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Subject: Analysis of potential reforms of aviation's inclusion in the EU ETS

Analysis of potential reforms of aviation's inclusion in the EU ETS

1. Introduction

This paper discussed different proposals for strengthening the EU aviation ETS either directly or through strengthening the stationary ETS. It assumes that the ETS will continue in its current scope (all flights within the European Economic Area (EEA) and does not discuss potential interactions with CORSIA. The paper is a scoping exercise listing the different options and discussing them qualitatively. The paper looks at the following options:

- Strengthening the aviation ETS
    - Reducing free allocation
    - Reducing the cap
    - Discounting of allowances
    - Limiting the use of allowances from the stationary sector
    - Minimum price for CO_2
    - Other issues
- Strengthening the stationary ETS
- Carbon border adjustment tax

The carbon border adjustment tax by itself does not reduce emissions but could be necessary as an enabling condition for more ambitious action in the aviation ETS. For this reason, it is discussed separately as a cross-cutting issue.

2. Strengthening the aviation ETS

2.1. Reducing free allocation

Proposal

Reduce or abolish free allocation of EUAA to aircraft operators.

Currently the cap for the aviation ETS is 95% of the average emissions 2004-06 which were approx. 40 Mt CO_2. On average 38 million EUAA/yr have been issued since 2013. Starting in 2021 the LRF will be applied to the cap; in 2030 the cap will be 27% below 2005.

Allocation is mainly done for free: 15% of the EUAA are auctioned, 3% issued for free to new entrants/fast growing airlines and the remaining 82% are granted for free to incumbents through a benchmark. In practice airlines only received 50% of the required allowances for free in 2019. Due to the strong growth in emissions since 2005 the cap is much lower than actual demand. In 2030 the cap will only cover around 30% of the total emissions from aviation (EC 2017). In the stationary ETS currently around 50% of the issued allowances are auctioned; starting in 2021 the share will rise to 55-57%.

Assessment

Free allocation is used in the stationary ETS only for those sectors which are at risk of carbon leakage. In other words, those sectors where it seems likely that installations could not compete against competition based in countries which do not price CO_2 emissions. The electricity sector is deemed not at risk and does not receive allocation for free[1]. For the manufacturing industry sectors a formula based on trade intensity as well as the direct and indirect costs of the ETS is used to determine whether a sector is deemed at risk. Sectors deemed at risk receive a higher share of free allocation through a benchmarking process. Sectors not deemed at risk only receive 30% of the benchmark until 2025, afterwards the share declines until 2030.

The formula to calculate carbon leakage risk cannot be used directly for aviation because the underlying principle – production moves from the EU to third countries – is not relevant: in aviation the "product" is transporting passengers and this cannot be moved to third countries. Carbon leakage could only occur under some specific circumstances which are discussed in chapter 4. In general, it is deemed as a low risk and should not impede reducing/abolishing free allocation. The original justification for the free allocation was to avoid such leakage under the full scope of the aviation ETS – all flights starting and/or landing in the EU. With the full scope the risk for leakage was much higher: a flight between two extra-EU countries with a stop-over in the EU would have had a disadvantage compared to one with a stop-over in another country (e.g. in the Middle East). The need for free allocation was not reassessed after the current scope was introduced.

Reducing free allocation would raise costs for airlines. The impact on emissions would only be indirect, i.e. through reduced demand due to higher ticket prices. On routes within the ETS the impact compared to the status quo would be higher for legacy airlines compared to fast growers/new entrants which already receive a lower share of allocation for free. Compared to overall operations low-cost carriers (LCC) might be affected more because they operate almost exclusively on routes

[1] There is an exception for some countries which can hand out free units in exchange for investments to modernise electricity generation and the electricity network, (Art. 10c). Combined heat and power plants (CHP) may get free allocation for the production of heat, but not for the production of electricity.

within the ETS. Without free allocation all airlines would be treated the same, the distortion due to the different historic emissions would not exist anymore.

Reducing free allocation would require changing the ETS Directive but could be implemented quickly. It builds upon existing legislation which makes it relatively easy to adopt. Airlines already need to buy 50% of the required allowances, i.e. they have the necessary experience and procedures are already in place. There is no practical hurdle to abolish free allocation starting in 2021 given the political will but airlines will be strongly opposed. Abolishing free allocation would also reduce the administrative burden somewhat both for airlines and MS. The same applies for the new entrants' reserve: without free allocation new entrants would just buy all the required allowances on the market, identical to the incumbents.

Art. 3d of the ETS Directive already states that all revenues from auctioning in the aviation sector should be used "to tackle climate change" including in the aviation sector itself. These provisions could be strengthened somewhat but several MS cannot accept obligatory earmarking of revenues due to their fiscal regimes/laws (i.e. they would not accept a change to "shall be used to" instead of "should"). A potential way to avoid this would be to move a share of allowances to a special fund which is not under the control of MS and which could have dedicated goals such as supporting e-Fuels in aviation. Such an approach is already implemented in the stationary ETS with the modernisation and the innovation funds. A similar approach as Art. 10c could also be introduced for aviation: free allocation would be linked to investments by operators to decrease emissions.

2.2. Reducing the cap for aviation

Proposal

Reduce the cap for aviation.

Currently the cap for aviation is 95% of average 2004-06 emissions until 2020. From 2021 onwards the linear reduction factor (LRF) applied in the stationary ETS also applies for the aviation sector, i.e. the 2030 cap is 27% below the historic value. A LRF of 3.8% instead of the current LRF of 2.2% would achieve a reduction of 43% in 2030, the same reduction as for the stationary ETS.[2] This option is shown in Table 2-1; the cumulated impact over the fourth trading period 2021-30 would be around 35 million EUAA. The cap for the stationary ETS during these 10 years is 15 500 million EUA.

