CAN
CLIMATE ACTION NETWORK
Europe

European Fat Cats

EU Energy Intensive Industries: **paid to pollute**, not to decarbonise

April 2018

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Authors: Julie-Anne Richards, Klaus Röhrig, Maeve McLynn
Thanks to: Johan Bosman (CAN Europe), Lena Reuster (FÖS), Sam Van den Plas (WWF), Femke De Jong (Carbon Market Watch) and Suzana Carp (Sandbag).

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Executive Summary

Energy intensive industry sectors have been among the slowest in the European Union (EU) to reduce their greenhouse gas emissions and invest in solutions to decarbonise and maintain technological leadership. Instead, these sectors have been putting a break on more ambitious climate policy, benefitting from watered down regulation, soft tax deals and preferential pricing. Their efforts to preserve unrivalled privileges have pushed the cost of dealing with climate change onto the rest of society.

Instead of pursuing real decarbonisation plans, energy intensive industry in the EU has managed to turn pollution into profit:

- Rather than paying for its pollution under the **EU Emissions Trading System (ETS)**, energy intensive industry is able to make a cash-grab through a combination of exceptions under the scheme. A blatant example are the windfall profits from excess emission allowances that industry actors initially received for free amounting to over **€25 billion** during 2008-2015. At the same time, EU governments **missed out on €143 billion in revenue due to free allocation of pollution permits** during the same period of time. Even after a recent reform, the EU ETS will continue to issue free allowances to energy intensive industry sectors which means that **public revenues amounting to around €380 billion will be foregone by EU governments between 2008 and 2030**.
- Energy intensive industry receives **extremely generous tax breaks**. For example in Germany, households pay nearly **twice as much for their electricity** as energy intensive industry sectors with total financial gains from tax schemes amounting to over **€17 billion** in 2016, roughly the same as the 2017 German federal budget for research and education;
- European governments still provide nearly **€15 billion** of fiscal support that encourages **consumption of fossil fuels** in industry and business each year.

As a result of these subsidies to energy intensive industry and its delayed action on decarbonisation, citizens pick up the bill for climate change and air pollution. They are increasingly paying with their health and lives: each year 231,554 Europeans die prematurely due to air pollution, almost a quarter of which comes from energy intensive industry. In addition, average annual health costs associated with air pollution amount to at least €215 billion.

Subsidies such as tax breaks, hand-outs and insufficient emission reduction targets have given European energy intensive industry little incentive to innovate and decarbonise. It is falling behind competitors in other regions, like China, who are investing heavily in innovation and the upgrade of their industry and starting to compete in high value segments formerly led by European industry.

While industry has long used "carbon leakage" (business relocating to a country with less stringent climate policies) as an argument to keep the status quo of low ambition, studies have found no evidence of leakage (Ecorys, 2013). In fact, European energy intensive industry pays less for electricity than many competitors, for instance German energy intensive sectors pay roughly 25% less for electricity than the same sectors do in China (Fraunhofer ISI and Ecofys, 2015).

Rather than maintaining the current level of overprotection, the EU should be much more concerned about losing competitiveness in innovative low carbon break-through technologies.

EU energy intensive industry must face the inevitable need to decarbonise and stop undermining ambitious climate policy. Instead, the sectors can embrace the opportunities of innovation and the circular economy through forward-looking approaches.

At the same time, policy makers and regulators need to establish certainty about the necessary pathway for decarbonisation in the coming decades. The UNFCCC has launched a yearlong exchange on how countries can ratchet up their climate commitments, the so-called Talanoa Dialogue. This makes 2018 an important year for kick-starting the process and momentum to increase global climate ambition. It thus provides the impetus for the EU to reboot its policy approach to energy intensive industry; making it clear that it will contribute to, rather than detract from EU climate ambition. Governments need to substantially reshape their current approach of massive government subsidies for energy intensive industry to pollute, and rather make them pay for pollution. This would provide industry and EU governments an incentive to invest in and to commit to innovation.

In addition, under the Paris Agreement, member states and the EU need to communicate long term greenhouse gas emission development strategies to the UN, outlining how they intend to mitigate emissions until mid-century. On 22 March this year, the European Council invited the European Commission to present a draft of such a long term strategy in early 2019 (European Council, 2018). It is crucial that these strategies set out pathways that ensure that every sector of the economy contributes substantially to the objective of the Paris Agreement, namely keeping global temperature rise well below 2 degrees and pursue efforts to limit temperature rise to 1.5 degrees.

Policy Recommendations

In particular, the EU needs to rethink its current industrial approach and consider the following policy recommendations:

- Make clear that energy intensive industry sectors will be required to fully decarbonise before 2050, setting stretch goals for the various sectors as markers along the way. The European Commission **should develop its draft long term climate strategy as soon as possible**, sketching out the possible pathways to decarbonise the European economy before mid-century in ways **compatible with the 1.5 and 2 degrees Celcius target of the Paris Agreement**.

- Based on the draft Long Term Strategy, the European Commission should develop **pathways for the ambitious decarbonisation of energy intensive industries**. It should do so in consultation with existing expert groups such as the High level group on energy intensive industries or the High level industrial roundtable 'Industry 2030', bringing together stakeholders including governments, industry, trade unions, academics and civil society. This exercise could help sectors to update existing industry-specific roadmaps toward full decarbonisation or start drafting those embedded in a cross-sectoral roadmap that is aligned with the Paris Agreement.

- Both the sectoral as well as the horizontal roadmaps should pay particular attention to **address energy poverty and provide measures to support just transition plans** for affected communities and workers in industries that must, by necessity, phase down and be replaced with zero carbon alternatives.

- The rules of the **EU ETS need to be revised and tightened** in light of the long term targets of the Paris Agreement by strengthening the cap, cancelling surplus allowances and ensuring that the polluter-pays-principle is respected in all sectors covered by the scheme.

- The funds created under the EU ETS should not hamper the necessary decarbonisation of industry sectors. Rules should be toughened to ensure that the Innovation Fund is not simply used to pad industry profits, but supports low carbon technology for short term use, and zero carbon technologies to deliver the necessary decarbonisation and emission reduction pathway. As the prime beneficiary of these funds, industry needs to start paying for its emission allowances. The **free allocation of pollution permits under the ETS needs to be phased out**.

- It is clear that the ETS alone will not be enough. Complementary policies are necessary, both at EU and at national level. The first opportunity is the establishment of adequate and credible 2030 targets for the deployment of renewable energy and energy savings at EU level. The European Commission should encourage member states to **strengthen carbon pricing**, for example through a common carbon floor price and look into additional measures to complement the insufficient ETS framework at the EU level. Finally, the European Commission should consider the setting of Emission Performance Standards for the production of resource and energy intensive materials.

- Member states should **assess all national policies addressed at industry, including taxation policy**, and ensure that it supports, not undermines, a transition to a zero carbon industry. Progress towards policy change should be reported through existing frameworks such as the European Semester.

Introduction

European citizens are acutely aware of the challenge of climate change. Three-quarters (74%) consider climate change to be very serious and 92% see it as a serious problem (EC 2017c). They rightly demand action, with nearly 90% of Europeans ranking government efforts to increase renewable energy as important. The majority sees the responsibility to act almost equally divided among industry, the European Union (EU) and national lawmakers. Historically the EU has prided itself on climate leadership – with a legacy of ambitious rhetoric, alliance building and action.

Against this backdrop, the EU's level of climate ambition is disappointing. Current EU climate policies are not up to the task of avoiding dangerous climate change and protecting the EU economy and its citizens against significant climate impacts.

