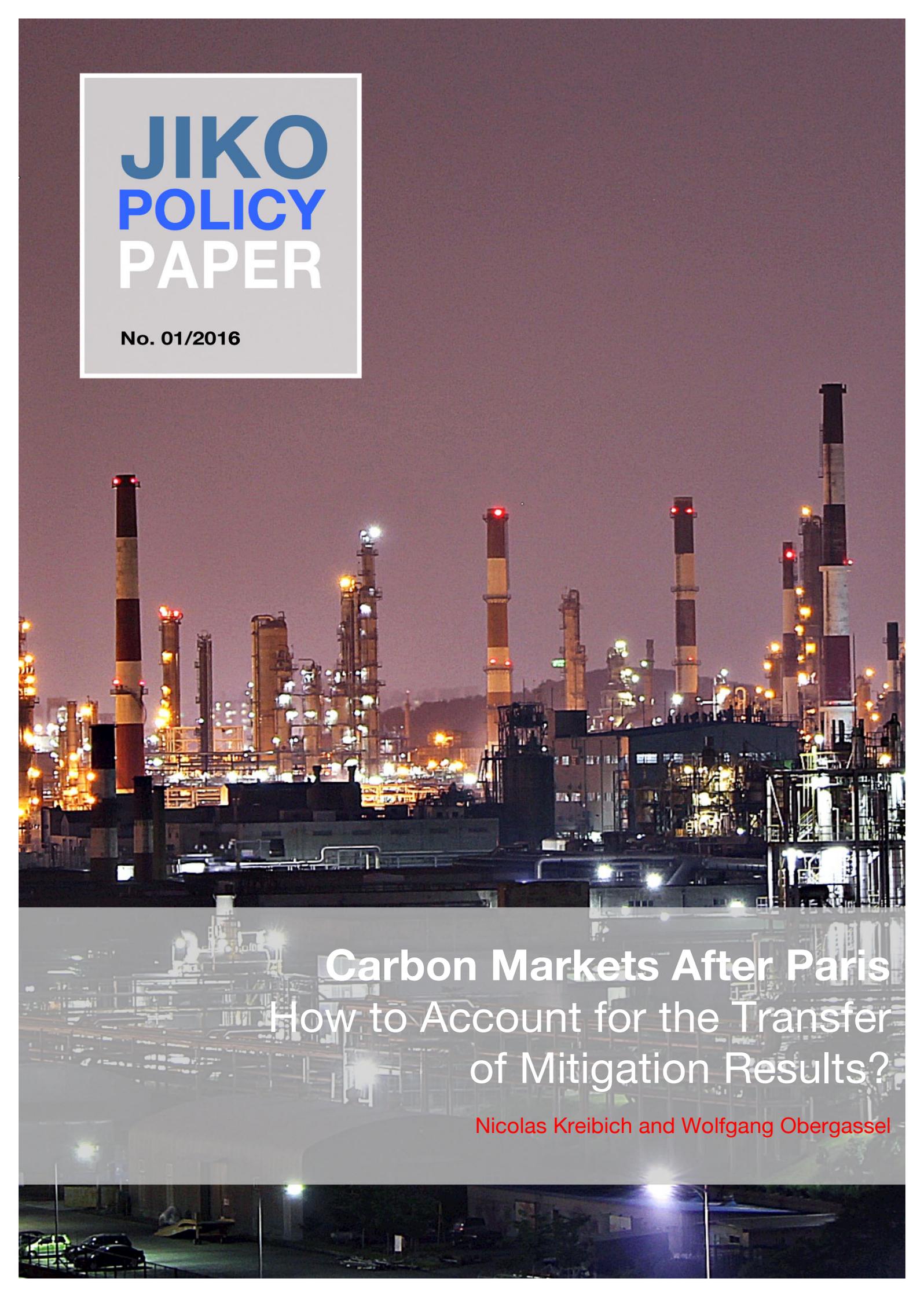


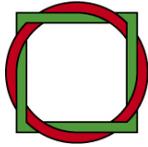
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Carbon Markets After Paris How to Account for the Transfer of Mitigation Results?

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Wuppertal Institute
for Climate, Environment
and Energy

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Carbon Markets after Paris

How to Account for the Transfer of Mitigation Results?

Nicolas Kreibich and Wolfgang Obergassel

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Summary

The Paris Agreement adopted at COP 21 in December 2015 is going to shape international climate policy for the next decades. The Agreement differs in many ways from the Kyoto Protocol (KP): Under this new agreement “contributions” will be adopted by all Parties, not only by so called developed countries as under the KP. This global participation, however, comes at the cost of increasing complexity: Instead of a uniform formula the Paris Agreement allows Parties to autonomously define their nationally determined contributions (NDCs), resulting in a large diversity with significant challenges for emissions accounting.

