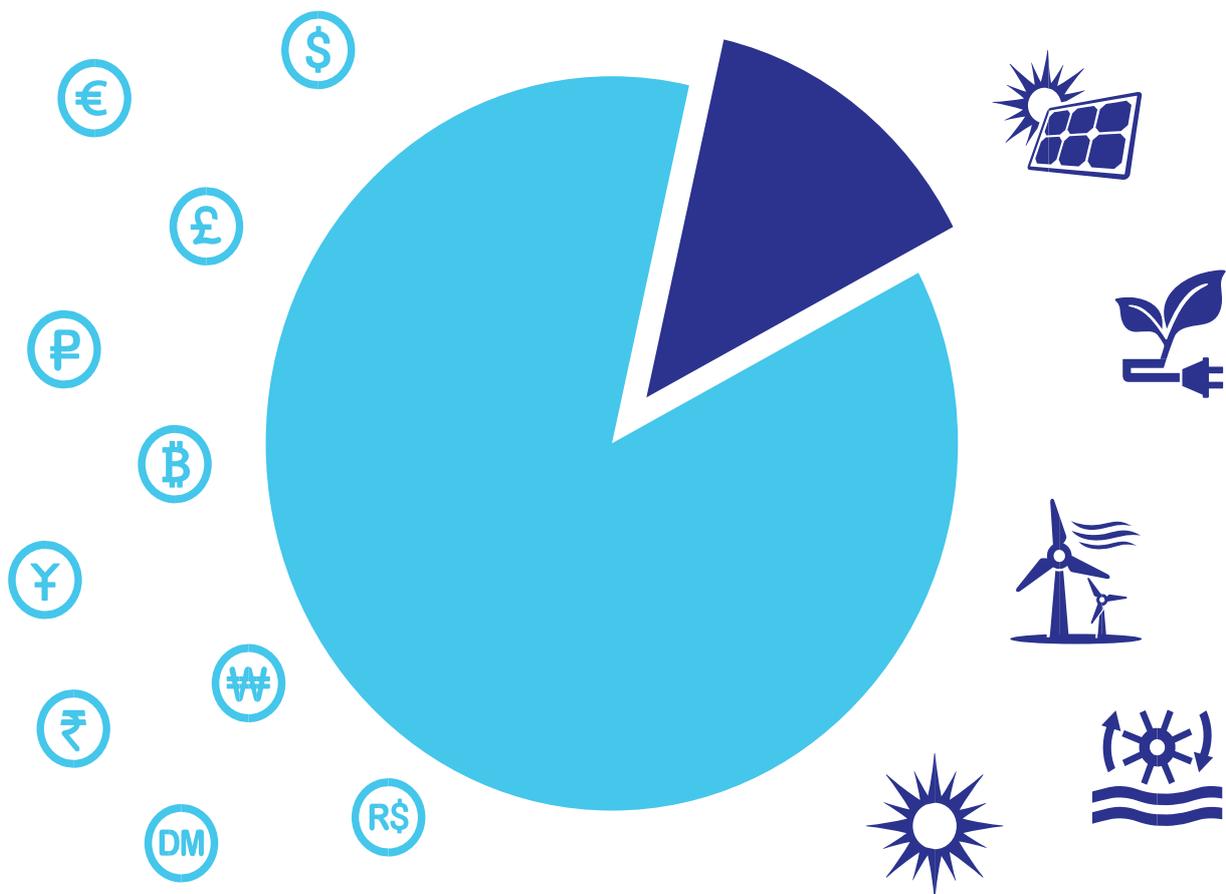


CPF/TCAF Discussion Paper

Blending climate finance and carbon market mechanisms

Options for the attribution of mitigation outcomes

Final version, March 2019



Blending of different instruments of international support might be required to support transformative greenhouse gas mitigation programs in developing countries in an effective and efficient way. While there is a substantial body of knowledge on blending of different financial instruments, blending of financial instruments with international carbon market mechanisms is less well understood.

This CPF/TCAF discussion paper discusses blending of financial instruments with international carbon market mechanisms from a perspective of environmental integrity and economic efficiency. Against this background the discussion paper outlines possible methodological approaches to attribute greenhouse gas emission reductions to financial and market instruments deployed within a mitigation program.

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This discussion paper reflects thoughts of the team of authors only. Those do not necessarily reflect the views of The World Bank or the Contributors to CPF and TCAF.

Contents

Contents	iii
Executive Summary	iv
1. Introduction	1
2. Approaches to attribution	3
2.1. What to attribute: quantifying emission reductions under the Paris Agreement	3
2.2. What do emission reductions cost: sources of financing and the valuation of climate finance and carbon markets	6
2.3. How to attribute: mapping approaches to attribution	12
3. Methodology for assessing the different approaches to attribution	14
3.1. Assumptions and definitions	15
3.2. Definition of criteria for evaluation of attribution approaches	18
4. Comparison of approaches to attribution	20
4.1. All to climate finance	21
4.2. All to carbon markets	24
4.3. Proportional attribution	28
4.4. Summary of comparison of approaches to attribution	30
5. Using cost savings from carbon markets for climate finance	37
6. Application: example program	38
7. Conclusions	40
References	41
Abbreviations and Glossary	43

Executive Summary

The Paris Agreement includes two major modalities for international cooperation on climate change: climate finance (Article 9) and carbon markets (Article 6).¹ It is however silent on how these two modalities for international cooperation interrelate. Can they be blended, i.e., combined in the support of the same mitigation program? And if so, whether and how should the resulting mitigation outcomes be attributed to climate finance and carbon markets?

The present discussion paper discusses three alternative approaches to the attribution of mitigation outcomes from a perspective of environmental integrity and economic efficiency.

The “*all to climate finance*” approach attributes all mitigation outcomes to climate finance. It allows climate finance to support countries in achieving their targets, to generate net global emission reductions beyond existing targets or a combination of both. It would however fragment international climate cooperation in two compartments: mitigation activities supported by international climate finance and mitigation activities supported by international carbon markets. This is because carbon market mechanisms could not claim any mitigation outcomes from a program that is supported by climate finance. It would therefore not be possible to combine climate finance and carbon market mechanisms to support the same mitigation activity.

Such a fragmentation would reduce the efficiency of carbon market mechanisms, particularly of international carbon crediting. Under crediting, disbursements happen generally ex post, once verified emission reductions are delivered to the buyer of the credits. Crediting in itself cannot directly address upfront financing barriers of mitigation activities or barriers due to lack of technical capacity. Indirectly, carbon crediting can help overcome such barriers if buyers of credits are willing to provide partial upfront payments or if carbon revenues become high enough to pay for risk premiums of providers of commercial finance. Therefore, carbon crediting might still find areas of application under an ‘all-to-climate finance-approach’ but, even within those areas, the exclusive usage of a crediting instrument to overcome various implementation barriers would be less efficient than addressing such barriers directly through other, more appropriate, instruments.

From the perspective of climate finance, the “all-to-climate finance-approach” would not have the same limitations as for carbon markets. Climate finance is much more flexible than a particular carbon market mechanism such as carbon crediting and it can come through an array of different and combinable instruments such as grants, equity contributions, concessional loans, results-based payments, guarantees, etc. Climate finance can therefore address multiple barriers without relying on blending with carbon market mechanisms. Still, exclusion of blending would deprive climate finance of a price signal that can reveal real costs and therefore help to avoid over-subsidizing mitigation programs and suboptimal allocation of scarce public funds. Much more important, however, climate finance alone cannot mobilize the resources needed to achieve the below two degrees target of the Paris Agreement and climate finance cannot realize the global cost savings in meeting national mitigation targets through usage of international carbon markets.²

¹ The Paris Agreement does not define the term climate finance. In this discussion paper we refer only to a subset of climate finance, i.e., concessional international finance provided for mitigation activities in developing countries.

² For estimates on cost savings and contribution to global resource mobilization by using international carbon markets in achieving a two degrees target see: (World Bank 2016, 2017b)

As an alternative the “*all to carbon markets*” approach attributes all mitigation outcomes to carbon market mechanisms. Carbon market mechanisms could therefore be blended with climate finance in support of the same mitigation activity. This approach is straightforward to implement and provides the strongest incentive for the development of carbon markets and for related instruments to evolve. It prevailed under the Kyoto Protocol including the Clean Development Mechanism (CDM). Many CDM projects were partially funded by official development assistance (ODA). ODA rules excluded funds spent for the purchase of certified emission reductions to be accounted as ODA (OECD 2004). CDM rules required confirmation from ODA providers of nondiversion of ODA to CDM projects and demonstration that CDM revenues were necessary to make the project happen (additionality).³ As long as these rules were respected a CDM project could claim the entirety of the achieved emission reductions and buyers of those emission reductions could use all of them for offsetting purposes – irrespective of the underlying ODA funding.

This attribution approach raised some concerns in the donor and the climate policy community, related to both environmental integrity and impact, as well as to financial and economic efficiency. Environmental integrity concerns emerged from the inherent difficulty in demonstrating CDM additionality for the entirety of a project’s emission reductions in cases where projects had already benefited from concessional finance and where CDM revenues were small or even marginal compared to project costs or other revenues the project generated. Concerns about environmental integrity and impact emerged when providers of concessional finance had the objective to increase overall (global) mitigation beyond what the Kyoto mitigation targets of developed countries could deliver. Allowing the entirety of the emission reductions generated by the supported projects to be used for offsetting purposes conflicted with this objective and seemed to ‘dilute’ the mitigation impact of concessional finance provided. This would apply under the Paris Agreement as well.

Furthermore, economic efficiency was questioned in a context where CDM revenues, dependent on an exogenous carbon price, were added on top of committed concessional finance without any readjustment, which could lead to potential ‘overpaying’ for emission reductions. From an economic perspective such practices could result in de facto subsidizing carbon market transactions, which could lead to a suboptimal global distribution of mitigation activities, inefficient allocation of resources (i.e. because, with subsidizing, resources may not flow to the most cost-efficient mitigation potentials) and therefore reduced economic efficiency.

Under the Paris Agreement all countries have some type of nationally determined mitigation contribution (NDC) - unlike under the Kyoto Protocol. This raises a further concern, namely the issue of host country target achievement. International climate finance supports mitigation activities in developing countries that could contribute to their target achievement. Transferring the entirety of the emission reductions generated by a climate finance-supported mitigation program to a buyer country would nullify the contribution of climate finance to target achievement because of the “corresponding adjustments” triggered by the transfer of mitigation outcomes. In addition, it could compromise the host country’s ability to progress in scope and ambition level of their NDC targets over time by using up the lower cost mitigation opportunities for carbon markets and therefore raising the host country’s cost of any additional mitigation commitments.

³ UNFCCC, CDM rules and reference, <http://cdm.unfccc.int/Reference/index.html>

Compared to these two approaches, the “*proportional attribution*” approach attributes mitigation outcomes to climate finance and to carbon market mechanisms proportionally to their financial contribution in supporting a mitigation activity. Such attribution proportionally to financial contributions should be based on grant equivalents. This approach allows blending of climate finance and carbon market mechanisms within the same mitigation program.

This approach basically attributes to climate finance and to carbon market mechanisms what they respectively paid for and therefore avoids cross-subsidization. No mitigation outcomes paid by climate finance would be available for offsetting. Such mitigation outcomes would either count toward the host country’s mitigation target or contribute to global net mitigation. Importantly, based on the analysis presented, we should only consider the grant-equivalent of climate finance in attribution, not the face value. The commercial component of a climate finance instrument, by definition, could only support investment necessary for BAU technologies – it is the grant-equivalent of the finance instrument that pays for the incremental cost of mitigation.

The proportional attribution approach could address concerns on environmental integrity and impact of the “all to carbon market” approach and could potentially increase economic efficiency compared with both of the alternatives above. The reason for this is that there is no cross-subsidization (as in “all to carbon markets”) while there is still an incentive for carbon markets to participate (in contrast to “all to climate finance”). It would also ensure that climate finance providers and recipients could support host country target achievement and/or achieve net global mitigation in a context of instrument blending. However, the “proportional attribution approach” requires more information on the financial flows involved and does not subsidize the price for the mitigation outcomes claimable by market mechanisms. This means that the proportional attribution approach provides less incentive for carbon market development than the “all to carbon markets” approach.

It still has to be seen how proportional attribution based on grant equivalents would work in practice. This discussion paper introduces the approach conceptually and argues that some of the disadvantages of the other attribution approaches might be avoidable under proportional attribution.

The discussion paper uses a simple comparative static analytical methodology based on stylized examples. It would still need to be demonstrated that the suggested conclusions hold under more general conditions.

