Automatic cancellation, overall mitigation in global emissions, and Article 6 of the Paris Agreement: an economic analysis

Discussion draft

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Executive Summary

The Paris Agreements calls for international transfers of mitigation under the centralized crediting mechanism of Article 6.4 to deliver an "overall mitigation in global emissions" (OMGE). Diverging interpretations of OMGE lead to different approaches to operationalize it, with important implications for the resulting economic incentives and ultimate effectiveness in driving increased mitigation.

This paper explores the economic implications of applying a partial automatic cancellation rate to emissions reductions generated under Article 6 of the Paris Agreement. We find that partial automatic cancellation of Article 6 units operates like a tariff on international transfers, driving a wedge between what buyers pay and what producers receive for each a ton of mitigation. In addition, the size of this wedge is not fixed but rather grows as the costs of abatement increase, putting an increasing cost on each incremental unit of mitigation. The partial automatic cancellation rate thus discourages the generation and transfer of mitigation outcomes, particularly as mitigation ambition increases.

While it is possible that this approach may drive some added mitigation in the short run, when marginal costs remain low, the effects of cancellation would reduce the total quantity of units transacted and the ability of high-integrity international cooperation to facilitate cost-effectiveness in achieving the Paris Agreement's ambitious mitigation targets over the longer term.

Specifically, applying a partial cancellation rate to Article 6.4 would:

1) Increase the marginal cost of mitigation for cooperating partners, by increasing the marginal cost of Article 6 units, preventing the equalization of the marginal cost of abatement across sources and thus hindering the ability of the market to achieve cost-effectiveness;
2) Decrease the quantity of demanded Article 6 units, due to the price sensitivity of buyers and the availability of competing sources of supply that do not apply an automatic cancellation rate;
3) Discourage greater mitigation, by applying a greater and greater cost penalty on transfers as ambition and associated marginal costs increase;
4) Reduce the supply of high-integrity units that would otherwise be available in the market, but are too costly to be commercially attractive when a partial cancellation rate is applied. This would drive down the average quality of units, as only low-cost and potentially low quality (e.g. non-additional) units would remain competitive;
5) Affect the share of proceeds generated by Article 6.4 and available for adaptation purposes in developing countries.

In a best-case scenario with a well-designed, high-integrity Article 6 mechanism that delivered only high-quality units, this analysis indicates that a partial cancellation rate could generate some additional mitigation in the short term, under the following conditions:

1) Countries using Article 6 do not reduce the ambition of their first or subsequent NDCs compared to a scenario without a required partial cancellation rate, either directly or through accounting flexibilities;
2) Countries do not replace their demand for Article 6 units with emissions reductions from alternative sources, not subject to the cancellation;
3) CORSIA demandeurs do not substitute Article 6 units with alternative fuels to meet their offsetting obligations, similarly avoiding the cancellation requirement.

While applying an OMGE cancellation rate under these conditions may yield some added emissions reductions in the short term, automatic cancellation's distorting effects on international cooperation would harm the ability of Article 6 to cut the costs of meeting global policy goals. As a result, an automatic cancellation rate risks impeding increased ambition in a dynamic policy context.

In the best-case scenario with high integrity, cooperation-based OMGE provides an alternative approach in which countries could increase ambition as part of their cooperation, and thus demonstrate consistency with Paragraph 1 of Article 6 of the Paris Agreement.

Issues and options for achievement of OMGE under Article 6.4

Paragraph 4 of Article 6 of the Paris Agreement establishes a mechanism to contribute to the mitigation of GHG emissions and support sustainable development. This mechanism shall, inter alia, aim to: (a) promote the mitigation of GHG emissions while fostering sustainable development; (b) incentivize and facilitate participation in the mitigation of GHG emissions by public and private entities; (c) contribute to the reduction of emission levels in the host Party, which will benefit from mitigation activities resulting in emission reductions that can also be used by another Party to fulfil its nationally determined contribution; and (d) deliver an overall mitigation in global emissions. A share of proceeds of credits generated under Article 6.4 shall also be used to assist developing country Parties that are particularly vulnerable to the adverse effects of climate change to meet the costs of adaptation (as well as to cover the mechanism's administrative expenses).