These challenges are further increased when Parties with different types of contributions participate in the transfer of emission units. Parties with very different types of INDCs have expressed their willingness to do so, mainly under future market-based mechanisms. This raises the following questions: How should these transfers be accounted for and what requirements (opt-In provisions) should be established to allow Parties to participate in the transfer of emission units in order to ensure environmental integrity?

This paper analyses these questions by first looking at GHG accounting frameworks more generally, their functions and elements. The functioning of such a system is then illustrated by presenting the provisions of the Kyoto Protocol's accounting framework. From there, the authors briefly present the diversity of the INDCs that have been submitted so far. Based on the overview of INDCs, different types of contributions are analysed regarding their compatibility with unit transfer and potential risk to environmental integrity in form of double counting. There are different forms of dou-

ble counting, two of which are particularly relevant in the context of accounting:

- **Double claiming:** emission reduction is used for GHG pledge attainment by the exporting and by the importing Party;
- **Double coverage:** emission reduction is used to meet a GHG target in one country and a non-GHG contribution in another.

The findings indicate that different types of contributions are associated with different levels of risks for these forms of double counting:

Participation of Parties whose contribution is expressed as a **continuous multi-year GHG target** is fairly straightforward since they are compatible with a carbon budget approach that can be used to directly account for the units transferred. Parties should however be required to fully account for net unit flows of units in order to reduce the risk of double claiming and increase ex-ante certainty.

Participation of Parties with **single-year targets**, in contrast, is much more problematic: Both the import (use) and the export of units could undermine the environmental integrity of the entire system. Hence, Parties with single-year targets willing to fully participate in emissions trading should be required to convert their contribution into a continuous multi-year target. Without such conversion, the export and particularly the use of units would need to be tied to very strict preconditions, significantly limiting the practicability of these transfers.

Contributions expressed in terms of **non-GHG targets as well as multiple targets** are associated with the risk of double coverage. While the import and use of emission units by Parties with such targets is rather unlikely since this would

require a conversion of the carbon unit into the metric of the respective non-GHG target, the export of units could be envisaged by several countries. The risk of double coverage could be addressed by limiting the export of units to credits outside the scope of the contribution. If units (credits or allowances) from within the scope of the contribution are also to be exported, all units transferred should be fully accounted for the different types of non-GHG contributions. However, there might be types of non-GHG contributions where this can be challenging.

Parties with **multiple contributions that combine a GHG target with non-GHG contributions** could import GHG units and account them for the GHG target. Exported units from within the scope of the contribution, however, would have to be fully accounted against the GHG targets as well as non-GHG contributions concerned.

In general terms, contributions expressed as **intensity targets** are less compatible with allowance trading approaches. Since the allocation of allowances would depend on dynamic factors, projections on the evolution of these factors would be needed ex-ante while the actual amount of allowances would then have to be adjusted ex-post. Crediting of activities that contribute to emission reductions below the intensity target might be possible.

In addition to these opt-in provisions for Parties willing to participate in unit transfers and regardless of the type of contribution in question, the scope of the contribution must be properly defined. In addition, there are some **general possibilities to minimize, reduce or avoid different forms of double counting**: If the primary goal is to ensure environmental integrity ex-post, all Parties involved would at least have to report on net unit transfers. This option would, however, not address the risk of double claiming ex-ante. To avoid double claiming and increase ex-ante certainty, Parties should be re-

quired to fully account for exported units generated from mitigation activities inside the scope of their contribution. Transfers of units generated outside the scope of the contributions must be reported and should be subject to international oversight. More generally, international oversight might be required for all types of unit transfers if the additionality of the underlying mitigation activities is not ensured by sufficient ambition of Parties' contributions. Hence, ambitious mitigation contributions are not only pivotal for speeding up climate change action and reducing associated costs but they can also make carbon markets more efficient.

1 Introduction

With the adoption of the Paris Agreement the global community breaks new ground in international climate policy: for the first time, all countries of the world are to undertake mitigation actions. This new paradigm will also fundamentally change the functioning of international market mechanisms.

The carbon market has so far been dominated by the Kyoto Protocol, which is essentially an international cap-and-trade system. Industrialised countries adopt absolute economy-wide emission targets and are issued emission units accordingly. At the end of the commitment period, they must present an internationally recognised emission unit for each tonne of GHGs they emitted. In the interim, they are able to trade emission units with each other. All transfers are deducted from the selling country's pool of units and added to the buying country's pool, while the overall number of units stays the same ("capped environment"). Industrialised countries may also source units from CDM projects in developing countries. As developing countries do not have Kyoto commitments ("uncapped environment"), the emission credits issued to CDM projects effectively enlarge the pool of units available to industrialised countries.