Table 2-1: Comparison of the current cap with a LRF that achieves 43% reduction by 2030

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Total 2021-30
	[M EUA]	[M EUA]										[M EUA]
LRF 2.2%	38.0	37.1	36.2	35.4	34.5	33.6	32.7	31.8	31.0	30.1	29.2	331.6
LRF 3.8%	38.0	36.5	35.0	33.4	31.9	30.4	28.9	27.4	25.8	24.3	22.8	296.4

Source: Own calculations

[2] The LRF is calculated against the base year emissions and leads to a constant reduction, it is not an annual reduction compared to the previous year. The 2020 starting point is a 5% reduction; an LRF of 3.8% of the base year emissions over 10 years achieves another 38% reduction, i.e. the total of 43%.

Assessment

Compared to the stationary sector the cap for aviation is rather high but when looking at the emission development the cap is very ambitious. The price for EUAA closely follows the price for EUA (see chapter 3). In 2018 aviation emissions are only 4% of those of the stationary sector and the cap is only 2-3% of the stationary cap. The share of emissions rose from 2.8% in 2013 and is projected to reach almost 7% in 2030. Reducing the cap for aviation would reduce the overall supply of allowances slightly. In the example above (LRF of 3.8%) the overall supply of allowances in the ETS would be reduced by 0.2%. This should lead to slightly higher CO_2 prices.

If there is no free allocation for the aviation sector anymore the impact of reducing the LRF for aviation would be the same as raising ambition in the stationary ETS by the same absolute amount. With the current share of free allocation reducing the aviation cap would essentially be a way to reduce free allocation on top of reducing the overall quantity of allowances. A lower cap would mean that the quantity of allowances available to allocate for free would be reduced and airlines would need to buy more stationary allowances.

Reducing the cap would raise costs for airlines. The additional cost impact would be very low if free allocation would be abolished in parallel – comparable costs would also occur if free allocation is abolished but the aviation cap remains untouched. If free allocation continues, the cost impact could be considerable depending on the new level of the cap. Of course, the cost impact would still be lower than abolishing free allocation completely. The impact on emissions would only be indirect, i.e. through reduced demand due to higher ticket prices. The impact compared to the status quo would be higher for legacy airlines compared to fast growers/new entrants which already receive a lower share of allocation for free. Having less free allocation through a lower cap would level the playing field.

Given the political will adjusting the LRF is a simple matter as the mechanism is already included in the directive. The alternative approach to reducing the cap is called rebasing: a one-time offset that reduces the cap once; the LRF would remain constant. It is discussed for the stationary ETS because the cap is still approx. 200 Mt CO_2 higher than the verified emissions (Figure 3). This approach is less relevant for aviation where the cap is well below emissions already.

2.3. Discounting of allowances

Proposal

Airlines need to surrender more allowances than would be required to cover their CO_2 emissions. A discounting factor of 2 would mean that operators need to surrender double the quantity of allowances.

Discounting could either only be applied to allowances stemming from the stationary ETS or could be applied for all allowances used by airlines. Such a discounting factor would increase the cost of emitting CO_2 without setting a minimum price (section 2.5). Justifications for the discounting factor could be the non-CO_2 effects of aviation, compensation for taxes not charged in aviation and the need to trigger decarbonisation in the aviation sector.

Assessment

From a political/legal perspective this option is more complicated as discounting is not foreseen in the ETS Directive. Introducing a new mechanism tends to be harder than adjusting an existing one such as increasing the LRF or the share of auctioning. Despite this there are numerous examples

for new mechanisms; the most prominent example is the Market Stability Reserve. Discounting has been proposed in other ETS schemes, e.g. the Waxman-Markey proposal in the US included a discounting factor of 1.25 for international credits (Center for Climate and Energy Solutions 2009).

There are three possible justifications for a discounting factor for aviation:

- **Non-CO_2 effects of aviation:** Aviation's impact on global heating is 3-5 times higher than the effect of its CO_2 emissions alone (UBA 2012). Reducing emissions in the stationary sector to allow higher emissions in the aviation sector would lead to higher radiative forcing, i.e. faster climate change. This could be compensated by requiring a discounting factor for allowances bought from the stationary sector. The factor should be oriented at the radiative forcing. A factor of three could be justified as being on the lower end of the impact on climate change and due to the fact that flights covered by the ETS have lower non-CO_2 impacts than long distance flights. A large portion of the non-CO_2 effects only take place when at cruising altitude (10 000 meters); short distance flights have a higher share of emissions below this altitude than long distance flights. A discounting factor of five could be justified by being conservative: it would guarantee that there is no net warming impact if allowances from the stationary sector are used by aviation. There is some danger that optimising flight routes and aircraft for CO_2 only would lead to higher non-CO_2 impacts; using a high discount factor would also ensure that the net benefit to the climate remains.

- **Compensation for tax exemptions:** Aviation is exempt from energy taxes and most VAT charges (see section 2.6). A discounting factor could be introduced to ensure a level playing field against competing transport modes. The minimum kerosene tax of 33 cents/litre in the Energy Tax Directive equals a CO_2 price of 130 EUR/ton. Based on the current CO_2 prices a discounting factor of five could be applied to compensate for the energy tax exemption. With this justification the discounting factor should be applied to all allowances used by airlines and not just those bought from the stationary sector. As the CO_2 price is rather volatile, this approach might require regular (e.g. annual) adjustments to react to the developing carbon price.

