine by region, based on reported recent changes in animal body mass, feed quality and quantity, milk productivity, and management of animals and manure. Based on this data, the researchers have been able to calculate new emission factors.

The new factors for enteric fermentation for dairy cattle are higher in all regions except Eastern Europe and most notably in Eastern/Southeastern Asia and Africa. Another significant result is that the factor for dairy cattle manure management has more than doubled in the US and Canada, because of an increase in manure managed in lagoon systems.

Source: Carbon Balance and Management, 29 September 2017, <https://cbmjournal.springeropen.com/articles/10.1186/s13021-017-0084-y>





# Scrapping CAP direct payments would reduce nitrogen emissions

Direct payments to farmers are a driver for increased fertiliser use and higher animal intensity, and consequently increased environmental impact.

**EU Common** Agricultural Policy (CAP) is one of the most prominent policy areas in the EU, taking up about 40 per cent of the common budget and impacting about half of the EU area. The environmental footprint of CAP has therefore been an object of public scrutiny for quite some time.

In two recently published papers we have analysed possible impacts of CAP direct payments on several agri-environmental indicators, among them ammonia emissions, and of two important greenhouse gases, nitrous oxide and methane. For ammonia, agriculture is the single most important source. While for greenhouse gas emissions, other emissions sources, especially energy and traffic, are much more important, but nevertheless all sectors must contribute to mitigating climate change.

We found that there is reliable positive correlation between ammonia emissions per hectare of agricultural land and level of direct payments per hectare: the higher the payments, the bigger the emissions (figure 1). The same can be observed for combined emissions of nitrous oxide and methane expressed in carbon dioxide equivalents per hectare: higher direct payments per hectare are reliably correlated to higher emissions (figure 2).

The correlation as such does not prove causal relation: the common cause of both higher emissions and bigger payments is partly found in the history of CAP direct payments. They were introduced to replace the market support, and were originally tied to production; hence countries with intensive agriculture tend to have higher

payments per hectare.

However, there is also good reason to believe that direct payments are also partly driving emissions, by contributing to greater reliance on procured inputs like fertiliser and fodder. Indeed, bigger subsidies are connected to greater use of mineral nitrogen (figure 3). Bigger subsidies are also connected to higher numbers of farm animals, with very high densities that imply imports of fodder that exist only at the “upper end” of the direct payments (figure 4).

Since methane emissions are largely driven by animal husbandry, and emissions of ammonia and nitrous oxide by animal husbandry and mineral fertiliser use, it is thus reasonable to conclude that these emissions are

not only historically connected to higher subsidies, but also partly result from them. Hence, getting rid of CAP direct payments can be seen as a cost-efficient way to reduce emissions of ammonia and two important agricultural greenhouse gases.

Aleksei Lotman,  
Estonian Fund for Nature  
and Kuno Kasak,  
University of Tartu

## References.

Lotman, Aleksei & Kasak, Kuno. 2017a. Euroopa Liidu ühine põllumajanduspoliitika – kas ka päriselt roheline? Akadeemia nr 3. (In Estonian with English summary – EU Common Agricultural Policy of European Union – green or greenwashed?)

Lotman, Aleksei & Kasak, Kuno. 2017b. EU Common Agricultural Policy direct payments, Nitrogen balance and eutrophication of the Baltic Sea. <http://estcap.blogspot.com/2017/08/article-eu-common-agricultural-policy.html>

