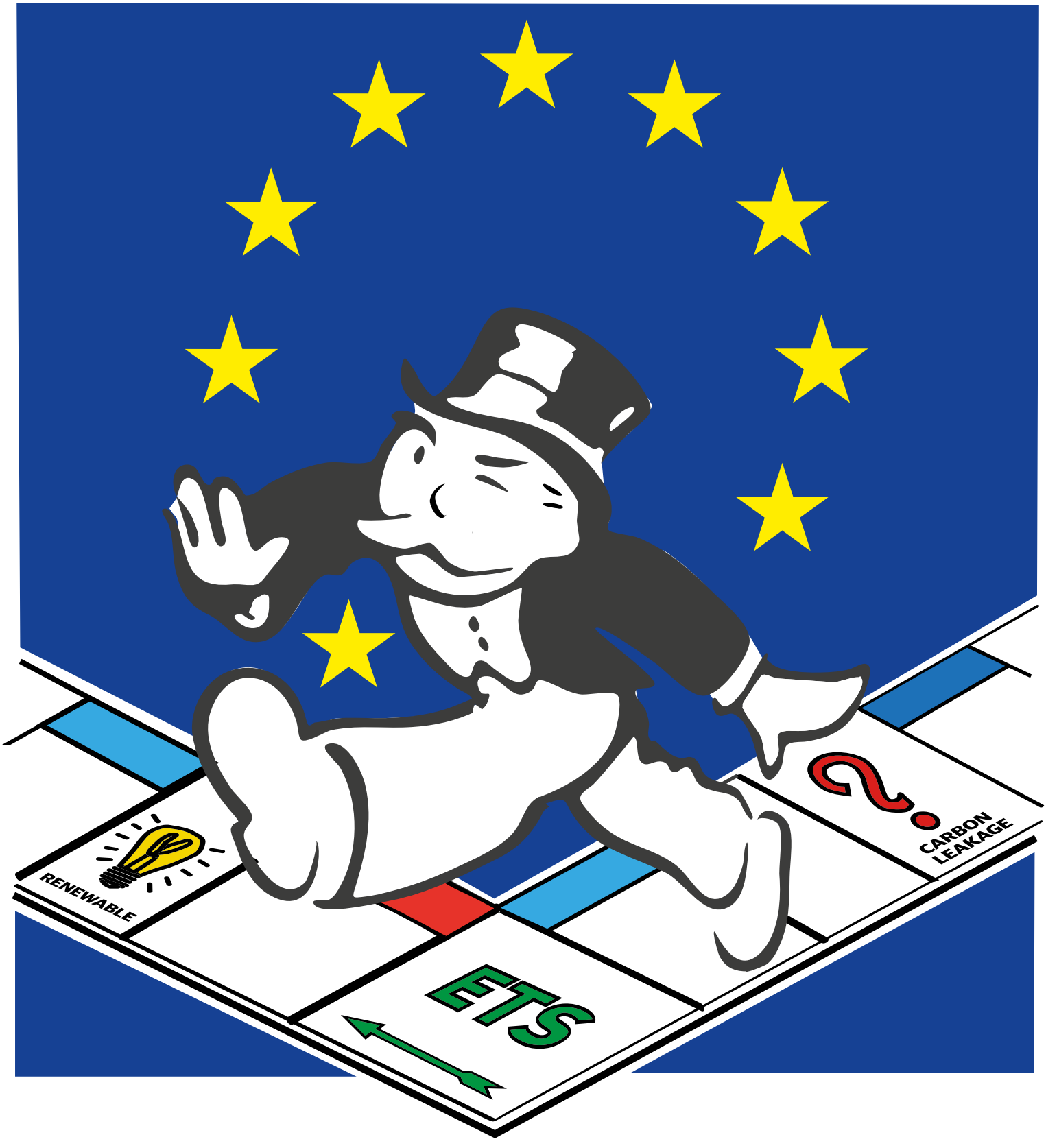
Carbon leakage myth buster

Carbon Market Watch Policy Briefing
October 2015



Executive summary

The current EU ETS rules have granted preferential treatment to industrial companies deemed at risk of "carbon leakage" in the form of awarding free pollution permits. The ongoing legislative process to revise the EU ETS rules for the post-2020 period provides an important opportunity to revisit the rules under which industrial sectors may be deemed at risk of carbon leakage. The current rules are in urgent need for reform for the following three reasons:

1. **To date there has been no compelling evidence that EU's climate policies are forcing companies to move abroad** and recent academic studies indicate that this is also unlikely to happen in the future even with a complete phase-out of free pollution permits.

2. **Free allocation has disincentivised companies to invest in sustainable technologies**. The result is that certain European industries have fallen behind the global average in carbon efficiency and saw their competitive advantage decrease. Phasing-out free allowances and increasing the share of auctioned allowances can mobilise up to €160 billion that can be ring-fenced for low-carbon breakthrough technologies in industrial sectors.

