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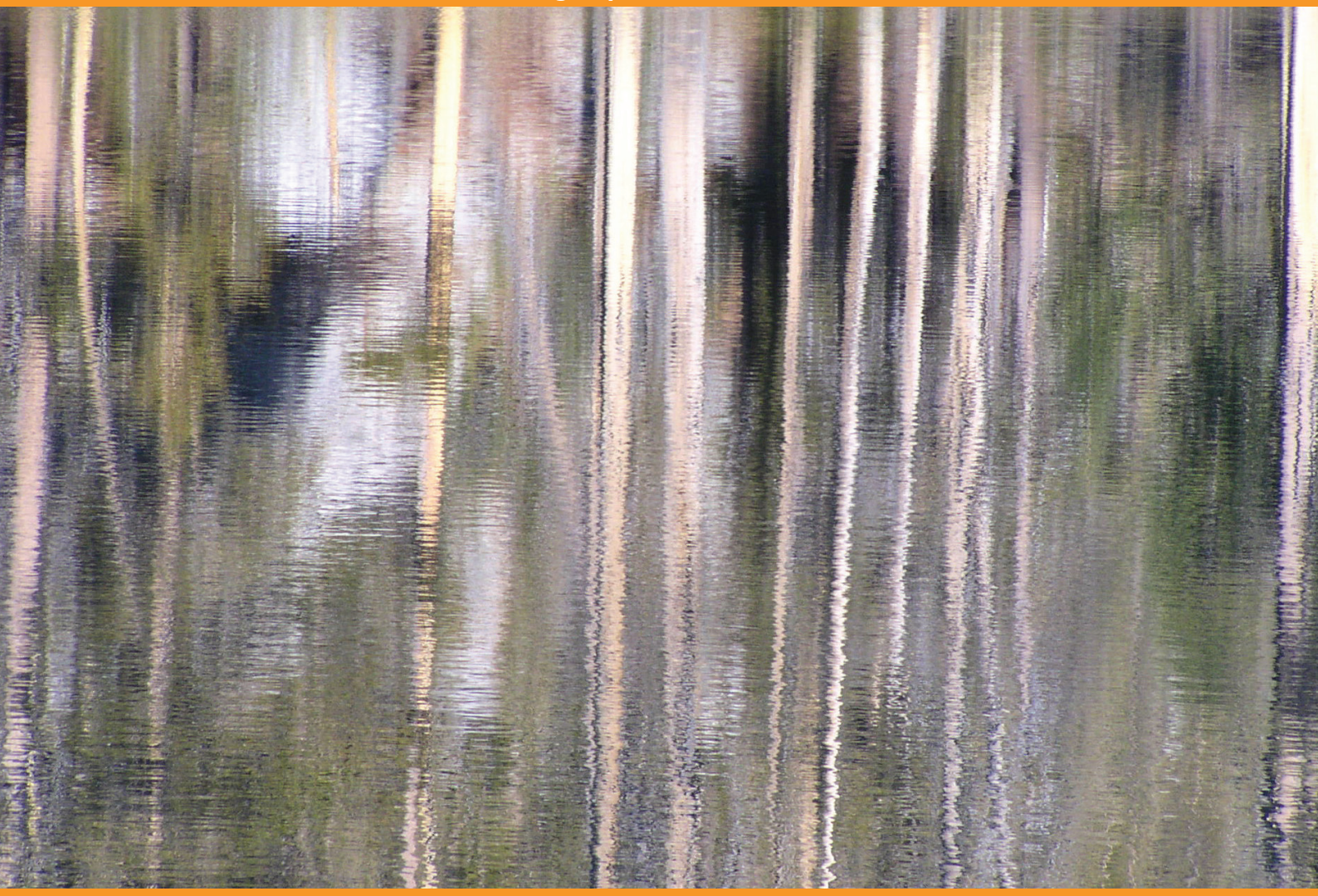

# Single-year mitigation targets: Uncharted territory for emissions trading and unit transfers

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# Single-year mitigation targets: Uncharted territory for emissions trading and unit transfers

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## ABSTRACT

This working paper explores the question of target "time frame" and its implications for the generation and use of tradable emissions units. Under United Nations Framework Convention on Climate Change (UNFCCC) agreements, some countries have adopted continuous or multiple-year emissions targets, while others have taken on discontinuous or single-year targets, most notably for the year 2020. Countries relying solely on single-year targets present greater uncertainty with regard to their emissions pathways, and as examined here, raise concerns regarding both ambition and comparability with other targets. The use of tradable units to meet a single-year target or the issuance of units in years prior to the single-target year could reduce the cumulative mitigation outcome compared with both single-year targets without using tradable units, and multi-year targets (with or without using units). Single-year targets may also limit the ability to use domestic carbon market instruments, such as emissions trading schemes. Continuous multi-year targets provide greater comparability of targets; they provide certainty about cumulative global emissions; they allow an assessment of the progress towards meeting targets; they make countries less vulnerable to changes in climatic or economic conditions; and they are compatible with domestic and international carbon market instruments, which are key policy tools in many countries for achieving mitigation. Multi-year targets also support the notion of carbon budgets, which is gaining more widespread currency, as seen in the Intergovernmental Panel on Climate Change (IPCC) *Fifth Assessment Report*.

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# 1. INTRODUCTION

Since the UN Climate Change Conference in Copenhagen in 2009 (COP15), more than 60 countries, which together account for almost 80% of global carbon dioxide ($CO_2$) emissions, have made pledges under the United Nations Framework Convention on Climate Change (UNFCCC) to reduce their economy-wide emissions (UNEP 2012). The pledges vary in their terms and features, but all but two use the same target year, 2020.[1] The 37 countries that have agreed to a second commitment period under the Kyoto Protocol, and which represent about 14% of global emissions in 2010, have also translated these single-year pledges into continuous, multiple-year targets for the years leading up to 2020 (UNFCCC 2012).

This paper explores the implications for emissions trading systems of having different target "time frames" (Prag et al. 2013) – i.e. continuous or multiple-year vs. discontinuous or single-year targets. To date, all emissions trading systems or programs involving unit transfer have operated on the basis of multiple, consecutive years of compliance or target attainment; in that context, single-year targets are largely uncharted territory. We examine the issues that could arise if countries lacking continuous, multiple-year targets seek to sell or acquire units. We consider options for unit accounting and assess whether they could address issues that arise with single-year targets and their compatibility with the use of market mechanisms. The analysis in this paper is relevant to both the 2020 pledges agreed in at COP16 in Cancun, and the commitments that Parties to the UNFCCC are considering for the post-2020 period, under the Ad Hoc Working Group on the Durban Platform for Enhanced Action (ADP).[2]

This paper is part of a series on accounting issues related to emissions units, emissions targets, and international agreements. Other papers have examined whether offset programs might be able to provide a net decrease of GHG emissions, and how to manage risks associated with double-counting of emission reductions. Related concepts are covered briefly below; for a more thorough discussion, see Schneider et al. (2014), Lazarus et al. (2013) and Erickson et al. (2011).

## 1.1 Terminology

For expediency, we use the terms "units" and "internationally transferable units" to refer to offsets, allowances, or other emission or emission reduction units that Party A can acquire from Party B (perhaps with many intermediate transactions) to apply towards its pledge.

Emissions units are typically either in the form of allowances or credits. **Allowances** are issued under **cap-and-trade mechanisms** where the emissions of a country, a sector, or a group of installations are capped and allowances are issued and allocated to the country or entities in line with the cap. An allowance, whether an Assigned Amount Unit (AAU) issued under the Kyoto Protocol, a European Union Allowance (EUA), or California Carbon Allowance (CCA), represents a "tradable permit" to emit one tonne of $CO_2$ equivalent.