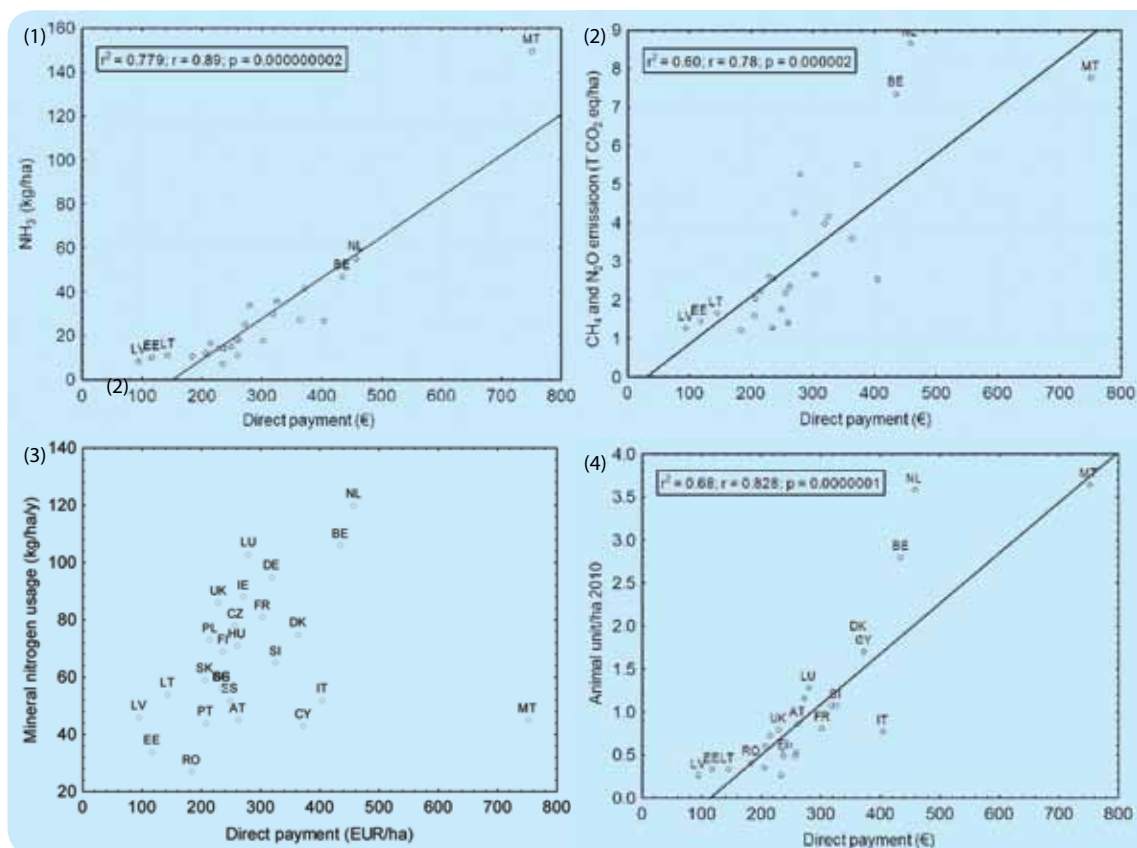
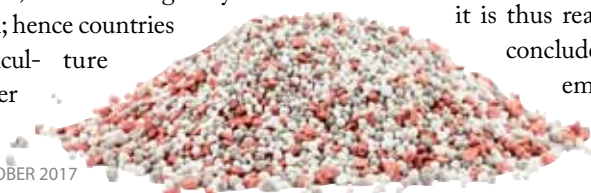


Figure: (1) How levels of direct payments in member states correlate with ammonia emissions, (2) how levels of direct payments in member states correlate with NO<sub>2</sub> and CH<sub>4</sub> emissions, (3) how levels of direct payments in member states correlate with mineral nitrogen usage, (4) how levels of direct payments in member states correlate with animal densities.