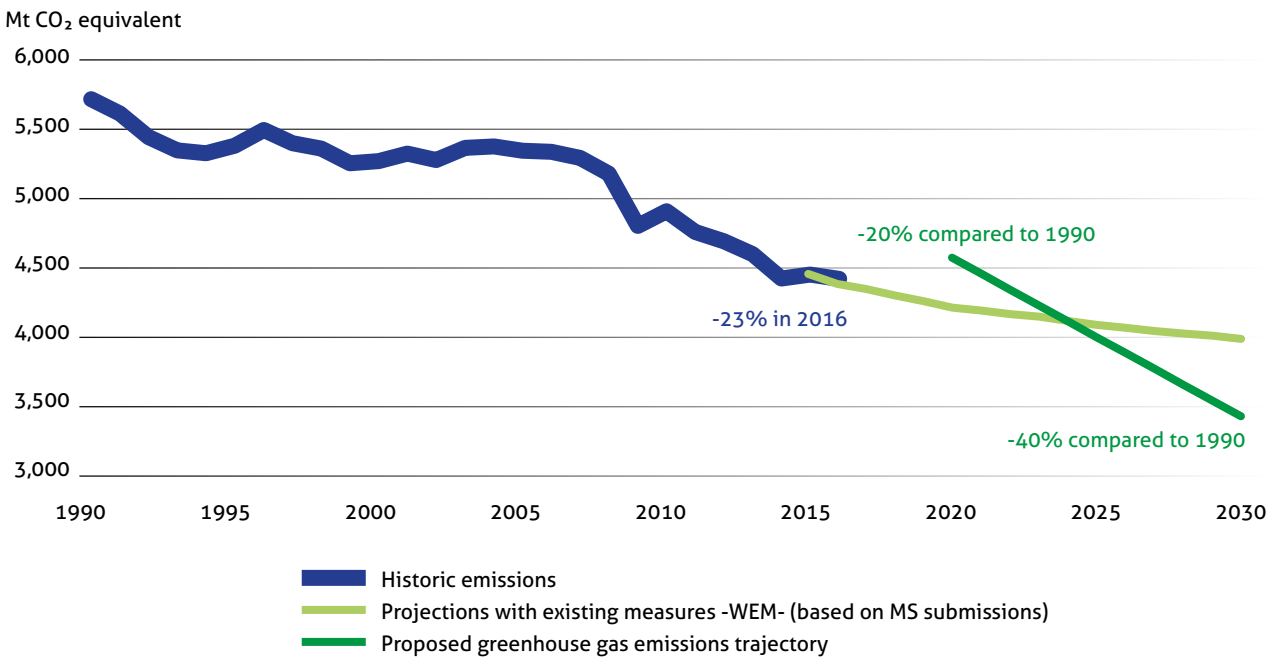
The European Commission's current zero carbon economy roadmap sets an aspirational goal of reducing greenhouse gas emissions by 80-95% by 2050 (EC 2011). However, in order to be compliant with the Paris Agreement, the EU's goal must be to reduce greenhouse gas emissions to zero well before 2050.

In the short term, the EU is not on track to meet its own, inadequate, 2030 target of 40% emission reductions compared to 1990 (see graph). Additional measures will be necessary to put the EU on a decarbonisation pathway. This report lays out key measures for one of the most polluting industries.

Energy intensive industries can take a portion of the responsibility for this shortfall in climate action. They have acted as an 'anchor' on EU climate policy, slowing down ambition and benefitting from watered down regulation, soft tax deals and preferential pricing. Preferential treatment for energy intensive industry has padded their bottom line and pushed the price of dealing with climate change onto the rest of society, while the industry has done too little to pursue real solutions to decarbonise.

This report outlines how skewed current EU policies are towards big polluting industries and how this has pushed the need and costs of climate action, and the impacts of pollution and climate change, onto European citizens.

GRAPH 1: **Progress towards meeting Europe 2020 and 2030 greenhouse gas reduction targets**



Source: EC November 2017

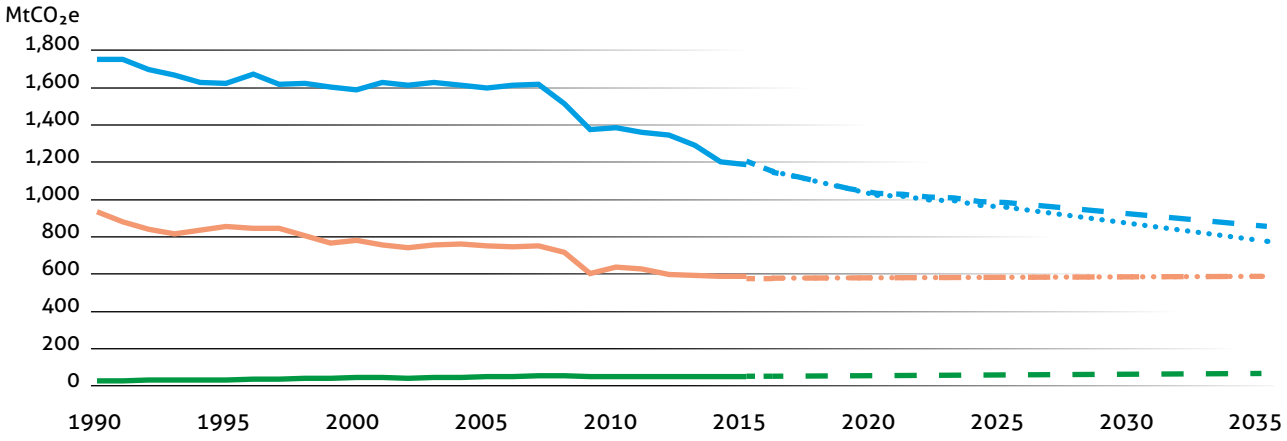
The Energy Intensive Fat Cats

Energy intensive industry includes iron and steel, cement, chemicals, refineries, copper, aluminium, paper, ceramic, lime, ferro-alloy, chlor-alkali, gypsum, metal, clay, petroleum, and glass producers. These sectors use a high proportion of the total energy consumed globally (37%) and in addition some industrial processes produce carbon dioxide directly as a by-product, for example cement manufacturing (Napp 2016). In the EU, energy intensive industry is responsible for almost a quarter (23%) of air pollution (AMEC 2014) and roughly a fifth (19.3%) of total greenhouse gas emissions.[1]

Despite greenhouse gas emissions falling in other industries in the EU, including the electricity sector, progress in the energy intensive industries remains slow (CEPS 2017, Napp 2016). In fact, while emissions of energy generators have been going down, emission levels from industry covered by the EU Emissions Trading System - mainly energy intensive industry - have stagnated since 2012 and are expected to stay constant until beyond 2030 (see graph below). This standstill is totally at odds with the overall EU's commitment to the Paris Agreement.

Energy intensive industries have followed an overall "business as usual" approach, focusing emission reduction efforts on the low hanging fruit of efficiency – which offers limited gains in these industries. Ex-post evaluation of climate policies shows that it is innovation, not small efficiency improvements, that is the main driver to lower emission intensity (EC 2017e).

GRAPH 2: **Greenhouse gas emission trends and projections under the scope of the EU ETS, 1990-2030**



Notes:

- In this graph, 'energy industries' refers to energy producing installations (utilities), while energy intensive industry is represented by 'other stationary installations'.
- Solid lines represent historical GHG emissions (available for the 1990-2016 period). Dashed lines represent projections of the WEM scenario. Dotted lines represent projections under the WAM scenario.
- The EU ETS GHG emissions presented were estimated based on the attribution of GHG emissions, reported by source categories in national GHG inventories and national projections, to EU ETS sectors and/or Effort Sharing sectors.

Sources: EEA, 2017a, 2017b, 2017c, 2017d.

1 Calculated as the sum of greenhouse gas emissions from Fuel combustion in manufacturing industries and construction: 483.40249 and Industrial processes and product use: 373.93741 calculated as a portion of All sectors: 4,451.81256 from Eurostat 2016a.

One can acknowledge the reductions in greenhouse gas emissions achieved by energy intensive industries since 1990. But the standstill of industrial decarbonisation since 2012 and expected future trends show that those sectors have not taken responsibility for their role in contributing to climate change and have not made the necessary effort or investment to decarbonise. They have instead fostered and benefitted from policy settings that, rather than providing incentives to innovate and reduce carbon, have made it profitable to pollute. The result is an inefficient and polluting industry in the EU that has pushed the cost and consequences of climate change onto European citizens and other industries.