1. Introduction

Large scale transformative mitigation programs in developing countries are often supported by numerous international finance providers as well as domestic sources of finance. They may mix commercial with concessional loans and other climate finance instruments. Furthermore, contributions from international climate finance may be blended with income from carbon markets.⁴ This has been the case for many programs developed in the past, where Kyoto Protocol markets may have played a role, as well as in the programs under development in emerging climate and carbon finance funds meant to include carbon financing streams under Article 6 of the Paris Agreement.

The rationale for blending of different instruments is to maximize the effectiveness and efficiency of international financial support, including crowding-in commercial financing. Large scale mitigation activities in developing countries face a multitude of implementation barriers and a variety of instruments are required to best address these barriers. Grants can be used to pay for building the required technical capacity and for program preparation. Concessional loans might be needed to cover a part of the capital investment in low-carbon technologies. Public guarantees might enable commercial loans to close the gap in upfront financing. In addition, results-based payments of climate finance might be needed to make projects commercially viable and/or sustainable. Finance including concessional international financing for mitigation activities is flexible and can come in all these different forms depending on the needs of the recipient country.

Carbon market mechanisms are, however, often less flexible in how they can support mitigation activities. Similar to results-based climate finance, carbon crediting has historically often only provided ex-post performance-based payments. Not only have the earlier generation of carbon markets under the Kyoto Protocol not included the concessional loans, guarantees or other instruments that may be needed as part of an overall financing package to support a successful large-scale mitigation program, but there is no indication that future markets under this Paris Agreement would include instruments other than results-based payments for transfers of mitigation outcomes. There is significant value, therefore, in developing business models and practices that allow for the blending of climate finance with carbon markets.

In contrast to climate finance, when international carbon markets are used to fulfill the purchasing countries' NDC commitments, they do not then help the host countries to achieve their NDC targets and would not reduce global net GHG emissions, although this use would contribute to achieving the acquiring country's NDC target. Some countries have stated their intention to use carbon market mechanisms to purchase mitigation outcomes but then cancel those mitigation outcomes rather than using them for the purchasing country's NDC compliance. While this approach would still not help the host country to achieve their NDC goals, because of the requirement for "corresponding adjustments", it could reduce global net

⁴ In this discussion paper, "climate finance" refers to international climate-related financing that supports mitigation in host countries that does not result in any international transfers of emission reductions units or mitigation outcomes under Article 6 of the Paris Agreement – even if it is "results-based climate finance". "Carbon markets", on the other hand, refers to international payments for mitigation outcomes (by public or private actors) that are transferred from one country to another under Article 6 of the Paris Agreement and generate "corresponding adjustments" for the host country, regardless of whether or not the acquiring country uses the mitigation outcomes for compliance with its NDC target. If a portion of an RBCF facility required the host country to transfer mitigation outcomes, then this component of the facility would be part of the carbon markets in this analysis, not climate finance (i.e. the facility would be a blended finance fund). Note that in the discussion of experience with blended financing to date, carbon markets refer to payments for units under CDM and JI.

GHG emissions by, in essence, the acquiring country going beyond its NDC. The focus of this analysis, however, as described in more detail in Chapter 3, is on the use of transferred mitigation outcomes for NDC compliance by the purchasing country.

Climate finance has historically not necessarily relied on blending with climate market instruments, although there are examples of this. Still, exclusion of blending would deprive climate finance of a price signal that can reveal real costs and therefore help to avoid over-subsidizing mitigation activities and suboptimal allocation of scarce public funds. Much more important, however, climate finance alone cannot mobilize the resources needed to achieve the below two degrees target of the Paris Agreement and climate finance cannot realize the global cost savings in meeting national mitigation targets through usage of international carbon markets.⁵

With the Paris Agreement, host countries have emission reduction commitments and “double counting” is explicitly ruled out. Therefore, any international transfers of mitigation outcomes under carbon markets could affect the host country’s ability to achieve their mitigation commitments⁶. This leads to new methodological issues with financial blending for climate change mitigation. Under the Paris Agreement the question arises of how different streams of financing in a blended finance environment may interact and how the resulting mitigation should or should not be attributed to these different sources of financing. In addition, developed countries have committed themselves to the substantial provision of climate finance to support developing countries in climate action. Some climate finance donors have raised concerns about their funding essentially subsidizing carbon markets, if all the mitigation achievements from large programs supported by a range of climate finance and carbon market instruments are converted into tradable emission reduction units.⁷

To date (as of October 2018) there is no formally agreed definition of the term *climate finance* on the level of the Conference of The Parties (COP) and guidance on new carbon market mechanisms under Article 6 of the Paris Agreement are not yet available. It is also not clear if guidance on the implementation of the Paris Agreement will cover the interrelation of climate finance and carbon market mechanisms.

In the context of the World Bank’s Carbon Partnership Facility (CPF) and Transformative Carbon Asset Facility (TCAF), the combination or “blending” of financial instruments such as concessional loans or grants with contributions from carbon markets has emerged as an important issue. More specifically, how much do different streams of financing in a blended finance environment contribute to the mitigation outcomes, and how should these contributions be recognized? The objective of this discussion paper is to present the options for answering these questions and discuss the implications of different approaches to blending carbon markets with climate financing.

⁵ For estimates on cost savings and contribution to global resource mobilization by using international carbon markets in achieving a two degrees target see: (World Bank 2016, 2017b)

⁶ This is because all transfers are subject to “corresponding adjustments” to the host country’s emission balance, so mitigation activities that result in transferred mitigation outcomes cannot, by definition, be accounted for the host country’s NDC compliance.

⁷ Another way to explain this is that, *not* addressing the question of whether emission reductions from mitigation programs supported by blended finance should be attributed to those different financing sources is implicitly saying that *all* the emission reductions should be attributed to carbon markets – that they should all be converted into tradable emission reduction units regardless of the variety of financing. In other words, “no attribution” is essentially the same as the “all to carbon markets” approach described in this discussion paper.

This discussion paper develops options for the attribution of mitigation outcomes to different finance streams (Chapter 2). Further, it presents a set of assumptions and definitions and transparently defines criteria related to environmental integrity and economic performance that will guide the subsequent analysis (Chapter 3). Based on this, the discussion paper analyses and compares the three options for attribution along the defined criteria (Chapter 4). The degree to which resource cost savings under attribution approaches may be used to further reduce global emissions is discussed (Chapter 5). This is followed by the application of the proportional attribution approach to an illustrative case study (Chapter 6). The discussion paper closes with findings and conclusions (Chapter 7).

2. Approaches to attribution

This chapter explains three broad approaches to attributing emission reductions to different streams of climate finance and carbon market support. One key element of this question is how to value the different financial contributions, which is addressed in section 2.2, following a discussion in section 2.1 of how the emission reductions that will be attributed should be calculated (i.e. what is the reference case or baseline for calculating emission reductions). While issues of attribution are particularly important for larger-scale mitigation activities such as sectoral-level programs, the options and analysis are not specific to a particular scale of crediting. What is important is that in each case, the boundary of the financing analysis would be the same as the boundary of the GHG impact analysis.

2.1. What to attribute: quantifying emission reductions under the Paris Agreement

Before discussing how to attribute emission reductions to different sources of financing, it is important to establish **what emission reductions are being attributed**, particularly in the context of operations under funds such as the TCAF and CPF. In other words, “what is the reference scenario against which (actual) program emissions will be compared to determine emission reductions for the blended finance-supported activities?” In traditional carbon market analysis, this “counterfactual” scenario of what would happen without the impact of the crediting program is called the baseline scenario or “crediting baseline” (Ellis, Corfee-Morlot, and Winkler 2007; Gillenwater and Seres 2011). We deliberately use “reference scenario” in this paper, because this refers to what would happen without both carbon markets *and* climate finance – in other words, emissions in the reference scenario might be higher than what would normally have been considered a crediting baseline, because climate finance will also be contributing to the emission reductions.

Under the CDM, the crediting baseline did not typically include the impact of recently enacted emission reduction policies, although it did consider technological change and other trends that could influence future emissions (Spalding-Fecher 2013). Research on crediting under the Paris Agreement (Schneider, Fuessler, et al. 2017; Broekhoff et al. 2017) has noted, however, that the crediting baselines under Article 6 of the PA should consider the host countries’ emission reduction commitments. This is both because a country’s (unconditional) pledge is their official estimate of the most likely scenario for future emissions

and because transferring any emission reductions that were calculated against a “business as usual” (BAU) baseline would make it more difficult for the country to achieve their NDC commitments (Schneider, Fuessler, et al. 2017). This is because the Paris Agreement states that all transfers of mitigation outcomes will require “corresponding adjustments” to ensure that there is no double counting. In other words, only one country can use the emission reductions for purposes of compliance with their NDC commitments.⁸ Current research specifically on crediting under the Paris Agreement has generally proposed that crediting baselines should be linked to host country NDC commitments, as long as there is an added check to ensure that their targets are ambitious (i.e. below BAU emissions) (Schneider, Fuessler, et al. 2017; Broekhoff et al. 2017; Spalding-Fecher et al. 2017).⁹

Blended finance programs present an additional challenge, because climate finance may be used both to support countries in *achieving* their NDC commitments and to assist them in *going beyond* those targets.¹⁰ This means that the climate finance component of the blended finance package may help a country first to move from “business as usual” to their NDC goal, while the combined climate finance and carbon market support would help to go beyond this goal. This means that, as long as climate finance can be used to support countries in achieving their NDC targets, the reference scenario for mitigation by blended finance programs should be the BAU scenario, and not linked to the host country’s commitment. This has implications for the generation of tradable emission reductions, as discussed later, but is the starting point for the following discussion and examples.

The World Bank’s new climate funds such as the TCAF and CPF have acknowledged this by suggesting that the attribution of emission reductions should be related to all financing sources that support the country in going beyond BAU emissions, while the crediting baseline should be the lower of BAU emissions and the emissions in the host country’s unconditional commitments (World Bank 2018). Conditional targets might need to be considered as well (see Box 1).

A simple example of the reference scenario and host country NDC commitments is shown in Figure 1 below. The host country’s BAU emissions in 2030 would be 26 MtCO₂e, while their NDC pledge would be to reduce this by 30% to 18 MtCO₂e. A mitigation program has also been identified which, at an added cost, could potentially reduce emissions by a further 30% (i.e. down to 10 MtCO₂e).¹¹ How these scenarios are financed is the subject of the next section.

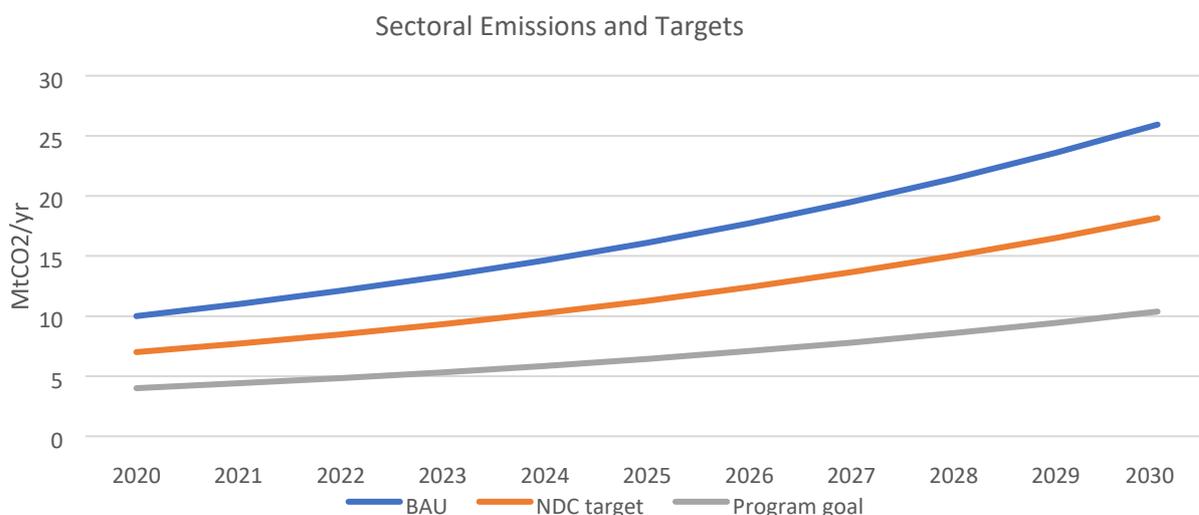
⁸ The situation is more complex if the sector in which the emission reductions occur is not covered by the host country commitment (Spalding-Fecher 2017). This is a key topic in the ongoing negotiations on the rules for implementation Article 6.

