

# What's needed to fix the EU's carbon market

## Recommendations for the Market Stability Reserve and future ETS reform proposals

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## EXECUTIVE SUMMARY

The EU Emissions Trading System (EU ETS) is the largest carbon market in the world and was originally seen as the cornerstone of Europe's climate policies. However, the EU ETS has suffered from a large amount of excess emissions allowances largely caused by weak emission reduction targets and the inflow of carbon offsets. This has resulted in a carbon price that is too low to promote low-carbon solutions.

The EU ETS suffers from credibility issues and an overhaul of the system is necessary to ensure that the EU can play a leadership role in the run up to a global climate agreement. In the coming years, EU policymakers have the chance to improve the design of the EU's carbon market as the proposal to enact a market stability reserve will be negotiated and new legislative proposals to implement the 2030 framework are expected in early 2015.

Measures to fix the problems of the EU ETS are necessary to set the European economy on a path to decarbonisation and avoid that future climate targets can be undermined for decades to come. Without action, European industry is at risk of falling behind in deploying low-carbon technologies compared to their competitors abroad. Moreover, the accumulated excess allowances put the emission reductions from other European policies at risk because it is possible to bank the unused oversupply of carbon allowances for use in the post-2020 period. This means that the EU ETS is transforming the emissions reductions from renewable and efficiency policies into future rights to pollute.

The EU's weak emissions targets and the huge inflow of international offsets have led to an oversupply of carbon permits while the economic crisis reduced demand for these permits. The surplus in the EU's carbon market amounts to 2.1 billion tonnes of CO<sub>2</sub>-equivalent and this surplus is projected to increase further to 2.6 billion carbon permits by 2020<sup>1</sup> which is more than the total tonnes of CO<sub>2</sub> emitted in all the EU ETS sectors in a year.

Up to 2020, around 1.6 billion international offsets will be used under the EU ETS, diverting investments away from projects that increase the competitiveness of European industry and the modernisation of Europe's energy system. The Commission has proposed to exclude the use of offsets after 2020, but the current use of offsets can still taint the domestic nature of the 2030 climate target because it is possible to bank allowances between trading periods. EU's 2030 target to reduce domestic emissions by at least 40% could in reality only represent a 34% domestic cut due to the surplus being banked into the post-2020 period.

An overhaul of the EU ETS based on the following recommendations is urgently needed as the EU ETS is currently cancelling out the greenhouse gas reductions from other existing and future policies and hence does more harm than good in the fight against climate change.

## Recommendations to fix the EU's carbon market:

- Ensure that the EU ETS is designed to be in line with the 2050 objective of reducing emissions by 80-95% by increasing the linear factor by which the ETS cap is annually reduced to at least 2.6%.
- Protect the domestic nature of the 2030 GHG target by removing at least 1.6 billion of the excess allowances.
- Avoid carbon price hikes by enacting the Market Stability Reserve at the earliest possible date (2017).
- Disallow the use of international offsets after 2020 as it delays domestic abatement efforts and has not proven to lead to real mitigation in host countries.
- Introduce full auctioning for all industrial sectors post-2020 to reflect the polluter-pays-principle.
- Establish an EU climate fund to be replenished by a portion of the ETS auctioning revenues.

## INTRODUCTION

The EU Emissions Trading System (EU ETS) covers just over 40% of the EU's greenhouse gas emissions. The objective of the EU ETS is to promote greenhouse gas reductions in a cost-effective manner by sending a price signal to promote technologies that stimulate the transition to a low-carbon economy.

The EU ETS is the world's biggest international carbon market covering more than 11,000 power stations and industrial plants in the 28 EU Member States, and Iceland, Liechtenstein and Norway, as well as intra-EU flights. The EU ETS puts a limit on the amount of greenhouse gas emissions that big installations can emit. This cap is reduced over time so that total emissions are reduced. Companies participating in the system receive or buy emission allowances which they can trade with one another: one emission allowance allows for one tonne of CO<sub>2</sub> to be emitted. Companies that cut their emissions more aggressively will have spare allowances to sell to other companies who did not sufficiently cut their emissions. After each year, a company must surrender enough allowances to cover all of its emissions, otherwise fines are imposed<sup>2</sup>.

The EU ETS was launched in 2005 as the world's first international carbon market. Its first phase was a trial period of three years from 2005 to 2007 in which the supply of allowances exceeded demand by a sizeable margin. Phase two (2008 to 2012) had to deal with a massive overcapacity of two billion allowances, or about a year's emissions, by the end of the phase. This surplus was banked for use in phase three from 2013 to 2020<sup>3</sup>.

On 22 January 2014, the Commission proposed the EU's 2030 climate and energy framework. EU leaders are expected to take political decisions on this framework in October 2014 which will be followed by a number of legislative proposals in early 2015 to implement the 2030 climate and energy targets. These proposals are inter alia expected to include a revision of the EU ETS to increase the linear reduction factor. The only legislative proposal that the Commission has put forward on 22 January 2014 is a separate structural reform of the EU ETS: the establishment of a so-called Market Stability Reserve. This co-decision proposal which gives EU policymakers the chance to improve the design of Europe's carbon market in the coming months still needs the approval of the European Parliament and the Council.