**Emissions trading schemes (ETS)** are a form of cap-and-trade mechanisms where the allowances are allocated to individual installations or companies in a country or group of countries. Examples include the EU ETS or the California ETS.

[1] The exceptions are Costa Rica, which has pledged to be carbon-neutral by 2021, and Papua New Guinea, which set a target for 2030.

[2] At COP18 in 2012, Parties to the UNFCCC agreed to a timetable for a new global agreement covering all countries, to be adopted by 2015 and implemented by 2020.

**Credits** are units that are issued under a **crediting scheme** for emission reductions achieved against a crediting baseline. Examples include the Clean Development Mechanism (CDM), Joint Implementation (JI), or voluntary offsetting. A credit, such as a Certified Emission Reduction (CER) under CDM or an Emission Reduction Unit (ERU) under JI, typically represents one tonne of emission reduced.

In the paper, we refer to Parties as "net importers" and "net exporters" of units; until now, that has generally corresponded with expectations for many developed and developing countries, respectively. However, some developing countries have indicated that they might buy international units, while some developed countries could eventually sell units, for example, as the result of linking emissions trading systems.

Finally, we must note two key assumptions in our analysis: that each unit traded actually represents a tonne of additional and verifiable emission reductions, and that emission reductions are never double-counted. We have made those assumptions to narrow the focus of our analysis, but neither issue – ensuring unit integrity or avoiding double-counting – has yet been fully addressed within the UNFCCC, and strategies to deal with them could interact with pledges and their time frames.

## 2. SINGLE-YEAR VS. MULTI-YEAR TARGETS

The time frame – or period in which emissions are accounted for – is one of several key dimensions that need to be considered when setting, and assessing progress towards meeting an emissions target (Prag et al. 2013). Most of the policy debate and analysis of the UNFCCC pledges has focused on other dimensions, such as the headline number (e.g. a 25% reduction), the reference point (e.g. relative to base year or business-as-usual emissions), target denominator (e.g. per unit GDP, per capita, or none), and coverage (gases and sectors included). The issue of time frame – and specifically the choice between continuous, multi-year and discontinuous, single-year targets[3] – has received far less attention.

This section explores some key differences between single-year and multi-year targets with respect to emissions implications and flexibility, in particular in the context of transferrable emissions units. As we discuss here, the choice of continuous vs. discontinuous targets raises a number of important issues related to the target ambition, comparability of effort, and the fungibility of market units, all of which deserve more careful consideration.

### 2.1 What are the key differences between single-year and multi-year targets?

As noted above, 37 of 60 countries have translated their single-year pledge for 2020 into a multi-year target; these are the countries that have agreed to a 2013-2020 commitment under the Kyoto Protocol, which requires a multi-year obligation, just as it did for the first commitment period (2008-2012).[4] As illustrated in Figure 1, a multi-year target (left panel) represents a goal or commitment to limit total, cumulative emissions over a continuous period, from the start date (year 1) to the target year (year 8 in our example). In contrast, the single-year target (right panel) represents a goal or commitment for the target year only, with no specific ambition or accountability for the years prior to the target, and thus less certainty regarding cumulative emissions.

[3] The other key time frame question is that of the target headline "dates", e.g. whether they are shorter-term, e.g. out to 2025, or longer term, e.g. out to 2050, which we do not assess here.

[4] Although New Zealand and Japan did not commit to a second commitment period under the Kyoto Protocol, they have indicated that they may still use a multi-year budget for the 2013-2020.

This is a crucial difference because what matters most for climate change is how much is emitted altogether: cumulative emissions. Keeping global warming below 2°C, the goal agreed to by the Parties at COP15 in Copenhagen, requires limiting cumulative emissions – and thus, accounting for them. Indeed, the Intergovernmental Panel on Climate Change (IPCC), in its *Fifth Assessment Report*, has suggested budgets for cumulative $CO_2$ emissions linked to different probabilities of meeting the 2°C goal (IPCC 2013, p.27). Compared with discontinuous, single year targets, continuous multi-year targets are far more consistent with a budget-based approach to climate change mitigation.

**Figure 1: Emissions accounted for under multi-year and single-year targets**

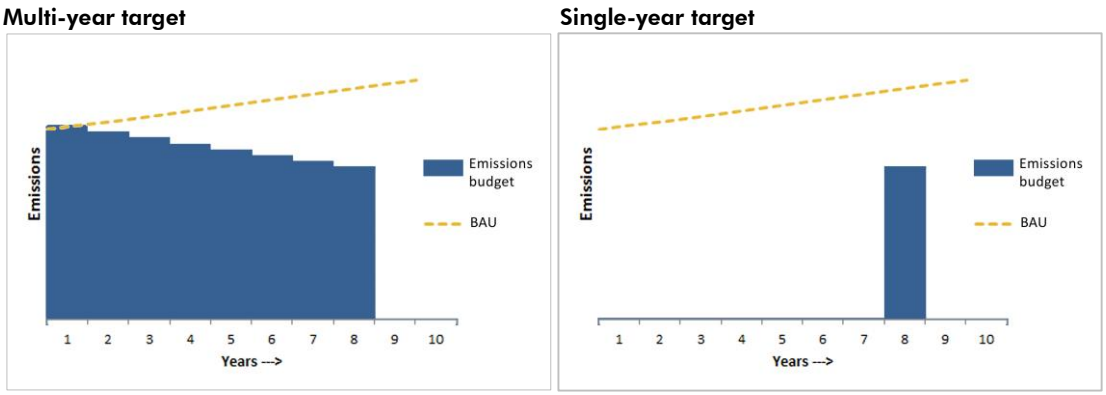
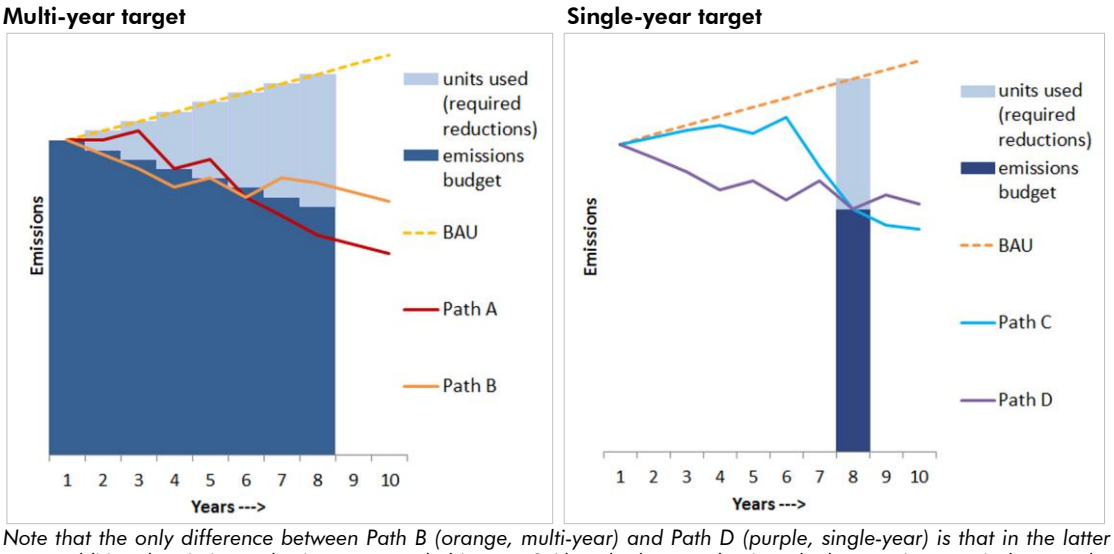



Figure 2 illustrates possible emissions pathways under multi-year and single-year targets. Both provide a country with flexibility in the timing of emission reductions, but under a multi-year target, the total, cumulative emissions must stay below the target amount (the area shown in pink). Thus, both Path A, with higher emissions upfront and a sharper decline in later years, and Path B, with earlier emissions reductions and higher final-year emissions, result in the same cumulative emissions and attain the multi-year target. In contrast, a Party with a single-year target can achieve its final target with higher or lower cumulative emissions (Paths C and D). In fact, the Greenhouse Gas Protocol's GHG Mitigation Goals Standard notes that "a significant risk associated with single year goals is that emissions can increase during the goal period and then be reduced only shortly before the target year, which would result in a larger amount of cumulative emissions than if emissions were capped year over year by a multi-year goal" (WRI 2013, p.46). As discussed below, this risk becomes more significant if transferrable units are used.