3. **Handing out free pollution permits has led to windfall profits at the expense of taxpayers.** These windfall profits are the result of industries letting their customers pay the price for freely obtained carbon permits. Certain industrial sectors are furthermore over-allocated with free carbon permits due to flawed EU ETS rules: companies receive free carbon permits based on historical production levels even if current production levels are cut by almost half. These excess emission rights can be sold for a windfall profit in the market.

This policy brief sheds light on the myths of carbon leakage and gives recommendations how to change the current rules in the overview table on page 10 and 11.

Key recommendations

- Phase out the free allocation of pollution permits by gradually increasing the share of allowances to be auctioned from 57% in 2021 to 100% in the future
- Limit the industrial sectors on the carbon leakage list to those that really need protection
- Only compensate industrial sectors on the carbon leakage list for the share of carbon costs that are not passed on to customers
- Do not give free pollution permits to sectors that are not on the carbon leakage list (and hence not at risk of carbon leakage)

"Carbon leakage" – the threat of production relocation due to the EU ETS

The EU Emissions Trading System (EU ETS) covers just over 40% of the EU's greenhouse gas emissions from the industry and power sector. After each year, companies participating in the system must surrender enough allowances to cover all of their emissions. Since 2013, power generators have to buy all of their allowances to emit CO_2 at auction. However, most manufacturing industries receive up to 100% of their CO_2 allowances for free because EU's policy makers have decided that they are at risk of "carbon leakage".

Carbon leakage is a term used to describe the hypothetical situation where stringent climate policies would force companies to move their production abroad to countries with less ambition climate measures to lower their production costs. This can lead to a rise in global greenhouse gas emissions.

The provisions to protect the manufacturing industry in Europe for the potential risk of relocation due to the EU ETS are only valid for the period from 2013 to 2020. Currently, more than 150 sectors, representing more than 97% of industrial emissions, are deemed to be at risk of "carbon leakage" and receive free pollution permits. Between 2013 and 2020, 6.6 billion allowances will be given out for free to industry. These free pollution permits have a monetary value of €50 billion[1].

A key question is how the concept of "carbon leakage" will be addressed in the next ETS trading round from 2021-2030. Despite concerns that free allocation rules have not had the desired effects, the European Commission has proposed to continue with many of the existing rules, including the hand-out of around 6.3 billion free pollution permits in the post-2020 period. Since the carbon price is expected to increase from around €8 today to an average €25 in the 2021-2030 period, this would represent a financial subsidy of €160 billion[2] to heavy emitters.

Uncovering the "carbon leakage" myth

There has so far been no compelling evidence that the EU's climate policies are forcing companies to move abroad and recent academic studies indicate that this is also unlikely to happen in the future:

- **No evidence for production displacement due to the EU ETS so-far:** A study commissioned by the Commission concluded in 2013 that no conclusive evidence of carbon leakage occurrences can be detected[3]. Some sectors have observed increased imports or decreased exports but this was mainly driven by global demand developments, and not by the EU ETS.

- **No evidence for future "carbon leakage" risk:** A recent academic paper published by the London School of Economics finds that the future impact of more ambitious climate policies on EU companies moving their production abroad is likely to be "extremely limited". A ten-fold increase in the carbon price would, according to the scientists, cause exports to fall by only 0.5% and would increase imports by 0.07%, even with 100% auctioning[4].

- **Industry confirms lack of "carbon leakage" risks:** The manufacturing industries themselves have denied the existence of carbon leakage risks. Energy-intensive companies last year reported to their shareowners that the competitiveness risks of the EU ETS are not an issue for them[5].

- **Many relocation destinations have similar climate policies:** The number of countries and regions where companies could relocate their production to avoid climate policies diminishes greatly as the global efforts to tackle climate change increase, especially in light of the future Paris agreement. Jurisdictions that have put a price on carbon currently account for 40% of the global economy[6] and the number is growing steadily. China will roll-out a national carbon market from 2017 and several regions in the United States and Canada have already implemented emissions trading for example. Carbon prices in emissions trading systems around the world are often similar to or higher than the EU ETS price.

- **Industry can pass-through the carbon costs:** The impact assessment by the Commission shows that all industrial sectors are able to pass-through a significant part of the carbon costs. This means that they have to bear only the remaining part of costs (i.e. the costs not passed through to customers). If costs can be passed through, then the risk of carbon leakage diminishes or disappears, depending on the percentage of pass-through[7].