# Cruise ships are big polluters

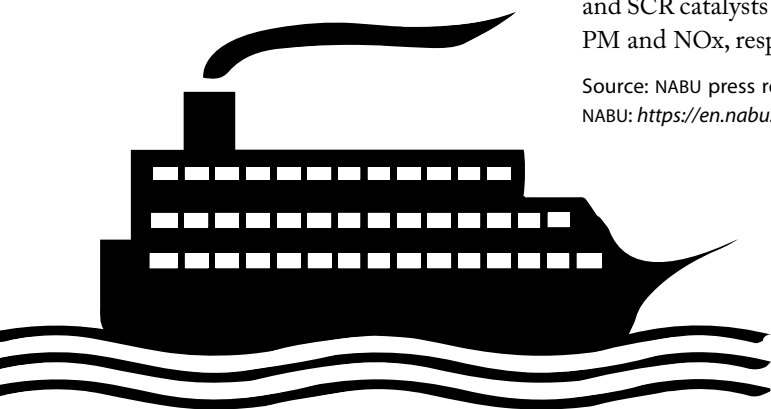
In its annual survey of cruise ships, the German environment group Nature and Biodiversity Conservation Union (NABU) found that no single ship has adequately reduced its environmental impact in 2017. Even worse, the cruise industry's contempt for the health of its customers and port citizens is underlined by the fact that not one company responded to a simple Q&A supplied, NABU said.

"The environmental performance of cruise companies is lousy, as is their at-

titude to transparency. Last year the sector claimed 23 ships would be operating with soot filters. The truth is not a single filter is working at present," said Dietmar Oeliger, head of transport policy at NABU.

According to NABU, a mid-size cruise ship burns as much as 150 tonnes of fuel each day, and emits as much particulate matter (PM) as one million cars. NABU is calling for a general ban on the use of heavy fuel oil on all ships worldwide and for all ships to install particulate filters and SCR catalysts to reduce emissions of PM and NOx, respectively.

Source: NABU press release, 5 September 2017  
NABU: <https://en.nabu.de>



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Remember not to ask this fellow to mind your geese, or the fossil fuel industry to do your climate research.

## Exxon misled public about climate change

An analysis of Exxon's research and public statements shows a sharp contrast between what the oil giant knew about climate change and what it told the public. The comprehensive, peer-reviewed academic study of ExxonMobil's internal deliberations, scientific research and public rhetoric over the decades has confirmed empirically that the oil giant misled the public about what it knew about climate change and the risks posed by fossil fuel emissions.

<https://insideclimatenews.org/news/22082017/study-confirms-exxon-misled-public-about-climate-change-authors-say>

## Air pollution cuts life by a decade, costing billions

A new study by Mikael Skou Andersen of Aarhus University in Denmark, shows that, on average, increased levels of the air pollutant PM<sub>2.5</sub> cut victims' life expectancy much more than previously thought. Moreover, the estimated economic cost of premature death differs wildly between the US and the EU because of the calculations used.

In the US, the cost-benefit analysis of reducing air pollution is calculated based

on the number of lives saved, with each life currently estimated to be worth \$7.4 million. This figure is more than three times higher than the one commonly used in Europe, where the focus is on the change in life expectancy.

According to Skou Andersen, an increase in airborne PM<sub>2.5</sub> of 10 micrograms per cubic metre causes an average loss of life expectancy of 9–11 years – much longer than a frequently cited estimate of 1–2

years. The author hopes that this information will inform international institutions and policy makers that want to accurately account for deaths caused by air pollution due to fossil fuel consumption.

Source: ScienceDaily, 3 July 2017.

The article: "Co-benefits of climate mitigation: Counting statistical lives or life-years?" Ecological Indicators, July 2017. DOI: 10.1016/j.ecolind.2017.03.051



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# Solar and wind – an untapped resource in south-eastern Europe

There is a 740 GW potential for cost-competitive renewable power generation across South East Europe.

**The International Renewable Energy Agency (IRENA)** has published a survey about the renewable power generation potential in the south-east Europe states of Albania, Bosnia and Herzegovina, Kosovo, Montenegro, Republic of Moldova, Serbia, the former Yugoslav Republic of Macedonia, Ukraine, Bulgaria, Croatia, Romania and Slovenia. In these countries there is a risk that new coal-fired power stations are being planned without proper discussion about the alternatives. The IRENA report is an important tool that surveys how renewable energy can be used in the region. The report summarises the potential as follows:

“The region’s power sector comprises over 118 gigawatts (GW) of installed capacity, out of which renewables accounted for 36 GW in 2015. Hydropower accounts for 75% of this renewable capacity, however, with most of it constructed several decades ago.