## WHY THE EU ETS FAILS TO PROMOTE LOW-CARBON SOLUTIONS

The goal of the EU ETS is to put a price on carbon emissions that is sufficiently high to promote investments in sustainable low-carbon technologies and reward companies that produce more efficiently. By putting a price on carbon emissions it becomes more attractive to use renewable energy than heavily polluting coal for example. Moreover, companies that produce more efficiently gain a competitive advantage because they do not need to buy as many allowances and hence have lower costs than their more polluting competitors.

The current carbon price of around 5 euros per tonne of CO<sub>2</sub> is however far too low to spur investments into efficient technologies or encourage the use of renewable energy. The low carbon price threatens Europe's longer term climate objective by locking in long-lived and carbon intensive infrastructure. The low carbon price is also partly responsible for the more than 50 dirty coal-fired power plants which are currently under

development in the EU<sup>4</sup>. Once built, these new coal plants will emit high amounts of CO<sub>2</sub> for decades to come. Figure 1 shows that the carbon price plunged from almost 30 Euros per tonne of CO<sub>2</sub> in 2008 to as low as 5 Euros today. The huge collapse in the carbon price is the result of a continued imbalance between supply of and demand for carbon permits. Main reasons for this are:

1. Even without economic crisis, the yearly emission limits of the system were set higher than the business-as-usual emissions, thereby allowing companies covered by the EU ETS to even increase their emissions<sup>6</sup>.
2. The surplus was further exacerbated by the possibility to use international offset credits in the EU ETS. In 2013, the accumulated use of offsets amounted to 1.2 billion. Offsets

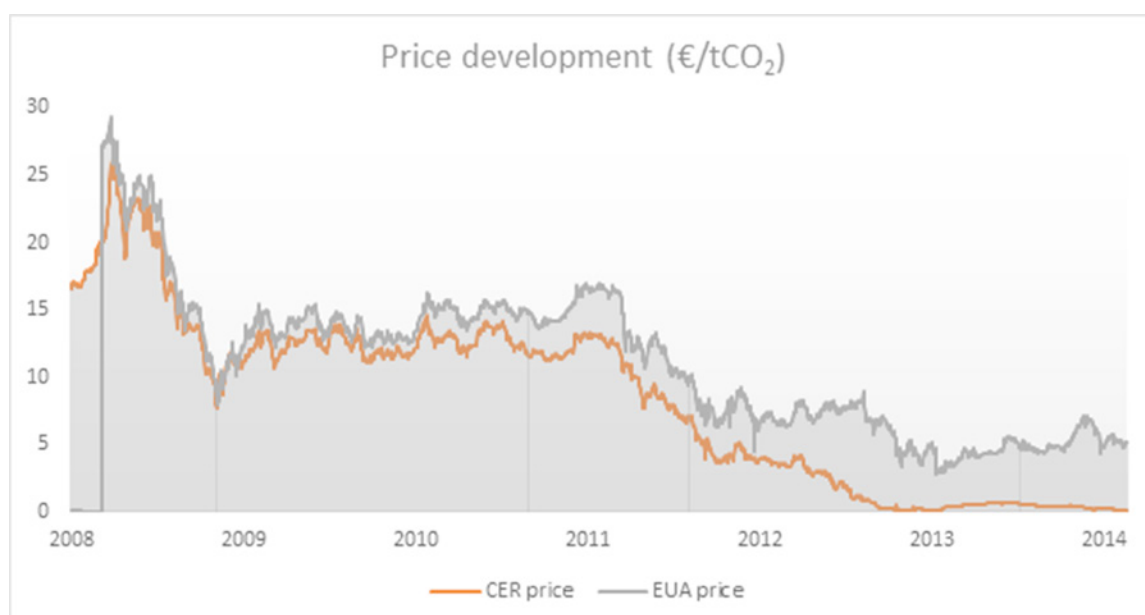
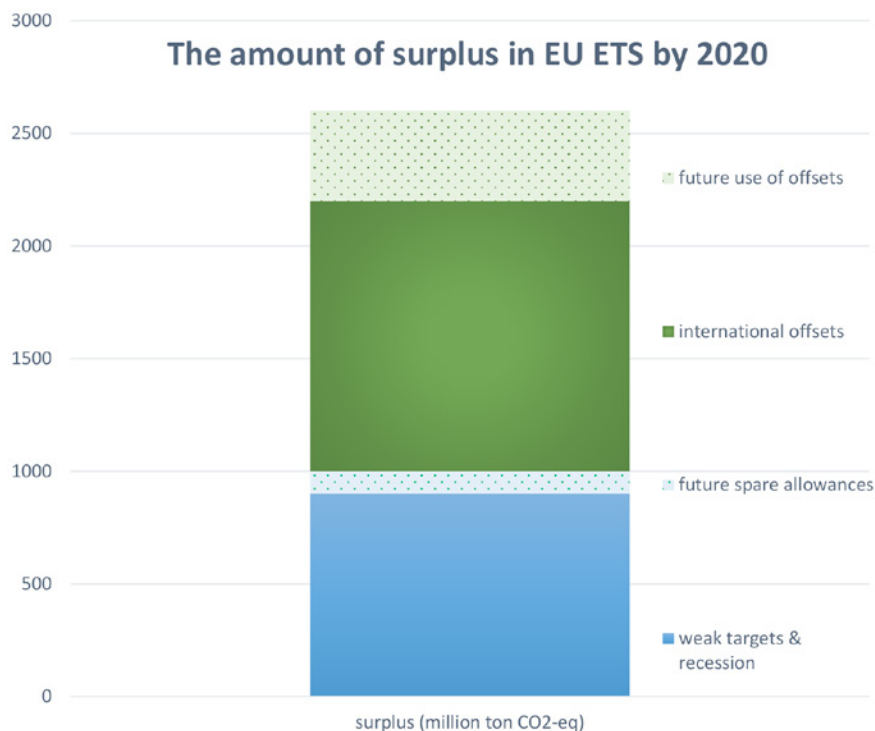