Energy intensive industries have been making money from polluting in the following key ways:

1. Emissions Trading Scheme (ETS)

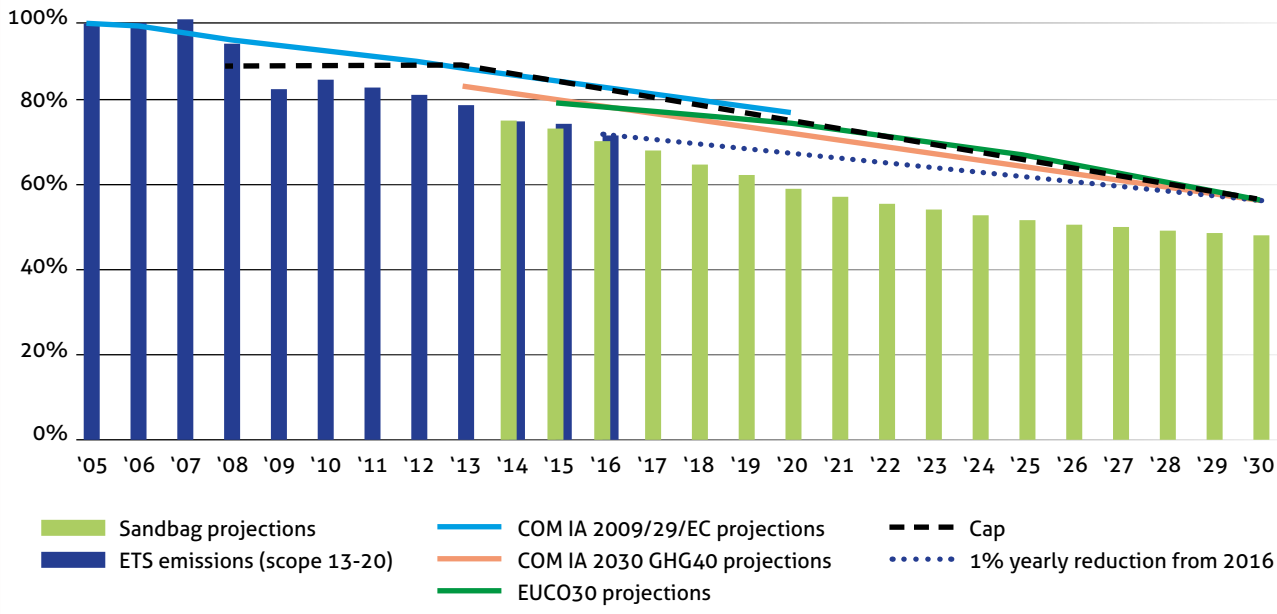
The EU ETS is supposed to be Europe's main policy driver to reduce emissions. It covers power generators, aviation and energy intensive industries – around 45% of total EU emissions (EC no date).

The ETS sets a cap on the total amount of greenhouse gases allowed from power stations, industrial plants and relevant airlines. Within the cap, power generators and industrial installations buy or receive emission allowances for every tonne of carbon they emit. The cap should reduce each year so that total emissions fall. Emission allowances can be traded, so that the least expensive emissions are reduced first.

However, the EU ETS is not fit for purpose and rather than driving emission reductions in energy intensive industry, it puts a break on the needed decarbonisation in these sectors. Even worse, it has been turned into a subsidy vehicle.

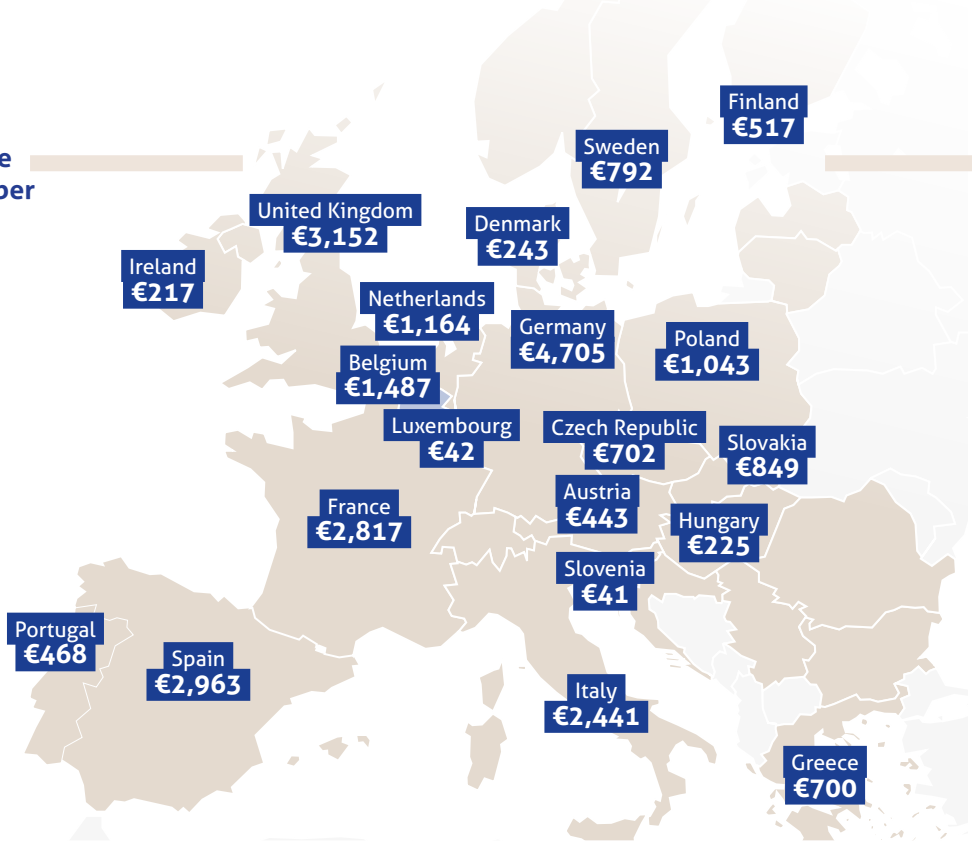
The first problem is that the caps have been set at too generous a level and not adjusted downward as it became clear they were not driving emission reductions from industry. The graph below shows that the ETS caps (in black) are higher than current emissions (in green) and significantly higher than projected emissions (in yellow), meaning that industry covered by the ETS has to take little or no effort to meet the caps. In fact, the majority of emission reductions have been a result of the global economic downturn and mainly achieved by lower production, not by reduced emissions intensity (Sandbag 2017b).

GRAPH 3: **ETS greenhouse gas emission reductions estimates up to 2030**



Source: Sandbag 2017a

MAP: **Windfall profits made by companies in EU Member States in million €**



TOTAL
from 20 countries
€25,011

Source: Carbon Market Watch 2016

TABLE 1: **Profits made by energy intensive industry through the EU ETS**

Sector	Windfall profits from surplus	Windfall profits from ooffsets	Windfall profits from minimum cost-pass through	Total windfall profits
Iron and Steel	€784 million	€239 million	€7,364 million	€8.4 billion
Cement	€2,729 million	€149 million	€2,083 million	€5.0 billion
Refineries	-€67 million	€86 million	€4,562 million	€4.6 billion
Petrochemicals	€774 million	€42 million	€901 million	€1.7 billion

Source: Carbon Market Watch 2016

In addition, the EU ETS rules have allowed industry to make a cash-grab from this lack of action. Energy intensive industries were given their emission allowances for free, rather than having to buy them in auctions. They then increased the cost of their products for the theoretical value of these allowances – charging their customers for costs that they did not pay. The charge (or "pass through") of non-existent costs earned industry windfall profits of €16.8 billion from 2008 until 2015. In Germany alone, industry gained over €3.5 billion from this windfall profit (CE Delft 2016 and Carbon Market Watch 2016).

Giving away free emission allowances undermines the polluter-pays principle, and reduces the incentive for companies to produce more efficiently or to invest in breakthrough technologies to reduce pollution (Carbon Market Watch 2016). It also pushes the responsibility for reducing emissions and meeting overall EU targets onto other sectors of the economy.

Due to lenient caps on greenhouse gas emission allowances, industry received more emission allowances for free than it actually needed. Industry actors then sold the surplus allowances on the market – netting a further €7.5 billion in windfall profits. For some of their emission reduction requirements, industry was able to use cheap offsets from non EU countries to meet targets – thus freeing up EU ETS allowances which they sold for a further profit of €0.8 billion. **In total, energy intensive industry made over €25 billion in windfall profits from the EU ETS during 2008-2015. Tata Steel UK Limited alone made over €1 billion in windfall profits from the EU ETS from 2008 until 2015** (CE Delft 2016 and Carbon Market Watch 2016).

TABLE 2: **Companies making the biggest windfall profit* from the EU ETS, 2008-2015**

Company	Industry sector	CO_2 overallocation kiloton 2008-2015	Total windfall profits* in million € 2008-2015	Country
Tata Steel UK Limited	Iron and steel	4,866	€1140.4	UK
U. S. Steel Košice sro	Iron and steel	1,646	€653.1	Slovakia
ArcelorMittal Germany	Iron and steel	27,443	€641.8	Germany
ILVA S.P.A.	Iron and steel	11,840	€628.2	Italy
ArcelorMittal España, s.a.	Iron and steel	17,446	€605.5	Spain
ArcelorMittal Belgium	Iron and steel (incl coke oven products)	10,751	€509.8	Belgium
Hüttenwerke Krupp Mannesmann GmbH	Iron and steel	14,288	€489.7	Germany
Tata Steel IJmulden B.V.	Iron and steel	1,447	€439.9	Netherlands

*Profits are an estimate of windfall profits from surplus, offsets and from passing the cost through to buyers. Source: CE Delft 2016

As a result of giving emission allowances away for free – rather than selling them to industry – EU governments lost out on potential auctioning revenue of at least €143 billion from 2008 until 2015. That money could have been available for investments in the climate-friendly transition of the European economy (CE Delft in Carbon Market Watch 2016).