Article 6.4's aim to deliver an overall mitigation in global emissions (OMGE) requires first an interpretative effort. What does OMGE mean?

Diverging interpretations of OMGE lead to different approaches to operationalize it, with important implications for the resulting economic incentives and market functioning that ultimately determine the effectiveness of any approach to OMGE.

Some approaches[1] aim to deliver OMGE by applying a discount rate to the emissions reduction credits, hereinafter, cancellation-based OMGE. This strategy includes automatic cancellation and discounting. These strategies effectively introduce an extra requirement for mitigation on particular transactions such as issuance or use. In particular, cancellation-based OMGE is delivered when a portion of the emissions reductions credited under the mechanism established by paragraph 4 of Article 6 is set aside and cannot be used by any Party towards their Nationally Determined Contributions (NDC). Thus, operationalizing OMGE in this way would imply either an automatic cancellation of credits at issuance or a discounted use by buyers.

Another approach[2] asserts that high-integrity use of a well-designed mechanism under Paragraph 4 of Article 6 would ensure OMGE if the mechanism "[p]rovid[es] a source of mitigation outcomes that enable Parties to select higher ambition in its NDC." This approach could be interpreted as delivering OMGE through a market framework that allows entities to pursue voluntary cooperation with robust accounting, transparency and environmental integrity provisions that facilitate meeting targets in a cost-effective manner and increase ambition in line with Paragraph 1 of Article 6[3]. Hereinafter, we will refer to this as cooperation-based OMGE. It is important to note that these approaches are not mutually exclusive. Proponents of cancellation-based OMGE are also largely supportive of a framework that would ensure integrity. Any approach to OMGE will only be effective if the market is paired with strong provisions for environmental integrity, including to avoid double counting, assure additionality, and mitigate leakage and potential reversals.

Cooperation-based OMGE can also be considered to encompass stringent baselines and conservative default emission factors[4]. Stringent baselines and conservative values are only one component to assure environmental integrity and that every tonne transacted on the market is backed up by at least one tonne of mitigation. For instance, jurisdictional REDD+ under the Warsaw Framework is intended to deliver OMGE by implementing

[1] Options A(a) and B1 and B2 in section VIII on "Delivering overall mitigation in global emissions" included in the latest version of the draft *Conference of the Parties serving as the meeting of the Parties to the Paris Agreement* (CMA) decision on the rules, modalities and procedures for the mechanism established by Article 6, paragraph 4, of the Paris Agreement (https://unfccc.int/sites/default/files/resource/SBSTA50.DT_.i11b.highlight.pdf)

[2] Option A(b) and B3 in section VIII on "Delivering overall mitigation in global emissions" of the Draft CMA decision for Article 6.4 (op. cit.)

[3] In Paragraph 1 of Article 6 "Parties recognize that some Parties choose to pursue voluntary cooperation in the implementation of their nationally determined contributions to allow for higher ambition in their mitigation and adaptation actions and to promote sustainable development and environmental integrity."

[4] Option A(e) and A(f) in section VIII on "Delivering overall mitigation in global emissions" of the Draft CMA decision for Article 6.4 (op. cit.)

reference levels across a national or subnational region and conservative crediting baselines set below business as usual scenarios. An advantage of a focus on environmental integrity provisions in the context of cooperation-based OMGE is that they can identify environmental integrity risk by mitigation activity and provide benefits related to transparency and accuracy.[5] A flat OMGE cancellation rate applied across all activities does not provide for nuance based on activity or activity type.

The economic implications of applying a cancellation-based OMGE approach are analyzed in the next section.

Implications of applying a cancellation-based OMGE rate through automatic cancellation or discounting

The potential impact on price and quantities of delivering cancellation-based OMGE is a function of supply and demand, and consequently uncertain by nature. Proponents of automatic cancellation or discounting appear to have underestimated how much an OMGE rate will raise costs to both buyers and suppliers, in particular in the longer term when marginal abatement costs are expected to be higher[6]. It is crucial to properly analyze the impacts before determining the appropriateness of the OMGE cancellation approach and any potential cancellation rate.

