Ambition Coefficients

Aligning baselines for international carbon markets with net zero pathways

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Global greenhouse gas (GHG) emissions have continued to increase over the last two decades despite all international and national attempts to mitigate climate change. The challenge has increased in the last years due to the shift from the top-down approach of the Kyoto Protocol to the bottom-up approach of the Paris Agreement (PA) where all countries pledge mitigation. However, the Nationally Determined Contributions (NDCs) are specified in many different ways, and for many countries are not really ambitious. According to UN Environment (2020) the projected emissions gap between NDCs and 1.5-2°C compatible emissions paths in 2030 has increased over the last 10 years. Thus, the time remaining shrinks to shift the emissions path downwards to achieve a balance of GHG emissions and sinks globally between 2050 and 2070, as seen as necessary by IPCC (2018) in order to respect the 1.5°C target of the PA.

International carbon markets have been hotly contested over the last decade. Negotiations about the detailed rules for carbon markets under Article 6 of the PA have been protracted, with COP26 being already the third attempt to achieve an agreement. While some parties and stakeholders call for international carbon markets to at least contribute to an ambition increase of NDCs over time (Howard et al. 2017), others continue to see carbon markets primarily as a tool to lower compliance costs and enhance flexibility in the achievement of NDCs.

When looking at different forms of international carbon markets, many observers see no long-term future for baseline and credit mechanisms. As their name says, these mechanisms generate emissions credits by comparing emissions after the implementation of a GHG mitigation activity to emissions under a counterfactual, the so-called baseline. The baseline is determined by applying a baseline methodology. A stringent baseline leads to few, or zero emissions credits being allocated to a mitigation activity while a lenient one will allocate many credits. If we want to achieve a high level of environmental integrity, the baseline should be stringent.

Why emissions intensity baselines do not ensure emissions decreases

Baselines for international crediting mechanisms, for example the Clean Development Mechanism (CDM) have to date been specified in form of greenhouse gas emissions intensity factors and linked to business-as-usual (BAU) developments. This means that baselines have been denominated as GHG emissions per unit of production of a good or service. Therefore, absolute emissions can still increase if the production of the goods and services increases and the rate of production increase exceeds the rate of GHG intensity reduction. Thus, with increasing production of goods and services through carbon market activ-

Into the future: baselines must be more stringent than BAU and take account of the Paris Agreement's long-term goal.

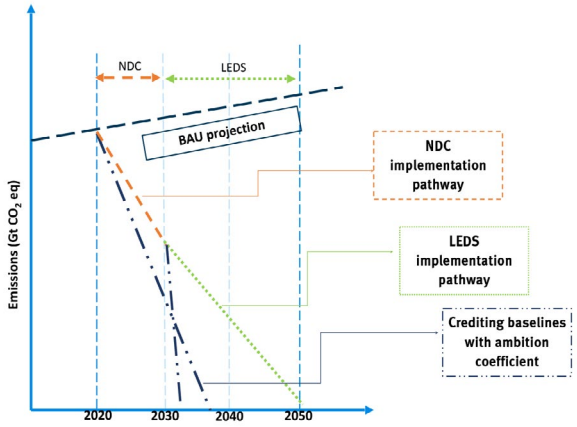
ities, absolute emissions may increase or fall only slowly. But under the Paris Agreement we need an absolute, rapid decrease of emissions regardless of production levels. Do we thus have to abandon the concept of intensity-based baselines for the international carbon markets under Article 6?

Paris-proofing the 'methodology capital' through dynamic elements

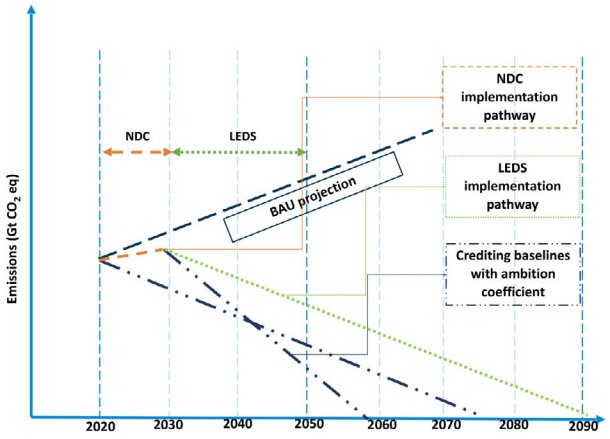
Consigning to the dustbin the over 250 CDM baseline methodologies approved over the last 15 years for a wide range of mitigation technologies would be an irresponsible waste of resources (cp. 'Ensuring ambitious baselines' elsewhere in this issue). Developing methodologies from scratch would also mean that Article 6 carbon markets would be blocked for several years, which would lead to a loss of mitigation opportunities as well as of the human capacity indispensable for operation of the markets.