South East Europe possesses vast technical renewable energy potential – equal to some 740 GW. The region’s wind energy (532 GW) and solar PV (120 GW) potential is largely untapped, as illustrated by IRENA’s suitability mapping of the region. This analysis revealed that 126.9 GW of the overall renewable energy potential could be implemented in a cost-competitive way today. The additional cost-competitive potential could be even higher – above 290 GW if low-cost capital is available.

Wind energy is the most abundant resource in the region, with an overall technical potential amounting to over 532 GW. This compares to only 4.9 GW installed in the region at the end of 2015, with most of this in Bulgaria, Romania and Ukraine. Over 18% of this potential, or 98 GW, could be additionally deployed today in a cost-effective manner. Out of 120 GW of technical potential, solar PV could provide an additional 5.2 GW of cost-competitive renewable energy

capacity. The additional cost-competitive biomass potential in the region amounts to up to 4.7 GW.

As for the projections for 2030 and 2050, with the expected further decline in technology costs, as well as the expected lower cost of capital in the mid- to long-term, the cost-competitive wind and solar PV potential of the region is expected to further grow to more than 650 GW by 2030. This means that almost the entire technical potential of those technologies will be cost-effectively exploitable. Given its size and potential, Ukraine can develop the largest part of this cost-competitive capacity, with an additional 70 GW of solar PV and 320 GW of wind. The high shares of renewables in the power sectors, however, can be also achieved in other parts of SEE.

The sensitivity analysis conducted for different levels of cost of capital revealed this as one of the determining factors significantly influencing the cost-competitiveness of a technology option; therefore, lower figures could render additional renewable capacities accessible. Strengthened enabling policy, regulatory and institutional conditions, and strong support schemes for renewables, among other measures, could improve the risk perception of the region. These would give positive signals to investors in the non-EU part of the region, in particular. The major identified barriers include: the absence of a long-term strong and stable renewable energy policy environment in the region; inadequately designed Power Purchase Agreements (PPAs) that do not meet investor requirements; high administrative barriers, adding to trans-



Wind farm in eastern Bulgaria.

action costs for businesses; and a lack of sufficiently attractive and consistent renewable energy support systems. In addition, several technical challenges exist, such as grid limitations and insufficient experience with the grid integration of variable renewables.

The region has, however, already stepped up its efforts to improve the investment framework and tackle the major challenges hindering a more accelerated renewables deployment. At the same time, the region is taking steps to introduce more market-based support schemes, moving from feed-in-tariffs (FITs), largely implemented in the region, to feed-in-premium (FIP) systems (in Albania and Croatia, for example). Due to limited competition in the energy markets and the early stage of renewable energy development, there are, however, concerns about the auction scheme being a suitable model.”

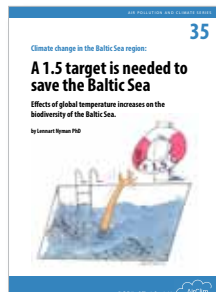
Compiled from IRENA Report  
by Reinhold Pape

Link: [http://www.irena.org/DocumentDownloads/Publications/IRENA\\_Cost-competitive\\_power\\_potential\\_SEE\\_2017.pdf](http://www.irena.org/DocumentDownloads/Publications/IRENA_Cost-competitive_power_potential_SEE_2017.pdf)

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Reports can be downloaded in PDF format from [www.airclim.org](http://www.airclim.org)



**A 1.5 target is needed to save the Baltic Sea** (March 2016). By Lennart Nyman. Effects of global temperature increases on the biodiversity of the Baltic Sea.