A cancellation approach works by introducing a requirement such that the production of an emissions reduction credit that "counts" for either sale or use as one ton of abatement now requires more than one ton of actual abatement to produce. As a result, this means that the supply curve (which represents the marginal costs of production) for those credits now differs from the supply curve for the underlying abatement. In particular, the supply curve shifts up as a credit now costs more than one ton of abatement to produce. The critical question is how much do those costs shift up and what are the implications for resulting market prices and quantities, relative to the case with no cancellation or discount.

Figure 1 depicts the impact of an OMGE cancellation rate of 50% (doubling abatement of transacted emissions reduction units) on prices and quantities of emissions reduction credits in a notional scenario representative of near-term conditions, where the supply curve is rather flat, and the demand can be either inelastic or elastic depending on market design. Although we use a 50% cancellation rate for illustration, the same conclusions hold to other cancellation rates, the relative impact of which will be directly proportional to the size of the cancellation rate.

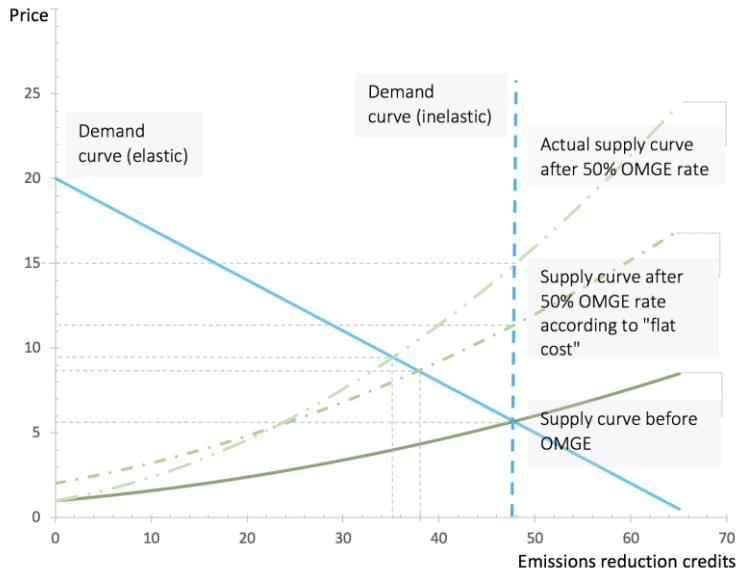

***Figure 1**. Market distortion of a theoretical 50% discount on a cancellation-based OMGE approach.*

[5] As illustrated by the quality concerns over the environmental integrity of certain CDM project types.
[6] See L. Schneider, Warnecke C., Day T., Kachi A. (2018), "Operationalising an 'overall mitigation in global emissions' under Article 6 of the Paris Agreement", New Climate Institute, Germany.

Some stakeholders argue that applying, e.g., a 50% cancellation rate would, at the most, double the cost of trading. They calculate the impact by dividing the total cost of abatement by the cancellation rate (i.e. total cost of X divided by 0.5 yields 2X).[7] This case corresponds to a situation where the costs of mitigation are flat, such that the incremental costs of each additional ton of abatement is the same as the last. Thus, if an initial quantity Q of abatement is available at $5/ton, another Q would also be available at $5/ton, such that supplying 2Q units of abatement (convertible into Q credits with a 50% cancellation rate) would still be feasible at $5/ton. This is shown in Figure 1 as the case with a "flat cost."

This case is unlikely to be realistic for anything other than small quantities of abatement, as supply curves typically slope upwards capturing the fact that increasing quantities of mitigation entail increasing incremental (marginal) costs to achieve. Moreover, supply curves typically not only slope upwards but do so at an increasing rate (i.e. are convex). If marginal costs of abatement increase in an upwardly curving (convex) manner, abatement costs rise faster and faster as you increase quantity of abatement and move up the cost curve.