**Figure 2: Possible emissions pathways under multi-year and single-year targets**




*Note that the only difference between Path B (orange, multi-year) and Path D (purple, single-year) is that in the latter case, additional emission reductions are needed in year 8 (thus the lower value in only that year) to precisely meet the single-year target.*

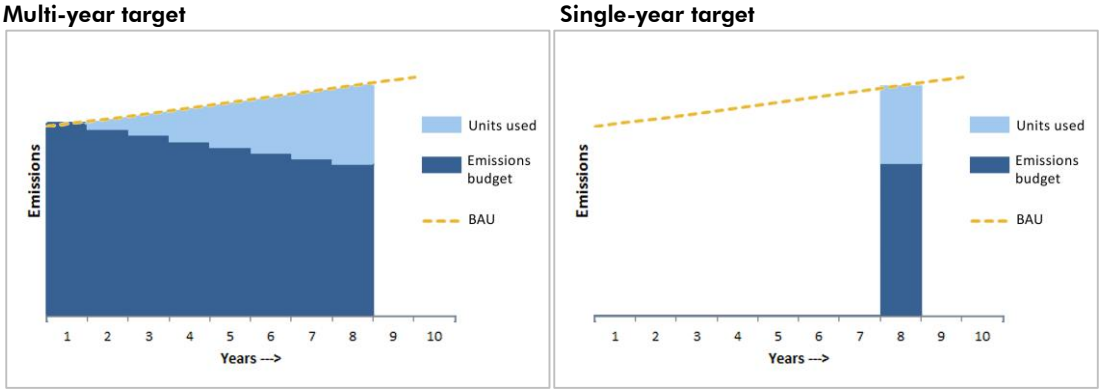
Although multi-year targets may require greater effort over the years covered by the pledge, in the final year, they provide more flexibility than single-year targets, and less exposure to annual variability in economy, weather, trade, or other factors. Consider Paths B and D in Figure 2, which represent identical emission reduction trajectories for years 1 through 7. Suppose that in year 8, low rainfall led to lower-than average hydropower production, requiring more coal-fired electricity generation, and thus leading to higher emissions than expected. Under a multi-year target, "extra" emission reductions from prior years could be used to compensate. Under a single-year target, however, there would be no such flexibility, and additional emission reductions would be needed. Given short notice, options could be limited to measures such as temporary shut-down of high-emitting facilities, an approach that would have little long-term emission reduction benefit.

## 2.2 Transferable units and cumulative emissions under single-year targets

The use of transferable emission-reduction units introduces other potential emissions trajectories that would be impossible or highly unlikely with domestic efforts alone. Figure 3 illustrates a theoretically conceivable situation in which a Party meets its target entirely by acquiring emission reduction units from other countries, without lowering its own emissions at all. Relying on transferable units would be much easier for the single-year target than for the multi-year one, as far fewer emissions units would be needed. Also, while it would be very difficult to reduce domestic emissions from business-as-usual to target levels in a single year, it would be relatively easy to make a single purchase of emission reduction units. Thus, the use of transferrable units to meet single-year targets would likely make a single-year target not only far less ambitious than a multi-year target, but also less ambitious than a single-year target met by domestic mitigation measures, to the extent that such measures involve long-lasting changes in technologies or practices.[5]

[5] Most mitigation measures, such as changes in technologies and practices, have impacts that last for years or decades. A Party could conceivably also achieve a one-year deviation from BAU in the single-target with draconian measures, such as a one-year shutdown of high-emitting facilities.

**Figure 3: Potential target compliance relying wholly on transferable units**




Another attribute of a multi-year target is its inherent compatibility with domestic emissions trading. Multi-year targets are a feature of all domestic or regional emissions trading schemes to date, and they provide temporal flexibility to covered entities in when they need to reduce emissions. Unused allowances can usually be banked into subsequent years within a target period, and in some cases beyond it. By enhancing liquidity and creating a price signal based on the long-term scarcity of allowances, multi-year flexibility can enable emissions to be reduced in more cost-efficient manner.

Single-year targets could thus be problematic for the functioning of domestic emissions trading schemes and international carbon markets, as well as for the development of new market mechanisms (Prag et al. 2013). The option to use units to meet a target for one year alone has simply not existed, and thus it is not clear how the issues that it poses to comparability, ambition, and the functioning of market mechanisms could be addressed.

### 2.3 Implications of unit transfers from Parties with single-year targets

Single-year targets are a new phenomenon. Until recently, countries have either had multiple-year targets, as in the case of entities or Parties holding allowances (e.g. under the Kyoto Protocol or the European Union's Emissions Trading System), or they have had no targets at all (e.g. forestry offset suppliers under California's cap-and-trade program or, until recently, all CDM host countries supplying Certified Emission Reductions).

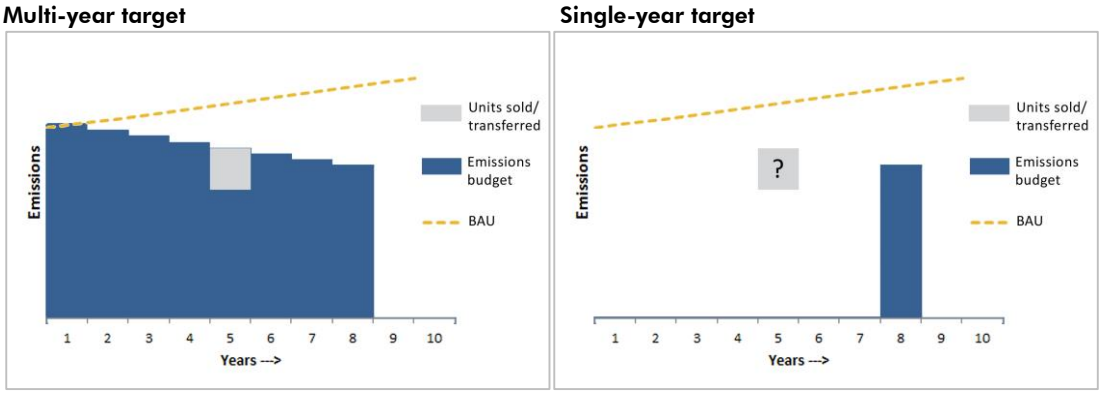
Where entities or Parties have a multiple-year target, the issuance and transfer of emission units leads to a corresponding reduction in their own emissions allowance. For example, under the Kyoto Protocol, the issuance of an Emission Reduction Unit (ERU) leads to the cancellation of an Assigned Amount Unit (AAU), a step necessary to avoid double-counting of emission reductions by both the buyer and the seller. When the seller has no emission reduction target, this step is not needed. (Note, however, that where Parties have established targets for future years, there could be other, indirect implications for the transfer of pre-target-year units; see Appendix 2.)