The Paris Agreement differs from the Kyoto Protocol in two fundamental ways. First, there will no longer be a clear distinction at national level between "capped" and "uncapped" environment. Second, countries' contributions will not have a uniform metric as under Kyoto (absolute emissions during a commitment period). Instead, the content of contributions was left to countries to determine on their own. Based on the INDCs so far submitted, countries will have absolute emission targets, targets to reduce

emission intensity compared to GDP, and targets to reduce emissions compared to business-as-usual (BAU). Some contributions are not at all based on greenhouse gas (GHG) emissions but consist of targets for renewable energy, energy efficiency, or of individual policies and measures. Contributions may also have different timeframes, for example, 2025 or 2030. Hence, the structure of this new regime is very different from the Kyoto system.

Against this backdrop, this paper asks what accounting framework is needed to ensure environmental integrity is preserved when transferring units in a post-2020 regime. We will address this question by first looking at accounting frameworks more generally: What are accounting frameworks and what components and functions do they have? To illustrate this, the functioning of the accounting framework of the Kyoto Protocol will be briefly presented to then jump into the much more complex post-2020 accounting world by looking at the Intended Nationally Determined Contributions (INDCs) that have so far been submitted to the UNFCCC. On that basis, the paper explores how unit transfer could be accounted for in the post-2020 era and how threats to environmental integrity, mainly through double counting of units, might be addressed.

2 Accounting Basics

2.1 What is an GHG accounting framework?

Accounting is often associated with tracking the effort of Parties towards their climate change mitigation contributions. However, the functioning of an accounting framework does not start with tracking the individual progress, nor does it stop there: It is a set of rules and procedures that first enables the understanding of Parties' contributions and their expected impact on global GHG levels while then allowing for tracking the Parties' efforts towards meeting their contributions in the target period. On that basis, estimates on the progress towards meeting the agreed global goal of limiting warming to below 2° Celsius can be made. Hence, an accounting framework is a tool for both, ex-ante estimation *and* ex-post tracking. Figure 1 illustrates the key elements of a GHG accounting

framework related to both of these aspects.

Parties' mitigation **contributions** are at the centre of the ex-ante emissions accounting framework. Contributions can have very different forms, not only in terms of the individual level of GHG reductions they try to achieve. In order to calculate allowable emissions, information on several aspects is needed (Hood, Briner, and Rocha 2014; Levin et al. 2015; Prag, Hood, and Barata 2013; Schneider, Kollmuss, and Lazarus 2014).

- The **timeframe of the contribution** is the period in which the contribution is to be achieved. It can be a single year or multiple years (another possibility is peak and decline).
- The **sectoral scope** defines the sectors covered.
- The **coverage of GHGs** defines which

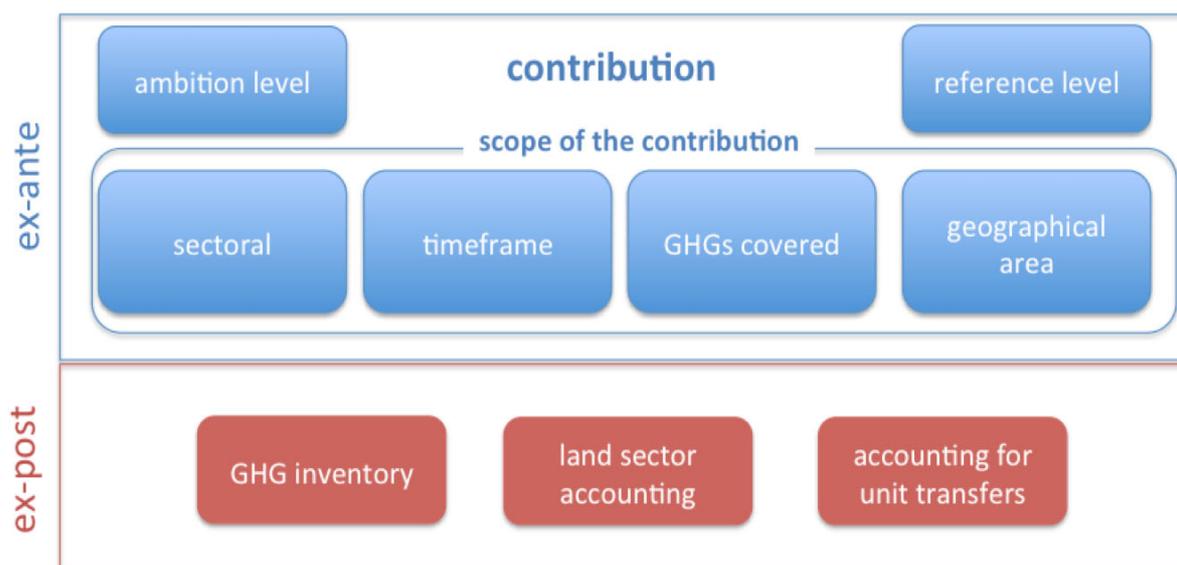


Figure 1: Elements of an accounting framework (own illustration based on: Hood / Briner / Rocha 2014; Levin et al. 2015; Prag / Hood / Barata 2013; Schneider / Kollmuss / Lazarus 2014)

greenhouse gases are covered by the contribution.