Thus, to properly capture the impact of an OMGE cancellation rate on prices, it shall be applied to the quantity of abatement in the context of an upward sloping (convex) marginal abatement cost function (abatement supply curve). Thus, a doubling of the abatement with an OMGE cancellation rate of, e.g., 50% would certainly more than double the marginal costs in the case with inelastic (vertical) demand. Inelastic demand means that demandeurs of credits are willing to absorb any cost increase and will not reduce their quantity demanded. The maximum impact on prices is both a function of the OMGE cancellation rate and the shape of the supply curve. The steeper the supply curve the greater the impact. Even a small OMGE cancellation rate could deter market participants from engaging in the new mechanism established under paragraph 4 of Article 6.

Higher costs may lead to reduced demand. The ultimate impact on prices and purchased quantities will depend on the interaction of both supply and demand. A scenario with inelastic demand, however, does not appear to be realistic.

Even in the context of ICAO's Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), which is often used to illustrate inelastic demand for emissions reductions, demand for offsets will probably be price-elastic as the carbon price signal revealed by CORSIA will also inform in-sector abatement measures and make CORSIA eligible fuels (sustainable aviation fuels and lower carbon fossil aviation fuels) more competitive. While in the near-term the price of emissions reduction units would certainly be cheaper than the full abatement cost of reducing emissions with sustainable aviation fuels, biofuels are currently heavily subsidized in key jurisdictions around the world.[8] Airlines with obligations under CORSIA would only pay for the relatively smaller price differential (which could be as low as $5-$30/tCO_2 depending on market configuration) that makes diverting biofuels currently used for road transportation into aviation competitive. Relatively low carbon price increases thus could significantly increase the amount of sustainable aviation fuels available to airlines at competitive prices, i.e., resulting in elastic demand for Article 6.4 emissions reductions rather than the anticipated inelastic demand.

Applying an OMGE cancellation rate in a scenario with elastic demand could substantially reduce the volume of units transacted (see Figure 1). As the supply curve becomes steeper the volumes would become smaller and smaller. This could undermine the overall mitigation benefits of the cancellation rate, even assuming the buying country does not reduce its emission reduction target as a result of a partial cancellation requirement. For example, in the case of Figure 1, if demand is inelastic, 48 units transacted implies 96 units of abatement with a 50% cancellation rate. However, if demand is elastic and the quantities demanded in equilibrium were to fall to 35 units, host country abatement would be 70 units and the "overall mitigation gain" from cancellation would

[7] Ibid.

8 See for instance the European Union's Renewable Energy Directive II (2018/2001/EU) where fuels used in the aviation and maritime sectors can opt in to contribute to the 14% transport target. Furthermore, to facilitate the deployment of alternative fuels for aviation, the Directive establishes that the contribution of non-food renewable fuels supplied to aviation will count 1.2 times their energy content.

decrease to 35 units. If the quantity demanded were to fall below 35, host country abatement and OMGE benefits would decline further. If cancellation ended up choking trade off completely, OMGE benefits would be zero because no transfers would occur. The risk of decreasing host country abatement increases if costs are steeper and demand is more elastic.

Importantly, reductions in generated units could affect the funding dedicated to adaptation, derived from a share of proceeds on 6.4 credits. Whether a reduction in generated units would decrease, increase, or maintain adaptation funding levels is uncertain, and would depend on price and quantity of units transacted. In a scenario with significantly limited transactions, the funds dedicated to developing countries for adaptation would be reduced too. At the extreme, if no units are transacted, no share of proceeds will be generated for adaptation. Further research on this issue - based on realistic assumptions of an upward sloping (convex) marginal supply curve and elastic demand - could help inform policymakers on possible adaptation funding impacts of a partial cancellation rate.

What is the basis for an alternative, cooperation-based OMGE?

By lowering total abatement costs and creating economic opportunities for public and private entities – the aim of paragraph 4 of Article 6 – carbon markets offer the potential to help achieve emissions targets at lower cost than expected. This has the potential to lower resistance to more ambitious targets and enable deeper and faster cuts in GHG over time, as countries ratchet up the ambition of their NDCs. Recent analysis indicates that a well-designed international market could achieve roughly double the global reductions implied by current NDCs at no added cost, and that even limited international cooperation scenarios could enable significant increases in ambition without increasing total costs[9].