During the Article 6 negotiations, on the technical level, the scepticism regarding the consistency of baseline-and-credit systems with the PA architecture has prompted many governments to call for baselines that are set below, i.e., more stringent than BAU and consider the long-term target of the PA. Through this, the market mechanisms would contribute to the transformational change needed to shift emissions to pathways that are in line with net zero targets. This means an approach needs to be found that generates a dynamic baseline where the baseline emission intensity would gradually and in a predetermined way move

Figure 1: Different net zero pathways consistent with common but differentiated responsibility



PA-compatible emissions pathways for industrialised countries



PA-compatible emissions pathways for LDCs

Source: authors

downwards from the BAU intensity towards a normative/policy reference (Hermwille 2020). In the Article 6 negotiations, the EU has been calling for baselines to be determined by the best available technology, but even such an approach nor a baseline linked to NDC and LEDS emissions pathways does not guarantee that emissions fall sufficiently quickly. The baseline must be more stringent (for a detailed account of the EU position, cp. 'Taking a long-term perspective' elsewhere in this issue).

The ambition coefficient for the emissions intensity applied in the baseline

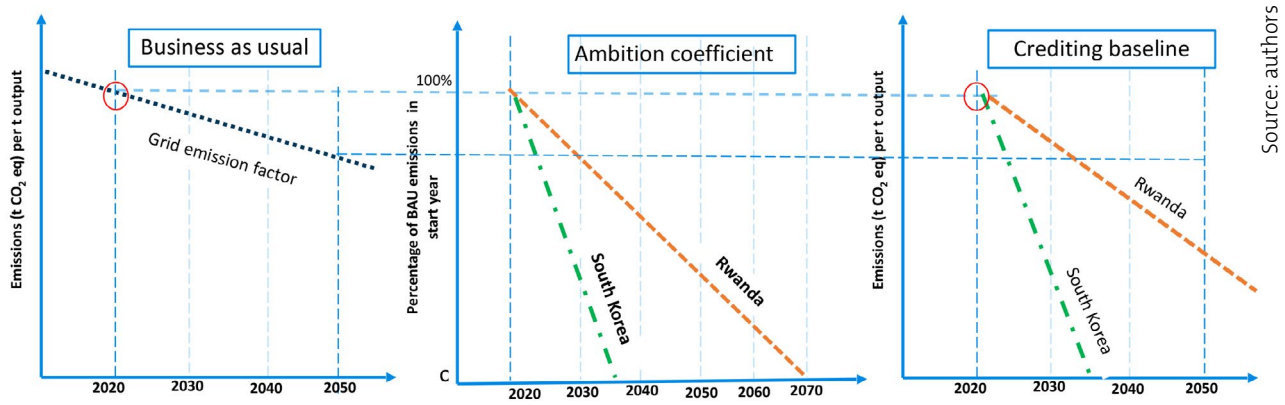
We now discuss how a transition parameter can be defined that reduces uncertainty for potential private investors and is predictable over long periods. In order to allow continued use of emissions intensity baselines while being in line with the ambition of the PA, we propose to apply an 'ambition coefficient' to emissions intensities of BAU technologies. This coefficient decreases to reflect increasing ambition over time, and reaches zero when a country needs to reach net zero emissions. It allows alignment of carbon markets with net zero pathways and ensures that carbon markets will not lead to a lock-in of emissions. The ambition coefficient's value would start at 100% of BAU and reach 0% at the date of net zero emissions.

Due to the principle of common but differentiated responsibilities and respective capabilities, the coefficient would fall more quickly for rich than for poor countries. The latter would still be able to generate emission reduction credits well beyond 2050, while for the former the baseline would reach zero around 2035, and thus emissions credit generation would be limited to removals from that point in time onwards. This differentiation would also be in line with the concept of 'suppressed demand' for goods and services in poorer countries which vanishes as countries develop.

Case study: ambition coefficients for South Korea and Rwanda

The conceptual application of the ambition coefficient is shown in Figure 2 for two countries, a high-income one and a low-income one, here exemplified by South Korea and Rwanda. The BAU emissions intensity as calculated in the CDM baseline methodologies will be multiplied by the ambition coefficient which declines over time. The required decline will be more rapid for South Korea than Rwanda.

Figure 2: Application of the ambition coefficient to the BAU to derive a dynamic crediting baseline in a case study



We now undertake the calculation of baseline emissions for projects producing electricity for the grid/saving electricity that want to generate emissions credits in South Korea, and similar projects in Rwanda, respectively. We assume that the projects start in 2020 and have a crediting period of 15 years until 2035.

As a first step, we take the average grid emissions factor calculated as per the baseline methodology applicable under the CDM, using the 'Tool to calculate the emission factor for an electricity system', from the database published by the Institute of Global Environmental Strategies (2021): 626 g CO2/kWh for South Korea and 654 g CO2/kWh for Rwanda.

As second step, we apply a country-specific ambition coefficient for each emission reduction vintage year. Here we apply our own assumptions. For South Korea as an OECD member, responsibility is high as acknowledged by the government when declaring a net zero target for 2050. We thus set 2040 as the year in which the ambition coefficient reaches zero. For Rwanda as a least developed country (LDC), responsibility is low and therefore 2070 is set as the date when the ambition coefficient attains zero.