⁹ These reports acknowledge that many NDC commitments may not be detailed enough or specified in a way that can easily be used for baselines, and so some guidelines may be needed on how to translate various types of commitments into relevant emissions (or emission reductions) trajectories. In addition, most developing countries have phrased their emission reduction commitments in terms of “emission reductions versus BAU” rather than in absolute terms, although few countries have explicitly presented this BAU scenario and the assumptions behind it.

¹⁰ The Paris Agreement does not define what an “unconditional” commitment means. Discussions with many countries and development banks has confirmed, however, that many countries still intend to access development finance and climate finance to reach their NDC commitments – even their unconditional mitigation commitments (see Box 1).

¹¹ This example implicitly assumes that the host country’s NDC commitment is below BAU emissions (i.e. it is an “ambitious” goal). It also assumes that the specification of the goal can be translated into an emission trajectory for the relevant sector, which could require additional guidance and analysis, either based on an international process or a national process.

Figure 1. Example of sectoral emission reductions and targets



Note: BAU = business as usual; NDC = Nationally Determined Contribution

In this example the NDC commitment is indeed below BAU, so the emission reductions from this pledge are the area between the blue and orange lines in Figure 1. The total emission reductions achieved by the program would be the area between the blue and grey lines in Figure 1. Only the area between the orange and grey lines should be considered as potentially tradable, however, because otherwise transferring units would compromise the country's ability to meet their NDC target.

Box 1. The issue of conditional NDC pledges

One additional issue in setting reference scenarios relates to the fact that some host countries define NDC pledges that depend (i.e. are *conditional*) on international support. This raises the question of how the conditionality of those pledges might affect transfers of mitigation outcomes. Countries may have different views on what type of external support they expect or do not expect to achieve their pledges. There is no agreed definition on what types of international support are related to unconditional and conditional pledges. Some host countries may understand that they can use market mechanisms to achieve conditional goals, while others might argue that they have included market mechanisms as a tool to achieve their unconditional goals. Still others might see crediting only as a tool to go beyond their *conditional* targets, with their conditional pledges based on requests for capacity building, technology transfer and non-credited climate finance. Because using any market mechanisms (i.e. Articles 6.2 and 6.4) to achieve NDC pledges would result in corresponding adjustments, however, it may not be possible for carbon markets to support host countries in achieving even their *conditional* commitments. This is because, while the crediting program may reduce domestic emissions, an adjustment to the national GHG inventory to reflect the transferred mitigation outcomes would mean the amount transferred internationally is not reflected in the host country's reported emissions (e.g. this amount is added back to the measured emissions before they are reported). Of course, a crediting program that catalyzes transformational change may have positive longer-term impacts for emissions

and development that are not part of the quantified emission reduction units that are transferred, but this is a separate issue from the immediate and direct impact on progress toward achieving the host country's NDC mitigation commitments.

2.2. What do emission reductions cost: sources of financing and the valuation of climate finance and carbon markets

This section addresses the different types of financing requirements for mitigation programs, and how those are valued. The valuation process is an important component of any discussion of attribution. The type of financing layers that might be used for different components of emission reductions are explained in Box 2.

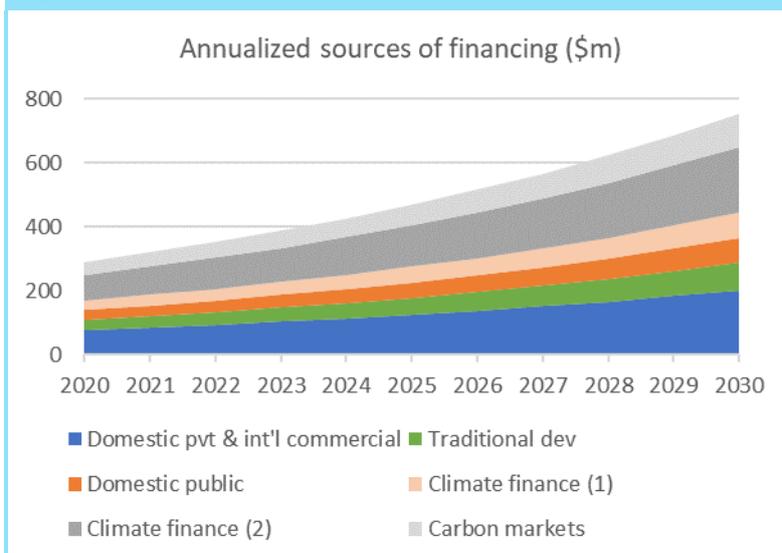
Box 2. Financing streams for mitigation programs

How are emission reductions related to emission reduction cost? The annualized financing required for the different emission levels in Figure 1 is illustrated in Figure 2. Note that the different slices of this figure do not refer to different projects/investments, but different financing layers of the program. For example, if a mitigation technology used to move toward NDC mitigation commitments was twice the cost of its BAU alternative, then 50% of the cost would be part of “BAU financing” while 50% would be part of the cost of the NDC goal. This is because even the BAU investment in the sector would require financing (e.g. to provide a certain amount of higher carbon intensity electricity to the grid). In this example, the costs of providing the BAU layer of financing is met by a combination of domestic and international commercial finance¹² (i.e. the dark blue area in Figure 2).

There could also be “traditional development finance” in the sector (e.g. classic infrastructure development funding) that had been already committed and is not classified as “climate finance” (i.e. the light blue area of Figure 2). In other words, even the BAU scenario in most developing countries has included some ongoing support from development finance institutions that was not part of the formal climate finance flows. An example would be development bank financial support for the construction of traditional road infrastructure.

¹² For simplicity, we assumed state-owned enterprises to be “domestic commercial financing”, even though they are publicly-owned, because their governance and operational processes would be closer to a private utility, for example, than a government ministry or agency.

Figure 2. Examples of the sources of financing for the sectoral emission reductions



For the NDC goal, the host country may use domestic public financing but also some international climate finance (the light and dark orange areas), because of the role of climate finance both in helping countries to achieve their goals as well as to going beyond them. In this example, domestic private finance is not shown as part of the NDC goal because private operators could not be expected to pay the incremental costs of mitigation.¹³

The mitigation program, in turn, might be supported by additional climate finance and carbon markets (the light and dark grey areas). Going back to the earlier discussion of quantifying mitigation, the emission reductions beyond a “reference scenario” that is defined by BAU would, in this case, be supported by a combination of domestic public finance, international climate finance, and payments from carbon markets. While international private finance might play a role in providing debt and/or equity for the overall program, it is important to understand that this commercial finance is providing the BAU layer of the financing, not the incremental financing needed for mitigation.

Grant element versus cash or face value of financing

The example above shows that mitigation activities may be supported by a wide range of financial instruments that fall under the broad heading of climate finance, as well as payments from carbon markets and even domestic concessional finance. Climate finance instruments vary in their degree of concessionality – in other words, to what extent they provide terms of financing more favorable (e.g. in terms of a grant element or lower interest rates) than conventional commercial financing.

The current OECD definition of a “concessional loan”, for example, requires a “grant element” of at least 25% - but this means that 75% of the loan can be on commercial terms. According to the OECD, “grant element” is “a measure of the concessionality of a loan, expressed as the percentage by which the present value of the expected stream of repayments falls short of the repayments that would have been generated

¹³ There could be exceptions to this. For example, energy efficiency standards might overcome a barrier to energy efficiency investments by forcing private companies to invest in more efficiency equipment, which might have commercial returns once the barriers were overcome. This could therefore be a mitigation strategy that could support achieving the NDC goal.

at a given reference rate of interest. The reference rate is 10% in DAC statistics.” For example, if 10% is the reference rate and the loan term is 10 years, then a \$100m loan offered at 5% has a present value of the payments of just under \$80m (i.e. the present value of the payments using the reference discount rate). The grant element of this loan – also called the “grant-equivalent” or “subsidy equivalent” - would therefore be \$20m. Another way to understand this is that this concessional loan is the same as the host country borrowing \$80m in the commercial market and then receiving a \$20m grant on top of this.

The concept of grant equivalence is closely related to understanding the value of funding that contributes to climate change mitigation. This is because the *BAU scenario for future emissions is essentially the investments that can be supported with conventional commercial financing*, without any additional incentives for low carbon technologies and practices. Going back to the earlier example, commercial financing (domestic and international) in the blue area of Figure 2 would support the investments needed under the BAU scenario (e.g. investments in conventional energy supply, waste management and transportation infrastructure), and that portion of the total investment required in the NDC goal and mitigation scenarios. To achieve the NDC target, additional financing is required – financing that would not be available on commercial terms. In fact, the additional financing required for mitigation is essentially the grant-equivalent of financing needed to achieve these goals – in essence, grant-equivalent financing has to be high enough to cover incremental costs of climate action because the non-grant elements cannot, by definition, support the incremental costs of mitigation.

An example of grant equivalence and incremental costs of mitigation

To understand this with an example, consider an industrial energy efficiency program financed by a five-year concessional loan. A company could invest in a conventional production unit for \$100 million, and this would produce \$35million in output each year with an operating & maintenance (O&M) cost of \$8.6 million. If the reference lending rates for this type of investment were 10%, then the company would break even on the investment (Table 1, upper part). Assuming the high efficiency production unit would cost an additional \$30 million and would yield \$3 million in annual energy savings¹⁴, with the same revenue and O&M cost, this investment would need a grant/subsidy of \$20 million to be viable (Table 1, lower part). If the energy savings resulted in emission reductions of 0.8 mtCO₂ per year, in this example, the cost of abatement would be \$7/tCO₂ (i.e. the discounted additional financing requirements divided by the discounted emission reductions).

¹⁴ While many energy efficiency investments will pay for themselves in a shorter period, this is used as a generic example of low carbon investments and the need for incremental financing.

Table 1. Example of investment analysis for a high and low carbon investment (all \$ million)

	0	1	2	3	4	5	NPV
High carbon - conventional technology							
-investment	-100						
-revenue		35.00	35.00	35.00	35.00	35.00	
-O&M cost		-8.60	-8.60	-8.60	-8.60	-8.60	
-net cash flow	-100	26.40	26.40	26.40	26.40	26.40	\$0.08
Low Carbon - high efficiency technology							
-investment	-130						
-revenue		35.00	35.00	35.00	35.00	35.00	
-energy savings		3.00	3.00	3.00	3.00	3.00	
-O&M cost		-8.6	-8.6	-8.6	-8.6	-8.6	
-net cash flow	-130	29.4	29.4	29.4	29.4	29.4	(\$18.55)

Notes: NPV = net present value; O&M = operating & maintenance

If the company were able to access a concessional loan at 4% interest rate instead of the reference interest rate of 10%, the reduced loan payments would cover the incremental costs of the more efficient technology. The program proponent could therefore break even with the investment in the low carbon technology (Table 2).

Table 2. Example of impact of concession loan on low carbon investment (all \$ million)

	Commercial	Concessional
Annual revenue	35.0	35.0
Annual energy savings	3.0	3.0
Annual O&M Costs	-8.6	-8.6
Annual loan payments	-34.3	-29.2
Net annual cash flow	-4.9	0.2

Notes: O&M = Operating and Maintenance

The grant-equivalent of this concessional loan (i.e. the face value of loan minus NPV of payments at commercial interest rates) is, in fact, \$21.9m – almost the same as the incremental cost needed for the mitigation program.¹⁵ This explains why *only grant-equivalent financing can pay for mitigation*. The commercial component of a climate finance instrument, by definition, could only support investment necessary for BAU technologies – it is the grant-equivalent of the finance instrument that pays for the incremental cost of mitigation. When we discuss the possibility of attribution of emission reductions to

¹⁵ The minor differences in the incremental cost for mitigation and the grant value of the loan are due to the different timing of the upfront investment versus the loan payments.

different streams of climate finance, therefore, we should **only consider the grant-equivalent of climate finance in attribution, not the face value.**

Fortunately, significant progress has been made in defining and reporting grant-equivalent values. The OECD Development Assistance Committee (DAC) agreed in December 2014 that all concessional loans should be reported and recorded as their “grant-equivalent” and not at face value. This change will take effect in 2019 for reporting on 2018 financial flows. In 2016, the DAC further decided to apply this same approach to other nongrant instruments such as equities and guarantees (Scott 2017; OECD 2014, 2016). Under this new practice, the reference rates will be 6% for Upper-Middle Income Countries (UMICs), 7% for Lower Middle-Income Countries (LMICs), and 9% for Low Income Countries (also including all Least Developed Countries regardless of income level; LDCs-LICs) (Scott 2017). This will also presumably apply to climate finance flows, in as much as these are disbursed by public donor agencies. This is an important step forward in tracking climate finance also because only the *grant-equivalent of climate financing* can contribute to mitigation. As discussed above, this is because mitigation is defined as reduction in GHG emissions versus a business as usual scenario, and that BAU scenario is precisely what can be financed with commercial, non-concessional financing.¹⁶ Any investments that could be financed by (risk-adjusted) commercial financing must be part of the BAU scenario and not part of a mitigation program. This change in accounting practice not only validates the “grant-equivalent” approach, but it also means that the data available on the grant-equivalent of climate finance flows may improve dramatically in that context. This is because all financial instruments for climate finance (e.g. concessional loans, equity, guarantees) will be required from this year to report their value in grant-equivalents.