Delivering real investments in the European economy

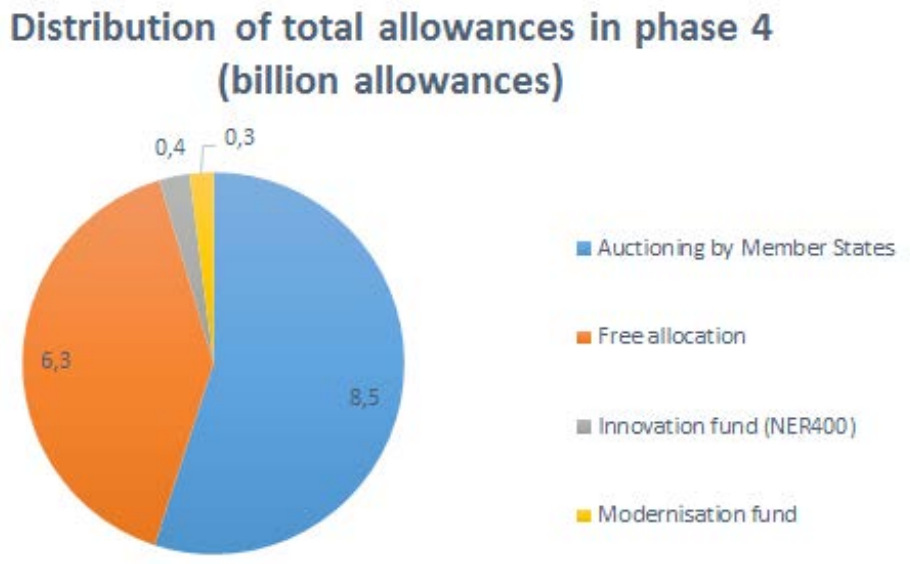
European industrial companies receive their allowances to emit CO_2 for free and are therefore hardly exposed to the carbon price. That means that European companies are currently not receiving a sufficient price signal to produce more efficiently or invest in innovative technologies that reduce CO_2. A wide range of technological options to reduce emissions in these carbon-intensive sectors are available that remain unexploited. Free allocation shields industrial sectors from the carbon price signal and puts European industry at risk of falling behind in deploying low-carbon, state-of-the-art technologies compared to their competitors abroad. It also fails to reward those companies that have already chosen to shift their production towards efficient, low-carbon technologies.

At the same time, giving free emission allowances to industry reduces auctioning revenues that could be mobilized by governments. Taxpayers must then make up the loss of public funds represented by the lower auctioning revenues. Consequently, free allocation means that less money is available for investments in the low-carbon transition of the European economy. Moving away from free allocation towards full auctioning of allowances would generate €160 billion in additional revenues between 2021 and 2030 that could be earmarked to fund breakthrough technologies in industrial sectors.

Europe lacks the abundant availability of cheap labour, energy and raw materials as in other places in the world. This is why Europe's industry needs to excel in turning its manufacturing processes into the most energy efficient and innovative in the world in order to remain highly competitive. Encouraging efficiency improvements through the carbon price and investing the auctioning revenues in breakthrough technologies in industrial sectors can help achieve this.

Recommendation how to deliver real investments in the European economy:

- Enlarge the innovation fund to an NER1000 by setting-aside one billion allowances. Invest the revenues in the transition to a low-carbon economy by supporting the energy and industry frontrunners that want to invest in breakthrough technologies in Europe.



"The EU ETS revision proposes to hand out 6.3 billion free allowances. If, instead, these allowances were auctioned, an additional €160 billion of climate finance could be mobilised and earmarked to fund breakthrough technologies in industrial sectors".

> Unequal carbon pricing place[s] the EU manufacturing sector in general – and the cement sector in particular – at risk of carbon leakage
> -Lafarge

LAFARGE HAS MADE **€485 MILLION** FROM THE EU ETS IN THE YEARS 2010 TO 2014

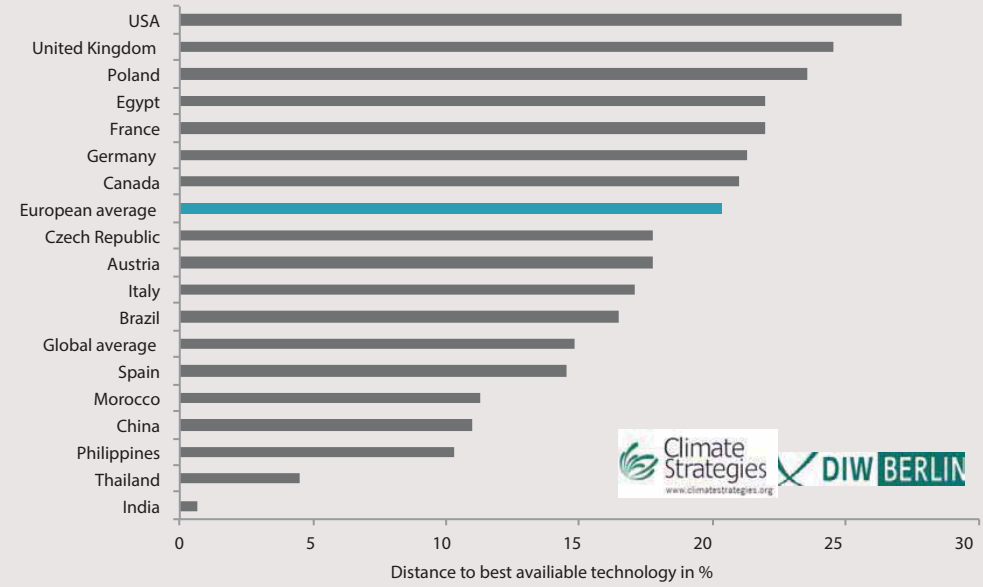
Case study: Europe has fallen behind in efficient cement production