**Cost-benefit analysis of NOx control for ships in the Baltic Sea and the North Sea** (April 2017). By Katarina Yaramenka, Hulda Winnes, Stefan Åström, Erik Fridell.



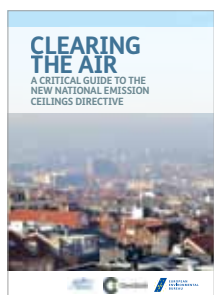
**Phasing out fossil gas in Europe** (March 2016). By Fredrik Lundberg. The natural gas industry faces strategic choices.



**Paths to a sustainable agricultural system** (March 2016). By Kajsa Pira et al. An agriculture and food system with reduced emissions.



**Carbon Capture and Storage in Norway** (2nd edition, March 2016). By Tore Braend. The Norwegian interest in CCS depends on the oil and gas sector.



**Clearing the air** (Feb 2017). A critical guide to the new National Emissions Ceilings directive.



**1.5 Stay Alive** (April 2015). Short documentary about climate change in the coastal zones of the Caribbean region. Winner of the Golden Sun award 2016. Contact [info@airclim.org](mailto:info@airclim.org) for access.

## Coming events

**Green Port Conference.** Amsterdam, Netherlands, 11 - 13 October 2017. Information: <http://www.greenport.com/congress>

**EU Environment Council.** Luxembourg, 13 October 2017. Information: [www.consilium.europa.eu/en/press/calendar/](http://www.consilium.europa.eu/en/press/calendar/)

**Shipping and the environment - from regional to global perspectives. 2nd BONUS Symposium.** Göteborg, Sweden, 24 - 25 October 2017. Information: <http://shipping-and-the-environment-2017.ivl.se>

**UNFCCC Second sessional period in 2017.** Bonn, Germany, 6 - 17 November 2017. Information: <http://unfccc.int/>

**22nd International Transport and Air Pollution Conference (TAP).** Zürich, Switzerland, 15 - 16 November 2017. Information: <http://tapconference.org>

**EU Clean Air Forum.** Paris, France, 16 - 17 November 2017. Information: [www.euconf.eu/clean-air/index.html](http://www.euconf.eu/clean-air/index.html)

**Climate change challenge: Shipping's fair share?** Copenhagen, Denmark, 22 November 2017. Information: [www.ecocouncil.dk/documents/arrangementer/2239-co2-shippings-fair-share-copenhagen-nov-2017](http://www.ecocouncil.dk/documents/arrangementer/2239-co2-shippings-fair-share-copenhagen-nov-2017)

**The future of transport 2017: Towards clean, competitive and connected transport in Europe.** Brussels, Belgium, 6 December 2017. Information: [http://www.eu-ems.com/summary.asp?event\\_id=4345&page\\_id=9313](http://www.eu-ems.com/summary.asp?event_id=4345&page_id=9313)

**CLRTAP Executive Body.** Geneva, Switzerland, 11 - 14 December 2017. Information: [www.unep.org/env/lrtap/welcome.html](http://www.unep.org/env/lrtap/welcome.html)

**EU Environment Council.** Brussels, Belgium, 19 December 2017. Information: [www.consilium.europa.eu/en/press/calendar/](http://www.consilium.europa.eu/en/press/calendar/)

**IMO PPR 5 (Sub-Committee on Pollution Prevention and Response).** London, UK, 5 - 9 February 2018. Information: [www.imo.org](http://www.imo.org)

**20th international conference on air pollution and control (ICAPC).** Paris, France, 19 - 20 February, 2018. Information: <https://www.waset.org/conference/2018/02/paris/ICAPC>

**Air Quality – Science and Application: 11th International Conference.** Barcelona, Spain, 12 - 16 March 2018. Information: <http://www.airqualityconference.org>

**Saltsjöbaden 6: Clean air for a sustainable future – goals and challenges.** Göteborg, Sweden, 19-21 March 2018. Information: <http://saltsjobaden6.ivl.se>

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