In terms of valuing payments from carbon markets, these should be considered 100% grant-equivalent for two reasons. First, there is no *financial* return to the purchaser – whether they provide payment upfront or ex-post, they only receive emission reduction units for these payments, not any other financial compensation. Secondly, carbon market payments are directly linked to the achievement of mitigation – the rules for Article 6, or any other carbon market standard, will only allow the issuance of tradable units when there has been a demonstrable mitigation impact. Payments for these transferred units are therefore directly tied to mitigation outcomes. As with climate finance, the funding that contributes to mitigation of GHG emissions versus BAU is grant-equivalent financing. Therefore, in the discussion on attribution below, carbon market payments are considered to be 100% grant-equivalent. Carbon market payments typically come after program implementation, of course, so comparing them to other sources of upfront financing would require calculating the present value of the payments. When determining attribution shares ex-ante (see below), a discount on ERPA-value may be applied (i.e. to consider issuance risk).

How and when to determine grant-equivalence of climate finance and proportions of financing?

Understanding the share of one stream of financing in a blended financing environment requires two steps: assessing the grant equivalent of each specific financing stream; and, then determining the share of each stream out of the total. Both could potentially be done ex-ante or ex-post, or ex-ante with some ex-post adjustments. For the first step, where grant equivalence depends on what reference commercial interests are used, and these rates may change, it may be difficult to calculate grant equivalent entirely ex-ante.

¹⁶ As explained earlier, BAU could include further, non-climate related, concessional development financing as well.

However, the OECD DAC guidelines above discussed specific fixed reference rates, so if this same approach is used, no ex-post adjustments would be needed to the reference rate.

The second issue is more complex, because, depending on the scale of the mitigation intervention and its stage of development, not all financing streams may be known ex-ante. The advantages and disadvantages of determining proportions of financing ex-ante vs ex-post can be summarized as follows:

Ex-ante

- **Pros:** For a larger investment program with contributions from multilateral development banks, the data on the form and terms of financial contributions from different investors is usually transparent and well known, and this will be even more so after the implementation of the OECD reporting guidelines described above. Also, these programs would generally have reliable feasibility studies and quantification of the expected mitigation outcome. This data could be used to establish the *proportions* of mitigation outcomes that would be attributed to different streams, and this could be fixed in the contractual framework of the investments. In other words, even though the *absolute* quantity of mitigation outcomes would be determined ex-post based, the *share* of mitigation outcomes would be fixed and not re-adjusted. This ex-ante approach therefore gives investors the confidence that they will receive a certain share of mitigation outcomes.
- **Cons:** During and after implementation, programs and their costs may change significantly, so that the ex-ante estimates of the share of investments for each source may turn out to be inaccurate. Therefore, the agreement on an attribution approach may require some pre-agreed rules on how to adapt the attribution if certain program outcomes change. Also, carbon market prices may change, which might also affect the attribution¹⁷. For instance, if during the implementation of the program the carbon market price falls below the average mitigation cost of the program (in \$/tCO₂e) and mitigation outcomes are attributed according to their grant-equivalent contribution to mitigation costs, then the carbon market could not contribute to the mitigation program.¹⁸

Ex-post

- **Pros:** After the program has been implemented and is operational, then all data is available to calculate financing contributions precisely which would allow for higher accuracy.
- **Cons:** The ex-post approach leaves carbon market players with higher uncertainties as to the quantity of mitigation outcomes they will receive as tradable units.

¹⁷ This assumes that the price of units is not completely fixed in advance.

¹⁸ Of course, this might also change the mitigation outcomes themselves, since in the ex-ante analysis the program developers expected to use carbon market payments as one component of their financing.

2.3. How to attribute: mapping approaches to attribution

This section outlines three main conceptual approaches to attributing emission reductions that are achieved from large-scale programs supported by both climate finance and carbon markets.¹⁹ Below these different approaches to attribution of the mitigation outcomes resulting from a program with blended finance are explored and put into the context of earlier (CDM) experience:

- **All to climate finance (separation of climate finance and carbon markets):** for this approach, any support to a given emission reduction program from climate finance would mean that none of the emission reductions would be attributed to carbon markets and internationally transferred²⁰ under an Article 6 mechanism, so there would consequently be no financial contribution from carbon markets. This does not exclude carbon markets from engaging in other sectors, or even other (non-overlapping) programs in the same sector, but simply separates programs supported by climate finance from those that are not. Under the CDM, examples of this approach included programs where donors stated that a project supported by their concessional loans or grants would not be able to register for the CDM.²¹ These donors felt that allowing these projects to sell CERs would essentially mean that the mitigation impact of their financing was re-sold and that the donors were subsidizing the price of carbon for the markets, and therefore wanted to keep these two forms of financing separate. This was obviously easier to track for an individual project, however, than for a large program, sectoral investment program, or sectoral policy changes.
- **All to carbon markets:** this means that, regardless of the contribution from different streams of climate financing all the calculated emission reductions are used to generate internationally transferable emission reduction units. This is essentially the same as the idea of “no attribution”, because the implicit assumption is that only the carbon market contribution was responsible for generating the emission reductions. For a large sectoral program, for example, even if the climate finance contributions had a grant value (see section 2.2) of several hundred million dollars, all of the emission reductions would be attributed to carbon market payments that could be, for example, only tens of millions of dollars. This was, in fact, the case for many CDM projects that received domestic or international concessional loans or grants as well as selling the CERs (Ci-Dev 2015). In this case, the argument was that, even with the concessional loans, the project was only viable when the carbon market payments were included in the financial analysis (i.e. an “investment analysis” justification for additionality). In other words, attributing all the emission reductions to carbon market payments was justified by arguing that the project would not have happened at all without those payments. This situation is obviously more complex as the scale

¹⁹ As discussed earlier, for a program supported by both climate finance and payments from carbon market, to ignore the issue of attribution is essentially the same as the “all to carbon markets” approach described here. So, the question is not *whether* to attribute emission reductions, but *how* to attribute them.

²⁰ The assumption here is that units that are transferred are what trigger corresponding adjustments, not simply units that are issued. If a purchasing country transferred units and cancelled them, the host country would still be required to make a corresponding adjustment, so the implications for their NDC targets would be the same as if the purchasing country used the units for NDC compliance.

²¹ An example is the Uganda GET FiT program, in which once climate finance was provided to top off the renewable energy feed-in tariffs, none of these renewable energy projects were allowed to apply for CDM registration (see discussion in World Bank 2017a; Kreibiehl 2013). Other European donors also often applied this restriction to projects supported by climate finance.

of the mitigation program increases and where large numbers of investments are required, each with different mixes of financing and, in some cases, facing different types of barriers to implementation.

- **Proportional attribution** relative to financial contribution: the implicit assumption behind this approach is that, because all the streams of grant-equivalent financing are necessary to achieve the mitigation goals, the attribution of the resulting emission reductions should somehow reflect the proportional grant-equivalent value of these financing contributions. This does not mean that units would be issued and transferred for the climate finance contributions,²² but that units would only be issued for the portion of the total emission reductions that reflect the financial contribution from carbon markets. This also does not necessarily assume that different climate finance sources will insist on attribution within the overall climate finance package. The key attribution issue is for carbon markets versus climate finance overall, because this determines how many tradable mitigation outcomes will be issued and potentially transferred. Climate finance donors could make their own decision about whether and how they would share the reporting of emission reductions among themselves. As discussed in the previous section, a key issue here is that all financing streams should be measured in grant-equivalent terms e.g. following the OECD guidance, since this is the only portion of the financing that contributes to mitigation – financing provided at commercial terms does not contribute to mitigation beyond BAU. Also, as discussed earlier, carbon market payments would be considered to be 100% grant-equivalent. As discussed in the previous section, determining the proportions²³ could be done either ex-ante or ex-post. The planning phase of a large mitigation program could involve putting together a comprehensive package of different climate finance contributions and potential carbon market payments based on expected emission reductions. These could be used to establish what portion of measured emission reductions for the overall program could be issued as transferable mitigation outcomes. Knowing this in advance would provide greater certainty to carbon market participants, who might sign forward contracts with the program owner for purchase of emission reductions units, or even provide some upfront financing based on expected emission reductions. In practice, however, it may be difficult to predict what different sources of climate finance will support a program, particularly if it is a large-scale or sectoral mitigation initiative. In addition, until there is an international market price for tradable mitigation outcomes, defining the carbon markets contribution toward a program in advance may also be difficult. This means that some form of ex-post calculation or adjustment may be needed on a regular basis. This would not be unusual, because carbon market programs already make ex-ante estimates of emission reductions but can only issue units for actual ex-post monitored performance.

²² As discussed in the introduction, in this paper we define climate finance as financing for mitigation action that does *not* result in the international transfer of emission reduction units. If units are transferred, the financial contribution is classified under carbon markets, regardless of whether this is public or private financing.

²³ Absolute quantity of emission reductions will only be issued as units based on ex-post MRV. However, it would be possible to fix the *proportions* of emission reductions that each financing stream will receive ex-ante (e.g. that carbon market payments will receive 30% of all calculated emission reductions). In this case, the share would not be adjusted, but only multiplied by total ex-post monitored mitigation outcomes to determine the absolute amount attributed to each funding stream.

Box 3. Two examples of application of proportional attribution*Additionality in the TCAF core parameters*

The note on “Core parameters for TCAF operations” provides an orientation of the basic principles for designing TCAF operations (TCAF 2018). The proposed rules for baseline setting require that the baseline has to be at least below an emissions trajectory that represents the host country’s NDC target or a business as usual (BAU) scenario, whichever is lower. The additionality provisions then require in its second layer a mapping of all international support a TCAF program receives (both in climate finance and ERPA value of carbon markets instruments) and a proportional attribution of mitigation outcomes generated by the TCAF intervention to the different finance streams. The first layer additionality assures that no mitigation outcomes beyond a BAU scenario are internationally transferred.

Attribution of impact in the Swiss domestic offsetting system

The Swiss domestic offsetting system is an instrument under the national CO₂-law that allows for the generation of domestic mitigation outcomes. It is primarily financed from a levy on fossil motor fuels, which is used to purchase offsets from private sector project developers and follows rules that are comparable to the CDM. In addition to selling offsets, some of the domestic offset projects and programs receive subsidies from governmental sources (e.g. in the framework of cantonal energy efficiency or renewables programs). In the case of such combination of climate related revenues, the rules (BAFU 2018) require an (ex-ante) proportional attribution of mitigation outcomes between offset revenues and subsidies based on an ex-ante assessment. Alternatively, the sharing of mitigation outcomes may also be negotiated between project developers and subsidy provider. This is particularly important because of uncertainties in the project parameters and future project performance. In practice, because contributions from governmental subsidies tend to be smaller than the revenues from the offsets (i.e. \$100/tCO₂e), in some Cantons the governments became more reluctant to provide subsidies to projects or programs that already receive support from offsetting because the co-funding may strongly reduce the share attributed to the government.

3. Methodology for assessing the different approaches to attribution

The approaches for attribution presented in section 2 will be assessed according to a set of criteria defined in section 3.2. To reduce unnecessary complexity from the considered blended finance situation, a number of initial assumptions are taken, and a common example is defined which will illustrate the findings of the assessment. Some of the simplifying assumptions will later be relaxed step-by-step to widen the analysis that is provided in section 4.