ETS rules have discouraged innovation and restructuring. Until 2012, industry was receiving free allowances on the basis of their historic emissions, rather than actual performance. Their free allowances therefore did not take into account falls in demand or improvements in efficiency, and as a result they lacked incentives to reduce emissions. Aggravating the problem were emission allocation rules that encouraged companies to keep installations open (otherwise they lost their free allowances). In cement manufacturing, these rules have resulted in approximately 5.2 million tonnes of excess CO_2 emissions in 2012 (Neuhoff et al 2015).

The combination of inadequate caps, overgenerous free allowances and accumulated surplus permits, keeps the carbon price within the EU ETS low. This allows Europe's industry to continue polluting on the cheap whilst the rest of society picks up the bill of climate impacts. Even after a recent reform[2], the EU ETS is not expected to drive emission reductions fast enough.

2. Cheap electricity

Energy intensive industries also receive subsidies on their electricity prices – padding their bottom line and profit, encouraging them to be more wasteful with energy and polluting more. These electricity subsidies to heavy industry push the costs of electricity onto the rest of society. EU-wide industry pays only €34/MWh of taxes and levies on electricity (in an overall electricity price of €110/MWh), whereas households pay €79/MWh in taxes and levies bringing their electricity price up to roughly €210/MWh – nearly double of that paid by industry (EC 2016). In Germany alone, households pay roughly two billion Euros more each year for electricity to make up for the subsidies that energy intensive industries receive. And once other industries and service sectors of the economy are included, the debt mounts to €4.5 billion each year (Fraunhofer ISI and Ecofys 2015).

For example, the average German household pays over 16 €ct/kWh for electricity, whereas in 2014 German energy intensive industry paid less than 5 €ct/kWh for electricity (Fraunhofer ISI and Ecofys 2015). This is a straight shift of the levies designed to cover the cost of developing renewable energy and protecting the environment, and other taxes, from industry to households.

3. Fossil fuel subsidies

Despite committing to phase out subsidies to fossil fuels many times, governments across the EU continue to provide subsidies to fossil fuel production and consumption. EU countries and the EU itself provided nearly €15 billion per year in subsidies to fossil fuel industry and business through fiscal support, including tax breaks for energy use, and price and income support for energy intensive companies and processes (Gençsü et al 2017).

As energy intensive industry uses roughly 20% of Europe's energy[3] and taps into fossil fuels directly as feedstock, it therefore benefits materially from the subsidies that European governments still provide to fossil fuels.

2 The phase IV reform was concluded in December 2017 and will come into effect from 2021-2030.

3 20% is calculated from Eurostat (2016b) p8 by adding the energy used by iron and steel, chemical, metals, minerals, machinery, mining, paper, wood products, textile and other industries against total energy used.

A number of examples identified in 'Phase-out 2020: Monitoring Europe's Fossil Fuel Subsidies' are highlighted below to indicate some of the methods used to support fossil fuel use in energy intensive industry[4]:

In France, reduced 'contributions for the public service of electricity' were applied to electricity consumed by industrial facilities, hyper-electricity intensive facilities and other industrial complexes (currently in operation), resulting in an annual average expenditure of €555 million in 2015-2016 (or €33 million per year given that fossil fuels contribute 6% of electricity generation. ODI and CAN Europe (2017) highlight that other tax exemptions awarded to energy intensive industry included tax waivers on the final consumption of electricity for the use of electricity in certain industrial processes and in geographies where energy is produced.

In Poland, energy intensive industry is granted a tax exemption on use of natural gas. In general industries are committed to pay a tax of €1.10/MWh, but industries with energy intensity above 5% are exempted from the excise tax (Gençsü et al. 2017). Coal is exempt from excise duty if it is used by energy intensive industry for heating purposes, and by business entities that implement systems aiming to foster environmental protection or increase energy efficiency (OECD, 2012).

In the UK, support provided to industry, through climate change levy discounts and exemptions, is estimated at an average of £224 million (€287 million) per year between 2014 and 2016 (HMRC, 2017a; 2017b). The climate change levy is a tax on energy use by non-domestic users to support energy efficiency and reduce carbon emissions.

European Banks

In addition to national subsidies, European banks provide support to fossil fuel extraction and use – keeping costs for fossil fuels low and therefore benefitting energy intensive industry. The European Investment Bank (EIB) provided €7 billion in funding for fossil fuel projects from 2013 to 2015. It also lent €38.4 million for co-fired generation of biomass and coal in 2015, and, at the end of 2015, approved a €600 million loan to a Spanish company for gas pipeline infrastructure, (CAN Europe 2016 and HEAL 2017). These subsidies directly or indirectly benefit heavy industry by making their inputs, including electricity, cheaper.

Another example comes from the European Bank for Reconstruction and Development (EBRD), which made investments of €2.5 billion in fossil fuels from 2014 to 2016 (Gençsü et al 2017). Meanwhile, the Connecting Europe Facility, which is designed to expand cross-border infrastructure, is being used to fund gas pipelines – €800 million between 2014 and 2016. However, by far the biggest gas pipeline project (€40 billion) is the Southern Gas Corridor which aims to link Azerbaijani gas fields to consumers as far away as Italy by 2020. EIB and EBRD loans for the Albania-Greece-Italy section are expected to be the biggest single loans in the history of either of these two banks (HEAL 2017).

4 For a full overview of the findings on subsidies to energy intensive industry please see country studies: https://www.odi.org/publications/10939-phase-out-2020-monitoring-europes-fossil-fuel-subsidies

EU citizens pay with their environment, health and their lives

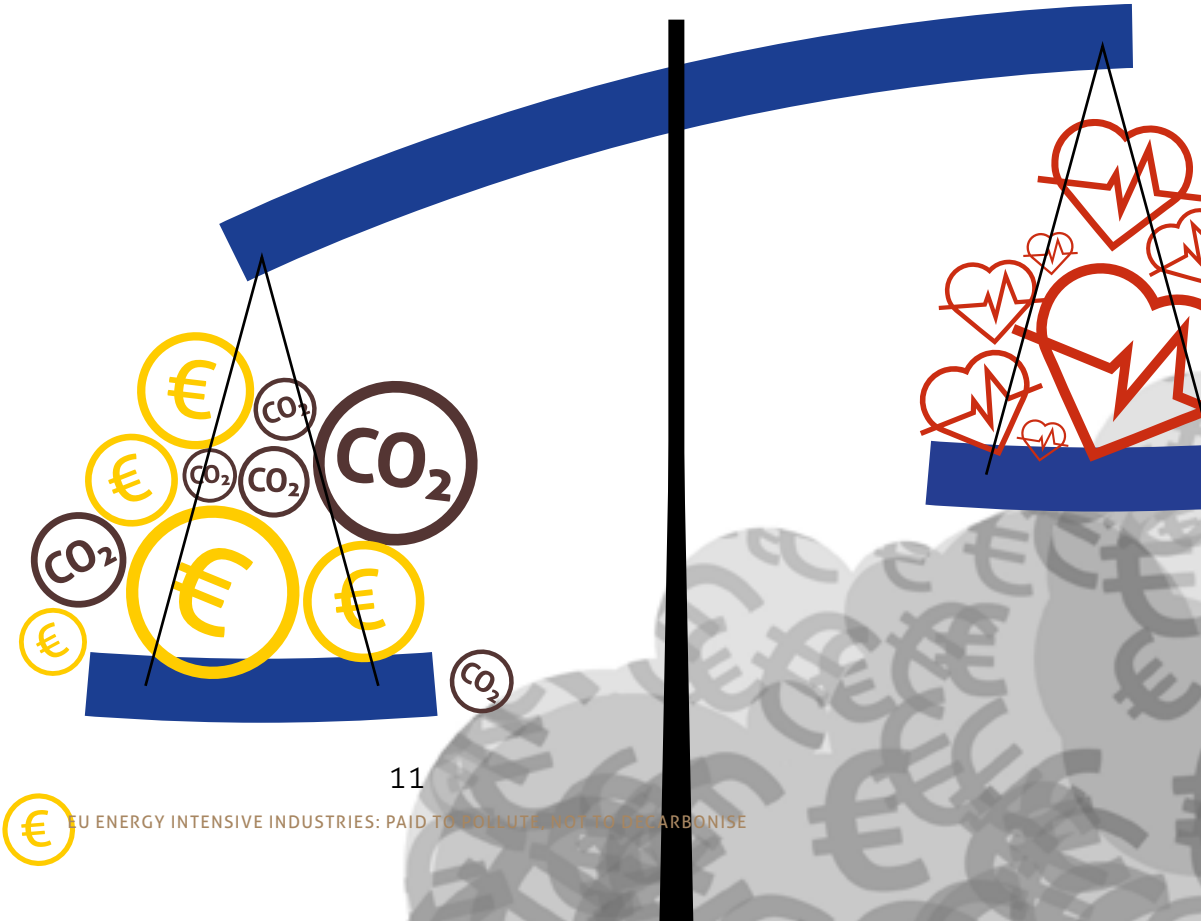
European citizens pay more for their electricity, and higher taxes to fund these subsidies to energy intensive industries. They pay a third time when they face the cost of climate change from heavy industries climate pollution.