Figure 1: The price development of CDM offsets (CER price) and EU ETS credits (EUA price) from 2008<sup>1</sup>

currently constitute more than half of the more than two billion excess allowances in the carbon market (see also figure 2).

- EU's emissions experienced a decrease as the economic crisis had an impact on the industrial production and electricity consumption. However, it is clear that even if economic growth returns to pre-recession levels, emissions are unlikely to climb back to high levels. From 1990 to 2011, EU's economy grew 45% while emissions decreased by 18.3%.<sup>7</sup>

Figure 2: The build-up of surplus in EU ETS up to 2020<sup>8</sup>



## CARBON OFFSETS

Under the EU ETS, companies can purchase up to 50% of their emissions reduction obligations through carbon credits from offsetting projects in developing countries. The overall limit is set at 1.6 billion offset credits for phase II and III (2008-2020)<sup>9</sup>. The price for carbon offsets is low: they are currently selling at €0.10 (see Figure 1).

European companies have rushed to exploit this option, which allows them to meet their current and future reductions efforts more cheaply than by purchasing allowances under the EU ETS. Even though companies are expected to overshoot their collective 2020 target without needing to buy any credits, companies have incentives to purchase international offset credits because this frees up EU carbon allowances that they can bank to meet their post-2020 reduction obligations or sell into the market at a profit.

Recently, the Commission and the Parliament have proposed that no international offsets can be used to meet the 40% domestic greenhouse gas reduction target for the year 2030. However, this welcome step towards domestic climate action in Europe is still threatened by the current banking rules that allow the carry-over of offset credits that have been converted into EU ETS allowances. This means that the 1.6 billion international offsets that will have accumulated in the system by 2020 can be used towards the 2030 reduction target. The future target will hence fall short of 1.6 billion tonnes of domestic action, which implies that EU's 40% domestic climate target for the year 2030 could in reality only represent 34% domestic emission reductions<sup>10</sup>, see also figure 3.

The domestic nature of EU's 2030 climate target is only guaranteed if the following conditions are met:

- International offsets cannot be used after 2020 as it delays domestic abatement and crowds out European investments in clean technologies.
- At least 1.6 billion allowances are cancelled from the system (which is equivalent to the accumulated amount of international offsets by 2020).
- The EU ETS directive includes safeguards that ensure linking with other emission trading systems does not compromise EU's domestic climate target.