3.1. Assumptions and definitions

Assumptions for analysis

To simplify the first step in the analysis and assessment of different attribution approaches, the following assumptions are taken with regards to the host and acquiring countries:

- a. The analysis assumes a future liquid world market for ITMOs at a global price.
- b. The acquiring country has an economy wide NDC emissions target which is below the BAU scenario. It is assumed that it reaches its NDC target either through the international transfer of carbon market units and/or through domestic action.
- c. The host country has an NDC target and only transfers mitigation outcomes that go beyond the meeting of its NDC target. This may be challenging to establish in practice but does not change the conclusions of the advantages and disadvantages of attribution approaches.
- d. It is assumed that there is no double counting and strict requirement for corresponding adjustments under Article 6 for all internationally transferred mitigation outcomes.
- e. ITMOs transferred are used in the acquiring country for NDC compliance and allow it to emit more than in absence of the international transfer. It is assumed that acquiring country NDCs do not depend on the availability of carbon markets and that they are not used for other purposes including voluntary cancellation or use e.g. under the CORSIA system.
- f. Mitigation outcomes attributed to climate finance contribute to the host country going beyond its NDC target.²⁴
- g. For baseline setting and additionality determination for transfers under Article 6, an approach (see e.g. Broekhoff et al.2017) is followed that requires the crediting baseline to be at or below both
 - a. the BAU emissions trajectory, and
 - b. an emissions trajectory that is consistent with the country reaching its NDC target (see also Box 1 for further details on NDC targets).
- h. It is further assumed that the amount of climate finance contributed to the blended finance is fixed and does not change with different roles of carbon markets (i.e. reduced payments from carbon markets do not result in climate finance filling the gap). Relaxing this assumption does not change the findings in this discussion paper regarding the advantages and disadvantages of attribution approaches.

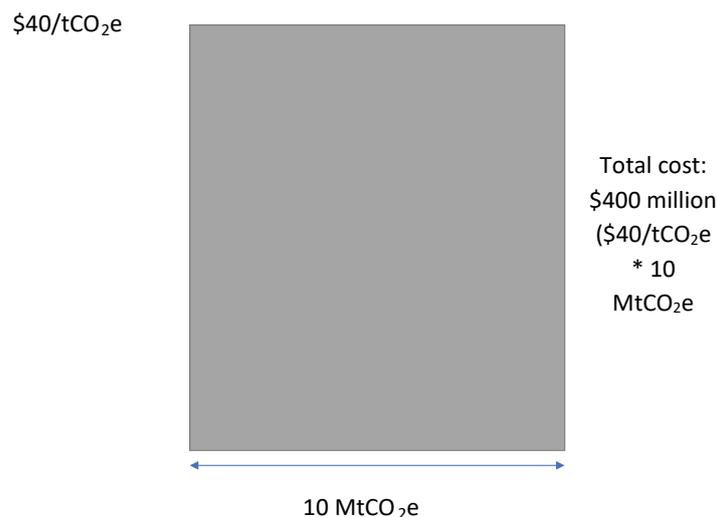
These assumptions are introduced in order to simplify the following analysis. Later, the assumptions can be relaxed and their impact on the result of the analysis can be considered.

²⁴ In real world climate finance there typically is no conditionality that emission reductions above target levels need to be achieved. If climate finance was just for reaching targets no attribution issue would emerge for carbon market mechanisms addressing mitigation outcomes beyond the target. In reality climate finance will both contribute to reach targets and to go beyond targets. Assuming all climate finance to achieve above target emission reductions is for simplification purposes only.

Definition of example

The following example is designed to illustrate the impacts of attribution approaches: There is one potential emissions reduction program, as illustrated in Figure 3. The total program is reducing 10 MtCO₂e over a given period at a resource cost of \$400 million (i.e. “grant-equivalent” cost).²⁵ This results in a marginal cost of emissions reduction of \$40/tCO₂e. The program can be realized in part if less than \$400 million are available.

Figure 3. The example emission reduction program to illustrate the impacts of attribution approaches



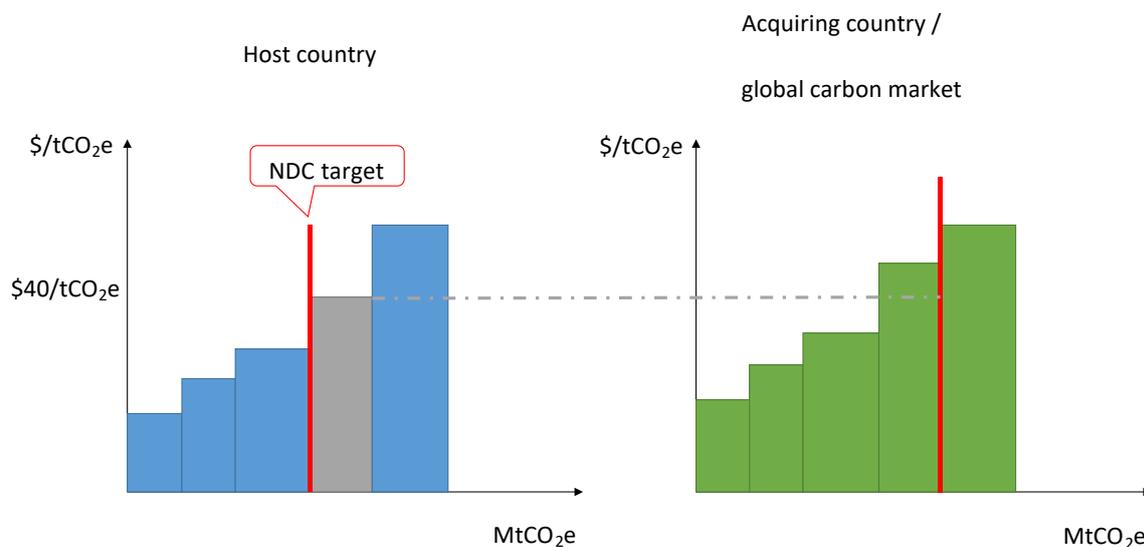
Source: Authors

Figure 4 shows a host country (blue) and an acquiring country (green) with their respective marginal abatement (emission reduction) cost curves. A vertical red line indicates the countries’ respective emission reduction (NDC) targets. This figure will reappear to help illustrate the impacts of attribution approaches.

The emission reduction program in the example above (grey block on left side of Figure 4) is beyond the host’s NDC target (left side of Figure 4). Similarly, this emission reduction program is less expensive than the last emission reduction taken up by the acquiring country to meet its NDC goal (right side of Figure 4) and below the global carbon market price.

²⁵ Example figures are rounded to help the illustration. A further example is given in section 6 during the application of the approaches to an example program.

Figure 4. The example emission reduction program to illustrate the impacts of attribution approaches



Source: Authors

Throughout, the analysis assumes that host countries meet their NDC target. Some host countries may hesitate to engage in global carbon markets and/or transfer emission reductions internationally if there is uncertainty about the effort required or the policy pathway needed to meet their unconditional NDC target. This is, however, independent of the attribution approach – attribution only arises when host countries participate in global carbon markets

The emission reduction program can be realized using climate finance, climate markets, or a combination of both²⁶:

- Climate finance from donors (which can be (in) acquiring country or elsewhere) contribute up to \$300 million of the \$400 million total emission reduction program cost. This \$300 million can be used for this emission reduction program or other programs. The conclusions are unchanged if climate finance contributes (overall) more.
- Carbon markets (in acquiring country) contribute a flexible amount depending on the marginal price of the emission reduction program and the carbon market price (see assumption on global carbon market).

²⁶ As a simplifying assumption, we do not include domestic concessional finance in this example, even it is relevant for attribution, given that it is also contributing to mitigation.

3.2. Definition of criteria for evaluation of attribution approaches

Environmental integrity of the mitigation actions under Article 6

There is no commonly accepted definition of the term “environmental integrity” in the Paris Agreement. The operationalization of the term is subject to ongoing Article 6 negotiations (as of October 2018).

In this context, we use the following working definition from the literature in this study: *Environmental integrity means that the use of international transfers does not result in higher global GHG emissions than if the mitigation targets in NDCs had been achieved only through domestic mitigation action, without international transfers* (as defined in Schneider, Füssler, et al. 2017).

In practice, the assessment of environmental integrity requires the comparison of a situation with international transfers with a situation without those transfers or other cooperation in terms of the impact on net GHG emissions of host and acquiring country.

Economic incentives

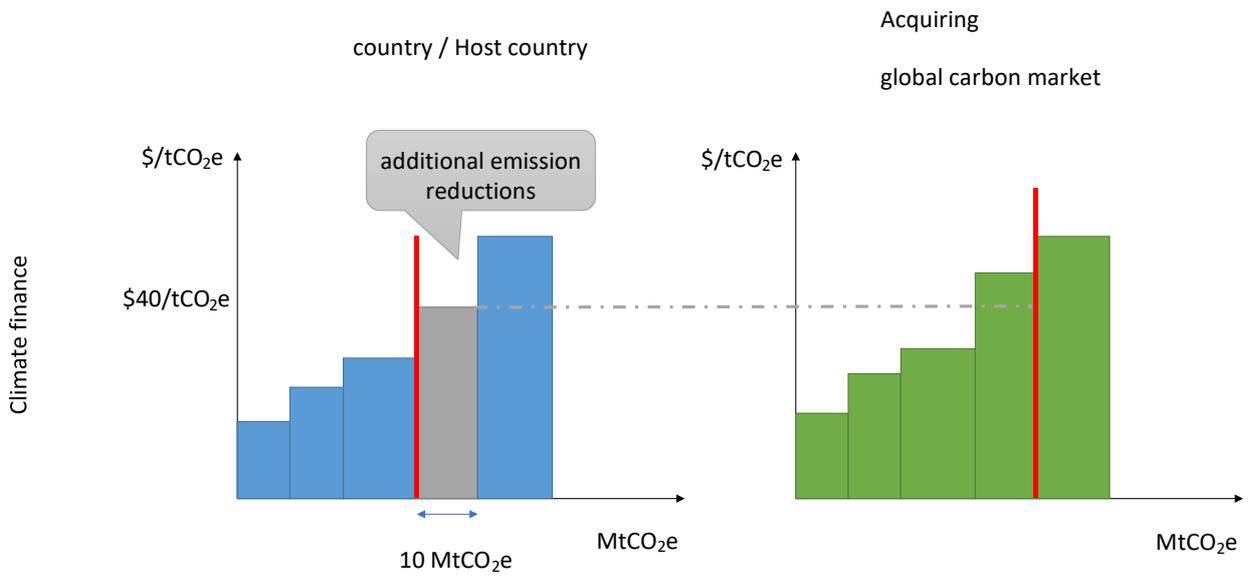
Economic incentives of an approach determine how far global emissions are reduced and at what (global) resource cost. This occurs both under a global carbon market as well as during the transition period towards a global carbon market.

Economic incentives consider how the attribution approach influences the behavior of, primarily, the acquiring country. The analysis lays out the incentives attribution approaches create, helping to draw out the advantages and disadvantages of approaches. Importantly, they help understand which approach may be preferable depending on the objectives of the acquiring country as well as climate finance donor.

Figures 5 and 6 illustrate the difference between climate finance and carbon markets. The panel shows a host country (left, blue) and an acquiring country (right, green) with their respective marginal abatement (emission reduction) cost curves and an emission reduction (NDC) targets (red vertical lines).

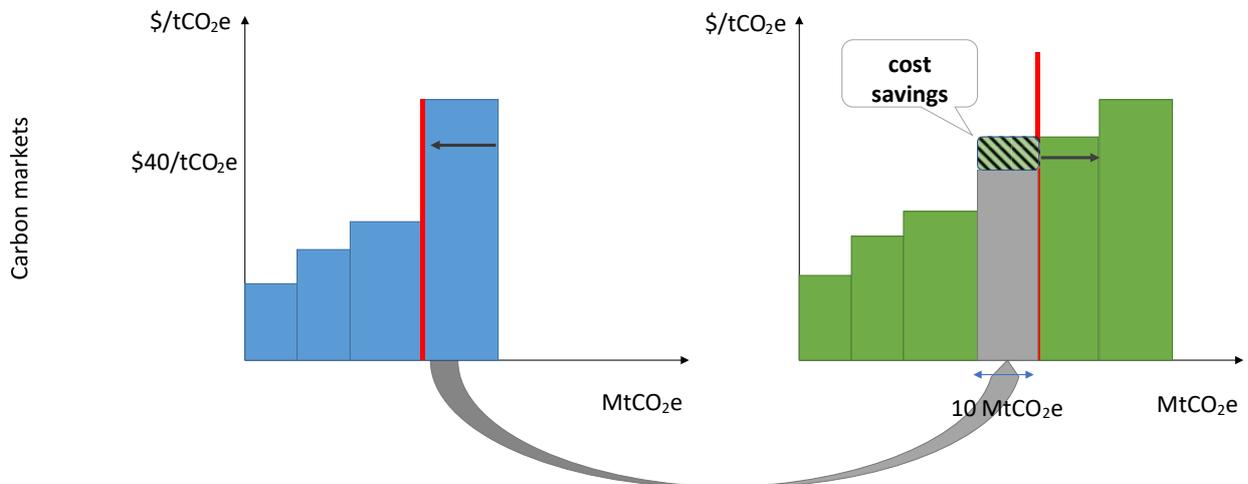
Figure 5 shows that climate finance achieves additional emission reductions in the host country that reduce global emissions further. Figure 6 shows that carbon markets transfer achieved emission reductions between the host country and acquiring country, leaving global emissions unchanged, but resulting in cost-savings (green-black shaded area).