Currently, the most efficient cement production occurs in Asia, particularly India and China[8]. This is because the European cement industry still uses older and less efficient plants, while most investment occurs in emerging markets where the growth in cement demand is the highest. By giving away free carbon permits there has hardly been a sufficient economic incentive to leverage emission reduction options in the cement sector. This has even led to the situation in which cement companies could financially profit from the EU ETS by selling their surplus of freely obtained carbon permits. According to Lafarge's 2014 annual report[9], the group has been able to make almost €500 million windfall profits from the EU ETS in the last 5 years, through the sales of excess carbon permits.

Subsidizing pollution through the allocation of free carbon permits results in less money being available for investments in breakthrough technologies. This has halted the development of technologies necessary to significantly decrease the energy and carbon intensity of cement production. Producing cement from magnesium silicates for example will significantly reduce CO_2 emissions as magnesium does not contain carbon, in contrast to limestone which is traditionally used to make cement. Further development of magnesium silicates however appear to be halted due to financial constraints. An enlarged innovation fund could help make Europe's cement production more competitive by making available additional financial resources for efficiency and innovation.

Figure 5: Energy consumption per tonne of cement clinker above benchmark in 2011.

Cement production is particularly efficient in some Asian countries.



Source: Based on Cement Sustainability Initiative - GNR database.

Windfall profits for polluters

Some energy-intensive corporations have used the EU ETS to increase their cash flows by using the theoretical risk of carbon leakage as an argument to receive pollution subsidies from governments. These companies have profited from the EU ETS in the following ways:

1. Industries have generated windfall profits by letting their customers pay the price for freely obtained carbon permits.

2. Industries have received more carbon credits for free than they actually need, and are able to sell their over-allocation for a windfall profit in the market.

3. Industries in several countries are subsidized for the hypothetical risk of "indirect carbon leakage".

Windfall profits from passing on non-existent carbon costs

Several carbon-intensive industries that are not at genuine risk of carbon leakage are still receiving all of their carbon credits for free. These corporations are able to cash in these freely obtained allowances by letting their customers pay for their non-existent carbon costs.

Numerous studies including an analysis by Commission[10] have found that companies pass through at least part of the costs of carbon pricing to consumers. The steel and refineries sectors for example pass through 60%-100% of the market price of carbon to their consumers. This has resulted in windfall profits in the order of €25 billion, assuming an average 50% cost-pass through rate[11].

The Commission therefore underlines that "all sectors analysed would be expected to gain windfall profits" in the post-2020 period based on the current EU ETS revision[12]. In the steel sector alone for example, the proposed EU ETS revision will lead to at least €1.3 billion windfall profits, according to the Commission's analysis[13]. This stands in contrast to the EU Council Conclusions of October 2014 stressing that the consideration to "avoid windfall profits will be taken into account".

Overview of the range of avarage cost pass- through in selected sectors from literature

Sector	Product	Minimum	Maximum	# of studies	Estimated in
Iron and steel sector	Flat products	60%	100%	3	McKinsey(2006); Vivid Economics (2014); CE Delft (2010)
	Long Products	66%	80%	2	McKinsey(2006); Vivid Economics (2014);
Cement	Portland cement, white cement	35%	70%	4	McKinsey(2006); Vivid Economics (2014); Walker (2008); Alexeevi-Talebi (2010)
Glass	Container glass	20%	50%	2	Vivid Economic (2014); Oberndorfer (2010)
	Hollow and other glass	30%	80%	3	Vivid Economic (2014); Oberndorfer (2010); Alexeevi-Talebi (2010)
Refineries	Petrol	60%	120%	5	McKinsey(2006) ; Vivid Economic (2014); CE Delft (2010); Alexeevi-Talebi (2010); Oberndorfer (2010)
	Diesel	40%	70%	4	McKinsey(2006) ; Vivid Economic (2014); CE Delft (2010); Oberndorfer (2010)
Petrochemicals	Plastic, PE PVC, PS	25%	80%	3	CE Delft (2010); Alexeevi-Talebi (2010); Oberndorfer (2010)
Fertilizers	Fertilizers and nitrogen compounds	0%	75%	2	Alexeevi-Talebi (2010); Oberndorfer (2010)