- The **geographic area** defines the area covered.
- The **level of the contribution** is the quantity of emissions and removals the Party is to achieve. The value can be expressed as a single value or a range of values.
- **Reference level** relates to the quantity of emissions against which the contribution is tracked. The choice of the reference level depends on the contribution type. It can be base year emissions, base year emissions intensity or base-line scenario emissions.

The first four categories define the scope of the Party's contribution (Schneider, Kollmuss, and Lazarus 2014), while the latter two establish its level of ambition. To allow for ex-post tracking, the accounting framework includes three additional elements:

- **GHG inventories** are a key element of the ex-post accounting framework. Inventories are currently reported to the UNFCCC following specific reporting requirements (national communications + biennial reports for Annex I and biennial update reports for non-Annex I Parties). A post-2020 accounting system could include common metrics and inventory methodologies (i.e. common methodologies for national inventories and common global warming potential values). The application of these and other accounting aspects would need to be complemented by respective guidelines for measurement, reporting and verification (MRV). Accounting and MRV are distinct but closely related issues. While MRV refers to the provisions for gathering, sharing and reviewing of

information, accounting establishes how this data is used to assess progress towards mitigation objectives (Hood, Briner, and Rocha 2014).

- Another element of the accounting framework relate to the principles for **land sector accounting**, which define how emissions from agriculture and forestry are accounted for.
- The third element is the principles for **accounting for internationally transferable emissions** units (Levin et al. 2015).

It is the latter aspect that we will focus on in this paper. Hence, in line with the afore mentioned functions of an accounting framework, we will look at those accounting elements that enhance ex-ante understanding of expected transfer of GHG units for the post-2020 period and allow to track actual transfer of GHG units after 2020 ex-post.

2.2 Kyoto Accounting

2.2.1 The Definition of Kyoto Commitments: The Assigned Amount

Under the Kyoto Protocol, the above-listed elements to defining commitments are regulated as follows.

- **Commitment timeframe:** Under Art. 3.1 of the Kyoto Protocol, commitments cover multi-year time periods. The time period that commitments refer to is uniform for all Parties. The first commitment period covered the years 2008-2012, the second commitment period covers 2013-2020.
- **Sectoral scope:** Kyoto commitments are economy-wide. The sectors to be covered are listed in Annex A to the Protocol. The sectors are: energy, waste, agri-

culture, and solvent and other product use (land use, land-use change and forestry (LULUCF) is accounted for separately).

- Coverage of GHGs: The GHGs covered under the KP are listed in Annex A to the Protocol: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF₆).
- Geographical area: The Kyoto commitments cover total national emissions.
- Commitment level: A country's commitment under the Kyoto Protocol is to ensure that its total aggregate GHG emissions during the commitment period do not exceed a specific absolute amount. This amount is referred to as "assigned amount". That is, the assigned amount is the total absolute volume of GHGs that a country is permitted to emit during the commitment period. Individual units are referred to as assigned amount units (AAUs).
- Reference level: The assigned amount is calculated on the basis of the quantified emission limitation and reduction commitments inscribed in Annex B to the Protocol. Countries with Kyoto commitments are therefore often referred to as "Annex B Parties". The commitments in Annex B are expressed in percentages of countries' emissions in the a specific base year or period. The default base year is 1990. For example, in the first commitment period the countries of the then European Community committed to reduce their emissions to 92% of 1990 levels. Thus, the assigned amount of these countries for the first commitment period was calculated as 5x 92% of 1990 emissions. Parties with economies in transition – countries from the former communist block – were able to choose a different base year or period.

2.2.2 Changing the Assigned Amount: Emission Trading and other Flexibilities

The Kyoto Protocol does not rigidly cap the level of emissions. Countries' assigned amounts are not fixed but may be increased or decreased. Annex B Parties have the following options at their disposal (Sterk and Arens 2010):

- They may generate and trade emission reduction units (ERU) among each other under the joint implementation (JI) mechanism according to Art. 6 of the Protocol. The ERUs are deducted from the assigned amount of the host country and added to the assigned amount of the buyer country.
- They may purchase certified emission reductions (CERs) from projects implemented in developing countries under the Clean Development Mechanism (CDM) according to Art. 12 of the Protocol.
- They may generate removal Units (RMUs) for sinks resulting from human-induced land use, land-use change and forestry (LULUCF) activities on their territories. Under Article 3.3 and 3.4 of the Kyoto Protocol, Annex B Parties may count a limited number of sink activities performed on their territory against their greenhouse gas emissions.
- They may trade all of the above units among each other under Art. 17 of the Protocol as long as each retains a minimum number of units, the so-called commitment period reserve (CPR). The CPR is equal to either 90% of the Party's assigned amount or five times its emissions in the most recent reporting year of the commitment period, whichever is lower (UNFCCC 2006a, Annex, para 6).