- **Decarbonisation in the aviation industry:** To achieve the objective of the Paris Agreement, all fossil fuel use needs to be phased out around the middle of the century (IPCC 2018). Remaining emission budgets will be required for sectors where achieving zero emissions is difficult to impossible, e.g. agriculture and some industrial processes. It is therefore necessary that all sectors start the required transformation process in time. For the aviation sectors this means new aircraft designs (e.g. electric or hybrid planes) and zero emission fuels (synthetic e-fuels or hydrogen). The logic of an ETS is to provide also intertemporal flexibility for emission reductions, i.e. to reduce emissions first in sectors with the lowest marginal abatement costs. For the next one to two decades this will be the energy sector and energy use in industry. Under current CO_2 costs there is little to no incentive for airlines to start the transformation and ramp-up the necessary innovation and market penetration processes, including infrastructure and potentially international supplies of zero emission aviation fuels. Creating sufficient price signals and setting-up the necessary companion policies within the next few decades will be essential for triggering the necessary ramp-up processes to achieve carbon neutrality in aviation until 2050. To send the required price signal a discounting factor could be used. The value for the discounting factor would have to be significantly higher than in the justifications above as current costs for these new technologies are still very high. Again, the discounting factor could be applied to all allowances (EUAA and EUA).

The impact of such a discounting factor on emissions from aviation would be indirect, i.e. through increasing ticket prices. A factor of 5 would lead to an increase of roughly 15-30% in ticket prices if passed through completely. The price increase would be higher for low-cost carriers as kerosene has a higher share of total operating costs for these airlines compared to full-service carriers. Such a moderate price increase is expected to have some impact on demand, but emissions would still be growing. If the stationary sector is short, the impact on the stationary sector would be real, i.e. there would be a need to reduce emissions. For the stationary ETS to become short (i.e. the cap would actually limit emissions) a reform along the lines discussed in chapter 3 would be required; under current rules a structural surplus of allowances until 2030 is expected in projections taking into account the energy targets and coal phase-out plans by governments.

The interaction between discounting and the MSR are more difficult to assess. Under current rules the MSR does not take the demand from the aviation sector into account. If these rules remain unchanged, the discounting would lead to a net scarcity of allowances while the MSR would still "see" a surplus in the market. Even without the discounting factor such a situation could happen by 2030 in scenarios assuming high emission levels in the stationary ETS. It seems likely that aviation demand will be included in the MSR calculations after the upcoming review of the MSR. Once aviation is included in the MSR the impact can only be estimated through modelling: it depends on the development of the emissions in the stationary sector, other changes in the review and the timing. A discounting factor until 2023 would most likely only reduce the invalidation taking place in the MSR anyway; this is because the intake of the MSR is twice as high until then and the surplus will be transferred to and subsequently cancelled in the MSR. A higher demand from aviation due to the discounting factor would reduce the quantity of allowances which are moved to the MSR. After 2023 the MSR might not be able to cope with a new oversupply of allowances. In that case the discounting would reduce the surplus. Depending on the relative levels this could either introduce a new deficit of supply or not affect emissions from the stationary sector. Even then, a discounting factor would still lead to higher ticket costs/reduced demand for aviation.

2.4. Limiting EUA purchases

Proposal

Aviation could only use a limited amount of allowances from the stationary sector.

Under current rules there is no hard cap which would directly limit aviation emissions in the ETS. The relative size of the aviation sector compared to the stationary market and the willingness to pay for transport by consumers means that there is an unlimited supply of allowances for air transport. Currently around 50% of the surrendered allowances from aircraft operators come from the stationary ETS; until 2030 that share is expected to grow to approx. 70%. A limit on the quantity of allowances from the stationary sector that can be used would introduce a hard cap on aviation emissions; if all allowances are used up, airlines would not be able to fly anymore. The limit would most likely be linked to the verified emissions as is the case for international credits in the third trading phase: A maximum of 1.5% of verified emissions can be covered by international credits; the allowed amounts are recorded in the EU transaction log (EUTL).[3]

[3] Stationary installations could use international credits to a nationally defined limit in the second trading period (7-22% of their free allocation amount). In the third trading period (2013-2020) operators could use up any remaining quantities, for installations without entitlement, new entrants or capacity extensions the allowed amount corresponded to 11% of their allocation during the period from 2008 to 2012 or up to 4.5% of their verified emissions during the 2013-2020 period (Commission regulation (EU) No 1123/2013).

Assessment

This is the only proposal which would limit emissions from the sector directly. Depending on the stringency of the limit this would lead to very high EUAA prices; the price of EUAs would not be affected. On the contrary, there would be less demand from aviation than under current rules.

Each year by 30 April operators need to surrender enough allowances to cover their emissions in the previous year. The Directive includes several rules to ensure compliance (Art. 16) which are strong enough for this proposal:

- The penalty for surrendering insufficient allowances is 100 EUR/t CO_2 (at 2013 prices, i.e. the penalty increases in line with the European index of consumer prices).
- The fine does not exempt the operator from surrendering allowances for these emissions; it is not a price ceiling. In the following year the operator needs to surrender the missing allowances.
- Several Member States can impose prison sentences for non-compliance with the Directive.
- If all enforcement measures by a MS fail the Commission has the right to impose an operating ban on the airline after a request by the administrating MS.

Faced with these fines, operators could react to a hard cap by inter alia:

- Deploying more efficient aircraft, increasing operational efficiency, electrification of taxiing, etc.
- Using alternative fuels, low/zero emission aircraft.
- Decreasing air services in the EEA compared to BAU. Depending on the tightness of the cap and the measures above this could range from slower growth to an actual reduction of air services.