Windfall profits from over-allocation

Carbon-intensive industries have in the past received more free carbon credits than they actually need, and are able to sell off the surplus carbon credits for a profit in the market. This is the result of flawed rules in the EU ETS directive. Companies receive free emission allowances based on historical production levels even if current production levels are cut by almost half. Industries that run their factories at low production levels can use this loophole to receive up to twice as many emission allowances for free than they actually need. This surplus of freely acquired allowances can be sold on the carbon market for a profit. This has sometimes led to the perverse situation in which industrial factories tried to maximize their windfall profits by reducing production levels and cashing in the resulting surplus allowances.

The European Commission found that during 2005-2012, industrial sectors accumulated a considerable surplus of free allowances of around one billion. If sold on the market against today's prices, these industries are able to generate a windfall profit of €8 billion.

Case study: ArcelorMittal steel factory in Florange (France)

The world's largest steel company has reduced the production levels of several of its factories in Europe due to the economic crisis. Yet each installation was still able to receive as many emission allowances for free as it would when running at full capacity. This has led to unions members accusing ArcelorMittal of artificially inflating its balance sheet by selling freely obtained pollution permits when it reduced production at its steel plant in Florange (France)[14].

ArcelorMittal has so far been able to build-up a surplus of 140 million freely obtained emission allowances[15]. By selling these surplus emission allowances ArcelorMittal has generated $500 million windfall profits in the last five years (around €440 million)[16].

Compensation for energy costs

Electro-intensive companies in several countries[17] are subsidized for "indirect costs"[18] that are the result of higher energy bills because of the possible impact of the EU ETS on electricity prices. A study for the Commission has concluded that indirect costs did not have a significant effect on the risk of carbon leakage in most industries[19]. Indirect costs can be avoided if a company buys renewable electricity, since there are no carbon costs associated with producing energy from renewable sources. Compensating electro-intensive industries for their indirect coal consumption hampers the transition to an efficient, climate-friendly energy system as it reduces the incentive to purchase low-carbon electricity. Little information is available on the amount of subsidies that are given to industry to compensate them for their high-carbon power consumption. The Netherlands has for example made available €50 million for the year 2015 alone[20].

Recommendations how to avoid over-subsidizing polluters:

- Phase out the free allocation of pollution permits and start auctioning more emission allowances to avoid subsidies for carbon pollution in the order of €160 billion in the 2021-2030 period.
- Do not allow the use of state aid to compensate industry for indirect carbon costs so that incentives remain for the transition to a low-carbon energy system.

The formula to determine the amount of free pollution permits

Industrial sectors are given free emission allowances to protect them from EU's carbon pricing instrument in order to address the hypothetical risk of "carbon leakage".

The formula to determine the amount of free allocation for a certain company (both in the current situation as well as under the newly proposed rules) is:

Free allowances = historic production level x *benchmark value* x *percentage free allocation* x *correction factor*

Benchmark value The amount of free allowances that an installation receives is determined mainly by performance benchmarks. These benchmarks reflect the greenhouse gas emission performance of the best installations in the EU producing a specific product.