To manage and track unit transfers, Annex B Parties are required to maintain national registries according to common standards (UNFCCC

2006b, Annex, Paras 17ff). Each national registry contains at least one holding account for the respective Party, holding accounts for each legal entity authorised by the Party to participate in the mechanisms, cancellation accounts as well as a retirement account for each commitment period (UNFCCC 2006b, Annex, Para 21).

A central International Transaction Log (ITL) manages and oversees the transfers of units between countries and each national registry must be in agreement with the ITL (UNFCCC 2006b, Annex, Paras 38ff).

Furthermore, Annex B Parties need to report annually on the movements, additions and subtraction of units (UNFCCC 2006c).

2.2.3 Emission Accounting

Annex B Parties are required to establish and maintain a “national system” to manage their GHG data according to Art. 5 of the Protocol. They are furthermore required to submit annual national greenhouse gas inventories based on this national system Art. 7 of the Protocol. The inventories are subjected to a technical expert review co-ordinated by the UNFCCC Secretariat according to Art. 8 of the Protocol and ultimately entered into a global compilation and accounting database (CAD) (UNFCCC 2006b, Annex, paras 50ff).

2.2.4 Reporting

Annex B Parties are required to submit a series of reports to allow for proper accounting of emissions and Kyoto units:

- An initial report, submitted once before the start of each commitment period, which needs to include the country's yearly GHG data back to its base year or period, a calculation of its initial assigned amount and commitment period reserve, and its decisions to what extent it intends to use LULUCF activities

under Art. 3.3 and 3.4. It also needs to include a description of the national system and of the registry (UNFCCC 2006b, Annex, para 6ff; UNFCCC Secretariat 2008).

- Annual reports containing information on the GHG inventory, LULUCF, changes to the assigned amount, and changes to the national system, and to the registry (UNFCCC 2006b, Annex, paras 17ff).
- Periodic “national communications” according to Art. 12 of the Convention and Art. 7 of the Protocol containing information on national circumstances; vulnerability to climate impacts; the national system and registry; policies and measures; financial resources and transfer of technology; education, training and public awareness (UNFCCC 2006d).
- A true-up period report after the end of the commitment period. The true-up period is a period of 100 days after the expert reviews of the GHG inventories covering the commitment period have been completed. The true-up period report has the same contents as the annual reports, and thus provides final information on the assigned amount (UNFCCC 2006b, para 3 and Annex para 49; UNFCCC 2006d, Annex, para 20; UNFCCC Secretariat 2008).

2.2.5 Compliance Assessment

After the end of the commitment period, Parties' assigned amounts are adjusted to the transfers they made. Units acquired from another Party are added to the acquiring Party's assigned amount while units transferred to another Party are subtracted from the transferring Party's assigned amount. To comply with their Kyoto commitments, Annex B Parties transfer units to the retirement account within their respective national registries. To assess whether a

Party is in compliance with its Kyoto commitment, the number of units in the retirement account is compared to the Party's actual emissions during the commitment period, as accounted for in its annual inventories.

If a Party has more units than its needs to cover all of its emissions, it can transfer any AAUs it has to the following commitment period. It can also transfer CERs and ERUs up to 2.5% of its assigned amount respectively (UNFCCC 2006b, Annex, paras 15f).