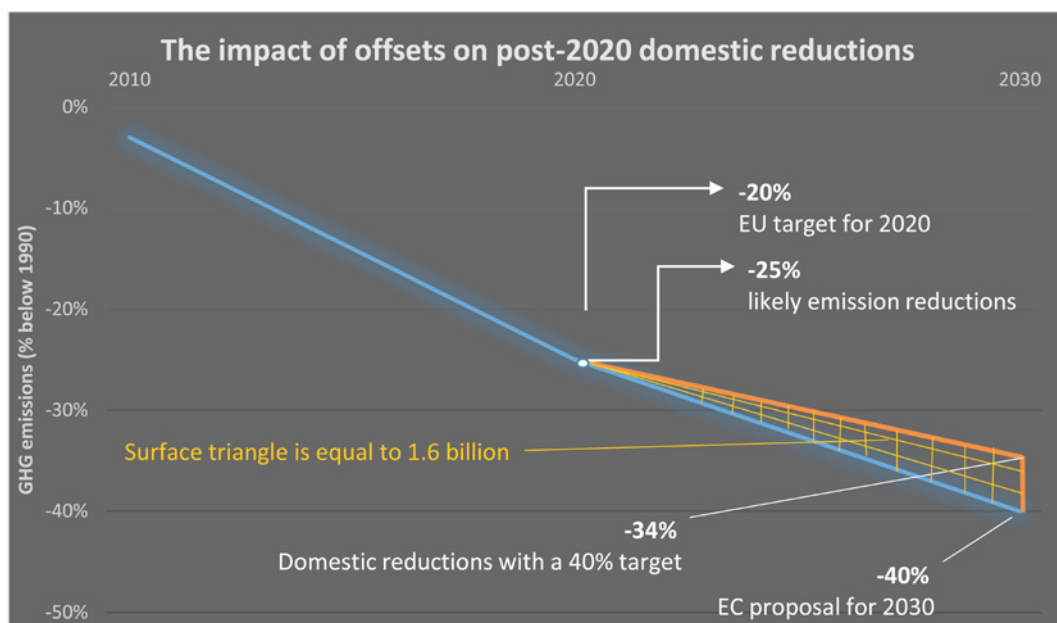


Figure 3: The impact of offsets on the post-2020 domestic reduction effort<sup>11</sup>

## LINKING OF EMISSIONS TRADING SCHEMES

The EU intends to link its ETS to other emerging emissions trading systems. It is currently negotiating with Switzerland on linking the EU ETS with the Swiss ETS for example. Such linking risks compromising the integrity of the EU ETS if the linked systems are oversupplied or allow the use of low-quality offsets. It will furthermore undermine the domestic nature of EU's 2030 climate target. The EU must therefore develop clear rules and safeguards that ensure linking does not compromise EU's domestic climate target for 2030.

## BACKLOADING: ONLY A TEMPORARY FIX

The proposal of the Commission to back-load the auctioning of 900 million allowances during phase 3 (2013-2020) is a temporary measure to tackle the surplus in the short term. Backloading reduces the auctioning amounts in 2014, 2015 and 2016 by respectively 400, 300 and 200 million allowances. These allowances are returned to the market in 2019 and 2020 by increasing the auctioning amounts by 300 and 600 million allowances in these years.

Backloading does not address the size of the structural surplus of around two billion allowances in phase 3 and 4, as can be seen from figure 4. Without further measures, the imbalance between supply of and demand for carbon permits will continue to exist, depressing the carbon price substantially for at least another decade<sup>12</sup>.