What is the implication, then, when a Party with a single-year target sells or otherwise transfers a unit to another Party? It depends on the timing of the emission reductions, which is related to the *vintage* of the transferred units (what year they were generated) and whether these units are credits or allowances. If credits were issued for emissions reductions that occurred in the single-target-year, and those credits were sold to another Party, then the seller's emissions allowance would have to be adjusted to avoid double counting, just as with a multi-year target.

Consider a Party that transfers a credit or allowance for year 5, as shown in Figure 4 below. If the Party has a multi-year target, the cumulative target has to be made one tonne stricter, as the unit sold must be added to the countries GHG emissions in order to avoid double counting or double claiming of emission reductions.[6] The unit-exporting Party will then have to further reduce its emissions by the amount equivalent to the units transferred externally. In the case of a Party with a single-year target, however, there are no clear accounting requirements for units transferred in a year not covered by the target.

This difference in accounting for transferred units would further complicate the comparability of single-year and multi-year targets, and could result in lower cumulative mitigation outcomes for single-year targets (see also Appendix 2). It could also make it more difficult to gauge the overall ambition of the Parties' combined pledges, as has been done in assessments of the "emissions gap" between pledges and the 2°C goal (UNEP 2011; 2012).

**Figure 4: Implications of applying emission units from one year to another**




Context is important here. For developing countries, the single-year targets set under the Cancun Agreements are the first economy-wide targets they have ever set. Of the 22 countries with single-year-only pledges, 17 are developing countries (see Appendix 1 for a summary of the pledges made). These countries, most notably China, India, and Brazil, have generated the vast majority of issued CERs, the dominant form of internationally transferred units to date (aside from those within countries in the EU-ETS). For countries that host many CDM projects, adopting a multi-year target up to the year 2020, when coupled with rules to avoid double-counting, could negatively affect activities to generate offsets or require more domestic mitigation action to compensate for the credits sold.[7]

For developed countries, single-year targets under the Cancun Agreements are simply an alternative to the multi-year targets under the Kyoto Protocol, which they agreed to but either did not ratify (the United States) or chose not to continue with (Canada and Japan). Given that the International Assessment and Review process under the UNFCCC "*aims to promote the comparability of efforts among all developed country Parties* with regard to their quantified

[6] Alternatively, where relevant, it could be deducted from a country's unit holding account, if such exists.

[7] To minimize impacts on CDM activities, a unit-exporting Party could elect to add the amount of exported emission reduction units (CERs) to its emissions accounts. However, doing so could create a cost to the host Party, if it then needed to find additional emission reductions to meet its target. While this situation would then be similar to that of Joint Implementation activities for a Kyoto Annex B Party, the difference is that CDM activities have thus far operated without such a consequence.

economy-wide emission limitation and reduction targets" (italics added), these single-year targets should be comparable with multi-year targets.[8]

### 2.4 What types of units would be appropriate to use to meet a target?

There are several types of transferable units that a Party could conceivably use to meet a target. We classify these unit types into three groups, as shown in Table 1, and then explore what relevance the target time frame (that of the unit seller/issuer as well as that of the unit user) may have for the appropriateness of unit use.

**Table 1: Types of units that countries may wish to count towards meeting a target**

| Type of Units | | Are emission sources represented by the unit within the scope of a current or future year target? | Example |
|---|---|---|---|
| A | Domestic allowances | Yes | Banked allowances |
| | Domestic offsets | Yes | ERUs used domestically |
| B | Domestic offsets | No | Credits from HFC abatement in China, which has a $CO_2$-only target, |
| | International offsets | No | CERs from countries that have not made pledges that cover the affected sector |
| C | International offsets | Yes | ERUs from other countries<br>CERs from countries that have made pledges that cover the affected sector |
| | International allowance | Yes | EUAs (or AAUs from EU countries) used to meet Australia's target |

Group A consists of units that represent emissions sources covered by a Party's current or future target – domestic allowances (for example, $CO_2$ from fuel combustion in an ETS) and credits from sources covered by a pledge – and used by that same Party. Such units can be useful for enhancing timing flexibility, such as by banking or borrowing across years within a multi-year compliance period (where target attainment is based on the sum of emissions across the period). Units with the same vintage as the target years(s) should not be accounted towards pledge attainment (e.g. EUAs are not used towards accounting of Kyoto targets), since these emissions are already counted in a Party's inventory or emissions accounts. However, the vintage of domestic allowances or credits may not coincide with the time frame of the target for which it is being used. For example, South Korea has set a single-year economy-wide target (30% below BAU for 2020), and is implementing a domestic emission trading system for major emitters (comprising 60% of emissions) starting in 2015 which will allow for banking and limited borrowing. The question is then whether South Korea could count banked allowances from 2018 towards its 2020 pledge.[9] Hence, for this group of units

[8] See http://unfccc.int/national_reports/biennial_reports_and_iar/international_assessment_and_review/items/7549.php.

[9] Prag et al. (2013) suggest that such use of allowances should not pose a concern because, while no economy-wide target applies for 2018, the ETS does establish a multi-year cap for major emitting sources. However, the situation may be a bit more nuanced. Even if South Korea has a multi-year cap, the ETS cap could be stronger in 2020 than in previous years. This could then lead to banking of 2015-2019 allowances into 2020. If these banked allowances were then used by the country to meet its Cancun pledge, this could lead to higher cumulative GHG emissions than if the country were to meet its pledge without the ETS and the possibility for banking. Note that borrowing is also allowed, with a 10% penalty, only from future years within the same "phase". Since the announced phases are for 2015-2017, 2018-2020, and 2021-2026, and 2020 is the last year of the second phase, no borrowing would be possible in that year.

(A), the main question is whether units with a different vintage than the target year(s) can be used for pledge attainment.

The second group (B) represents units that do not fall within the scope of a current or future target. In some cases, the source and user of the unit will be the same. For example, China's target for 2020 does not currently appear to include non-$CO_2$ gases; China might thus use domestic credits from hydrofluorocarbon (HFC) or methane reduction projects to meet its own target. However, in the majority of cases, international transfers will be involved, i.e. the Party using (retiring) the unit will be different from the one where corresponding emission reductions occur. Many countries have yet to adopt economy-wide targets and could generate CERs or other internationally traded offsets.

For Group B, the main question is whether the unit vintage should coincide with the time frame of the target. In other words, should a Party with a single-year target (e.g. for 2020) be able to use credits issued for a different year (e.g. 2017)? One could imagine a case where such a Party meets its 2020 target by acquiring and retiring 50 credits from an offset project that reduces emissions by 10 tonnes $CO_2$e each year from 2015 to 2019. This approach could be less costly for the Party than reducing its own emissions by 50 tonnes $CO_2$e in 2020. However, this approach would result in higher global emissions in 2020 than if only 2020-vintage credits were used. In contrast, if only target year vintages could be used for target attainment, then 50 tonnes of offsets would represent 50 tonnes of emission reductions during the target year, and would likely lead to a cumulative benefit closer to those of domestic action. As a result, for this group of units, the correspondence between the vintage of a unit and the time frame of the target to which it is applied is an important consideration. Accounting rules could make this a requirement, though as discussed in the next section, doing so could be difficult in practice.

Group C corresponds to units that fall within the scope of the exporting country's current or future target. This is perhaps the most significant group of units in terms of the sheer volume used to meet targets; as noted above, most offsets to date have been issued for emission reductions in countries, such as China, India, and Brazil that have adopted economy-wide emissions targets. Like units in Group A, units issued in the single-target year(s) should not be counted towards the issuer's pledges, to avoid double-counting. However, a more difficult question is whether accounting rules should allow for units from vintages prior to the unit-exporting country's target year(s) to be used for meeting targets (i.e. should 2016 vintage offsets from China be usable by the EU?).