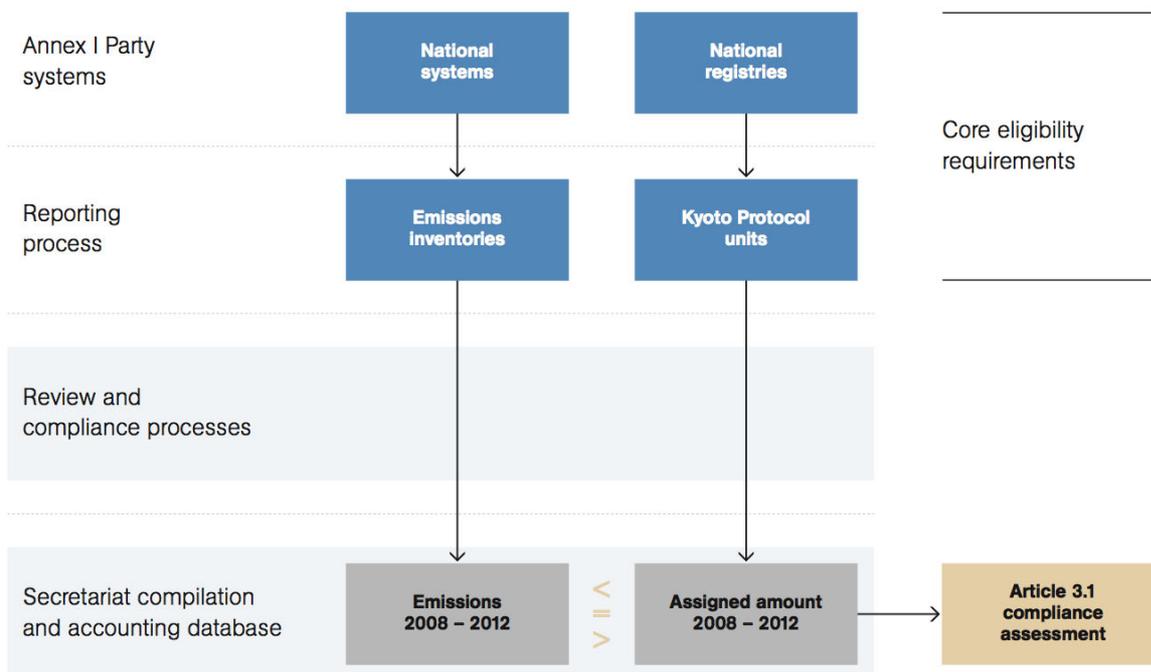


Figure 2: Overview of Kyoto Protocol Accounting and Compliance (Source: UNFCCC Secretariat 2008, 21)

3 Broad Variety of INDC Types

Having established the functioning of the accounting framework of the Kyoto Protocol, this section will jump into the post-2020 accounting world, which will presumably be much more complex due to the lack of a uniform metric and a mandatory guidance on how Parties are to design their national contributions. In the following, we will therefore illustrate the diversity resulting from the open structure of the post-2020 process by surveying and categorising the INDCs that have been submitted to the UNFCCC. The INDCs effectively define the task that will need to be achieved by the new agreement's accounting framework.

At the time of writing, 160 INDCs had been submitted, representing 187 countries.¹ As noted in the introduction, the INDCs do not follow a uniform format but display a large variety of types of contributions²:

- 105 INDCs are GHG emission targets,
- 20 are combinations of GHG targets and non-GHG targets; the non-GHG targets are typically afforestation/reforestation, renewable energy and energy efficiency targets;
- 22 are actions only; these are policies and measures that countries intend to take;

- 8 are combinations of non-GHG targets and actions, with the actions typically related to the targets;
- 2 are non-GHG targets only, both aiming to transition to close to 100% renewable energy in the electricity sector.

Of the 105 GHG emission targets, 33 INDCs are absolute reductions compared to a base year.

The use of base years varies:

- 15 use 1990 as base year.
- 1 uses 1994.
- 1 uses 2000.
- 8 use 2005 as base year.
- 1 uses 2006;
- 6 use 2010.
- 1 uses 2014.

76 INDCs are reductions compared to a baseline scenario.

Five INDCs are fixed level targets, stipulating a fixed amount of emissions in the target year or target period.

Seven INDCs are emission intensity targets, of which two have combined intensity targets with peak year targets.

¹ Submitted INDCs are available online at <http://www4.unfccc.int/submissions/indc/Submission%20Pages/submissions.aspx>

² The World Resources Institute has provided a synthesis of INDCs (WRI 2016). Analysis is based on WRI data.

4 Accounting for unit transfer post-2020

The fact that there is no mandatory guidance on how national contributions are to be designed poses significant challenges for the accounting framework, in particular if it is to allow for the transfer of international units. Units are typically allowances issued under cap-and-trade mechanisms, such as the Kyoto Protocol's AAs, or credits issued under a crediting scheme for emission reductions achieved against a crediting baseline, such as the CERs and ERUs issued under the Kyoto Protocol's project-based mechanisms. However, the transfer of mitigation outcomes must not necessarily be related to market-based mechanisms but can also occur via non-market based approaches. For the sake of simplicity, however, we will in the following use the term units to refer to the transfer of mitigation outcomes from both, market-based and non-market based approaches. It must be noted that GHG emission units are only relevant to UNFCCC accounting if they are to be transferred from outside the boundary of a Party's contribution and counted directly towards the achievement of that contribution. Transfers within the boundaries of a Party's contribution are not relevant to UNFCCC accounting.