A prerequisite for voluntary cooperation to increase ambition The main policy rationale for any market-based approach to reduce pollution is to help enhance flexibility and thus lower costs. The key condition for cost-effectiveness is equalization of marginal costs[10] across different sources of abatement. Cooperation-based OMGE differs from cancellation-based OMGE in that it imposes a high bar for mitigation and other requirements prior to crediting, but it does not impose added transaction costs once that bar has been met. With ambitious baselines applied at the program level or at the country level, the cost of supplying abatement increases, but once reductions below the baseline are achieved, then each ton of mitigation supplied is paid the same. This approach preserves cost-effectiveness as it keeps the same incentives at the margin for each subsequent ton of reduction produced, independently of whether or not these are internationally transacted.

This key condition for cost-effectiveness is never achieved with cancellation-based OMGE because automatic cancellation works similarly to a tariff on international transfers, creating a wedge between what buyers pay and what producers receive for a ton of mitigation. Furthermore, the size of this wedge increases as the quantity of mitigation (i.e. ambition) rises. This creates a perverse result of discouraging rather than encouraging increasing ambition by making it harder and harder to engage in voluntary international cooperation. This strikes directly at the central benefit of using a market approach by distorting the incentives for emission reductions at the margin.

Thus, automatic cancellation will make it increasingly harder to reduce any target quantity of emissions globally. While any transaction subject to a partial cancellation rate will, by its own definition, provide overall mitigation in global emissions, it will do so at the expense of cost effectiveness that could generate a larger overall mitigation in global emissions over the longer term. This result could impede the ability of Article 6 cooperation to fully contribute to the Paris Agreement's dynamic ambition cycles.

Applying lessons learned and experiences gained from the CDM to Article 6.4

[9] Piris-Cabezas, Pedro, Ruben Lubowski, and Gabriela Leslie. Forthcoming. "Estimating the Power of International Carbon Markets to Increase Global Ambition." Working paper. World Bank, Washington, DC.
[10] Marginal cost is the cost of producing one more unit of a good or service, in this case one ton of emission reduction.

The design of the new mechanism under paragraph 4 of Article 6 should benefit from the lessons learned and experience gained from existing mechanisms and approaches adopted under the Convention[11], and in particular from mechanisms such as the Clean Development Mechanism (CDM).

The CDM suffered from quality concerns over the environmental integrity of certain project types. The questioned environmental integrity, combined with the fact that host countries had no emissions reduction targets, could have produced a net global increase in emissions levels as a result of international trading. This seriously undermined the credibility of the CDM and hindered its capacity to deliver on its promises.

The new mechanism could represent a substantial departure from the shortcomings of the CDM experience. According to paragraph 5 of Article 6, emission reductions resulting from the mechanism shall not be used to demonstrate achievement of the host Party's NDC if used by another Party to demonstrate achievement of its own NDC.

Properly operationalizing paragraph 5 necessarily implies host countries accounting for the use of emission reductions resulting from the new mechanism by applying adjustments in the structured summaries of their biennial transparency reports, as required by the Paris Agreement rulebook.[12]

In this new framework, assuming proper implementation of paragraph 5, including through stringent baselines and accounting approaches based on broad scope, environmental quality concerns due to lack of additionality of projects or over-estimation of emissions reductions are addressed. In addition, the necessary adjustments reflected in the structured summaries of host countries required under para 77(d) of the Katowice transparency decision provide an added degree of assurance. For instance, an over-estimation of reductions would need to be compensated eventually with greater domestic emission reductions to achieve the host country's NDC, i.e., the integrity of the emissions reduction claims is guaranteed one way or another by the host country.

But this integrity safeguard only works for host countries that have properly communicated the highest possible ambition in line with Article 4.3 of the Paris Agreement, and when the emission reduction claims fall within the scope of their NDCs. Unfortunately, current NDC pledges are not fully in line with these requirements.