From a political/legal perspective this option is rather challenging as it requires adopting a new mechanism and would face extremely strong resistance from the sector. A possible limit could be 50% of verified emissions initially and decline in line with the requirements for achieving the Paris Agreement. Under current conditions this is about one EUA for each EUAA. If the cap would be frozen at current levels, this would also build upon the CORSIA goal of carbon neutral growth after 2020. The Kyoto Protocol could also be used as a precedent for this limit: the use of international credits could only be "supplemental to domestic actions" (UNFCCC 1998).

A closed aviation ETS (i.e. without the option to buy any EUA at all) would be the extreme case for such a limit. This would require a higher initial cap for aviation than the current value, e.g. it could be set to current emission levels and decline as above. If the current cap would remain unchanged, half of European aviation would need to be grounded. A closed aviation ETS would increase supply of allowances in the stationary sector and face even stiffer opposition.

2.5. Minimum floor price for aviation

Proposal

If the CO_2 price is below a certain threshold a minimum price is introduced either through a surrender charge or a minimum auctioning price.

This proposal would guarantee a minimum price and could be justified with the same logic as the discounting factor: to address non-CO_2 effects, to compensate for exempted taxes and to ensure transformation in the sector.

Assessment

The UK has introduced a minimum price for energy installations covered by the ETS (House of Commons Library 2018); the Netherlands is in the process of introducing one for electricity generation (Government of the Netherlands 2019). In the UK a surrender charge is applied. The charge is calculated about every two years as the difference between a target price and the average CO_2 price in the previous year. This charge is then applied to all emissions. The alternative approach for a minimum price would be to set a minimum auction price. If the closing price is below the minimum price no allowances would be sold but put into a reserve or cancelled.

There is no provision for setting a minimum auctioning price, but several Member States are discussing this option in the stationary ETS. It seems possible that this will be allowed in the future. A surrender charge could be applied today already from a legal perspective.

From a practical perspective both approaches are not feasible for aviation. The surrender charge as implemented in the UK would need to be levied by Member States. In the ETS the administration for aircraft operators does not depend on the routes flown but on the home base of the operator. If one country would require a surrender charge, airlines based in that country would have a disadvantage against airlines based in other countries but flying on the same routes. Even for domestic routes a unilateral introduction is not feasible: low-cost carriers offer domestic routes in many Member States competing with legacy airlines in their "home territory". A surrender charge in aviation would need joint action at least by all Member States with significant aviation industry to have any effect. This is also the reason why ticket taxes have been used in various Member States to tax aviation. Ticket taxes can be applied based on destination.

A minimum auction price for EUAA alone would not be feasible either unless EUA purchases are limited. Operators would just buy more EUA and not use EUAA at all. A minimum price for EUA on the other hand would directly lead to higher prices for EUAA as well (chapter 3).

2.6. Other Issues

EUAA as a separate unit

The reason for introducing EUAAs was the Kyoto Protocol: international aviation incl. intra-EU international aviation is outside of the "quantified emission limitation and reduction objectives" of the Kyoto Protocol. Aviation ETS allowances could therefore not be backed by assigned amount units (AAUs), the allowance used to account emission targets of countries under the Kyoto Protocol[4]. The

[4] The Kyoto Protocol introduced three market mechanisms: international emission trading and two project based mechanisms (CDM and JI). International emission trading is based on trading between countries. To ensure consistency between the EU ETS and MS target achievement under the Kyoto Protocol each EUA was „backed" by an AAU. A

whole accounting rules for the Kyoto Protocol do not apply to the Paris Agreement so the distinction between EUA and EUAA is not necessary anymore. At the same time, it does no harm and could be useful, e.g. when parallel regimes between the ETS and CORSIA are set up. EUAA would be needed in a (semi-)closed system discussed in section 2.4 or if discounting is only applied to allowances bought from the stationary sector (section 2.3).

Energy taxes and VAT

Aviation in general is exempted from fuel taxes and no VAT is charged in most cases; most MS charge VAT for domestic flights and six MS have a separate ticket tax on departing passengers which is only applicable for aviation. Land based transport in general needs to pay both taxes with some exemptions for VAT for railways on international tickets. VAT applies to products sold by installations covered by the stationary ETS.

For installations in the stationary sector the Energy Tax Directive (EC 2015) is complex:

- Coal used for electricity production is exempted, if used for heat production there is a minimum energy tax.
- Electricity is taxed independently of the carbon content
- The same fuel can have different minimum tax rates depending on the usage (heat, electricity, transport)
- The exempted minimum kerosene tax for aviation is 33 cents/litre; this corresponds to a carbon price of approx. 130 EUR/t CO_2. For road transport most Member States charge higher taxes than the minimum rates listed in the Energy Tax Directive.

The different tax treatment of aviation can be used to gather political support for the different proposals to enhance the aviation ETS.

Flights excluded from the EU ETS

In an annual report Member States need to report on the application of the ETS Directive under Article 21 of this Directive. The latest report includes a section on emissions from domestic flights reported to each competent authority (EC 2018a). The administrating Member State is supposed to report the sum of all domestic flights in all Member States by their airlines. The sum of these reported domestic emissions is only 80% of the total domestic emissions as reported in the national GHG inventories. There are two possible explanations for this difference:

- Low quality of reporting by Member States under the Art. 21 report.
- The impact on the exemptions for government flights, de-minimis etc. is much larger than anticipated.

While the quality of the Art. 21 reporting seems the more likely reason this issue should be investigated and understood to ensure that this gap is not due to the exclusion of flights from the ETS. Excluded flights are not covered under the ESR either, i.e. effectively they are not under any emission control scheme at all.

transferral of an EUA from an operator holding account in one MS to another MS was mirrored by parallel transferrals of an AAU in the transaction log under the Kyoto Protocol. Units related to international aviation – being outside of the scope of national targets under the Kyoto Protocol – could not be backed by units valid under the UNFCCC.