The role of the UNFCCC might however not be limited to accounting but the international organisation could also oversee activities that generate units to be used for meeting Parties' contributions. In some cases, such international oversight will be indispensable to safeguard the environmental integrity of the system. For instance, if units are generated outside the scope of Parties' contributions, there would be no in-

centive for Parties to ensure the additionality of the underlying activities, since exported units would not be counted against their contribution. Therefore, the additionality of the activities would have to be determined by an international body. More generally, however, international oversight might also be required for units generated within the scope of Parties' contribution if the additionality of the underlying mitigation activities is not ensured by a high ambition of Parties' contributions: If a contribution is built on an "inflated baseline" and the Party has been provided with a surplus of emission allowances, the Party could be prone to use part of its allowances to allow for a non-additional activity to generate credits, thus creating "hot air". This risk could be significantly reduced with international oversight. However, as the focus of this analysis is on accounting, details on how international oversight should be designed are beyond the scope of this paper.

4.1 What kind of units might be traded and how could transfers look like post-2020?

There are **three possible transfers** (Hood, Briner, and Rocha 2014):

1. International transfer from one country to another;
2. Transfer of domestic units from a sector not covered by the contribution (e.g.

agriculture) to a sector that is covered by the contribution (e.g. energy);

3. Transfer from one time period to another.

The units transferred can stem from domestic or from international systems and can be transferred domestically or internationally (Prag, Hood, and Barata 2013, 21).

The best known examples are the transfer of units issued by international bodies, namely the UNFCCC under the Kyoto Protocol (see above). There is less, however growing, experience with the transfer of units issued by domestic bodies. These domestic allowances and credits might be transferred at the international as well as at the domestic level. An example for domestic credits transferred internationally are credits from Japan's Joint Crediting Mechanism (JCM), while the linkage between Quebec's and California's ETSs allows for the international transfer of domestic allowances. With its possibility to use offset credits from (urban) forestry projects and other types of projects, California also exemplifies the use domestic offset credits that are transferred domestically.

4.2 Double counting as a key risk associated with unit transfers

One of the key issues associated with the transfer of units is the risk of double counting of units. Following Schneider et al. (2014), we define double counting as follows: "Double counting occurs when a single GHG emission reduction or removal, achieved through a mechanism issuing units, is counted more than once towards attaining mitigation pledges or financial pledges for the purpose of mitigating climate change" (Schneider, Kollmuss, and Lazarus 2014). There are several forms of double count-

ing: **Double issuance (1)** refers to the situation where more than one unit is issued for the same emissions reduction. **Double claiming (2)** is when the same emission reduction is accounted twice against mitigation pledges: By the country where the reductions occur and by the country using the unit issued for that reduction. **Double use (3)**, also referred to as double selling, occurs when one unit is used to meet multiple obligations. **Double purpose (4)** refers to the situation where one unit is used for attaining a mitigation pledge but the financial or technology transfer related to that unit are counted towards financial or technology pledges (Schneider, Kollmuss, and Lazarus 2014). **Double coverage (5)** refers to the situation when one emission reduction is used to meet a GHG target in one country and a non-GHG target in another (Hood et al. 2014).

Not all types of double counting are directly related to accounting provisions. Double issuance, for instance, must be addressed through a robust design of the mechanisms involved (Schneider, Kollmuss, and Lazarus 2014), while robust registry systems are important to avoid double selling or retirement of units (Hood, Briner, and Rocha 2014). However, accounting is key to address double claiming while potentially also assisting in addressing double coverage.

Under the Kyoto Protocol, **double claiming** is not possible for Annex I parties with Kyoto targets, since any emission unit transferred is directly deducted from the sellers account to the buyers account via the International Transaction Log (ITL). Under the CDM, however, there is already some form of double claiming: While the emission reduction *units* (CERs) from a CDM project can only be *counted* against the Kyoto target of an Annex I country, the emission reductions resulting from the project can be *claimed* by the host country as part of its reduc-

tion pledge under the Convention (Prag, Hood, and Barata 2013).

4.3 Accounting Options to Address Double Counting

In the following, different approaches of dealing with double counting will be presented. The analysis is limited to approaches that deal with double counting in the context of accounting. Other relevant areas, which are also indispensable for addressing double counting, such as the design of robust governance arrangements and tracking systems, will not be explored further.

There are various possibilities to address the double counting risks described above. The choice depends on the objectives pursued. This is related to the two key functions an accounting system can have, as outlined above: The accounting system can limit itself to providing ex-post certainty on the units used or it can enhance clarity on the expected use of units ex-ante as well as during the timeframe in which the target is to be achieved. In this context, it is key to understand the difference between accounting and reporting. Reporting and accounting are distinct but overlapping issues. While reporting in this context relates to providing information on how units have been issued, transferred and used, the accounting framework establishes rules on how these activities are to be counted towards the achievement of contributions.

In any case, reporting of unit flows should be maintained separately to inventory reporting because – depending on the data and methodologies used – some inventories may not be accurate enough to attribute particular emission reductions to specific interventions. Further, in order to safeguard the environmental integrity of the international system, it is important that

unit flows are reported by both parties involved in the transfer, in the case of market-based transfers buyers and sellers (Prag, Hood, and Barata 2013). In the following we will briefly present different options for dealing with double counting.