The answer may depend on context. It is commonly presumed that units originating from developing countries which have developed CDM or other similar activities and institutions under the Kyoto Protocol will be eligible for use by importing countries, regardless of whether they were issued prior to the exporter's first target year. To rule otherwise might seem to defy expectations that have been created through past agreements around the CDM and the use of CERs. At the same time, the use of such units could potentially have negative impacts on cumulative emission reductions (see Appendix 2).

However, the situation is different for units originating from developed countries with single-year targets, which, as Annex 1 Parties, lack the same context. While it is unlikely these countries would be exporters of units for years prior to their target year (or exporters at all), it would seem wise for accounting rules to prohibit the use of such units. Doing so would provide a blueprint for addressing issues that could arise should countries seek to adopt discontinuous single-year targets in future agreements.

We should note here that although this paper compares single-year and multi-year targets for a single time period, the more important distinction is between targets that are discontinuous and those that are continuous over time. A discontinuous target could specify multiple target years, such as an X% reduction for year 5 and a Y% reduction for year 8, but still be subject to the concerns described in this paper. Continuous targets are those that lack any time gaps in coverage, and thus enable comprehensive and cumulative tracking of emissions.

In summary, the issuance, transfer and use of units by countries with discontinuous, single-year targets raises a number of concerns, most notably that they render targets less comparable, and they can lead to fewer cumulative emission reductions compared with multi-year targets or even single-year targets met through domestic mitigation. Both of these factors could hinder progress towards global climate change mitigation goals. In the next section, we discuss possible ways to avoid those outcomes.

## 3. ADDRESSING CONCERNS WITH UNIT USE FOR SINGLE-YEAR TARGETS

Options for common accounting may help to address some of the issues that arise with unit issuance, transfer and use by Parties with single-year targets. To do so, such options should balance: a) enhancing the comparability with multi-year targets, especially for those Parties using units, b) avoiding the risk of reduced ambition due to the use of units, and c) avoiding disincentives for Parties to adopt more comprehensive and ambitious targets in the future.

### 3.1 Assessment of potential options for the use of units for target attainment

In this section, we assess four potential options for common accounting rules with respect to unit use and target time frame:

**Option 1:** The vintage year of all units used must correspond to a year covered by a Party's target.

**Option 2:** A limit is placed on the fraction of a Party's target that can be met by units – especially, or more strictly, in the case of discontinuous/single-year targets.

**Option 3:** In order to use units, a Party must translate its single-year target into a continuous multi-year emissions path, which becomes the basis for judging target attainment.

**Option 4:** In order to use units, a Party must translate the number of units it uses in its target year into a multi-year path for unit use in prior years. For example, assuming a linear emission reduction trajectory for a country that has adopted its first target, if 8 units are used in target year 8, then the Party must acquire and cancel another 7 units for year 7, 6 units for year 6, etc. Or in cases of countries with prior emissions targets, the Party would acquire 8 units for each of the prior years (1-7) (see further explanation below).

Option 1 would aim to safeguard the integrity and comparability of targets by ensuring that reductions actually within the target time frame. This option echoes a suggestion in a recent OECD/IEA paper for the UNFCCC Climate Change Expert Group: "if a country has a single-year target, it could still elect to use international units, but only those whose vintage corresponds to the single target year" (Prag et al. 2013, p.26). While a country with a single-year pledge could only use units with that year's vintage, a country with a multi-year pledge, could use units with vintage years corresponding with the pledge's full time frame. If the country has continuous multi-year pledges, then units could be carried over from prior periods. (We cover the relationship of vintages to seller's pledges below).

While simple, however, this approach has disadvantages. First, by restricting vintages of units eligible for use in meeting pledges, and by making eligibility dependent on the buyer country's target, this option could distort or fragment carbon markets. This restriction would concentrate demand for target year units and reduce demand for non-target-year units, and could complicate transaction rules. This would make carbon markets less efficient.

Second, it could lead to arbitrage or "leakage" as Parties with multi-year targets could buy earlier unit vintages (e.g. year 5 units) and thereby free up units vintages (e.g. year 8 units) that are eligible for use by Parties with single-year (year 8) targets, defeating the intent of this restriction. Such arbitrage or leakage may even occur if there is no direct trade between Parties with multi-year and single-year targets, as long as both Parties buy the same type of carbon market units, such as CERs. Furthermore, for many crediting mechanisms, in particular, the CDM, units such as CERs do not have a clear single-year vintage. The vintage of emission reduction units from crediting mechanisms often spans more than one calendar year, and depends on the timing of monitoring periods and requests for unit issuance.

In conclusion, this option would only work if all Parties that both have targets and exchange units have the same target time frame. Option 1 would still allow a country with a single-year pledge to meet its pledge largely through the purchase of units, leading to the comparability and ambition concerns described above. Furthermore, this option may not work as intended in the case of internationally transferred allowances, since the ability to free up an allowance for transfer does not necessarily reflect an emission reduction in that year.[10]

Option 2 partially addresses this concern, by limiting the fraction of a Party's target that can be met with units. A quantitative limit could be based on existing language on supplementarity for developed-country Parties.[11] Supplementarity limits are not necessarily specific to single-year targets, though stricter limits could be considered, as compared with multi-year targets. (Option 2 could be applied together with Option 1.) However, such limits would, at best, only partially address comparability and ambition issues.

Option 3 is the most straightforward approach. In order to use units, Parties would need to translate their single-year target into a continuous multi-year emissions path, which would then become the basis for judging target attainment. This option would, by definition, address the comparability and ambition concerns – there would be no unit use with single-year targets. However, some Parties may argue that this is restrictive, at least for those that have adopted single-year targets for 2020 on the assumption that units could be used.

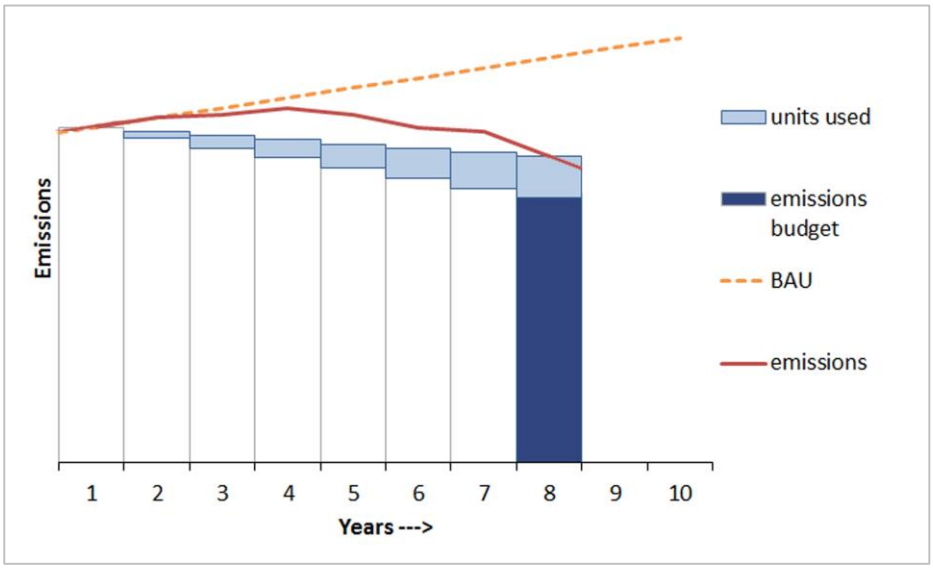
Option 4 is similar in concept, but potentially quite different in implication. It would require Parties to translate only the part of their target that corresponds to unit use into a multi-year target. In doing so, it would make a single-year target more comparable to a multi-year target, at least with respect to the role of transferable units. Take the hypothetical example shown in Figure 5. A country meets its single-year target for year 8 through a combination of units acquired (blue area in year 8) and reductions in emissions covered by its target (drop in red line relative to BAU). Under this option, the country would also acquire and cancel units for prior years as a function of how many units are used in the target year, assuming a linear trajectory. For example, if 20 million units were used in year 8, then 2.5 million units would

[10] For example, assume Country A were to sell a 2020 vintage allowance to Country B for its use in pledge attainment. If Country A had freed up a 2020 vintage allowance by reducing 2020 emissions below target levels, then the overall emission goal for 2020 would be maintained. However, the 2020 allowance could be freed up for other reasons, such as the use of banked allowances from before 2020 in Country A.