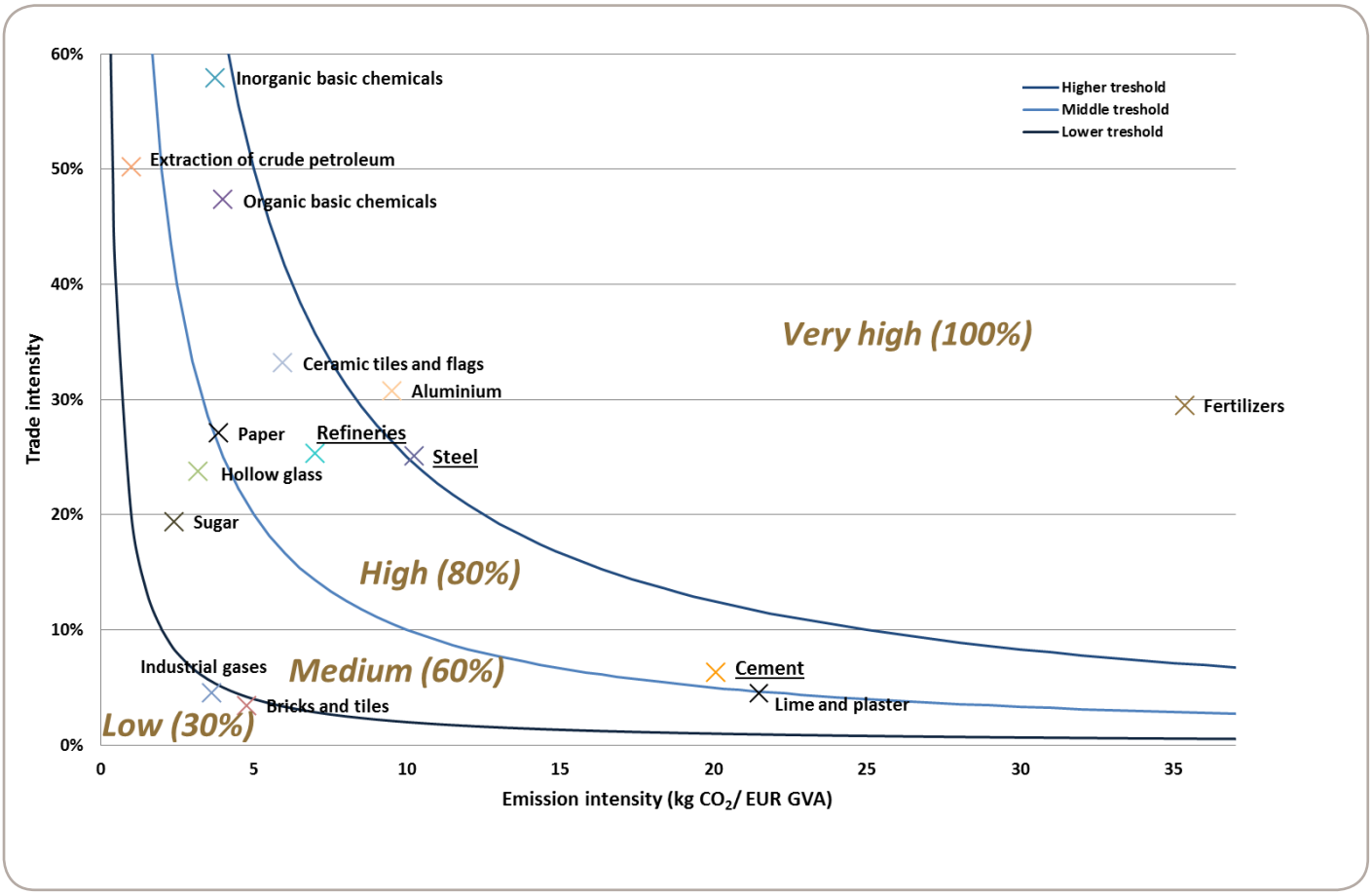
Percentage of free allocation Industrial sectors that are deemed to be exposed to the risk of "carbon leakage" are put on the so-called "carbon leakage list" and receive 100% of their allowances up to the benchmark for free. Two parameters are assessed in order to determine the exposure of each industrial sector to the risk of "carbon leakage": their trade intensity (imports and exports) and their emissions intensity. The other industrial sectors not on the list receive less for free.

Correction factor The maximum amount of free allowances is fixed to a certain percentage (±40%) of the total available emission allowances. This is to ensure that the amount of allowances available for auctioning and delivering fiscal revenue to Member States remains predictable. In years in which the demand for free allowances exceeds the fixed limit, a cross-sectoral correction factor is applied to reduce the amount of free allocation to each industrial installation accordingly.

The EU ETS revision proposal

The EU ETS revision[21] presented in July 2015 proposes to make available free emission allowances to all industrial sectors, whether they are at risk of relocating or not. The exposure to "carbon leakage" is determined by the multiplication of the trade and the emissions intensity of an industrial sector. If the resulting value is above the 0.2 threshold (emissions intensity x trade intensity>0.2), the sector receives 100% allocation of free allowances, else the sector receives 30% for free. The figure from the Commission shows that even industries that are hardly at risk of relocating as a result of the EU ETS (sugar, cement, lime) would be eligible for 100% free allocation. In total 94% of industry's emissions will be on the "carbon leakage list" and receive 100% for free.

The total number of free allowances is capped to a certain limit in order to protect the auctioning revenues of Member States. Since almost all of industry's emissions are covered by 100% free allocation, it is very likely that the limit on the amount of free allowances will be exceeded. This makes it necessary to apply the correction factor in the post-2020 period to reduce the amount of free allocation to each industrial installation accordingly. This situation can be avoided if the 100% free allocation of emission allowances is reserved for those industrial sectors that are really considered to be at risk of relocation due to the EU ETS. Raising the threshold for 100% free allocation to 2.5 for example would guarantee that the steel, aluminium and fertilizer sectors are able to receive 100% of the required allowances for free with little risk that the correction factor reduces their number of free allowances.