Figure 5. Climate finance creates additional emission reductions



Source: Authors

Figure 6. Carbon markets transfer emission reductions between countries and create resource cost savings but no additional emission reductions



Source: Authors

Costs

Resource costs determine the global efficiency of attribution approaches. Resource costs are defined as the additional lifetime costs (both capital and operating) needed to reduce emissions. Global resource costs are compared for the same level of global emission reductions to understand the efficiency gains (i.e. cost savings) under different approaches. In fact, these cost savings are the *raison d’etre* for global carbon markets – emission reductions can be achieved more economically in another country (host) than domestically (in acquiring country). Nevertheless, attribution approaches may result in different global resource costs for achieving additional emission reductions beyond countries’ NDCs.

Climate finance can provide subsidization, specifically indirect subsidization across emission reduction programs over time. Climate finance can build the relevant experience and capacity to reduce the cost of programs, e.g. by increasing learning rates via deployment. In all approaches, this subsidizes carbon markets that contribute after climate finance has achieved some of these cost reductions. As Chapter 6 shows, there can also be subsidization of carbon markets for certain attribution approaches.

Transaction costs for public and private entities involved

Transaction costs consider how feasible attribution approaches are in practice. For example, the grant-equivalent would need to be determined for climate finance, which may be challenging if multiple sources of climate finance are combined. Emission reductions need to be able to be measured, reported and verified. For carbon markets, corresponding adjustments need to be possible. Approaches that follow simpler rules for attribution, (i.e. *all to climate finance* or *all to carbon markets*) are easier to implement (although there may still be issues to allocate emission reductions across different sources of climate finance or carbon market funds that enable the same emission reduction program). This further requires the assumption that complete and transparent data is available on financial contributions for climate finance and carbon markets.

Sustainability of climate outcomes over time

Approaches differ in how far they encourage deeper and continued emission reductions over time. This considers how far the attribution approach influences the creation of an eco-system that leads to deeper emission reductions now and in the future (e.g. by 'buying-down' technology cost over time) and whether the emission reductions depend on continued flows of climate finance or climate finance can phase out over time in favor of carbon markets.

4. Comparison of approaches to attribution

This section compares the attribution approaches based on the criteria provided in section 3.2:

- All to climate finance – section 4.1
- All to carbon markets – section 4.2
- Proportional attribution – section 4.3

This draws out the advantage and disadvantages of approaches described in section 2.1, with a detailed discussion of first the principles and then, *in italics*, illustrating this based on the example set out in Section 3.1. The analysis considers relaxing assumptions taken in Section 3.1 where this provides additional insights or a change in the evaluation of attribution approaches. Further, the analysis highlights the advantages and disadvantages of attribution approaches during a transition period towards global carbon markets post-2020, where

- fewer acquiring countries engage in international transfers of emission reductions; and/or

- the carbon price(s) are low; and/or
- demand for emission reductions may be lower at given prices than what can be provided by host countries.

A reference case of no climate finance and no carbon markets serves as the comparator.

The section ends with a comparison of attribution approaches. This summarizes the advantages and disadvantages of approaches and considers how different objectives, such as kick-starting global carbon markets or increasing global ambition and hence emission reductions, could imply a preference of certain approaches.

4.1. All to climate finance

Incentives

This approach provides no incentive for carbon markets. Without attribution, there is no reason for carbon markets to contribute to an emission reductions program that also receives climate finance. This leads to a strict separation of programs: those that receive only climate finance, and those that receive only carbon market funds.

In the example, this means that only \$300 million climate finance will be provided and none of the carbon market funds towards the \$400 million emission reduction program. This has implications for the emission reductions achieved as well. The program can only be realized in part (three quarters i.e. 7.5 MtCO_{2e} are achieved, based on \$300 million provided out of the \$400 million initial requirement).²⁷

This approach (in comparison with the two other attribution approaches) potentially reduces the number of emission reduction programs in the host country that could be achieved as not all programs can be realized in part or the marginal cost may be increased for projects realized only in part.

Further, for those programs that receive carbon market funds, it becomes crucial that there will be no climate finance contributing at any stage. The prospect of climate finance contributions, and without the attribution approach unchanged, would discourage carbon markets to take on such programs. This potentially has two effects – one of lowering the risk affinity of carbon markets to take on programs (i.e. requiring higher rate of returns) and second of reducing (or eliminating) the ability of climate finance to help contribute 'rescue' programs that would not be completed without additional finance. The most likely outcome of this approach is that carbon markets target separate opportunities from climate finance and this delineation reduces the cost effectiveness of this approach.

²⁷ There is also a potential outcome where the program cannot be realized (and climate finance would be spent on another program or rescinded) However, in this example the program can be achieved in part.

Environmental integrity

As carbon markets and climate finance are delineated and target different emission reduction programs, there is no impact on environmental integrity.

Global emissions fall. The host receives climate finance to achieve emission reductions beyond the NDC target. If the emission reduction activity can be achieved in parts, the host realizes additional emission reductions beyond the NDC.

In this example, the \$300 million of climate finance reduces global emissions. Assuming the program can be realized in part and that emission reductions are proportional to investment, \$300 million in climate finance create 7.5 MtCO₂e additional emission reductions (\$300/400 million provided for the 10 MtCO₂e program).

Costs

Without carbon market engagement, this approach does not change any costs achieving the NDC in the acquiring country compared with the reference case of no carbon markets and no climate finance.

Without transfers (under carbon markets), the average and marginal mitigation costs in the acquiring country are unchanged.

In this example, there are no transfers to the acquiring country and hence no change in the cost of achieving the acquiring country's NDC target.

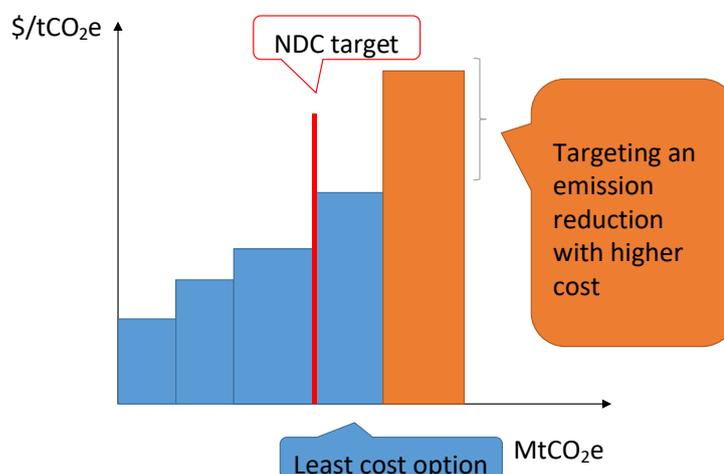
Global resource cost of achieving the emission targets are unchanged by attribution. The acquiring country still achieves its NDC with domestic emission reductions. The host country achieves its NDC with domestic emission reductions.

In this example, the 7.5 MtCO₂e created by climate finance are additional global emission reductions at a global resource cost increase of \$300 million (the climate finance contribution).

However, additional emission reductions created by climate finance may not be the most cost-efficient options available, as illustrated in Figure 7. In contrast to carbon markets, climate finance has multiple and sometimes competing objectives beyond emission reductions. Under this attribution approach it is therefore unlikely to achieve the globally least-cost emission reductions (in contrast to, at least in theory²⁸, other attribution approaches as detailed in the following sections) as there may be lower cost emission reduction programs either in the same host country or other host countries.

²⁸ In practice, information asymmetry may reduce the economic efficiency [Lütken, S. E. (2012)]

Figure 7. As lowest emission reduction cost may not be the primary concern of climate finance, higher cost emission reductions may be targeted, which increases global resource cost for a given level of emission reductions
Host country



Source: Project team

Overall, without attribution to carbon markets there must be a clear separation between programs receiving climate finance and programs receiving carbon market funds. The only suitable option for carbon markets to participate in this approach is the delineation of emission reduction programs that receive climate finance or carbon market funds. This reduces the economic efficiency of this approach, as climate finance is unlikely to select the least-cost emission reduction program. Carbon markets however can act separately alongside climate finance and this foregoes the 'leverage' climate finance could provide by subsidizing costs for a given program (i.e. subsidizing carbon markets) as discussed for the *all to carbon markets* approach.

Transaction cost

Transaction costs stem from determining the grant-equivalent if climate finance donors were to compare their relative contribution, although this may not necessarily be required, or, at least, not at the level of detail as for carbon markets programs. However, as there are no carbon markets involved in the same emission reduction program, the overall transaction costs of attribution are minimal.

Sustainability

This approach does not encourage carbon market growth as it does not provide an incentive to carbon markets and it makes it more challenging for carbon markets to act alongside climate finance. Only emission reduction programs that have costs below the carbon market price will be taken up by carbon markets - and only when there is no climate finance already involved.

It does, however, achieve additional emission reductions as long as climate finance continues. This means that climate finance could still reduce future costs of emission reductions that carbon markets can take up if prices rise in the future, for example when climate finance increases deployment, learning rates or provides additional technical assistance. This assumes that climate finance is targeted in such a way that will allow for this learning and will target sectors with high potential for replication, cost savings and transformation – and even then, this approach provides the same benefits as the *proportional attribution* approach but adds the complication of a strict delineation between emission reduction programs financed by climate finance and those by carbon markets.

4.2. All to carbon markets

Incentives

Climate finance subsidizes carbon markets in this approach in contrast to *all to climate finance* and *proportional attribution*. This is direct subsidization within a given mitigation program. Climate finance is used for part of the program, not only for de-risking the program and thereby indirectly reducing the cost of capital, but also by reducing the amount of resources that need to be provided by carbon markets to achieve a given set of emission reductions (which is not the case for *proportional attribution*).

Some countries may decide that using climate finance for subsidization for a limited period might be a valuable strategy to incentivize carbon markets under certain circumstances.

In the example, the entire emission reductions of 10 MtCO_{2e} from the total program go to carbon markets and climate finance contributes \$300 million to reduce the cost to carbon markets from the marginal cost of \$40/tCO_{2e} to \$10/tCO_{2e}, i.e. to provide a direct subsidy of \$30/tCO_{2e}. This will be taken up by carbon markets as long as the global carbon market price is at or above \$10/tCO_{2e}.

This approach has two implications:

1. The subsidy that donors provided could alter the incentives for other donors engaging in emission reduction programs or lead to donors including restrictions on investments receiving climate finance to also engage in carbon markets. Other donors may agree to their role of incentivizing carbon markets with their subsidies. Further, during the transition period (i.e. where only a few countries participate in a carbon market), high- and middle-income acquiring countries may have more active carbon markets and therefore benefit more from the direct subsidization of climate finance.
2. Climate finance's ability to help host countries to increase the ambition of their NDC is reduced. In contrast to other attribution approaches, no emission reductions are attributed to climate finance and therefore to the host country. The international transfer of all emission reductions likely makes it more difficult for host countries to build up emission reductions over time beyond their NDC target that might eventually allow them to step up the ambition level of their NDC. This implies that some hosts and donors may have an incentive to 'ring-fence' emission reduction programs receiving climate finance from those where carbon markets provide funds, an outcome

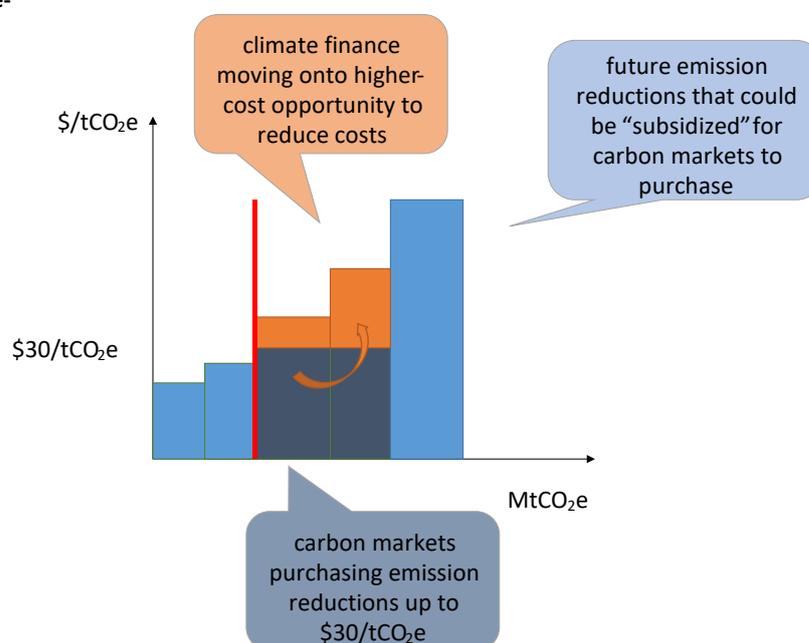
mirroring the *all to climate finance* approach but with the impetus for the segregation coming from climate finance donors (or hosts) instead of carbon markets. Further, during the transition period, the potential transfer of emission reductions that receive climate finance could create challenges in meeting NDC targets²⁹ (although there is a trade-off in kick-starting a domestic eco-system in this 7 approach that could encourage further emission reductions – similar to the *all to climate finance* approach but with the benefit of potentially larger capital flows from carbon markets compared with climate finance).