Voluntary cancellation

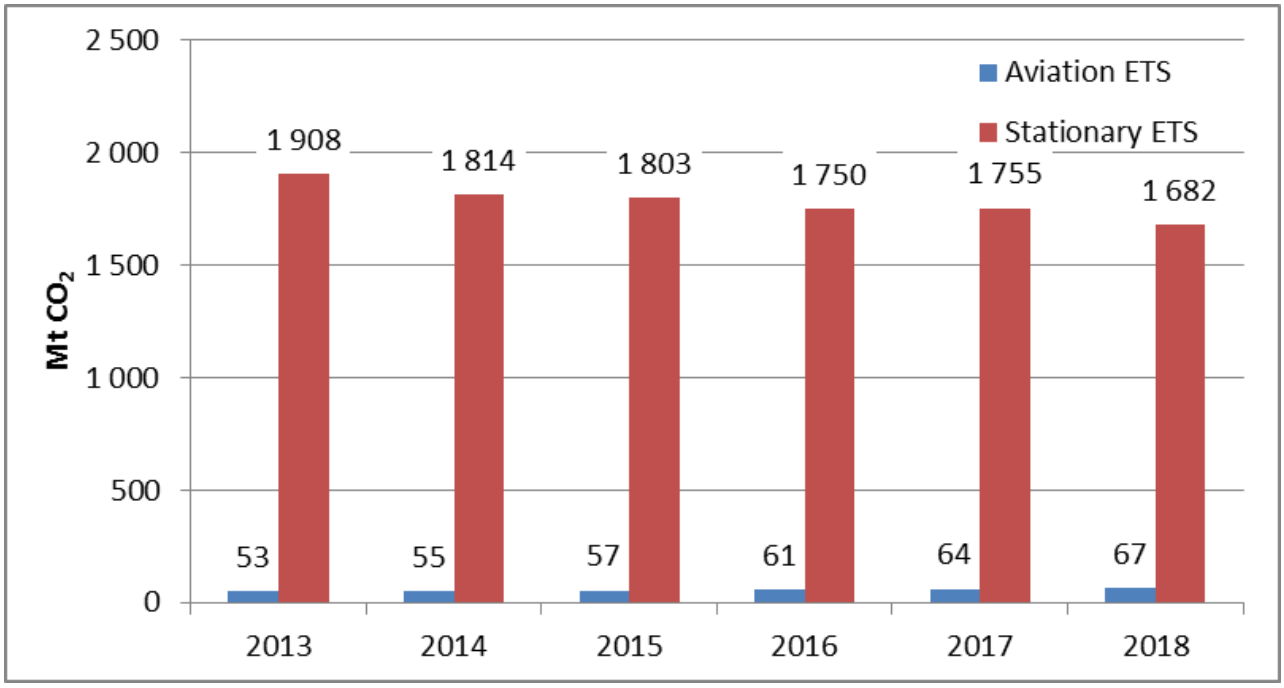
Under Art. 12(4) of the ETS Directive Member States have the right to voluntary cancel allowances in the event of a policy driven coal phase out. This means that a quantity of allowances corresponding to a closed power plant will not be auctioned. Such a voluntary cancellation ensures that no other power plant can use the newly available certificates from the closed installation to increase emissions and output. The right to voluntary cancellation could be expanded to the aviation sector, e.g. in cases where Member States withdraw subsidies for regional airports or successfully shift airline passengers to use railways.

3. Strengthening the stationary ETS

Introduction:

The aviation ETS is closely linked to the stationary ETS by one-way trade. Aviation operators can either use aviation allowances (EUAA) or allowances from the stationary ETS (EUA) for compliance. In contrast, stationary installations cannot use EUAA for compliance.