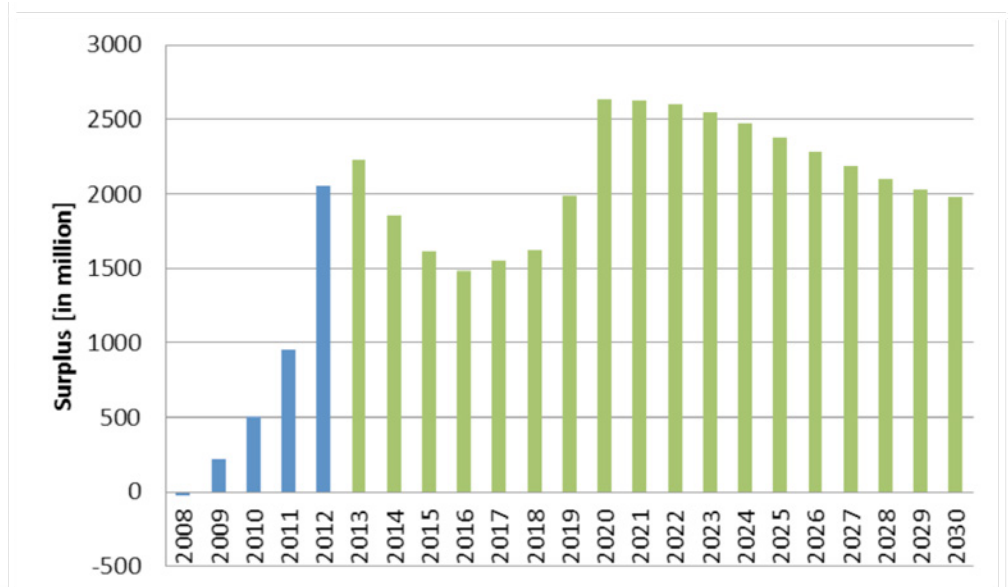


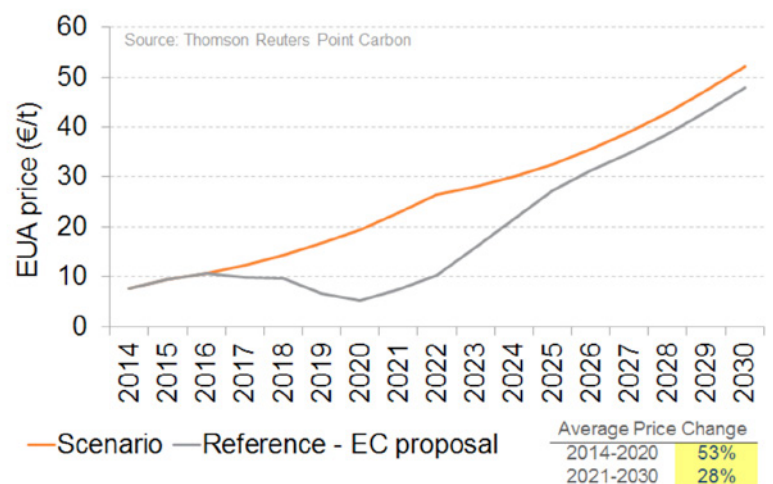
Figure 4: The surplus in the EU ETS in million allowances (the blue columns are based on actual figures, the green ones are estimations)<sup>13</sup>

## WHY THE MARKET STABILITY RESERVE IS NOT ENOUGH

The current imbalance in the carbon market is aggravated by the “mismatch between the **supply** of emission allowances, which is **fixed** due to the nature of the EU ETS as a cap-and-trade system (and was decided in more favourable economic circumstances) and **demand** for them, which is **flexible** and impacted by economic cycles, fossil fuel prices and other drivers”<sup>14</sup>.

On 22 January 2014, the European Commission proposed to set up a Market Stability Reserve (MSR)<sup>15</sup> to address the imbalance and mismatch between the supply of and demand for carbon permits, operating from 2021 onwards. Under the proposal, carbon allowances are automatically put into or released from the reserve based on predetermined rules. If the surplus is larger than 833 million allowances in any year, 12% of the surplus is placed in the reserve, while if the surplus gets below 400 million, the reserve will automatically release 100 million allowances back to the market.

### 2017 start + permanent cancellation: prices\* (real)



\*The depicted price scenarios reflect only an indicative price path and are based on theoretical statistical model. Scenario prices do not reflect a Point Carbon price forecast, but are meant to show the relative impact of different scenarios.

Figure 5: The carbon price development when the MSR starts operating in 2017 and the back-loaded allowances are permanently cancelled (Thomson Reuters Point Carbon, 2014)

Although the Market Stability Reserve will help to create more scarcity on EU's carbon market in the short term and mitigate the downward pressure on the carbon price resulting from efficiency and renewable policies, it does not provide a structural solution for the more than two billion overhang of carbon permits in the long term. The Market Stability Reserve does not remove the surplus from the carbon market as it will return the surplus allowances to the market over time. The surplus is especially problematic because it weakens future climate targets. Moreover, while the proposal attempts to smoothen out the manner in which the 900 million back-loaded allowances come back into the EU ETS<sup>16</sup>, the reserve does not stop the 900 million back-loaded allowances from returning to an already overflowed market in 2019 and 2020.

According to Thomson Reuters PointCarbon this will result in an unstable carbon price development, whereby the price remains below 10 euros for the next couple years, drops to below 5 euros in 2020 and then rises very steeply up to around 50 euros by 2030, see the grey line in figure 5.

In order to make the Market Stability Reserve an effective tool, several improvements are needed:

- **Permanently cancel excess allowances** to avoid locking-in carbon-intensive investments and a very steep carbon price hike in the future.
- **Earlier start date.** The surplus in the carbon market is projected to increase from 2.1 billion today to around 2.6 billion allowances by 2020. This is almost equal to the total tonnes of carbon dioxide emissions the EU ETS was originally expected to reduce in Europe's power stations and factories<sup>17</sup>. The Market Stability Reserve needs to be enacted at the earliest possible date in order to address the current market imbalance, and start operating from 1 January 2017.

Figure 5 above shows that cancellation of excess allowances –in combination with an earlier start date- will lead to a more stable carbon price development compared to the Commission's proposal.

## IMPLEMENTING THE EU'S 2030 TARGET

Implementing EU's 2030 target requires an increase of the linear reduction factor (LRF) by which the EU ETS cap is reduced each year. Currently the cap is reduced each year by 1.74% so that by 2020 the emissions are 21% lower than in the year 2005. The European Commission has indicated that to achieve a 40% climate target by 2030, the EU ETS sectors need to reduce their emissions by 43%-48% compared to 2005 levels<sup>18</sup> (table 1). The Commission's 2030

communication settles for the lowest end of this range by proposing to cut the cap by 2.2% per year from 2021, so that by 2030 the emissions from fixed installations are 43% below 2005 levels. If instead the cap is cut by 2.6% per year from 2021, the emissions from ETS installations will be 47% below 2005 levels, which is still within the Commission's 43%-48% range. A linear reduction factor of 2.6% has the additional benefit of bringing Europe on the linear trajectory towards its long-term climate objective.