[11] Decision 1/CP.16, 80(f); see http://unfccc.int/resource/docs/2010/cop16/eng/07a01.pdf.

need to be acquired for year 1, 5 million for year 2, and so on, linearly increasing to the 20 million used for 2020. This pattern of unit acquisition would then resemble the type of linear trajectory for converting from single to multi-year targets as discussed by the UNFCCC (2011) and as used to determine targets under the Kyoto Protocol for its second commitment period. The total amount of units (90 million in this example) could be acquired, retired, and reported for any year up to and including 2020.

**Figure 5: Option 4 – requiring unit purchases for years prior to single target year**




In some cases, countries already had prior targets under the Kyoto Protocol, and the single-year target does not reflect their first emissions target. In such cases, the approach described above – starting from no unit purchases in the first year (year 1 above) – would not be appropriate. Such approach would only be appropriate where there is no expectation of mitigation effort in Year 1, as might be the case of a country adopting a target for the first time. In the case of countries with pre-existing targets (e.g. Kyoto Parties for commitment period 1 only), it would be more appropriate to assume an equal level of mitigation effort in each year. In such cases, the amount of units a country should acquire could be equal to the amount needed for the target year times all of the prior "non-target" years.

This option could significantly increase expected demand for market units. Still, like Option 3, it could face resistance from some Parties, as it could require the acquisition of more units than they may have expected. Moreover, as with Options 1 and 2, this option would only partially address the concerns with regard to the ambition of cumulative emission reductions with single year targets. In the case of Figure 5, for example, a country with a multi-year target corresponding to the linear reduction path would need to buy more units that the country with the single year target.

As discussed in Section 2, the transfer of units by Parties with single-year pledges, especially units sold in years prior to the target year, can also present issues of comparability and affect cumulative emissions (see Appendix 2). However, for many developing countries, the Cancun pledges represent a first economy-wide target, one that is viewed somewhat differently,

through a different process (International Consultation and Analysis[12]) than the pledges of developed countries (International Assessment and Review). These same developing countries are the major suppliers of international offsets (CERs) through an internationally negotiated market instrument (CDM), and may expect to continue supplying these credits for some time to come. On the other hand, for developed countries, economy-wide targets are not new, and they are not major suppliers of units, with some notable exceptions (e.g. Russia and Ukraine).

## 4. DISCUSSION AND IMPLICATIONS

Discontinuous, single-year targets raise concerns regarding both ambition and comparability with other targets. Single-year targets involve greater uncertainty with regard to their emissions pathway and hence their implications on cumulative GHG emissions. The use of units to meet a single-year target or the issuance of units in years prior to the single-target year could reduce the cumulative mitigation outcome compared with both single-year targets without using units, and multi-year targets (with or without using units).

Single-year targets also pose greater risks for the countries in meeting their target, as the emissions in one particular year can depend on climatic conditions, trade and other varying parameters. Finally, single-year targets limit the possibilities to efficiently use domestic carbon market instruments, such as emissions trading schemes.

Continuous multi-year targets can help address these issues: they provide greater comparability of targets; they provide greater certainty about cumulative global emissions; they allow an assessment of the progress towards meeting targets, and they make targets less vulnerable to changes in climatic or economic conditions; and they are compatible with domestic and international carbon market instruments, which are key policy tools in many countries for achieving mitigation. Indeed, to date, all countries or other geographic entities that have used units, generally through various forms of emissions trading, had multi-year emissions targets.

Single-year targets have nonetheless played an important role. They have provided the vehicle for many developing countries to articulate their first emissions pledge through the Cancun Agreements. In many cases, simply taking on an emissions target has involved a significant political "lift" on the part of national leaders, which should be recognized and supported. At the same time, as a vehicle for achieving of ambitious and effective climate goals, as reflected in cumulative emissions, as well as for supporting the development of emissions trading as means to mitigate climate change, single-year targets are fundamentally flawed. They are best viewed as useful, transitional instruments.

We therefore recommend that a 2015 international climate agreement require that targets be continuous and multi-year. Multi-year targets also support the notion of carbon budgets, which is gaining more widespread currency, as seen in the IPCC *Fifth Assessment Report*, reflecting a greater focus on limiting cumulative emissions rather than, or in addition to, emissions levels for specific years.

In the meantime, the available options need to be further explored for those countries that have made single-year pledges for the year 2020. Making discontinuous, single-year targets work with emissions trading and the transfer units – i.e. preserving the integrity and ambition targets – will therefore require charting new territory, if indeed, it is possible. One, simple

[12] The ICA is applied to the Biennial Update Reports from developing countries and not applied directly to their targets/pledges.

approach to address these shortcomings would be to disallow the use of units to meet single-year pledges for 2020, unless such targets are converted to multi-year targets. This approach could facilitate the use of carbon market instruments to achieve mitigation, such as domestic or regional ETS. It may also encourage countries to convert their single-year targets into multi-year targets, which would enable them to use units towards meeting their targets. From an accounting perspective, this option is the most robust among the ones considered.

Another option discussed in this paper that deserves further consideration is to translate only that part of a single-year target that is attained by unit use into a multi-year target (Option 4 above). This approach preserves the possibility of using units to meet a single-year target for those Parties who elect not to adopt a multi-year target. At the same time, this approach enhances comparability among targets, ensures a greater amount of cumulative emission reductions, and reduces the extent to which unit use could reduce target ambition. However, as highlighted above, this approach would not go as far as a multi-year target towards achieving these benefits. In our assessment, the other options discussed here, i.e. the limitation of unit use to units with the same vintage and the placing of limits on the amount of units used, are either not practicable or of limited effectiveness at addressing the concerns raised by single-year targets.

The issues and options for the sale or other transfer of units issued in pre-target years need to be further explored. The use of units from pre-target years to attain 2020 or post-2020 pledges could significantly lower the ambition of 2020 targets. The consequences need to be further explored, in terms of the magnitude that the cumulative ambition of 2020 targets could be lowered. On other hand, developing countries have had clear expectations that CERs can continue to be issued and sold pre-2020. A solution to this issue would need to take the expectations from developing countries into account but also ensure that the 2020 gap does not widen significantly due to the use of pre-target year units.