Applying these values to calculate the ambition coefficient, it reaches 75% in 2025, 50% in 2030 and 25% in 2035 for the case of South Korea, while it reaches 90% in 2025, 80% in 2030 and 70% in 2035 for Rwanda. The resulting baseline emission factors are shown in Table 1.

The outcome would be that an activity in Rwanda would generate significantly more credits from the late 2020s onward compared to South Korea.

Table 1: Baseline emissions factors (g CO2/kWh) for grid electricity-related activities in South Korea and Rwanda

Country	2030	2025	2030	2035
Rwanda	654	589	523	458
South Korea	626	470	313	157
Difference (%)	5%	20%	40%	66%

NDCs and Long-term low emission development strategies (LT-LEDS) could be a starting point, but as noted above their ambition is often lacking. We therefore suggest building on exercises like Holz et al. (2018) or van der Berg et al. (2020), where large teams of researchers from around the world try to calculate fair emissions pathways. Appropriate indicators for such calculations should take into account both the country's capacity and its responsibility for the current level of emissions. They could thus include gross national income (GNI)/capita, cumulated historical emissions, mitigation potential and geographic criteria.

We would like to note that this approach does not require agreement under the UNFCCC on a 'fair' distribution of the burden of mitigation action, which is unlikely. It will thus simply limit the possibility to benefit from participation in international carbon markets to those countries showing a sufficiently high level of actual emission reductions. The increasingly stringent baselines imply that a larger share of the mitigation remains in the host countries thereby facilitating them to raise ambition in their NDCs and protecting the PA from perverse incentives for governments to keep mitigation action low to increase revenues from carbon markets.

Governing and administering the ambition coefficients can in principle be undertaken by UNFCCC entities like the support structure of the Article 6.4 SB. This would mirror the calculation of standardised baselines by the regional cooperation centres (RCCs) of the UNFCCC Secretariat, which has frequently been undertaken in the latter years of the CDM. Before the Article 6.4 infrastructure is in place, buyer country clubs like the supporters of the San José Principles could apply ambition coefficients jointly for their purchases. Sweden, for instance, already intends to apply more stringent baseline methodologies for their Article 6 pilots (Michaelowa et al. 2020).

Bridging the negotiations gap through the ambition coefficient

The ambition coefficient offers a solution to address the revision needs of approved CDM methodologies that are found to be incompatible with the PA principles of reference levels below BAU, contributing to NDC implementation and being aligned with PA long-term objectives (for a discussion, see Michaelowa et al. 2020). The ambition coefficient can thereby reconcile positions in the current discussion on transition of elements from the CDM: it preserves the body of knowledge on quantifying and calculating emissions and associated reductions, while aligning the reference levels with PA-compatible pathways. A tedious case-by-case revision of methodologies with justification for chosen parameters could be avoided.

Carbon market actors and investors may see this proposal as creating barriers to the upscaling of carbon markets and a deterrent for the mobilization of private finance. Yet, it ensures that at least some trade can still happen. Investors may prefer a stringent but transparent system of dynamic baselines to a future with ad-hoc changes to bring carbon markets in line with global mitigation targets. This is what prior experience suggests when private actors preferred conservative defaults under the CDM to values that were costlier to monitor. The ambition coefficient valid for the relevant crediting period of the activity should be fixed ex ante until the end of the current NDC cycle (5 years). The ambition coefficient should then be updated with every new NDC cycle in the light of the results of the most recent global stocktake. By doing so, one could take into account whether countries are actually in line with the net zero pathways. Only such a dynamic baseline approach will ensure a continued role for international carbon markets for several decades as it generates trust that the markets will operate in line with the long-term ambition of the international climate policy regime.

A key benefit of the ambition coefficient approach compared to baseline methodologies linked to NDC targets is

that there is no potential for gaming by the host country, i.e. to adopt less stringent targets to maximize carbon credit revenue. If a country deviates from a PA-compatible emissions trajectory, and at its next NDC update this deviation becomes apparent – no matter whether this is because its NDC itself lacks sufficient ambition or because the country does not comply with its NDC – it will face the disadvantage of being excluded from the opportunity to supply credits on the international carbon market. This is because, when the deviation becomes apparent during the country's next NDC update, its ambition coefficient will now go down even more quickly than in the past, and the date at which it reaches zero (or the relevant negative endpoint) is accelerated. One would thus even expect that entities wanting to sell emission credits will put pressure on the government to increase the ambition of the NDC update. The ambition coefficient concept is thus an incentive compatible with a continuous ambition increase. At the same time, the ambition coefficient baseline does not interfere with the NDC and thus respects each country's sovereignty.

The ambition coefficient approach can serve as a 'bridging proposal' for the operationalization of PA carbon markets resolving the negotiation gridlock between those who want to increase stringency in carbon market instruments and those who think mitigation ambition should be generated through more stringent NDCs, facilitated by cost savings and increased financial resources generated by carbon markets. It also allows to align the existing body of methodologies with the necessary ambition levels to implement the PA, keeping transaction costs low.

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