Reductions compared to 2005	2030	2050
Overall	-35 to -40%	-77 to -81%
ETS sectors	-43 to -48%	-88 to -92%
Non-ETS sectors	-24 to -36%	-66 to -71%

Table 1: Emissions in ETS and non-ETS sectors<sup>19</sup>

In order to keep climate change below 2°C, the EU has set a long-term objective of reducing greenhouse gas emissions by 80-95% by 2050 compared to 1990. The EU ETS will be critical in this transition, because the power sector can almost totally eliminate CO<sup>2</sup> emissions by 2050

by switching to renewable energy sources. The linear reduction factor (LRF) should be in line with the overall 2050 objective. The proposed LRF of 2.2% is however not on the linear pathway towards the long-term climate objective of reducing emissions by 80-95% by 2050, see

also figure 6. As part of the ETS revision to implement the EU's 2030 emissions reduction target, the LRF therefore needs to be changed to 2.6% to bring the EU ETS in line with Europe's overall climate objective.

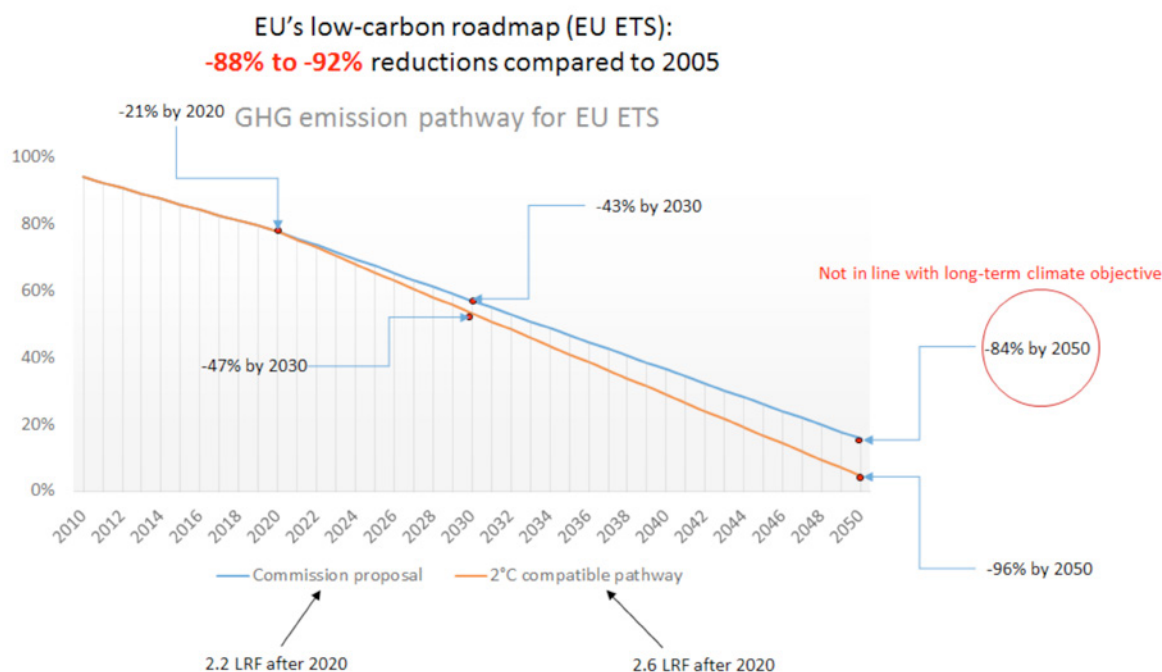


Figure 6: The different greenhouse gas emissions pathways for the EU ETS as proposed by the Commission and to keep global temperature rise below 2°C

## GREEN JOB LEAKAGE

As a result of the overgenerous allocation of free allowances and the low carbon price, European companies do not receive any price signal to produce more efficiently or invest in innovative technologies that reduce CO<sup>2</sup>. A wide range of technological options to reduce emissions in these carbon-intensive sectors remains therefore unexploited. Some observers have warned of the risk of “green job leakage” i.e. clean tech firms moving overseas because Europe fails to set out ambitious climate change policies that would

increase the demand for their low-carbon products and solutions.

The European industry is therefore at risk of falling behind in deploying low-carbon technologies compared to their competitors abroad. Currently the most efficient cement production occurs in Asia, particularly in India and China. In the steel sector, the European installations often perform worse than the global average<sup>20</sup>.

## CARBON LEAKAGE

Carbon leakage is the situation in which, as a result of stringent climate policies, companies move their production abroad to countries with less ambitious climate measures to lower their production costs. This can lead to a rise in global greenhouse gas emissions. Currently, the production from European industrial sectors that is deemed to be exposed to a significant risk of “carbon leakage” is getting protection by receiving their allowances to emit CO<sup>2</sup> for free.

In principle, all companies are supposed to purchase their emission allowances under the EU ETS through auctioning. This concept has been adopted during the revision of the ETS in the 2020 package as the default allocation method, because it is the most transparent method and puts into practice the polluter-pays-principle. From 2013 onwards, all power generators need to buy their CO<sup>2</sup> allowances at auction. In sectors other than power generation, the transition to auctioning takes place progressively. Manufacturing industry that is not at risk of carbon leakage received 80% of its allowances free of charge in 2013 and this will decrease annually to 30% in 2020. Allowances that are not allocated for free will be auctioned.