The direct subsidization implies using public climate finance to leverage private finance through carbon markets. Climate finance could target multiple emission reduction opportunities to reduce their price (but not the resource cost) to the potentially lower level of the global carbon market price, hence contributing to the realization of further emission reductions in the host country compared to *all to climate finance* or *proportional attribution*, as shown in Figure 8. However, this does not lead to further emission reductions on a net global scale, as internationally transferred emission reductions are cancelled out by higher emissions in the acquiring country. Climate finance could also be reduced for specific emission reduction programs in tandem with a rise of global carbon market prices.

Adding to the example, if the global carbon market price rises from \$10/tCO₂e to \$30/tCO₂e, the same \$300 million climate finance could help unlock additional higher-cost emission reduction opportunities in the host country. In this example, only climate finance of \$100 million would be needed to buy down the costs so that carbon markets could provide the remainder of the funding. \$200 million in climate finance would be freed up to target additional reduction programs to subsidize its marginal cost to the global carbon market price as shown in Figure 8.

²⁹ Note in the real world climate finance may be used to support countries in both achieving their NDC commitments as well as going beyond those commitments. This means the emission reductions achieved because of climate finance whose purpose was to support achievement of NDC goals will now be transferred internationally, and so take the host country further away from their NDC commitment.

Figure 8. The same amount of climate finance could potentially be leveraged (in contrast to other attribution approaches) to reduce the cost of multiple emission reduction programs to the level of the global carbon market price-



Source: Authors

There is no role for climate finance other than subsidization of carbon markets – this is a key point that distinguishes this attribution approach from the *proportional attribution* approach laid out in the following section.

During a transitional period when fewer acquiring countries compete and therefore there is no global carbon market price, this attribution approach may have reduced economic efficiency. This approach could crowd out lower-cost emission reductions in the acquiring country: in the extreme example of two-countries only – one host and one acquiring country – this approach sets the incentive to reduce carbon market spending. The acquiring country carbon market has the incentive to contribute as little carbon market funds as possible to the emission reduction program, because they will receive all the emission reductions regardless of their contribution.

*In this example, if there was no global carbon market price, and carbon market participants providing finance (e.g. companies covered by an ETS in an acquiring country) were to contribute as little as \$1 million they would still receive all emission reductions. With \$300 million in climate finance, ~7.5 MtCO₂e (\$301/\$400 million * 10 MtCO₂e) would be generated. This means that the carbon market participants' providers could receive ~7.5 MtCO₂e for \$1 million (i.e. ~0.14 \$/tCO₂e). Arguably this is an extreme case, but it is still well within the incentives set by this attribution approach.*

Environmental integrity

With attributing all emission reductions to carbon markets, the use of markets leads to a net increase in global emissions compared to a situation where no international transfers occur. Climate finance cannot be used to create emission reductions beyond the host's NDC. Further, the use of carbon markets allows for a related increase in emissions in the acquiring country so that the program does not reduce net global emissions. By contrast, if carbon markets were not used, the part of the program that is supported by climate finance would still be (in part) realized, leading to a net emission reduction. With this the use of carbon markets leads to an increase in global net emissions compared to a situation without, and environmental integrity is not maintained.

In this example, up to 10 MtCO_{2e} are transferred from the host to the acquiring country. This substitutes the same amount of emission reductions that the acquiring country would have needed to mitigate domestically in absence of the international transfer to achieve its NDC target. Global emissions are not reduced. In absence of international transfers, only the fraction of the program supported by \$300 million of climate finance is implemented, leading to a net reduction of 7.5 MtCO_{2e}. Correspondingly, in the situation with the use of carbon market, global net emissions are 7.5 MtCO_{2e} higher than without the use of carbon markets as climate finance now is not attributed any emission reductions.

Costs

Global resource costs are (potentially) higher compared with other approaches or without the use of carbon markets. Climate finance directly subsidizes the carbon market contribution, meaning that emission reductions that potentially may be costlier than domestic emission reductions in the acquiring country take place.

Adding to the example: assume that marginal emission reduction costs in the acquiring country are equal to the global carbon market price of \$10/tCO_{2e}. The price of emission reductions from the program are \$10/tCO_{2e} for 10 MtCO_{2e} as climate finance contributes \$300 million to subsidize the marginal cost from \$40/tCO_{2e} to \$10/tCO_{2e}.

The 10 MtCO_{2e} transferred to the acquiring country crowds out 10 MtCO_{2e} of domestic emission reductions. These emission reductions carry a resource cost of \$400 million in total (\$300 million climate finance and \$100 million carbon markets). Globally, the same emission reductions are achieved at a \$300 million higher spending (i.e. at the climate finance share).

Transaction cost

This approach has the lowest transaction cost of all approaches. There is no need to determine grant-equivalents or to track climate finance sources. The funding from carbon markets is transparent and easily determined, as is then the split between different sources of carbon market funding.

Sustainability

The subsidization of carbon markets by climate finance may help scale up carbon markets. The subsidized low cost of emission reductions provides incentives to actors in acquiring countries to participate in a global carbon market to reduce the costs of achieving domestic targets in the acquiring country.

However, climate finance will continue to be needed for these higher-cost emission reduction programs to subsidize the cost. Without climate finance, certain emission reductions may not be taken up by carbon markets or continue to reduce emissions (e.g. when continued operating expenses are incurred that are higher than the carbon market price).

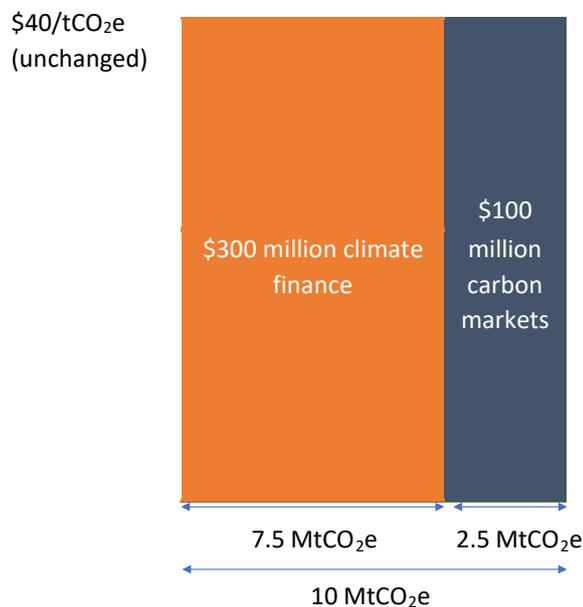
4.3. Proportional attribution

Incentives

This approach aligns the value carbon markets place on emission reductions with the cost of generating those emission reductions. Carbon markets in the acquiring country would provide funds up until the marginal cost of domestic emission reductions in the acquiring country (which in a competitive international market would be the international market price for carbon credits). As there is no subsidization, the marginal cost of the emission reduction program in the host country – and the price of those mitigation outcomes – is unchanged as is the marginal cost of emission reductions in the acquiring country. However, this also means that climate finance does not incentivize carbon markets to participate as much as under the *all to carbon markets* approach.

In this example, the \$300 million provided by climate finance would support 7.5 MtCO_{2e} of the mitigation program. The remaining 2.5 MtCO_{2e} could be supported with \$100 million in carbon market payments, as long as the global carbon market price was at least \$40/tCO_{2e}. This approach does not subsidize carbon markets but puts carbon markets on equal footing alongside climate finance, as shown in Figure 9.

Figure 9. Proportional attribution does not change the marginal emission reduction cost for carbon markets (in contrast to *all to carbon markets*) and treats carbon markets and climate finance equally as sources of funding to realize the emission reduction program (if carbon market price is at least \$40/tCO₂e)



Source: Authors

The *proportional attribution* approach restricts the role of carbon markets to those emission reduction programs that are lower in cost than the willingness to pay in the acquiring country. Only programs that have marginal emission reduction costs equal to or below the carbon market price would attract carbon market funds. This contrasts with the *all to carbon markets* approach which “buys down” i.e. subsidizes the marginal cost of emission reductions so that they can be sold into the carbon market.

Environmental integrity

With proportional attribution, the use of carbon markets does not impact net global emissions and environmental integrity is maintained. With or without carbon markets, climate finance generates the same amount of net emission reductions, and only the mitigation outcomes achieved by carbon markets are offset by higher emission in the acquiring country.

In this example, the \$300 million climate finance delivers global emission reductions of 7.5 MtCO₂e. With carbon markets, its \$100 million contribution reduces (unadjusted) host country emissions by 2.5 MtCO₂e and allows for an increase in acquiring country emissions of 2.5 MtCO₂e, which has no net impact on global emissions. The total impact on global emissions is the same as in absence of carbon markets, when only the reduction of 7.5 MtCO₂e from climate finance takes place.

Costs

The impact on global resource costs to achieve the NDC targets are lower than in the other attribution approaches. Compared with *all to climate finance*, gains from trade result in lower emission reduction costs in the acquiring country and hence globally. Compared with *all to carbon markets*, climate finance does not subsidize potentially high resource cost emission reductions that could crowd out lower resource cost emission reductions in the acquiring country.

In this example, up to 10 MtCO_{2e} are reduced at lower or equal cost than in the acquiring country.

Transaction cost

This approach has the potentially highest transaction cost. For climate finance, the grant-equivalent of the various sources needs to be determined (see section 2.2). For carbon markets, the funds provided from each source or emission reduction purchase agreement (ERPA) of the program needs to be tracked, unless there was an international market price, which could then be used to estimate the total value of carbon market contributions. Both need to be compared to understand the proportions.

An additional difficulty may be the transparency surrounding the determination of the grant-equivalent. Carbon market participants might have an incentive to downplay the grant-equivalent of climate finance to increase their proportional share of emission reductions, although reference to OECD DAC agreements on the reference interest rates would reduce this risk. In addition, some financial information such as ERPA prices may be confidential, which could present a problem in the period before international benchmark prices were available. As a solution, the determination of grant-equivalent can follow international best practice using default interest rates for specific groups of countries as defined by OECD DAC (see section 2.2) and detailed assumptions of attribution calculations might have to be agreed on by the countries involved (including host country).

Sustainability

This approach allows for a role of carbon markets on equal terms to climate finance but does not provide an additional incentive such as the *“all to carbon markets”* approach. Where the carbon price meets or exceeds the cost of the emission reduction program, carbon markets can finance mitigation action, including potentially action that goes beyond the specific mitigation program until the host country potential at this marginal cost is depleted. However, climate finance does not provide an additional up-front financial incentive for carbon markets to step in by buying down the costs of emission reductions.

4.4. Summary of comparison of approaches to attribution

This section summarizes the advantages and disadvantages of the different attribution approaches. Table 3 summarizes the impact of the three approaches on global emissions and resource cost.

Table 3. Impact on global emissions and resource cost

All to climate finance	All to carbon markets	Proportional attribution
7.5MtCO ₂ e net global emission reductions for \$300 million.	No net global emission reductions.	7.5MtCO ₂ e net global emission reductions for \$300 million.
	10MtCO ₂ e of emissions offset in acquiring country at resource costs of \$400 million, but at a price of \$10/tCO ₂ e for the acquiring country.	2.5MtCO ₂ e emissions offset in acquiring country at resource costs of \$100 million.
	Offsetting can be cheaper or more expensive than domestic mitigation in the acquiring country.	Cost saving in acquiring country compared to domestic mitigation.