According to the European Environment Agency (EEA), climate change is expected to cost the EU around €190 billion a year by the end of the century. Southern Europe will be hit particularly hard, with Mediterranean countries potentially losing 1.2% of GDP by 2050. In addition to higher temperatures, more droughts and heat waves, rising sea levels, more river flooding, impacts on tourism in southern regions and low altitude ski slopes, climate change could lead to a 20% increase in food prices, reduced well-being and many additional deaths (EEA 2016 p283-285).

The societal and economic consequences of climate change are already happening today. The EEA highlights that reported economic losses caused by climate-related extremes in EU countries from 1980 to 2016 were approximately €410 billion. Since 1990, average annual losses have been over €11 billion (EEA 2018).

The Health and Environmental Alliance (HEAL) estimates that already 231,554 Europeans die prematurely due to air pollution which mostly comes from fossil fuels – including in industry and transport (World Bank 2016). In addition, the average annual health costs associated with air pollution stand at €215 billion (Coady et al 2015 in HEAL 2017).

Heavy industry is responsible for almost one quarter (23%) of air pollution emissions (AMEC 2014), contributing directly to the large health costs brought on by air pollution.



Falling behind on innovation and decarbonisation

The perverse incentives within the EU ETS, combined with the many other subsidies European energy intensive industry receives, have undermined the incentive for these industrial sectors to invest in break-through technologies to innovate and decarbonise. A wide range of technological options to reduce emissions in carbon intensive sectors remain unexploited (including efficiency gains and new technologies that will be explored in the following section). Consequently, industrial emissions are not projected to go down from now until 2030 (Carbon Market Watch 2016).

Despite the modest improvements in the EU ETS agreed as part of the Phase IV revision[5], the main opportunities to turn the ETS into a meaningful policy tool to drive towards low emissions and innovation have been missed. Rather, the ETS continues to protect incumbents and work against innovation (Sandbag 2017). It is particularly disappointing that the detrimental practice of handing out free allowances will continue during the next phase, with the EU set to give out 6.3 billion allowances to energy intensive industry for free, worth approximately €160 billion (WWF 2017).

Free allocation of emission allowances in the EU ETS means that European Governments have lost a valuable source of income to invest in the low carbon transition and innovation. Between 2008 and 2015, almost 11.8 billion allowances were given away for free with a potential value of €143 billion (CE Delft in Carbon Market Watch 2016). This €143 billion in lost revenues could have made up a significant chunk of the climate investment gap, the €177 billion gap in investment needed to meet climate and energy targets across the EU (EEA 2017).

Adding up foregone revenues due to free allocation since 2008 and the estimated value of free allowances issued during the next ETS trading phase, **EU governments miss out on a total of €380 billion between 2008 and 2030** (Trilling et al. 2017). This loss actually weighs twice for the taxpayer: as the actual public revenue loss which could have been used to cover social and climate-related expenses, but also as the price current and future generations have to pay for the costs and damages of unmitigated climate change and persistent air pollution.

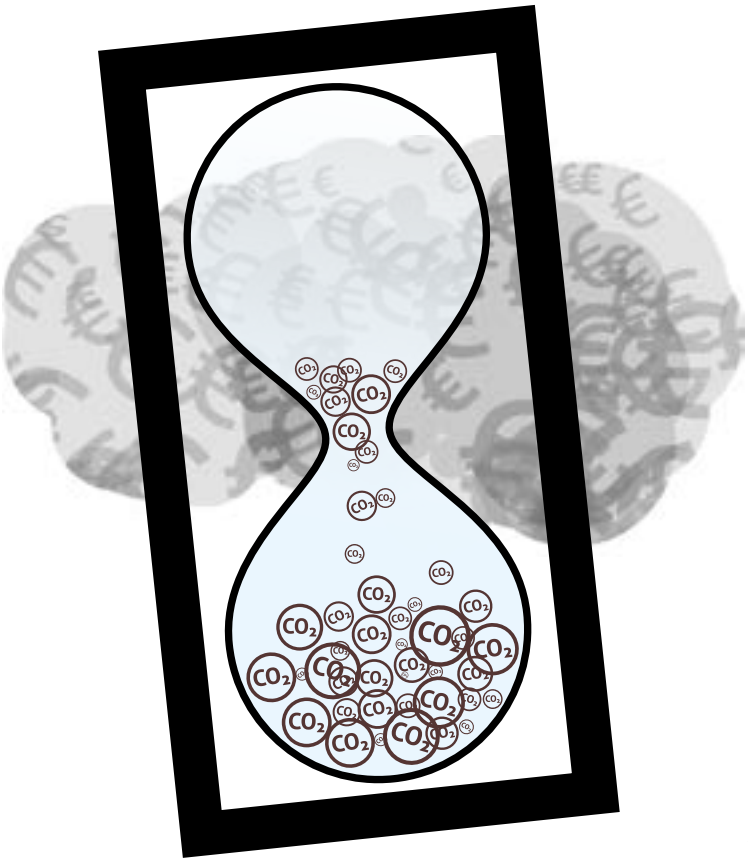
What's more, the global economic downturn has resulted in declining demand for the products of many energy intensive industry sectors, such as steel and cement manufacturing, and have subsequently caused overcapacity. During this period, an unhealthy reliance on government subsidies and perverse incentives to maintain the status quo have slowed down EU energy intensive industry's drive to invest and innovate. They are losing ground to competitors, as described below.

Investment in innovation and other intangible assets remains lower in the EU than in many competitors, who are investing heavily in the upgrade of their industry. The EU's innovation gap is increasing as EU industry's drive to adopt the new, disruptive technologies required by a circular economy (outlined further in this report) is blunted by the deceptively soft bed of subsidies, tax breaks, cheap energy and a flawed ETS. Major economic players like China are investing heavily in research and development, design and trademarks (EC 2017b) and starting to compete precisely in those higher added value segments where Europe traditionally did best (EC 2017c).

5 Including voluntary unilateral cancellation of emission allowances by Member States, double surrender as translated into an increased MSR (Market Stability Reserve) intake rate, and cancellation of 3 billion tonnes of CO_2 from the surplus. For more detail see: https://sandbag.org.uk/2017/11/14/eu-fails-show-leadership-cop23-analysis-ets-reform/

The EU and its member states need to turn this situation around and stimulate more capital investment and facilitate the uptake of promising innovation. The EU also needs to strengthen its enabling environment to ensure that its risk-bearing disruptive innovations will create new markets and industrial leadership in Europe rather than outside (EC 2017c). It could do this by following the advice of its sustainable expert groups which have recommended to classify finance and investment in terms of their contribution to sustainability, encourage investment in areas of circular resource management, instead of the continuous throughput of energy and materials, and instill long term thinking in investment decisions (High Level Expert Group on Sustainable Finance 2018).

Ironically, it is the very structures created within the EU which, rather than establishing an "enabling environment" and long term circular thinking, pull the rug out from under it. Reversing the perverse subsidies and contradictory incentives identified earlier in this report would be a significant step towards the objectives the EU has set on innovation, circular economy and greenhouse gas emissions.



Carbon Leakage is a pervasive myth with no basis

Many of the subsidies to industry are based on the claim from energy intensive industry that they need protection from "leakage" – that is, the risk of businesses relocating to a country with less stringent climate targets and laws, thereby shifting production from a "low emitting" area to a "high emitting" area.