Figure 1: Verified emissions in the ETS – Aviation and stationary sector

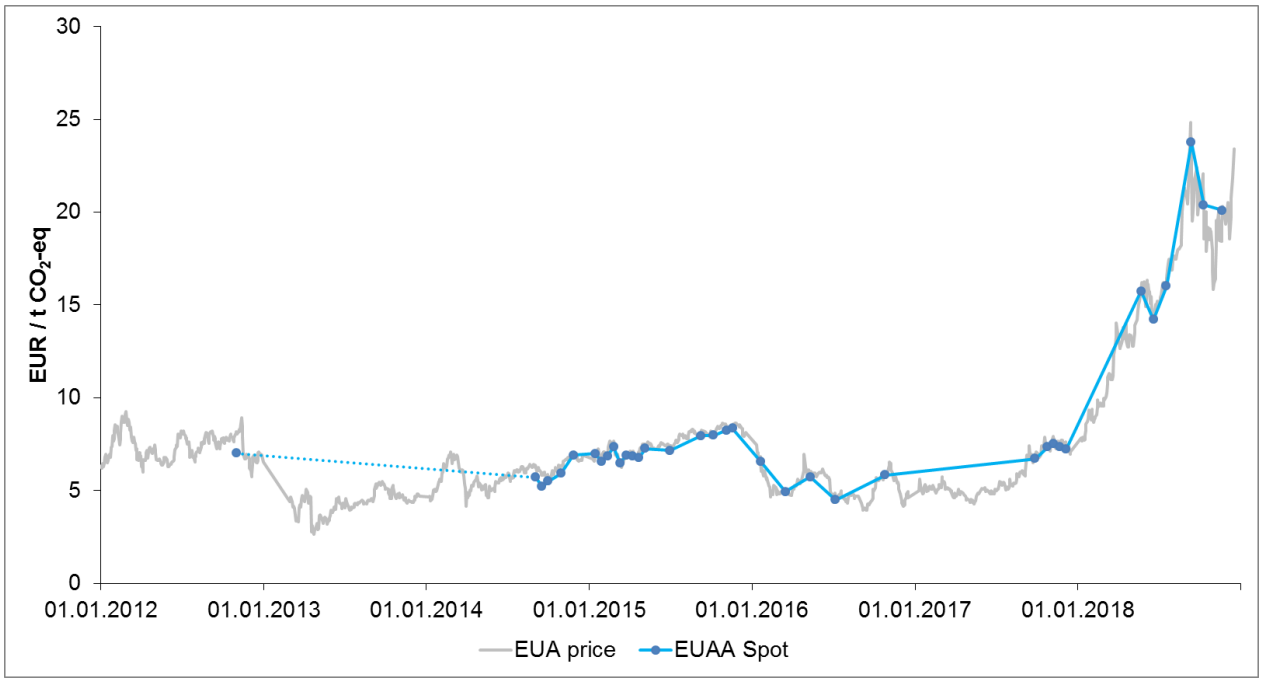


Source: EEA (2019)

The volume of the stationary ETS is 25 times the volume of aviation ETS (see Figure 1). Emissions in the aviation ETS are growing year on year and exceed the number of EUAA available to the market (both allocated for free and sold/auctioned). Therefore, the aviation sector buys allowances from the stationary sector which is currently characterized by a surplus. Prices for aviation allowances (EUAA) follow the prices of allowances in the stationary sector. In 2018 a revision of the EU ETS for the fourth trading period was agreed focussing on the stationary sector (EC 2018b). The agreement as well as increased demand for allowances in the stationary sector in 2018 is reflected in rising prices both for EUA and EUAA (see Figure 2).

The revision in 2018 included an agreement on a faster declining cap[5] in line with the 40% GHG reduction target for the economy as well as an enhanced market stability reserve (MSR) in order to reduce the surplus and improve the system's resilience to unforeseen developments, such as macroeconomic fluctuations. When the surplus of emission allowances is high, fewer allowances will be auctioned and the difference is placed in the MSR. On the other hand, when the market is tight, allowances will be additionally auctioned from the reserve. With the 2018 reform the amount to be absorbed by the MSR is doubled in the first years[6] and from 2023 onwards holdings in the reserve above the auction volume of the previous year will lose their validity.

Figure 2: Price trends for allowances from aviation and the stationary EU ETS



Source: Point Carbon, (2012); EEX (2019); ICE (2019)

If the stationary ETS is strengthened leading to higher allowance prices, then the aviation ETS is strengthened as well as EUAA prices follow those of the stationary sector. Apart from incentivising emission reductions in the aviation sector the (stationary) ETS can and should be stepped up (Verena Graichen et al. forthcoming (2019)):

- The current EU target of minus 40% is not in line with the Paris agreement to limit the increase in the global average temperature to well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 °C above pre-industrial levels.
- The EU Commission has published a long-term strategy in order to reach carbon neutrality in 2050. The current 2030 target implies that greenhouse gas reductions would have to happen twice as fast after 2030 compared to the period 2010-2030; the current 2030 target lies well above a linear target path 2020 to 2050. Postponing the action to later years increases

[5] The GHG reduction target for the ETS is 43% below 2005 levels until 2030 (EC 2019a). The cap declined by 1.74% in the years 2013-2020 in the stationary sector, the aviation cap remained constant in this period. With the reform, the linear reduction factor is increased to 2.2% from 2021 onwards for both stationary and aviation sector.

[6] The intake rate defines the amount of allowances to be transferred to the reserve: in the years 2019-2023 the intake rate is 24% of the allowances in circulation, afterwards the intake rate is reduced to 12%.

the cost of action especially for investments with a long lifespan, such as investments in the power sector.

- Originally a triple-target for GHG reduction, renewable energy and energy efficiency was set. Whereas the targets for renewables and energy-efficiency have been stepped up in the meantime, the GHG reduction target remained unchanged, even though the other two targets contribute to emission reductions. The Commission expects that when "the agreed EU legislation is fully implemented, total greenhouse gas emission reductions are estimated to reach around 45% by 2030" (Euractiv 2019).
- Further additional measures undertaken by Member States are not reflected in the current cap setting, e.g. several European countries have joined the Power Past Coal alliance and have pledged to phase out coal during the fourth trading period of the EU ETS. [7]
- There is growing support for more ambitious climate targets. The European Parliament called for raising the EU's target to 55% below 1990 levels in a resolution in March 2019 (EP 2019). In her candidacy as president of the European Union, Ursula von der Leyen also called for more ambition (Ursula von der Leyen 2019): "I want to reduce emissions by at least 50% by 2030."

Proposal:

The stationary ETS is reformed in a way that the 2030 cap is in line with the Paris Agreement and carbon neutrality in 2050. Furthermore, the resilience of the ETS is increased by strengthening the MSR and encouraging Member State to make use of the unilateral cancellation clause. A minimum price for auctions is implemented both in the aviation and the stationary sector, unsold allowances are placed into the MSR (Verena Graichen et al. forthcoming (2019)).