Source: Authors

There are trade-offs between the attribution approaches: encouraging carbon markets to engage early (i.e. before market prices are high) versus not reducing global emissions and subsidization from climate finance.

- *All to carbon markets* provides this encouragement for carbon markets. It is also a transparent and tractable approach as no care needs to be taken to proportionally attribute any emission reductions other than all to carbon markets. This approach could contribute towards building ecosystems. The downsides are that
 - climate finance cannot claim any attribution for emission reductions,
 - global net emissions are higher than in absence of the use of carbon markets (and therefore environmental integrity is affected),
 - global resource costs are potentially much higher than in other attribution approaches, and
 - it requires a global carbon market (or at least multiple acquiring countries to compete) to ensure that the carbon market price is driven up to a level that reflects marginal emission reduction costs (or allowance prices in ETSs) in acquiring country(s) – this is crucial for the transition period.
- *Proportional attribution* avoids these downsides: it provides attribution of emission reductions to climate finance, maintains the outcome of increased global emission reductions achieved by

climate finance and does not lead to additional global emissions (and therefore maintains environmental integrity) and provides an incentive to minimize global resource cost to achieve a given emission reduction target within the NDC. Crucially, this approach does not require a global carbon market (or multiple acquiring countries) as the price the acquiring country is willing to pay for emission reductions is always reflective of the cost of emission reductions in the acquiring country. This means that no low-cost emission reductions are crowded out in the acquiring country by subsidization from climate finance, and importantly, that this approach is feasible during a transition period to a global carbon market where, in the beginning at least, there are few acquiring countries competing for international emission reductions.

- *All to climate finance* is akin to the *proportional attribution* approach but has potentially lower economic efficiency and higher resource cost by leading to a clear delineation between emission reduction programs targeted by climate finance and programs targeted by carbon markets.

Table 4 summarizes the advantages and disadvantages and discusses implications for the transition period towards a global carbon market.

Table 4. Summary of attribution approaches including discussion of trans

	All to climate finance		All to carbon markets		Proportional attribution	
	<i>Advantage</i>	<i>Disadvantage</i>	<i>Advantage</i>	<i>Disadvantage</i>	<i>Advantage</i>	<i>Disadvantage</i>
<i>Incentives</i>	<p>No subsidizations within program.</p> <p>Climate finance lowers host country's and global emissions.</p>	<p>No role and incentive for carbon markets. This leads to a segregation of programs with climate finance and programs with carbon market funding.</p>	<p>Highest incentive for carbon markets – climate finance directly subsidizes the marginal emission reduction cost and hence carbon markets.</p>	<p>Climate finance does not reduce global emissions, unless it is strictly separated from carbon markets (converging to).</p> <p>Climate finance selects the emission reduction program and subsidizes it, which likely does not lead to a least cost solution.</p>	<p>No provision of subsidies within program.</p> <p>Attribution of emission reductions to climate finance.</p>	<p>Provides a smaller incentive for carbon markets than <i>all to carbon markets</i> as climate finance does not subsidize marginal cost of emission reductions.</p>
<i>Environmental integrity of carbon markets</i>	N/A (no role for carbon markets).		The use of carbon markets leads to an increase in global emissions as climate finance does not reduce global emissions. Therefore, environmental integrity is not maintained.		The use of carbon markets does not change net global emissions as climate finance is attributed the emission reductions it achieves. Therefore, environmental integrity is maintained.	

Transition period	Delineates programs and so makes sure carbon markets purchase what they can while	Potential of climate finance to target lowcost opportunities that otherwise would be	Subsidized prices for carbon markets incentivize their growth and engagement.	Unsubsidized carbon markets may have a more difficult start.	Balanced attribution helps to incentivize carbon markets while leaving an	Does not provide a strong incentive via subsidization for carbon markets in
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All to climate finance		All to carbon markets		Proportional attribution	
<i>Advantage</i>	<i>Disadvantage</i>	<i>Advantage</i>	<i>Disadvantage</i>	<i>Advantage</i>	<i>Disadvantage</i>
climate finance targets other opportunities.	targeted by carbon markets – which can impede development of carbon markets. Vice versa, can lead to overpaying for emission reductions by climate finance.		Competition between carbon market players needed for economic efficiency. During the transition period, there may be less competition and hence greater subsidization than optimal.	independent role for climate finance. Maintains environmental integrity from the onset. Robust to only having a few carbon market participants.	contracts to the <i>all to carbon markets</i> approach.

Transaction cost	Attribution cost are low as only the grant equivalent of climate finance sources needs to be determined.	Grant-equivalent determination is required if climate finance sources are to be compared.	Attribution costs are minimal and potentially lowest among all approaches. Carbon market funding is readily observable, and all emission reductions are attributed to these.	Reporting of climate finance impacts still requires determination of grant-equivalent.	None.	Highest transaction cost of approaches as the grant-equivalent has to be determined for all climate finance sources and compared with the carbon market funds.
Sustainability	Indirect subsidization still potentially reduces future costs of emission reduction programs.	No role for carbon markets. Cannot buydown/subsidize programs for carbon markets to take-up.	Provides a strong price incentive for carbon markets to develop.	Sustainability of emission reductions depends in part on climate finance flows. Without subsidies for carbon markets,	Balanced attribution helps to incentivize both climate finance and carbon markets. Allows for incremental role of carbon markets	Does not provide a strong incentive for carbon markets to develop. Cannot buydown/subsidize

All to climate finance		All to carbon markets		Proportional attribution	
<i>Advantage</i>	<i>Disadvantage</i>	<i>Advantage</i>	<i>Disadvantage</i>	<i>Advantage</i>	<i>Disadvantage</i>
	Sustainability of emission reductions depend on climate finance flows.		programs may not continue.	and climate finance expanding or replicating the mitigation program over time. Sustainability of emission reductions does not depend on climate finance flows. Carbon markets only interact with climate finance if the cost of emission reduction programs is at or below the global carbon market price (cost in acquiring country).	programs for carbon markets to take-up.

Source: Authors

5. Using cost savings from carbon markets for climate finance

As section 4 shows, the use of carbon markets reduces the costs for the acquiring country to reach its NDC compared to a situation where it does not use carbon markets. These cost savings can be used to further reduce global emissions.

There are two possible scenarios for cost savings:

- a. The cost savings benefit the developers and buyers, e.g. the private sector participants in an ETS (or similar compliance market) and strengthen their economic performance. This has been widely the case in existing schemes buying mitigation outcomes, e.g. in the EU-ETS. Private actors receive private savings, and these are not available for further emission reductions via climate finance.
- b. The acquiring country itself could also purchase emission reductions via carbon markets when domestic action falls short of the NDC target. Any cost savings here could be used to encourage further global emission reductions via increased spending on climate finance.

The analysis in section 4 follows scenario a. Therefore, there are no additional global emission reductions stemming from private cost savings on achieving a given emission reduction target. This is the case in the *proportional attribution* and *all to carbon markets* approaches for private actors in carbon markets. Hence, the use of cost savings does not alter the conclusions of the advantages and disadvantages of attribution approaches.

In contrast, scenario b could result in global emission reductions as the acquiring country is the actor of the carbon market. An acquiring country could decide to disburse at least part of the rent resulting from the use of carbon markets as climate finance leading to additional emission reductions.

When using the *all to carbon markets* approach in scenario b, in theory the issues of environmental integrity of the approach might be mitigated by the increase in climate finance flows. However, if the climate finance is again primarily used to subsidize other carbon markets' mitigation outcomes, the additional climate finance has limited effect on mitigation. Also, it might be simpler (and more economically efficient) for acquiring countries to directly pay higher prices for buying mitigation outcomes from carbon markets in the first place.

There remains a broader issue under the *all to carbon markets* approach. There could be a scenario in this approach where climate finance providers in one acquirer country subsidize carbon markets of another acquirer country. In this case, the subsidized acquiring country could agree to spend part

of the cost savings (and subsidization) on climate finance to achieve further emission reductions, however this requires a calculation of the subsidy and willingness to pass-on cost savings.

A further possibility is that the acquiring country tightens its target instead of increasing its climate finance contribution based on realized cost savings through offset usage. Analyzing this case would lead to a comparison of two different international engagement strategies: exclusive usage of market mechanisms versus usage of both market mechanisms and climate finance. This deserves further research but is beyond the scope of this report.

6. Application: example program

Building on the explanation in chapter 2 and the example provided in section 3.1, we illustrate the proportional attribution with the following example. We assume that the total mitigation program will reduce 9 MtCO₂e over a given period at a resource cost of \$360 million (i.e. “grantequivalent” cost). In the example (Table 5) the necessary resource cost for mitigation action leverages a total of \$1,052 million in investments in terms of face value. These include concessional loans and grants from International Financial Institutions (IFIs) or other international climate finance donors. To apply the proportional attribution approach, these contributions are valued according to their grant equivalent (i.e., following OECD definition (see section 2.2)).

Table 5. Example of proportional attribution and all for carbon markets?

Source of finance	Face value	OECD grant equivalent	Eligible for attribution	Attribution: Proportional		Attribution: All to carbon markets	
	m\$	m\$		%	MtCO ₂	%	MtCO ₂
IFI 1 loan	500	80	Yes	20%	2.0	0%	0.0
IFI 2 grant	320	220	Yes	55%	5.5	0%	0.0
Private sector equity	100	0	No	n/a		n/a	
Commercial loan	150	0	No	n/a		n/a	
Commercial currency hedge	n/a	0	No	n/a		n/a	
<i>ERPA carbon markets</i>	<i>110</i>	<i>100</i>	<i>Yes</i>	<i>25%</i>	<i>2.5</i>	<i>100%</i>	<i>10.0</i>
Total	1180	400		100%	10.0	100%	10.0

Source: Authors

In addition, international technical assistance may contribute to catalyzing the overall project. However, although technical assistance is often key to reducing barriers and paving the way for the implementation of mitigation programs, it is very difficult to quantify the impact on the overall mitigation outcome and its relative contribution is likely to be small. For simplification, technical assistance may be neglected when considering proportional attribution.

7. Conclusions

The three attribution approaches considered in this paper have both strengths and weaknesses in relation to different objectives of donors, acquiring and host countries:³⁰

- The “*all to climate finance*” approach allows for a clear separation between climate finance and carbon markets, so that programs must be financed *either* by climate finance or by carbon market instruments. Climate finance achieves additional global emission reductions. The downside of this approach is that it does not capitalize on the synergies of blending different financing sources to maximize the upscaling of climate action. In addition, because of the lack of a market signal, climate finance-supported investments may not target the least-cost global emission reductions.
- The “*all to carbon markets*” approach is straightforward to implement and provides the strongest incentive for the development of carbon markets and for related instruments to evolve. However, this subsidization of carbon markets by climate finance does not allow climate finance to generate net global emission reductions if blended with carbon market mechanisms and raises concerns on environmental integrity and economic efficiency.
- Compared to these two approaches, the “*proportional attribution*” approach requires more information on the financial flows involved. It does not subsidize the price for the mitigation outcomes, which therefore provides less incentive for carbon market development. On the other hand, it allows a balanced blend of climate finance and carbon market instruments in one program, fully maintains environmental integrity, achieves additional global emission reductions and provides adequate incentives to foster economically-efficient mitigation solutions. However, it does require that the carbon market is willing and able to pay the actual mitigation costs of the program and foregoes the incentivization that *all to carbon markets* provides.

³⁰ The incentives for host countries are only affected when the sale of mitigation outcomes to carbon markets affects their ability to meet current and/or future NDC commitments. This analysis assumes that only mitigation outcomes above the NDC target will be included in the emission reduction program (and hence either climate finance or carbon market funds, or both). Further additional work is needed to better understand how the sale of mitigation outcomes may affect host countries when NDC targets are not (yet) met.

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Abbreviations and Glossary

ACEF	African Clean Energy Facility
BAU	Business-as-usual
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CMA	Conference of the Parties serving as the meeting of the Parties to the Paris Agreement
GRMF	Geothermal Risk Mitigation Facility
GHG	Greenhouse gas
ICEF	US India Clean Energy Facility
IFC	International Finance Corporation
IFI	International Financial Institution
ITMO	Internationally transferred mitigation outcomes
CPF	World Bank's Carbon Partnership Facility
NDC	Nationally Determined Contribution
RBCF	Results Based Climate Finance
REDD+	Reducing emissions from deforestation and forest degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries
TCAF	Transformative Carbon Asset Facility
tCO ₂ e	Tonnes of CO ₂ equivalent
TLFF	Tropical Landscape Finance Facility
UNFCCC	United Nations Framework Convention on Climate Change