However, "leakage" is a myth that has no basis in fact. Numerous studies have found **no evidence of leakage**, or production displacement, deriving from the EU ETS. In 2013, a study done for the European Commission concluded: "We found no evidence for any "carbon leakage" in energy intensive sectors in the past two ETS periods" (Ecofys 2013). A recent academic paper, the first ever analysis to quantify the effect that energy prices have on global trade, found that that the prospects of EU companies moving their production abroad due to more ambitious climate policies is 'extremely limited'. A ten-fold increase in the carbon price would, according to the researchers, only marginally affect imports and exports, even with the phase-out of free emission allowances and 100% auctioning (Carbon Market Watch 2016 and Sato and Dechezleprêtre 2015).

After the recent phase IV reform of the ETS, the carbon price is only expected to rise modestly (with estimates from little impact on today's low price of around €10-12 per tonne CO_2 to a high estimate of €38 by 2030), noting that previous forecasts have consistently overestimated prices (Evans 2017). Even at the high end, these prices are not at half the levels needed to provide sufficient incentives to meet the commitments made under the Paris Agreement.[6]

Any risk of leakage is only decreasing. With the Paris Agreement in place, all countries have now agreed to take action to keep warming well below 2 degrees and pursue effort to limit warming to 1.5 degrees Celsius, ensuring it stays well below 2 degrees Celsius – making null and void the carbon leakage argument. China is set to launch its national ETS and has been trialling emissions trading schemes since 2013-14 across five cities and two provinces, covering 1,373 Mt CO_2, and achieving high compliance

6 The report of the High-level Commission on Carbon Prices suggested that the carbon price levels needed to achieve the Paris temperature target are at least US$40–80/t$CO_2$ by 2020 and US$50–100/t$CO_2$ by 2030 (Carbon Pricing Leadership Coalition, 2017).

rates. Prices in these pilot markets have been comparable to the EU ETS, generally below 60 yuan/tonne (€7.62) and with an average of approximately 30 yuan/tonne (€3.81). Surely, domestic energy intensive industry also receives generous protection in China, but with the largest global emitter moving, momentum on increasing global climate ambition is growing.

On introduction of its national market in 2019, Chinese emissions trading will cover approximately one-third of the country's carbon emissions (3,500 Mt CO_2) – almost twice the size of the EU market (Pike and Zhe 2017). Other countries have committed to climate action, and are being held to account, within the Paris Climate Agreement, with an increasing number stepping up their efforts.

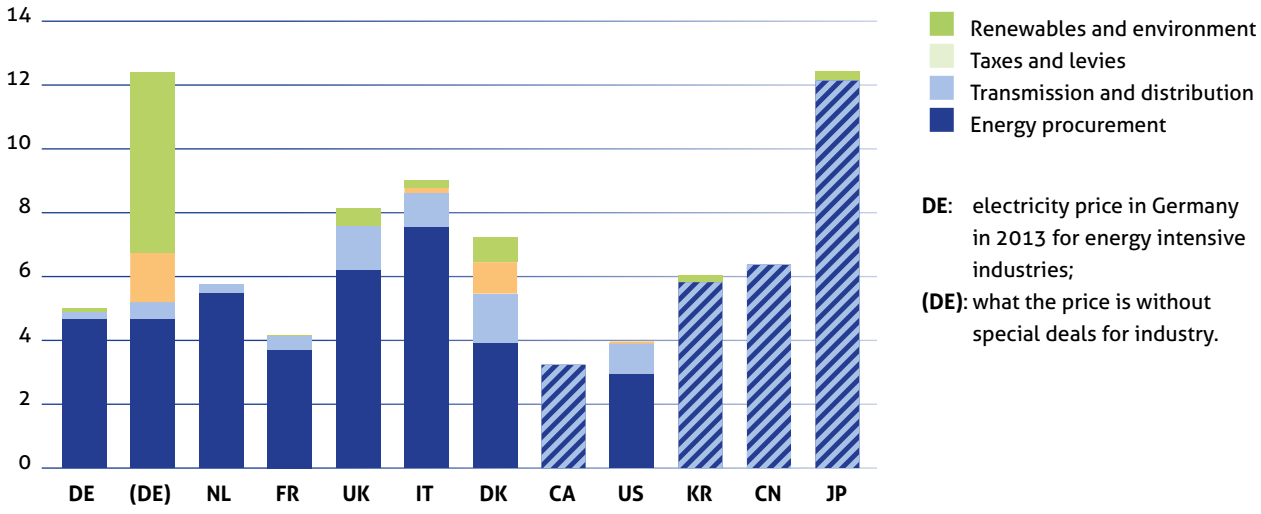
When taking into account the costs of energy paid by energy intensive industry, we see that **energy costs for the manufacturing industry in the EU are substantially lower than most of the EU's trading partners**; for example, China, Japan and Russia.[7]

Energy intensive industry in Europe receives more subsidies for its electricity than the same industries in Canada, US, Korea, China and Japan. For example, in Germany electricity prices for big industry are halved by government subsidies to less than 5 €ct/kWh – whereas Chinese industry pays more than 6 €ct/kWh for electricity – at least 20% more, as demonstrated in the graph below (Fraunhofer ISI and Ecofys 2015).

Additionally, EU industry lost market share to China in steel, paper and aluminium, despite energy costs in the EU being lower than in China (Ecofys et al 2016). EU energy intensive industry needs to stop hiding behind the carbon leakage argument, and instead embrace innovation, decarbonisation and a circular economy. What follows is a recipe for this change.

GRAPH 4: **Electricity prices for big companies**

Calculated electricity price (€ct/kWh)



Source: Fraunhofer ISI and Ecofys (2015)

7 Real unit energy costs (RUEC) – combine energy prices and energy intensity to assess the significance of energy costs in the manufacturing sector. Results are presented as percentage of value added for the manufacturing sector (excl. refineries). For full overview of costs per EU Member State please see graph 3.5.22: https://ec.europa.eu/commission/sites/beta-political/files/swd-energy-union-key-indicators_en.pdf

Opportunities for innovation and decarbonisation

Current policy settings and schemes allow energy intensive industry to continue on a high carbon pathway, propped up by tax payers and losing ground to key competitors on the innovation front. There are alternative pathways, that will require government and industry to face up to the new global environment for heavy industry, the need for urgent climate action, and the opportunities of both.

Whilst improvements in efficiency and decarbonisation of the energy supply can lead to modest emissions reductions (CAT 2017), this "low hanging fruit" has largely been utilised, and deeper, more substantial changes are essential. The biggest energy intensive industry sectors, such as steel, aluminium, cement, chemicals and refineries, all require myriad of **new technologies and production processes** if an economy-wide target such as a 95% reduction commitment is to be credible (CEPS 2017) including the following options (drawing on Wyns and Axelson 2016, CAT 2017):

- Developing **new process technologies** such as a new type of blast furnace that does not require coking coal, oil-based inputs being replaced with other lower carbon inputs in the chemical industry;

- Introducing **innovative products** such as clinker substitute to replace Portland cement, new high performance and lightweight steel, chemical compounds that can be assembled from bio-based feedstock;

- **Transition business models** including for example, fertilizer producers moving from pure manufacturing into agricultural service provision utilizing emerging biotechnologies, the cement and steel industries addressing overcapacity and responding to lower sales volumes through **rationalisation**, modernisation and increased overall value added;

- **Align with other major shifts**, for instance the electrification of ammonia and steel production could allow these processes to act as a battery, balancing a grid with high levels of renewables, reconfigure industries to fit within new resource efficiency and **circular economy** models via adopting business models based on re-use and recycling.

Reaching zero carbon for energy intensive industry will require not only improvements in efficiency, but shifting to clean inputs and the decarbonisation of the energy supply. It will require a far more holistic approach with wide-reaching changes to industrial sub-sectors. For example, the circular economy concept will decrease demand for industrial products and necessarily replace high carbon products with zero carbon alternatives. It will also require targeted research, development and deployment efforts to accelerate the availability of new technology and options (drawing on Circle Economy & Ecofys 2016, CAT 2017). Examples of the steel and cement sectors are presented below to demonstrate the huge shift required from current thinking and pathways to a zero carbon mentality and pathway.