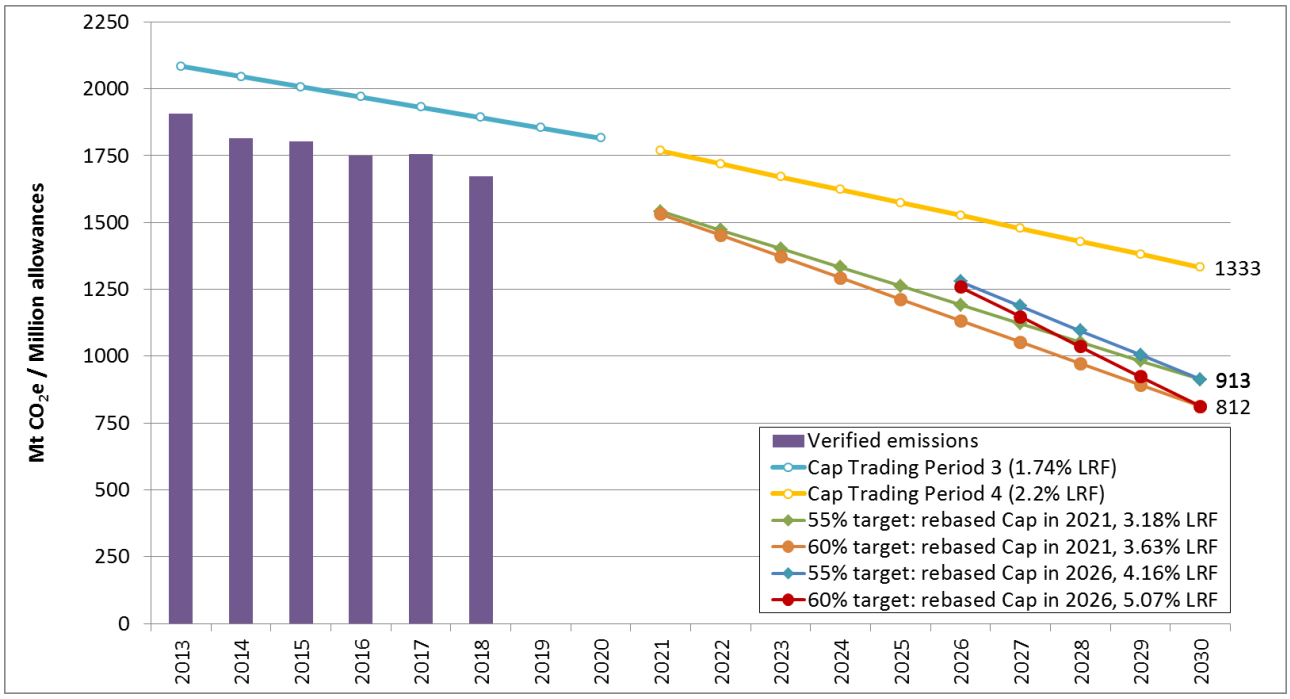
A cap in line with an EU-wide GHG reduction target of 55-60% below 1990 levels

The current cap is reaching -43% below 2005 levels. In order to contribute to an enhanced economy wide reduction target, the ETS would be required to step up the reduction within the sector to around 60-65% below 2005 levels. This can best be reflected in a rebased cap that declines at a faster pace than currently to reach the revised target in 2030.

Why rebasing? From the start, caps in the EU ETS have been higher than annual emissions. In the third trading period the difference amounts on average to 205 Mt CO_2 per year. This contributes continuously to building up a new surplus which then has to be reduced by the MSR. An ETS reform should ensure that the cap is reduced to actual emission levels (rather than being related to historic cap levels). The LRF can then be set as a linear line between the rebased value and the target. Whereas the LRF has more effect in the long term, rebasing reduced the new amounts coming into the market already in the short term.

[7] The following countries have announced a coal-phase out by 2030 at the latest: Austria, Belgium, Denmark, Finland, France, Ireland, Italy, Netherlands, Portugal, Slovakia, Sweden and the United Kingdom. In Germany, a government commission proposed an end date for coal of 2038; the results were welcomed by Chancellor Merkel, but are not transposed into law yet (Europe Beyond Coal 2019).

Figure 3: EU ETS cap in line with an economy wide reduction target of 55-60%



Verena Graichen et al. (forthcoming (2019))

Enhanced resilience with an improved MSR and unilateral cancellation

The current MSR is fit to reduce the historic surplus, but if emission levels will (hopefully!) continue to decline as in the last decade, then the MSR as currently designed will not be able to absorb the new oversupply coming into the market. The MSR is set for review and it should be ensured that the intake rate (the amount of allowances to be absorbed by the MSR in event of surplus above a certain limit) will not drop to 12% of the allowances in circulation after 2023. An intake rate of at least 24% or even higher should be adopted in the event that the cap is adjusted only late in the fourth trading period if at all. Furthermore, the thresholds defining whether the MSR is activated as well as how many allowances are released from the MSR in case of shortage should decline in parallel to the cap. Currently these are fixed values, even though emissions and the cap decline.

Strengthening the MSR is a no regret option: it is only triggered in a situation of surplus. At the same time it has a key role to enhance the resilience of the system and avoid price drops which hamper investment in emission abatement technologies.

A minimum price at auctions

An option to ensure a (soft) price floor is introducing a minimum price at auctions. The price could be set in a way that it increases over time and thus reduces uncertainty for investors whether emission abatement technologies will be economical. In case the minimum price is not reached, the allowances foreseen for auctioning would be transferred to a reserve, e.g. the MSR. As opposed to a minimum price only for auctions of aviation allowances, in the stationary sector the measure is expected to deliver, because both the auctioning quantities and the higher auctioning share.

A group of countries taking the lead

Both the adjustment of the cap as well as the strengthening of the MSR will require political decisions at EU level. There are additional measures that Member States alone or a group of Member State could take to increase the ambition of the ETS.

The amended EU ETS Directive foresees the option to reduce national auctioning amounts and cancel allowances "in the event of closure of electricity generation capacity in their territory due to additional national measures" (Article 12(4)). The amount of allowances that can be cancelled is linked to the average emissions of the closed plant in the five years prior to the closure. This article is thus an option how Member States can reduce the supply of allowances by reducing their auctioning amounts.