Manufacturing industries that are at risk of carbon leakage receive 100% of their emission allocation (benchmark<sup>21</sup>) for free. Currently, 164 sectors, representing more than 95% of industrial emissions, are deemed to be at risk of carbon leakage and allocated free pollution permits. For the period 2015-2019, the Commission proposed adding eleven sectors to this carbon leakage list so these sectors will also receive their pollution permits for free. In May 2014, this draft proposal for the carbon leakage list up to 2020 has been sent to the European Parliament and the Council for a compulsory three-month scrutiny, during which time either party can object to the measure.

However, the parameters that are specified in the ETS directive to identify the sectors at risk of carbon leakage are questionable: They assume that the price to emit one ton of CO<sup>2</sup> is 30 euros in Europe, even though the price has been much lower (currently around 5 euros) for years. This assumption is outdated and unrealistic, which

is why almost all of industry’s emissions are covered by 100% free pollution permits. The current parameters also ignore comparable efforts undertaken by other global actors: China is launching seven regional carbon markets, South Korea is introducing a cap-and-trade system and South-Africa is implementing a carbon tax for example. More realistic assumptions regarding price and trade conditions would imply a drastic reduction of the number of industrial sectors eligible for free allowances from the current 60% of sectors, representing 95% of industrial emissions, to a mere 33% of sectors, accounting for only 10% of emissions<sup>22</sup>. The current carbon leakage provisions are applicable to the third trading period and therefore end in 2020. In April 2014 the Commission launched a stakeholder consultation process on the post-2020 carbon leakage provisions in order to discuss the different options to address the potential risk of carbon leakage in the future. These new carbon leakage provisions will be part of the ETS revision to implement the 2030 package.

Recommendations how to address the risk of carbon leakage and avoid green job leakage:

- Reject the carbon leakage list for the 2015-2019 period that leads to more windfall profits for industry at the expense of taxpayers. Instead, the Commission should be requested to use more realistic assumptions to identify sectors at risk of carbon leakage
- Ensure full auctioning of allowances to all industrial sectors post-2020 to reward efficiency and climate-friendly investments.
- Establish a climate fund in order to support pioneering industrial technologies post-2020 which is replenished by a portion of the ETS auctioning revenues. This fund could support the development of breakthrough technologies that are necessary to achieve deep emission reductions in steel, cement, chemical and paper industry and help ensure the survival and the sustainability of Europe’s manufacturing base.

### CURRENT CARBON LEAKAGE RULES CAUSE WINDFALL PROFITS FOR INDUSTRY AT THE EXPENSE OF TAXPAYERS

More industries will receive free pollution permits despite a recent study ordered by the European Commission that found that during 2005-2012 there were no occurrences of carbon leakage<sup>23</sup> and industrial sectors received more free pollution permits than the amount of CO<sup>2</sup> they emitted. During 2008-2011, the steel sector was able to build up a surplus of more than 300 million CO<sup>2</sup> excess allowances, while the cement sector received 200 million allowances more than needed<sup>24</sup>. Steel company ArcelorMittal alone received 123 million free surplus allowances during this period with an estimated value of 1.6 billion euros (and a reported revenue of 250 million euros)<sup>25</sup>. Windfall profits occur when companies pass through the opportunity cost of the CO<sup>2</sup> permits to their consumers while receiving these permits for free. During 2005-2008, carbon-intensive industries gained windfall profits in the order of 14 billion euros<sup>26</sup>, which implies a substantial transfer of money from taxpayers to industry.

# RECOMMENDATIONS TO FIX THE EU ETS

## ADJUST THE EU ETS CAP TO THE 2050 OBJECTIVE

Implementing EU's 2030 target requires an increase of the linear reduction factor (LRF) by which the EU ETS cap is reduced each year. The linear reduction factor needs to be in line with the overall objective of keeping climate change below 2°C. The current linear reduction factor of 1.74% does not do this, as it brings the EU ETS to only 73% reductions by 2050 compared to 2005. As part of the ETS revision to implement the EU's 2030 emissions reduction target, the LRF needs to be changed to 2.6% to allow reductions in the ETS sector of 47% by 2030 and 96% by 2050 compared to 2005.

## PERMANENTLY REMOVE 1.6 BILLION SURPLUS ALLOWANCES

Cancelling the inflow of international offsets by removing at least 1.6 billion of the excess allowances protects the domestic nature of the 2030 GHG target. This also ensures that the carbon market does not cancel out abatement from other European policies that reduce emission by turning these emissions reductions into future rights to pollute.