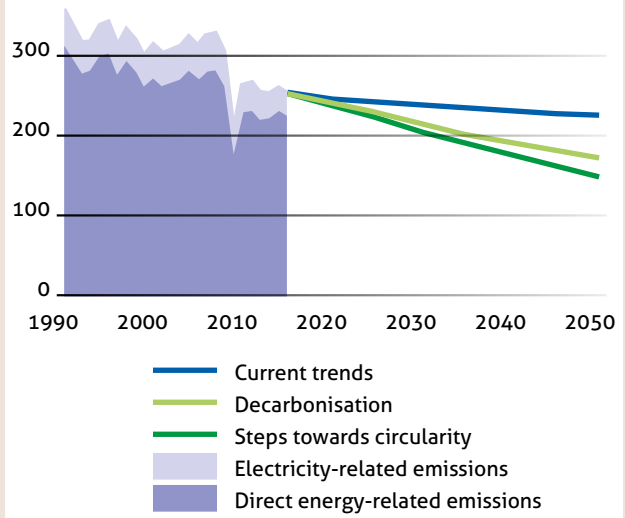
Bringing this innovation on quickly, in the timeframe demanded by climate change, will require massive targeted investments in innovation and capital intensive transformation. It has to be ensured that industry cannot receive these investments to simply pad their profits, but they must be used to decarbonise and innovate. See the investment section below for how the capital for those needs could be generated through pollution pricing, and how it could be deployed.

Example: steel sector

Much of the emission reductions from steel production in the EU is a result of falling production. Production peaked in 2007 at 210 Mt and has since decreased by 21% in 2015 (World Steel Association 2016b in Sterl et al 2017). EU steel production is projected to grow at the modest rate of 0.8% per year to 2050 (Boston Consulting Group & Steel Institute VDEh 2013 in Sterl et al 2017).

The graph on the next page shows three projected pathways: current trends, decarbonisation and steps towards circularity, which include optimisation of the energy and emissions performance of existing production routes, such as increasing process integration, using process gas streams or capturing the emitted carbon, and recycling scrap steel within manufacturing (Sterl et al 2017). The fact that even the most optimistic projection falls dramatically short of the EU 2050 80-95% greenhouse gas reduction target, demonstrates the significant additional investment that is required, and how the industry will be required to think outside the box – requiring an altogether different set of policy levers to be in place than soft targets, free allowances and subsidised electricity. It also speaks to the need for society to look for replacements for steel where possible.

GRAPH 5: **EU Emissions from Steel ($MtCO_2$/year)**



Source: Sterl et al (2017)

One positive example is the initiative from SSAB, LKAB and Vattenfall to create fossil-free steel, the HYBRIT project, 50% funded by the Swedish Energy Agency. Starting with reforming mining, and also utilizing hydrogen produced by renewable energy, the aim is to be fossil-free by 2045. In the short term, blast furnaces will be converted to eliminate most of the remaining CO_2 emissions. This project demonstrates some of the short- and long term thinking that European industry must adopt (LKAB 2018). The steel sector at large will only remain competitive if it manages to scale up these technological frontrunners and replace existing inefficient and carbon intensive furnaces. Without the proper regulatory framework and high pollution costs, it is unlikely that the sector will move in this direction by itself.

Example: cement sector

Cement production in the EU decreased in the wake of the financial crisis in 2008 and has not recovered since, standing at 67% of 1990 production in 2014 (Sterl et al 2017).

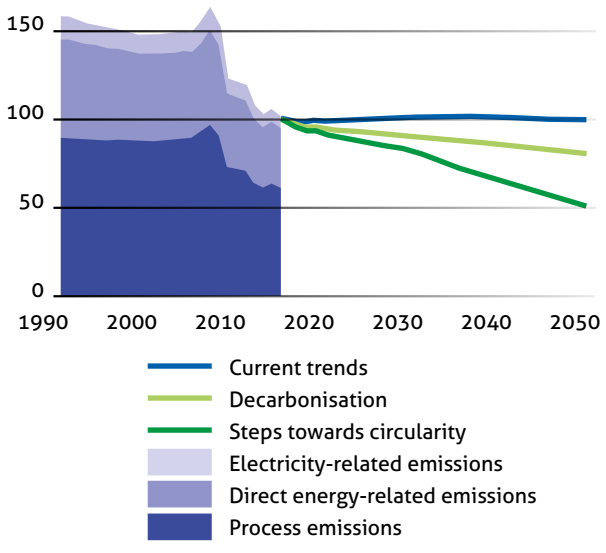
There are several options to reduce emissions in the cement sector, which can be broadly grouped into four categories: clinker substitution, efficiency improvements, use of alternative fuels (both in direct energy and in the power sector), and demand reduction (IEA 2009 in Sterl et al 2017).

The graph below right incorporates projections of emissions from the EU cement industry, showing that on current trends emissions are likely to remain constant.

With strong efforts, including 20% of demand reduced via product substitution, emissions are projected to follow path C. This includes partial substitution of the cement needed for concrete production by using aggregates of cement with e.g. crushed concrete (Fischedick et al. 2014 in Sterl et al 2017), wood waste ash from biomass combustion (Ban & Ramli 2011; Turgut 2007 in Sterl et al 2017), cotton waste from the spinning industry, and limestone powder waste from limestone processing factories (Algin & Turgut 2008 in Sterl et al 2017). Alternatively, it could be a full replacement of concrete with other materials, such as steel or aluminium (which, however, should have their own decarbonisation pathways that may require reductions in production), Cross-Laminated Timber (Circle Economy & Ecofys 2016 in Sterl et al 2017), or cement-free concrete, such as alkali-activated concrete (Neuhoff et al. 2014; Bilek et al. 2016 in Sterl et al 2017).

This modelling demonstrates that with substantial emissions remaining, innovative options will be necessary (Sterl et al 2017) and must urgently be developed. Again, current policy settings provide no incentive for this work to begin.

GRAPH 6: **EU Emissions from Cement ($MtCO_2$/year)**



Source: Sterl et al (2017)

Investment needed

As these two examples demonstrate, industry and government will need to make significant investments in research and development and planning alternatives, as well as creating a circular economy. Two core things must happen. Firstly, governments need to drastically reconsider the current approach of massive government subsidies for energy intensive industry to pollute, and rather make them pay for pollution – both providing industry an incentive to invest and EU governments with funds to commit to innovation. Secondly, both the private and public sector must invest in research, development and deployment. These elements could be complementary – for instance, tightening caps and auctioning ETS emission allowances would raise an additional €120 billion in the period 2021-2030 (WWF 2016) which could be allocated, in part, to industry innovation.

New policy approaches will be necessary, partly as revision IV of the EU ETS has missed the most promising opportunities to reduce emissions and also as deep decarbonisation strategies for energy intensive industry are not able to be driven entirely by the EU ETS, with its far too low carbon price. For instance, the steel sector is estimated at having abatement costs of between €100 and €500 per tonne of CO_2 (CEPS 2017) – this compares with current EU ETS price of around €10 per tonne (Markets Insider 2018) and forecast price of €25 per tonne by 2030 (I4CE 2017). It is clear that policies beyond carbon pricing are required to enable the development of new technologies in relevant time horizons (CEPS 2017).

A part of this solution is the EU ETS Innovation Fund (formerly the New Entrants' Reserve (NER) 300 Programme). In the past, the NER has allocated €2.1 billion and attracted €2.2 billion in additional private investment to 39 innovative projects. Thus in total about €4.3 billion (EC Nov 2017). For the period after 2020, ETS allowances are to be set aside for the Innovation Fund to support large scale demonstration of innovative low carbon technologies for energy intensive industry, renewables, and carbon capture and storage (EC Sept 2017). These plans are expected to generate approximately €4.5 billion over 2021-2030. This is a good step in the right direction, but nowhere near the potential scale of what auctioning ETS permits could generate. Likewise, it is neither close to investment levels needed, given that a single demonstration project can run to €1-2 billion (CEPS 2017).

Whenever public funding is made available for innovation, it should clearly be demarcated, so that it does not turn into general support for a firm's day-to-day operations (and follow the ignominious pathway of the EU ETS).

Perhaps even more important than public research funds is strengthening Europe's "enabling environment", that should stimulate capital investment, and facilitate promising innovation to ensure that risk-bearing disruptive innovations will create new markets and industrial leadership in Europe (EC 2017d).

Europe needs to stimulate more capital investment and facilitate the uptake of promising innovation. Strengthening Europe's enabling environment will ensure that its risk-bearing disruptive innovations will create new markets and industrial leadership in Europe rather than outside (EC 2017d). It could do this by following its own advice to classify finance and investment in terms of their contribution to sustainability, encourage investment in areas of circular resource management (instead of the continuous throughput of energy and materials), and instill long term thinking in investment decisions (High Level Expert Group on Sustainable Finance 2018).

Most tools to stimulate and support industrial competitiveness are available on the national and regional level. The ambition to strengthen European industry at EU level therefore needs to be matched by national reform efforts, taking into account specific national and regional differences (EC 2017d).