Another option that is discussed is the introduction of a surrender charge as applied by the UK. Certain EU ETS installations are required to pay a top-up on the carbon price, in the case of the British surrender charge it applies to electricity generation. While this can be a very effective measure to drive emissions down, when applied to the stationary sector it will have only an indirect effect for the aviation sector as it might lead to a reduced demand for allowances and thus lower prices (unless the supply of allowances is reduced, too).

Assessment

The strengthening of the stationary ETS is of utmost importance as the ETS is considered a key instrument to reduce emissions in the EU. Any reform to the stationary ETS ensuring that carbon prices are stabilized and/or rise will directly affect the aviation sector through higher prices per ton of CO_2.

4. Carbon border adjustment tax

Proposal

A ticket tax is applied to flights outside the scope of the EU ETS to compensate the lack of carbon pricing in third countries.

Assessment

A carbon border adjustment tax (CBAT) has been discussed to compensate for perceived unfair competition between operators regulated by a carbon price and those in countries without such a measure. In the ETS this issue is currently addressed through free allocation for industry (section 2.1). For aviation the product (transporting a passenger from A to B) cannot be moved easily to a third country: traveling on land to airports in Kaliningrad or Kiev is not practical in almost all instances. But there are two scenarios in the current scope of the aviation ETS where there might be direct competition between flights inside the ETS and those outside, i.e. where carbon leakage might occur:

- Long-distance flights leaving the EEA which require a stop-over: if the stop-over is within the EEA that part of the flight will be covered by the ETS whereas if the stop-over is in a third country, the entire flight would not be covered by the ETS (e.g. Berlin – Madrid – Quito vs. Berlin – Dallas – Quito).

- Intra-EEA flights where a stop-over in a third country is feasible. There are only very few routes where this might be interesting, in most cases there is no viable route outside the ETS. One such example might be from Portugal to Cyprus: a flight with a stop-over in North Africa (e.g. Egypt) would extend the flight distance but be fully outside of the scope of the ETS. After Brexit there is some danger that the UK could become a hub for such flights, but the EU could avoid this through the bilateral air service agreement which will need to be agreed.

For tangible products the idea of a CBAT is to charge a duty/tariff when importing this product. For aviation this does not seem feasible. Instead, a ticket tax could be designed to compensate for the lack of climate jurisdiction in third countries. The ticket tax discussed here would only be applied on flights not covered by the EU ETS (or a separate ticket tax would be introduced on top of the existing ones). It would need to be high enough to compensate for the carbon costs occurred in the ETS. This would pose some design questions: for the example Berlin – Dallas – Quito the avoided carbon cost is only the flight to Madrid whereas for the example Portugal – Cyprus the entire trip would be the basis.

From a political perspective this could be seen as favouritism by the EU for its carriers and lead to similar debates as the full scope of the aviation ETS. At the same time outbound ticket taxes are applied in many countries worldwide and not contested from a legal perspective. A carbon border adjustment ticket tax would unavoidably impact some routes/carriers more than others and could become rather complex. Under current carbon prices the danger of carbon leakage is so low that such an approach does not seem necessary.

5. Conclusions

The paper lists several ways to enhance the ambition of the aviation ETS. Based on this qualitative assessment the following conclusions can be drawn:

Emission reductions in the sector

Only the option to limit the use of allowances from the stationary ETS would directly put a cap on aviation emissions. In all other options the effect would be indirect: CO_2 prices and therefore ticket prices would increase which would lead to decreased demand for aviation. Low-cost carriers would feel higher CO_2 costs more strongly as their other operating costs are lower than for full-service carriers, i.e. costs associated with fuel burn have a higher share of the ticket price. At the same time the clientele of low-cost carriers tends to be more price sensitive.

Reducing the quantity of allowances

Any reform to the stationary ETS has a much higher potential to reduce the quantity of allowances EU wide due to the size difference between the stationary ETS and the aviation ETS. Reducing the cap for the aviation ETS can be justified but the impact is relatively small, especially if free allocation is abolished.

Increasing the cost of carbon

Discounting of allowances, increasing the share of auctioning and introducing a minimum floor price all aim at increasing the cost for emitting CO_2. Out of these, abolishing free allocation is the politically most feasible approach which follows the logic applied in the stationary ETS. It would have the added

benefit of reducing the administrative overhead for operators and MS. Reducing free allocation would also reduce existing distortion between fast growing and legacy airlines: allocation of free allowances is based on historic activity data.

Introducing a discounting factor has the potential to increase costs even more. A factor of 3 to 5 could be easily justified. The introduction of a minimum price either through a surrender charge or a minimum price for auctioning would require an EU-wide introduction but could be done. A minimum price for aviation allowances alone would have no practical effect as long as the price signal is given by the stationary sector.

Decarbonisation of the aviation sector

None of the options discussed above - unless taken to the extreme (e.g. a very high discounting factor or a restricting EUA limit) - would lead to a real decarbonisation of aviation. New technologies with the potential to have zero emissions are still in their early phase and costs tend to be prohibitive compared to current technologies. To ensure the necessary transformation policy intervention beyond setting a higher carbon price is needed. One building block would be to set up dedicated funds supporting the development and deployment of such technologies. Based on current CO_2 prices and the current cap around 1 billion EUR/year could be raised from full auctioning and used to fill such funds.

Carbon border adjustment tax

A carbon border adjustment ticket tax could in principle be introduced to avoid carbon leakage. The need for such a tax depends on the level of ambition in the aviation ETS in the future. The practical details of such a tax could become rather complex.

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