## IMPROVE THE MARKET STABILITY RESERVE

The EU ETS needs to be revitalised so that it promotes investments in clean technologies, rewards companies that produce more efficiently and encourage fuel switching from polluting coal to cleaner gas and renewables. The Market Stability Reserve aims to address the imbalance between the supply of and demand for carbon permits and helps to mitigate the downward pressure on the carbon price as a result of renewable and efficiency targets, but it falls short of providing a structural solution for the surplus. Bringing forward the

operation date of the reserve and permanently removing excess allowances leads to a more stable carbon price development.

## NO FUTURE ROLE FOR INTERNATIONAL OFFSETS

After 2020, the EU ETS needs to be designed so it promotes domestic action and European investments in clean technologies. Allowing companies the option of using international offsets to comply with their reduction obligations delays the necessary transformation to a European low-carbon economy and potentially even leads to an increase in global emissions<sup>27</sup>. After 2020, international offsets should hence not be allowed for use under the EU ETS.

## FULL AUCTIONING TO REFLECT THE POLLUTER-PAYS-PRINCIPLE

Until 2020 industrial sectors will receive their allowances for free, which weakens the incentive for reducing emissions and leads to a substantial transfer of money from taxpayers to industry in the order of billions of euros. Full auctioning of allowances to all industrial sectors is the only way forward, since auctioning is the most transparent allocation method, puts into practice the polluter-pays-principle and rewards efficiency and climate-friendly investments.

## ESTABLISH A CLIMATE FUND TO KEEP INVESTMENTS IN EUROPE AND PROVIDE CLIMATE FINANCE

A climate fund needs to be established which is replenished by a portion of the ETS auctioning revenues to support pioneering industrial technologies, keep investments in Europe and provide climate finance to developing countries.

- i. EC (2014), SWD(2014)17, Impact Assessment accompanying the Proposal for a Decision concerning the establishment of a market stability reserve (see [here](#)) Overall effort required calculated as the cumulated difference between 2005 emission levels and yearly AEA caps.
- ii. An excess emissions penalty of 100 euros per tonne of CO<sup>2</sup>-eq.
- iii. [http://ec.europa.eu/clima/policies/ets/reform/index\\_en.htm](http://ec.europa.eu/clima/policies/ets/reform/index_en.htm)
- iv. Greenpeace (2013), Silent Killers: Why Europe must replace coal power with green energy (see [here](#))
- v. Own figure based on PointCarbon data (2014)
- vi. Sandbag (2013), Driving toward disaster? The ETS adrift in Europe's climate effort (see [here](#))
- vii. DG CLIMA (2014) presentation (see [here](#))
- viii. EC(2014), Impact Assessment accompanying the Communication for a 2030 climate and energy framework (see [here](#))
- ix. EC (2014), Technical Paper: Kyoto Ambition Mechanism Report
- x. Own calculation with the assumption that 1.6 billion surplus allowances are used for compliance in the 2020-2030 period.
- xi. Own calculation, assuming EU-28 emissions of 5.626 million tCO<sup>2</sup> in 1990 (EEA technical report no 09/2014).
- xii. PointCarbon Thomson Reuters (2014), Carbon Market Analyst: Digesting the EU 2030 climate and energy framework – an update to our long-term price forecast
- xiii. EC (2014), Q&A on the proposed MSR (see [here](#))
- xiv. EC (2014), SWD(2014)17, Impact Assessment accompanying the Proposal for a Decision concerning the establishment of a market stability reserve
- xv. EC(2014), COM(2014)20 (see [here](#))
- xvi. Around 421 million allowances will be withdrawn from the auctioning schedule in 2020 and released back in equal halves in 2021 and 2022.
- xvii. The EU ETS was originally expected to reduce 2.8 billion tonnes of CO<sup>2</sup> emissions according to Sandbag (2013) (see [here](#))
- xviii. EC(2014), COM(2014)15, A policy framework for climate and energy in the 2020-2030 period (see [here](#))
- xix. EC(2011), SEC(2011)288, Impact Assessment accompanying the 2050 low-carbon roadmap (see [here](#))
- xx. Climate Strategies (2014), Staying with the Leaders: Europe's Path to a Successful Low-Carbon Economy (see [here](#))
- xxi. The benchmark is the threshold for what an installation gets for free. The starting point for setting the benchmark values is the average performance of the 10% most efficient installations in the (sub)sector. The benchmark (ton CO<sup>2</sup> per ton product) is then multiplied by the average historical production during 2005-2009 to get to the amount of free allocation the installation receives.
- xxii. CE Delft (2013), Carbon leakage and the future of the EU ETS market (see [here](#))
- xxiii. Ecorys (2013), Carbon Leakage Evidence Project (see [here](#))
- xxiv. EC (2012), Impact Assessment accompanying the Backloading proposal (see [here](#))
- xxv. Sandbag (2012), Losing the lead? Europe's flagging carbon market (see [here](#))
- xxvi. CE Delft (2010), Does the energy intensive industry obtain windfall profits through the EU ETS? (see [here](#))
- xxvii. Offsets from the Clean Development Mechanism may have delivered no more than 40% of the emissions reductions it sold (see [here](#))



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