The case of German Fat Cats[8]

In Germany, a wide array of measures is in place ensuring that energy intensive industry is well shielded from the same costs and obligations that other market players and households have to shoulder.

In 2016 alone, Germany provided **direct and indirect subsidies to energy intensive industry amounting to around €17 billion**, which is about equal to Germany's 2017 federal budget on education and research and significantly higher than the expected financial volume of the ETS Innovation Fund for the entire next trading phase 2021-2030.[9]

Between 2005 and 2016, industry received a total of more than €159 billion subsidies in the form of rebates, exemptions and preferential tax treatment. These schemes have steadily increased since 2005.

Broadly, German energy intensive industry benefits from schemes falling into four main categories: ETS-related subsidies, exemptions from energy and electricity taxes, exemptions from the German feed-in tariff for renewables and miscellaneous exemptions and rebates.

TABLE 3: **Overview of direct and indirect subsidies to energy intensive industry in Germany, 2005-2016**

Subsidy category	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
EU ETS	2365	1851	75	1987	1605	1649	1616	885	586	1098	1179	964
Energy/electricity tax	4132	4236	5066	5263	5374	5440	3837	4693	4432	4626	4482	4550
Feed-in tariff for RES	624	640	974	1138	1182	2086	3495	3583	5286	6844	6505	6523
Miscellaneous rebates	3603	3592	3576	3586	3575	3624	3901	4231	4466	4672	4791	4973
TOTAL	10724	10319	9691	11974	11736	12799	12849	13392	14770	17240	16957	17010

Source: Green Budget Germany (2017)

1. ETS-related subsidies

Through free allowances and compensation schemes, the EU ETS provided subsidies to German industry of more than **€950 million** in 2016. This figure considers all free allowances given to the industry as subsidies, irrespective of whether the sectors used them to cover their own emissions or sold them on the market.

2. Exemptions from energy and electricity taxes

Germany also grants a number of rebates and exceptions for its energy and electricity taxes to energy intensive industry. Currently, a total of 52,900 German companies benefit from special tax rebate which for example grant beneficiaries to pay a reduced electricity tax rate of 1.54 Ct/kWh instead of the general rate of 2.05 Ct/kWh. In addition, certain processes applied in energy intensive sectors are even completely exempted from both electricity and energy taxes. Altogether preferential tax provisions for energy intensive industry in 2016 amounted to **€4.5 billion**.

3. Exemptions from the German feed-in tariff for renewables

In order to boost the market share of renewables in its national energy mix, Germany has opted for the introduction of a feed-in tariff. Under this scheme, the producers of renewables receive a fixed amount for their energy sold on the market. Since this fixed price is higher than the actual market price of energy, the difference is paid through the feed-in tariff which is added to everyone's energy bill. A growing number of companies has been granted either partial or total exemption from paying the tariff, depending on their energy-intensity. In 2016, German energy intensive industry received around **€6.5 billion** in subsidies.

4. Miscellaneous exemptions and rebates

There are a number of additional measures in place. They range from special rates on levies to support cogeneration and investors in offshore energy, to rebates for concession fees paid to local municipalities for making use of public infrastructure. While the latest amounts to an estimated subsidy of €6.5 billion per year, Green Budget Germany estimates the total of remaining rebate schemes to amount to **€5 billion**.

8 The following section builds on an analysis of financial benefits to energy intensive industry between 2005 and 2016 by the German Forum Ökologisch-Soziale Marktwirtschaft (FÖS)/Green Budget Germany: Green Budget Germany (2017). Ausnahmeregelungen für die Industrie bei Energie- und Strompreisen - Überblick über die geltenden Regelungen und finanzielles Volumen 2005-2016 (available in DE). http://www.foes.de/pdf/2017-04-FOES-Kurzanalyse-Industrieausnahmen-2005-2016.pdf

9 Assuming (very optimistically) an average carbon price of €30/tCO_2 and a total of 450 million allowances set aside for the fund which is meant to finance low carbon technology demonstration projects, the Innovation will be worth €13.5 billion over the 2021-2030 period.

Conclusion and recommendations

2018 is an important year to kick-start the process and momentum to increase global climate ambition. Countries have agreed to discuss how to enhance ambition, providing the impetus for a reboot of the EU's approach to energy intensive industry, ensuring they add to, rather than subtract from, EU climate ambition.[10]

Enhancing ambition is necessary as initial pledges to the Paris Agreement put the world on a pathway to 3 degrees Celsius – a catastrophic level of climate change.[11]

The EU and its member states need to make clear that energy intensive sectors will be required to fully decarbonise before 2050, setting stretch goals for the various sectors as markers along the way.

The European Commission should **revise its draft long term climate strategy as soon as possible**, sketching out the possible pathways to decarbonise the European economy until mid-century in ways **compatible with the 1.5 and well below 2 degrees Celsius targets of the Paris Agreement**.

Based on the revised roadmap, the European Commission should develop **pathways for the ambitious decarbonisation of energy intensive industry**. It should do so in consultation with existing expert groups such as the High level group on energy intensive industries or the High level industrial roundtable 'Industry 2030', bringing together stakeholders including governments, industry, trade unions, academics and civil society. This exercise could help sectors to update existing industry-specific roadmaps toward full decarbonisation or start drafting those embedded in a more cross-sectorial roadmap that is aligned with the Paris Agreement.

Both the sectoral as well as the horizontal roadmaps should pay particular attention to **address energy poverty and provide measures to support just transition plans** for affected communities and workers in industries that must, by necessity phase down and be replaced with zero carbon alternatives.

The rules of the **EU ETS need to be revised and tightened** in light of the long term targets of the Paris Agreement by strengthening the cap, cancelling surplus allowances and ensuring that the polluter-pays-principle is respected in all sectors covered by the scheme.

The funds generated by carbon pricing, and increased auctioning of ETS allowances, should be committed to the Innovation Fund. Rules should be established to ensure that the Innovation Fund is not simply used to pad industry profits, but supports low carbon technology for short term use, and zero carbon technologies to deliver the necessary decarbonisation and emission pathway. As the prime beneficiary of these funds, industry must accept it should pay for its emission allowances. The **free allocation of pollution permits under the ETS needs to be phased out**.

It is clear that the ETS alone will not be enough. Complementary policies are necessary – both at an EU level and at a national level. The first opportunity is the establishment of adequate and credible 2030 targets for the deployment of renewable energy and energy savings at EU level. The EU should encourage member states to **strengthen carbon pricing**, for example through a common carbon floor price and look into additional measures to complement the insufficient ETS framework at the EU level. Finally, the European Commission should consider the setting of Emission Performance Standards for the production of resource and energy intensive materials.

Member states should **assess all national policy addressed at industry, including taxation policy**, and ensure that it supports, not undermines, a transition to a zero carbon industry. This should include removing energy price subsidies for energy intensive industry, shifting the burden from the public back to the industries responsible for pollution, as well as ensuring concrete plans are implemented and reported upon to phase out all fossil fuel subsidies. Progress towards policy change **should be reported through existing frameworks** such as the European Semester and through upcoming frameworks such as National Energy and Climate Plans (NECPs) under the Energy Union.

This wholesale revision of existing policy – and reversing the current approach of paying energy intensive industry to pollute – is necessary to ensure that the EU is making its fair contribution to the Paris Climate Agreement and that the energy intensive industry within the EU has a future in the new decarbonised, circular economy that we must, necessarily, create.

10 Discussions on how to increase ambition will be pursued via the Talanoa Dialogue which is a process organized through the UN Framework Convention on Climate Change (UNFCCC), running throughout 2018.

11 The Climate Action Tracker calculates current unconditional pledges that governments have made, including NDCs, would limit warming to about 3.16°C [3] above pre-industrial levels by 2100 (CAT 2018).

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Climate Action Network Europe is Europe's largest coalition working on climate and energy issues. With over 140 member organisations in more than 30 European countries – representing over 44 million citizens – CAN Europe works to prevent dangerous climate change and promote sustainable climate and energy policy in Europe.

CAN Europe is a regional node of Climate Action Network, a worldwide network of over 1,100 Non-Governmental Organizations (NGOs) in more than 120 countries, working to promote government and individual action to limit human-induced climate change to ecologically sustainable levels.

CAN members work to achieve this goal through information exchange and the coordinated development of NGO strategy on international, regional, and national climate issues.

Climate Action Network Europe
Mundo-B, Rue d'Edimbourg 26, Brussels 1050, Belgium

www.caneurope.org