While neither cooperation-based nor cancellation-based OMGE will be sufficient to meet the goals of the Paris Agreement under current conditions of low ambition, applying a partial cancellation rate in a context where emissions reductions could come from sectors not subject to a corresponding adjustment and/or from countries with unambitious NDCs could result in a negative market distortion, where higher integrity units could be crowded out by low-quality, non-additional carbon credits that come in at any price left in the market. Thus, applying an OMGE cancellation rate in this context would be counterproductive.

Furthermore, as the partial cancellation rate might not be sufficient to compensate for these credits' lack of integrity, operationalizing OMGE with a cancellation rate could have the unintended consequence of delivering a net global increase in emissions levels – thus defeating its purpose. Automatic cancellation under these circumstances would provide a false sense of "automatic" achievement of overall mitigation, which could distract Parties and the public from the underlying quality of transferred units.

Even assuming all credits in the marketplace will be of the highest environmental quality, the economic analysis above indicates that a partial cancellation rate would advantage cheaper[13] credits and reduce the supply of more costly emissions reductions. If higher cost emissions reductions reflect additional sustainable development

[11] Decision 1/CP.21, paragraph 37.f.

[12] The scope of such corresponding adjustments is proving more difficult to agree than expected, as the need for corresponding adjustments has been challenged in the negotiations by some Parties. Thus, it should not be taken for granted.

[13] There are some truly additional projects that are low-cost and there is not a one-for-one relationship between additionality and costs. However, it is more likely to find non-additional projects that are very cheap (requiring no effort, which indicates non-additionality) versus expensive.

benefits or help to catalyze needed transformational change, a partial cancellation rate would reduce Article 6's ability to achieve these goals.

Conclusions

While in principle cancellation-based OMGE might be able to achieve some added reductions in the short term, it will do so at the expense of cost effectiveness that could generate a larger overall mitigation in global emissions over the longer term. Automatic cancellation will reduce the cost-effectiveness of the market by distorting the incentives at the margin, making it increasingly harder to reduce any target quantity of emissions globally, potentially discouraging rather than encouraging more ambitious mitigation commitments.

Even in the near term, however, setting the right cancellation rate would be a difficult political and technical exercise and requires understanding the underlying supply and demand curves. Previous analysis (Schneider et al. 2018) has implicitly assumed flat costs, which is an unrealistic case that minimizes the potential market distorting effect of raising costs, which would discourage demand for units and could impact the share of proceeds available to developing countries for adaptation.

The effects of OMGE will also change over time as market conditions evolve. An OMGE cancellation rate designed to deliver overall mitigation in the near-term might have unintended consequences in the mid- to long-term, when carbon market price signals are expected to be substantially larger. In the long-term, even a small OMGE cancellation rate could deter market participants from engaging in the new mechanism established under paragraph 4 of Article 6. This would be at odds with the purpose of the mechanism, which is intended, inter alia, to incentivize and facilitate participation in the mitigation of GHG emissions by public and private entities that otherwise would not be in a position to generate emissions reduction under Article 6.

Applying a cancellation-based OMGE approach will advantage cheaper credits and reduce the supply of more costly emissions reductions. To the extent that higher cost emissions reductions reflect additional quality or sustainable development benefits, or help to catalyze needed transformational change, a partial cancellation rate would reduce Article 6's ability to achieve these goals.

Cooperation-based OMGE provides an alternative approach in which OMGE could be achieved through a market framework of voluntary cooperation with robust accounting, transparency and environmental integrity provisions that facilitate meeting targets in a cost-effective manner. These conditions would allow countries to increase their ambition as part of their cooperation, and thus demonstrate consistency with paragraph 1 of Article 6 of the Paris Agreement.

Entities engaging in voluntary trading of emissions reductions generated under Paragraph 4 should ensure that reductions are generated in countries that have properly communicated the highest possible ambition in line with Article 4.3 of the Paris Agreement and that account for these emission reductions in their emissions balances. Absent these requirements, transfers of emission reductions under any approach to OMGE could risk delivering a net global increase in emissions levels, undermining the capacity of carbon markets to enable deeper and faster cuts in GHGs over time.