SWD (2015) 135, Impact Assessment accompanying the EU ETS revision

Overview table comparing current rules with the EU ETS revision and recommendations

Current carbon leakage provisions	EU ETS revision proposal	Recommendations
Over phase 3, ±40% of the total allowances will be allocated for free to industry. If the total amount of free allowances exceeds ±40% of the total ETS cap, the **cross-sectoral correction factor** is applied to reduce the amount of free allowances to all industries.	EU Member States decided that the **current share of auctioned allowances (57%) should not decline after 2020,** which means that a **uniform correction factor** is applied to the amount of free allowances to all industries if it exceeds ±40% of the total ETS cap.	The minimum **share of allowances to be auctioned should gradually increase from 57% in 2021, to 100% auctioning in the future.** Auctioning is the most cost-efficient, simplest, fairest, and most transparent way to allocate allowances, fully reflecting the polluter-pays principle. The modernization fund should be monetized by the European Investment Bank and should therefore come on top of the Member States' auctioning share.
Industrial sectors not at a risk of carbon leakage receive 80% for free in 2013, down to 30% in 2020, with a view to reaching no free allocation in 2027	**Industrial sectors that are not at risk of carbon leakage** (and hence are not on the carbon leakage list) will still receive 30% for free up to 2030	**Industrial sectors that are not on the carbon leakage list (and hence not at risk of carbon leakage) should not receive any free allocation after 2020**
The **validity of the carbon leakage list** is **5 years.** The carbon leakage list identifies which industrial sectors are deemed to be at risk of carbon leakage and receive 100% free allocation.	The validity of the carbon leakage list will be **10 years.**	**The validity of the carbon leakage list** should be no longer than **5 years**. Regularly updating the list is important to make the list responsive to the rapidly changing global market developments
Currently 97% of industry's emissions receive 100% free allocation. **The carbon leakage criteria** to determine who is on the list and who is not is based on the trade intensity and/or the carbon costs of total production costs.	Around 94% of industry's emissions will be on the **carbon leakage list** and receive 100% free allocation[22]. The **carbon leakage criteria** are based on the multiplication of the trade intensity and the carbon intensity. Everyone above the 0.2 threshold gets 100% free allocation, even though only sectors above the 2.5 threshold are at very high risk of carbon leakage.	**Sectors that are not deemed to be exposed to carbon leakage** *("high risk")* **should not receive any free allowances** from 2021 onwards. That means that sectors falling below the 2.5 threshold should not be able to receive any free allowances. This will significantly reduce the share of industry's emissions on the carbon leakage list and reserve the limited amount of free allowances to those sectors that could really be at risk of relocation
The trade intensity criterion to assess the extent to which sectors are at risk of carbon leakage does not exclude trade with countries that have implemented comparable climate efforts to the EU ETS**.**	**The trade intensity criterion** to assess the extent to which sectors are at risk of carbon leakage does not exclude trade with countries that have implemented comparable climate efforts to the EU ETS**.**	The trade intensity criterion should **exclude trade with countries that have implemented carbon pricing policies or are participating in the 2015 global climate agreement.** These regions are deemed to have taken comparable efforts to reduce emissions and hence the import + export to these regions will not bring EU industries at risk of carbon leakage.
No provisions are introduced to take into account the ability of industrial sectors to pass-through carbon costs to consumers. The free allocation of allowances to sectors that pass-through carbon costs will result in **windfall profits.**	**No provisions** are introduced to take into account the ability of industrial sectors to **pass-through carbon costs to consumers.** The free allocation of allowances to sectors that pass-through carbon costs will result in **windfall profits.**	Sectors should not be compensated for the carbon costs that they can pass on to their customers to avoid windfall profits. **Sectors on the carbon leakage list should only be eligible to receive free allowances for the share of carbon costs that are not passed on to customers**, based on the minimum cost-pass through rates in table 33 of the Impact Assessment.