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## APPENDIX 1: COUNTRY TARGETS BY PLEDGE TYPE

| | Relative to historic base year | | | Relative to BAU emissions in target | | Not related to BAU | |
|---|---|---|---|---|---|---|---|
| **Reduction target** | **Country** | **Reduction target by 2020** | **Historic base year** | **Country** | **Reduction target by 2020 from 2020 BAU** | **Country** | **Reduction target** |
| **Absolute reductions, multi-year targets** | **Type 1:** | | | No such multi-year pledges have been made | | No such multi-year pledges have been made | |
| | Australia | 5% | 2000 | | | | |
| | Belarus | 8% | 1990 | | | | |
| | Croatia | 5% | 1990 | | | | |
| | EU27 | 20% | 1990 | | | | |
| | Iceland | 15% | 1990 | | | | |
| | Kazakhstan | 15% | 1990 | | | | |
| | Monaco | 30% | 1990 | | | | |
| | Norway | 30% | 1990 | | | | |
| | Switzerland | 20% | 1990 | | | | |
| | Ukraine | 20% | 1990 | | | | |
| | **Share of global $CO_2$ emissions (in 2010): 14%** | | | | | | |
| **Absolute reductions, single-year targets** | **Type 2, A1 countries:** | | | **Type 3:** | | **Type 4:** | |
| | Canada | 17% | 2005 | Brazil | 36.1% to 38.9% | Costa Rica | Carbon neutrality by 2021 |
| | Japan | 25% | 1990 | Chile | 20% | Maldives | Carbon neutrality by 2020 |
| | New Zealand | 10% | 1990 | Indonesia | 26% | Papua New Guinea | Carbon neutrality by 2050 |
| | Russia | 15% | 1990 | Israel | 20% | **Share of global $CO_2$ emissions (in 2010): <1%** | |
| | USA | 17% | 2005 | Kyrgyzstan | 20% | | |
| | **Share of global $CO_2$ emissions (in 2010): 24%** | | | Mexico | 30% | | |
| | **Type 2, NA1 countries:** | | | Papua New Guinea | 50% by 2030 | | |
| | Antigua and Barbuda | 25% | 1990 | Singapore | 16% | | |
| | Marshall Islands | 40% | 2009 | South Africa | 34% | | |
| | Moldova | 25% | 1990 | South Korea | 30% | | |
| | Montenegro | 20% | 1990 | **Share of global $CO_2$ emissions (in 2010): 11%** | | | |
| | **Share of global $CO_2$ emissions (in 2010): <1%** | | | | | | |

<table>
<tr><th></th><th colspan="3">Relative to historic base year</th><th colspan="2">Relative to BAU emissions in target</th><th colspan="2">Not related to BAU</th></tr>
<tr><th>Reduction target</th><th>Country</th><th>Reduction target by 2020</th><th>Historic base year</th><th>Country</th><th>Reduction target by 2020 from 2020 BAU</th><th>Country</th><th>Reduction target</th></tr>
<tr><td rowspan="5">Intensity-based reduction</td><td colspan="3">Type 5:</td><td rowspan="5" colspan="2">Countries could also in theory propose an intensity based reduction against a future, projected emissions level in a target year. No such pledges have been made.</td><td rowspan="5" colspan="2">No such pledges have been made</td></tr>
<tr><td>Country</td><td>Intensity-based reduction in 2020</td><td>Historic base year</td></tr>
<tr><td>China</td><td>$CO_2$/GDP by 40-45%</td><td>2005</td></tr>
<tr><td>India</td><td>$CO_2$/GDP by 20-25%</td><td>2005</td></tr>
<tr><td colspan="3">Share of global $CO_2$ emissions (in 2010): 27%</td></tr>
<tr><td>Quantified: policy-, sectoral-, and project-level actions</td><td colspan="6">Type 6:<br>Burkina Faso, Central African Republic, Colombia, Cook Islands, Ethiopia, Gabon, Morocco, Peru<br>Share of global $CO_2$ emissions (in 2010): 1.9%</td></tr>
<tr><td>Non-quantified: Policy-, sectoral-, and project-level actions</td><td colspan="6">Type 7:<br>Afghanistan, Algeria, Argentina, Armenia, Benin, Bhutan, Botswana, Cambodia, Cameroon, Chad, Congo, Côte d'Ivoire, Dominica, Egypt, Eritrea, Gambia, Georgia, Ghana, Guinea, Jordan, Macedonia, Madagascar, Malawi, Mauritania, Mauritius, Mongolia, San Marino, Sierra Leone, Swaziland, Tajikistan, Togo, Tunisia<br>Share of global $CO_2$ emissions (in 2010): 6%</td></tr>
<tr><td>No pledge</td><td colspan="6">Type 8:<br>Bangladesh, Bolivia, Cuba, Ecuador, Iraq, Iran, Kenya, Kuwait, Lao, Libya, Malaysia, Mali, Myanmar, Nigeria, North Korea, Oman, Pakistan, Philippines, Qatar, Saudi Arabia, Serbia and Montenegro, Sudan, Syria, Thailand, Trinidad and Tobago, Turkey, Turkmenistan, Uganda, United Arab Emirates, Tanzania, Uzbekistan, Venezuela, Vietnam, Zambia<br>Share of global $CO_2$ emissions (in 2010): 14%</td></tr>
</table>

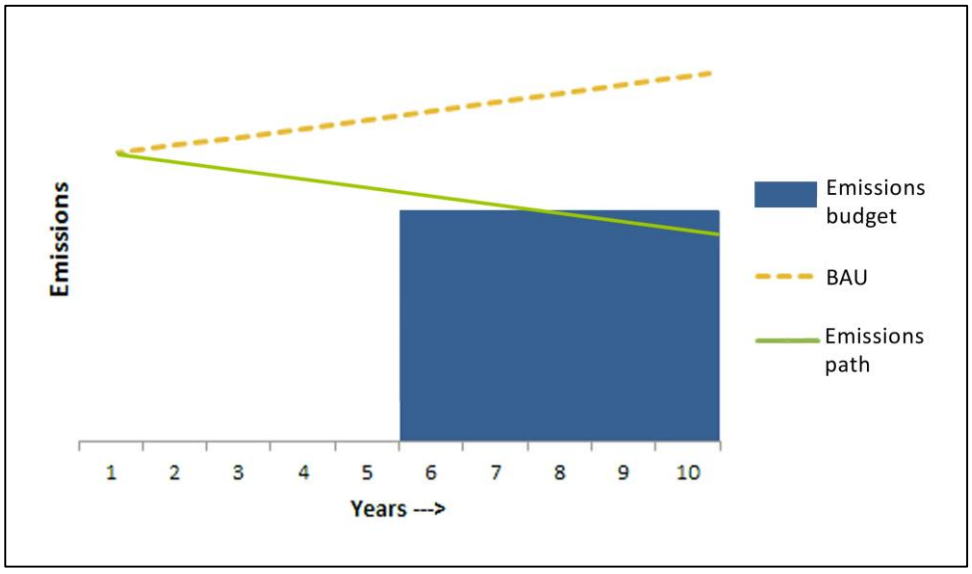
## APPENDIX 2: CAN ISSUING UNITS IN PRE-TARGET YEARS REDUCE CUMULATIVE MITIGATION EFFORTS?

At COP15 in Copenhagen and COP16 in Cancun, many countries, for the first time, made mitigation pledges under the UNFCCC, for the year 2020. These first steps could lead to further pledges or targets under a post-2020 climate regime. Many of these countries currently participate in mechanisms, principally the CDM, where units are issued for emission reductions and sold internationally. Recently, at COP19 in Warsaw, Brazil proposed that units issued in the period up to 2020 be applicable towards meeting pledges or targets in a post-2020 climate regime. In addition, units issued for reductions in pre-target years are sold internationally and used by other countries to meet UNFCCC pledges and Kyoto Protocol targets, such as the use of CERs in the EU ETS. This raises the question: What is the impact of using units issued for pre-target years on cumulative global mitigation efforts, assuming that all units issued represent real, measurable, additional, verified and permanent emission reductions?

### How might a country achieve its target without issuing units in pre-target years?

Figure 6 below presents a simple illustrative pathway for a country that does not have a target for the first five years and has a five-year target period for the second five years. In the figure, we assume that BAU emissions would increase over time (yellow broken line). The country reduces its emissions in pre-target years in a linear reduction path to meet the target (green line). It is important to note that the country may also achieve the target through different paths which result in higher or lower cumulative GHG emissions (see Section 2 of this paper). However, in our example we assume that the country would follow a linear reduction path. The conclusions from this analysis hold also for different emission reduction paths.