Sectors can still be added to the carbon leakage list based on a **qualitative assessment** by the European Commission taken certain criteria into account, but without specifying how	Sectors below the 0.2 threshold (but above a 0.18 threshold) can still be added to the carbon leakage list based on a **qualitative assessment** by the European Commission taken certain criteria into account, but without specifying how	**Sectors should not be able to enter the carbon leakage list through a "qualitative" assessment,** based on the opinion of Commission officials. This ensures that the assessment of the exposure of sectors to the risk of carbon leakage is made in the most transparent, democratic and objective way possible.
The historical production data is taken from 2005-2008 or 2009-2010 (whichever is higher)	**The historical production dat**a are taken from the 2013-2017 and 2021-2025 period	Support the Commission's proposal
If companies **reduce their production** by more than 50% compared to their historical production level, then their free allocation of allowances will be reduced accordingly. If companies undertake **significant capacity extension**, they are entitled to additional free allowances	In addition, if companies significantly **increase their production** compared to their historical production level, then they are entitled to additional free allowances from the New Entrants Reserve. It is unclear what will be considered a "significant" production increase or decrease, currently it is set at more than 50%.	If companies decrease their production by 10% or more, their allocation of free allowances should be reduced accordingly to avoid windfall profits from selling surplus allowances.
The **benchmark values** are determined on the basis of performance data of the 10% most efficient installations in the EU in each sector based on their production in the years 2007 and 2008. These benchmarks will soon become severely outdated as the data will be more than two decades old by 2030.	The **benchmark value**s from 2007-2008 are reduced by 15% for the 2021-2025 period and by 20% for the 2026-2030 period to reflect technical progress since then (= average 1% annual improvement rate). If on the basis of submitted production data it appears that the annual progress is much higher or lower than 1%, the benchmark values are annually reduced by 0.5% or 1.5% instead	The benchmark values should ideally be based on the best available product (in terms of GHG emission performance) on the global market, consistent with the top-runner approach. This ensures that European installations receive an incentive to keep up with their global competitors. In case this is unfeasible, the **benchmarks should be annually adjusted by -1.74% up to 2020 and -2.2% thereafter** to be in line with the reduction of the overall emission ceiling. This means that the benchmark values from 2007-2008 are reduced by 27% for the 2021-2025 period and by 38% for the 2026-2030 period.
Member States may provide compensation for **indirect carbon costs** in line with State aid rules.	Member States should provide compensation for **indirect carbon costs** in line with State aid rules and use the revenues from auctioning in this regard.	**State aid for indirect costs should not be allowed** in order to keep the incentive for industry to switch to low-carbon energy sources and avoid a distortion of the internal market. Innovation support could instead be directed towards industrial sectors with relative high indirect costs to enable efficiency improvements or a switch to renewables.
300 million allowances have been monetized to fund investments in low-carbon innovation in the energy sector (NER300)	400 million allowances will be set-aside to fund low-carbon innovations in energy and industry (NER400). Additionally, 50 million allowances from the MSR will fund low-carbon innovation projects before 2021	The innovation fund (NER400) should be enlarged into an **NER1000** in which 1 billion allowances are set-aside to fund investments in low-carbon innovations in the energy and industry sector

Contact information:
Femke de Jong, EU climate policy advisor
femke.dejong@carbonmarketwatch.org

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1. SWD(2015) 135, Impact Assessment accompanying the EU ETS revision see here p. 27
2. SWD(2015) 135, Impact Assessment accompanying the EU ETS revision see here, p. 27
3. See Ecorys' Carbon Leakage Evidence Project: Factsheets for selected sectors, September 2013
4. LSE (2015), Asymmetric industrial energy prices and international trade, see here
5. See the 2014 letter of the Institutional Investors Group on Climate Change (IIGCC) to president Barroso here
6. ICAP (2015), see here
7. CEPS (2013), Carbon Leakage: An overview, see here
8. Climate Strategies (2014), Staying with the Leaders: Europe's Path to a Successful Low-Carbon Economy see here
9. Information taken from Lafarge annual reports: €158 million (2010), €177 million (2011), €99 million (2012), €14 million (2013) and €37 million (2014)
10. SWD(2015) 135, Impact Assessment accompanying the EU ETS revision see here, p. 202 table 33
11. In the 2021-2030 period, assuming 6.6 billion free emission allowances that are sold at today's prices (±€8/tCO_2). The 50% cost-pass through rate is an estimate based on table 33 of SWD(2015) 135
12. SWD (2015) 135, Impact Assessment accompanying the EU ETS revision see here, p. 182 (using the highest cost-pass through rates found in literature)
13. SWD (2015) 135, Impact Assessment accompanying the EU ETS revision see here, p. 183 table 24 (using the lowest cost-pass through rates from the literature)
14. See Le Monde (2012) here
15. Sandbag (2014), Slaying the Dragon see here
16. Information taken from ArcelorMittal's annual reports: $140 million (2010), $93 million (2011), $220 million (2012), $32 million (2013) and $14 million (2014)
17. The Netherlands, Germany, Greece, the UK, Spain, Belgium (Flanders) and Norway.
18. Installations covered by the EU ETS face direct carbon costs when buying their CO_2 emission allowances at auction. Consumers of energy and industrial products can face indirect costs when the costs of carbon emissions related to their consumption are being passed through to them. Indirect carbon costs are the logical result of how the "polluter-pays" principle is implemented in the EU ETS. If a consumer buys a car for example, the carbon costs of the steel used to produce that car are passed on to him or her. The consumer hence pays indirectly for the carbon pollution it has caused.
19. Ecorys' Carbon Leakage Evidence Project: Factsheets for selected sectors, September 2013
20. see here
21. COM(2015) 337, EU ETS revision proposal see here
22. Ecofys (2015) see here

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