**Figure 6: Emissions pathway for a country with no target in years 1-5 and a target in years 6-10**

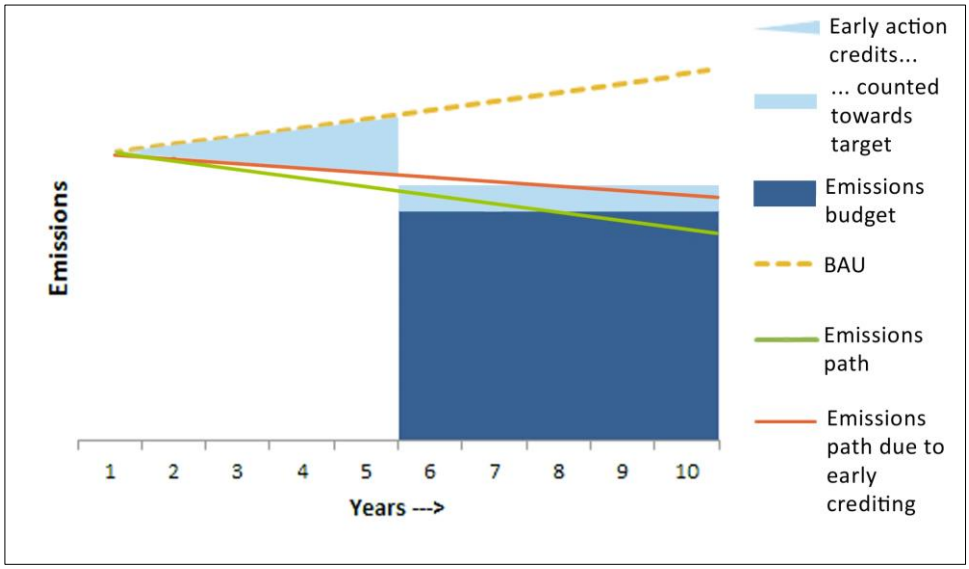



### Achievement of pre-target year reductions through units

We now consider the situation where the country would achieve all pre-target year reductions through the issuance and transfer of units, such as CERs (see Figure 7). If these units are used to meet pledges (either by the same country in future target years or by other countries in the same or future years), the overall cumulative emissions can be higher compared with the situation where no units are issued in pre-target years. To illustrate this, Figure 7 shows the

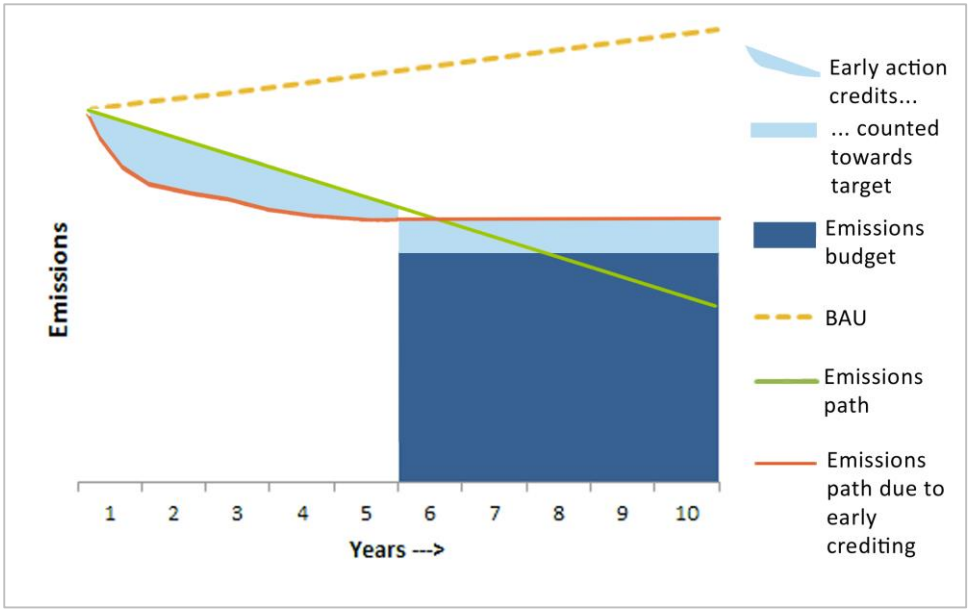
situation where the same country uses the units issued for reductions in pre-target years, to meet its pledge within the targets years. All pre-target year units are used in the five-year target period, i.e. the number of units issued in pre-target years (light blue triangle in the first five years) corresponds to the number of units used in the five-year target period (light blue square in the second five years). This allows the country to have higher cumulative emissions over the 10-year period (red line) compared with the situation where the country does not issue and use units from pre-target years (green line). The same conclusion holds if the units issued in pre-target years are sold to other countries which use them to attain pledges.

**Figure 7: Lower total cumulative emission reductions because of early crediting**




However, the issuance and use of units in pre-target years does not necessarily lead to higher cumulative emissions. If the country issues units to accelerate its emission reductions path below the path it would take without issuing units (green line), then cumulative emissions are not affected over the 10-year period. This is illustrated in Figure 8 below.

**Figure 8: Same cumulative emission reductions with early crediting**



In this case, the country reduces its emissions to a larger extent in pre-target years than it would without issuing units (green line). The units issued in pre-target years (light blue area in the first five years) are used to meet the pledge in the five-year target period (light blue square in the second five years). In this case, the issuance and use of units impacts the shape of the emission reduction path – emissions are lower in the first five years and higher in the second five years – but cumulative emissions of both reduction paths (the green and the red line) are equal.

In conclusion, the issuance and use of units from pre-target years can but does not necessarily have to increase cumulative emissions. The impact on cumulative emissions depends on whether the units are issued to achieve the emission reduction path that would be followed without unit issuance to attain the future pledge or whether they increase pre-target year reduction below this reduction path.

In practice it appears difficult to distinguish these cases. First off, countries can follow different emission reduction paths, and assumptions would need to be made on what reduction path would likely occur without the issuance of units. And second, to date, internationally accepted units are mostly issued for reductions from individual projects or programs of activities. However, it is not possible to assess for individual reduction measures whether they are reductions below the reduction path without unit issuance (i.e. reductions between the yellow and the green line) or reductions that go beyond the domestic action the country would take without the issuance of units (i.e. reductions below the green line).

### Conclusions and recommendations

The issuance and use of units for reductions in pre-target years could lead to higher cumulative GHG emissions. Units issued from countries with 2020 pledges for pre-2020 reductions are recognized under the Kyoto Protocol and may be used to attain 2020 or post-2020 pledges under UNFCCC. However, an extensive use of such units could undermine global efforts to reduce GHG emissions. This is important when assessing the ambition of 2020 and post-2020 mitigation pledges and assessing the gap to meet the 2°C target. This also questions to what extent units issued for reductions up to 2019 should be bankable into 2020 and thereafter.

However, context is also important. In Copenhagen and Cancun, many countries have, for the first time, made mitigation pledges under UNFCCC. Developing countries and emerging economies may have made such pledges in the expectation that they can use international mechanisms, including the issuance and transfer of units, in pre-2020 years to attain such pledges. In this regard, international support should continue to be provided to help these countries reducing their emissions. When considering the means for such support, policy-makers should be aware of the possible consequences on cumulative emissions of using pre-2020 units to attain pledges in 2020 or post-2020. Similarly, it is important to be aware that an enhancement of early mitigation action through the recognition of pre-2020 units in a post-2020 climate regime could ultimately lead to higher cumulative GHG emissions. Finally, in this context it is also important that any voluntary cancellations of units imply that these units cannot be recognized in the future towards attaining mitigation pledges.

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