4.3.1 Net Unit Flow Reporting

If the primary goal is to **understand the impact resulting from the contributions ex-post**, information on actual net flows of units is needed from all parties involved. Parties would have to report on issuance, retirement, transfers and banking of units. This would ensure that the aggregate global reductions can be accurately calculated ex-post. As highlighted by Hood et al. (2014) this approach does not necessarily mean that the information would be tallied against the individual contributions, since Parties would not be required to **account** for the transfers of units but only to **report** the information on the flows of units. Hence, there still could be double claiming of mitigation by buyers and sellers, leading to significant uncertainty ex ante on the total emission reductions that can be expected (Hood, Briner, and Rocha 2014).

4.3.2 Reporting with Increased Ex-Ante Certainty

a) Estimation of Unit Flows

If **greater certainty on ex-ante estimates of emission reductions** is desired, the requirement to report the transfer of units ex-post must be complemented by introducing additional provisions. In such case, all parties would be required to provide **estimates** of the expected unit flows. This would increase understanding on future flows of units, allowing a better estimate on the aggregate total of inventory emissions, target emissions levels and transfers. However, in the end the actual unit

flows might significantly deviate from these estimates (Hood, Briner, and Rocha 2014).

b) Quantity Limit

To further increase ex-ante certainty, parties could agree on a maximum use of units from jurisdictions that are not willing to account for the transfer of units. This would allow for a better understanding of the aggregate emission reductions ex-ante and reduce (not eliminate) double claiming (Hood, Briner, and Rocha 2014).

4.3.3 Accounting of Units Towards Mitigation Contributions

Finally, parties could agree that use of units is only possible if both Parties do fully account for the transfer of units. This would fully prevent double claiming (Schneider, Kollmuss, and Lazarus 2014). However, a key prerequisite for this approach is to clearly define the **scope of the contribution** as described above, in terms of their temporal, geographic, GHG and sectoral dimensions.

Schneider et al. (2014) draw on double entry book keeping to illustrate three options for accounting of units. This logically differentiates between debit and credit, with debit corresponding to the actual GHG emissions and additional reduction obligations of the country and credit reflecting the country's entitlement to emit GHGs. Schneider et al. (2014) explore three options: (A) accounting for net flows of units, (B) restriction on the issuance of units and (C) restriction on the use of units.

a) Accounting for Net Flows of Units

This is the most straightforward approach for dealing with the international transfer of emission units. It requires selling countries to add the unit sold as a debit while the country using the unit adds it as a credit to its account. Domestic units that fall within the scope of the

contribution and are transferred internationally, such as ETS allowances of linked systems, must also be added as debits, while internationally transferred domestic units generated outside the scope of the contribution must not be accounted but only reported.

b) Restriction on the Issuance of Units

Under this option countries would not be allowed to issue units eligible for UNFCCC accounting if the emission reductions fall within the scope of their contribution. While countries would still be allowed to issue these units in the context of their domestic policies (e.g. ETS) these units cannot be used in the context of UNFCCC accounting.

c) Restriction on the Use of Units

Similarly, this option does only allow the use of units issued for emission reductions generated outside the scope of the contribution to be used for UNFCCC accounting.

As highlighted by Schneider et al. (2014) in order to effectively prevent double claiming all parties would have to agree on the same approach. The main difference between the three approaches 3a) to 3c) relates to the treatment of units issued for domestic emission reductions that fall within the scope of the contribution. Approach 3a) "Accounting for net flows of units" is the only one allowing easy linking of ETS because it reflects the transferred allowances as credits and debits in the UNFCCC contributions. Since it is at the same time the most simple approach of the three, Schneider et al. (2014) suggest to use this approach for post-2020 accounting.

4.4 Diversity of INDCs and Participation in Unit Transfer

In a recent report, Obergassel and Gornik analyse the INDCs submitted by 24 November 2015

regarding the question to what extent they envisage the use of market mechanisms. The analysis shows that of the 147 Parties that have submitted INDCs, 86 are planning or considering the use of international market mechanisms. However, the vast majority of these Parties intend to participate as sellers, while only 13 consider purchasing units. In addition, five Parties intend to use domestic markets, while seven Parties have expressed interest in using both, domestic and international markets (Obergassel and Gornik 2015).

The contributions of these Parties do not only display diverse levels of ambition but they also differ significantly in terms of some of the elements that characterise the contribution (**timeframe, sectoral scope, reference level**). Furthermore, some Parties interested in using international markets (such as Samoa) submitted an INDC defined as a non-GHG target.

Against the backdrop of the large diversity of contributions discussed in section 3, we will in the following look at the challenges associated with the participation of Parties with different kinds of contributions in the international transfer of units. The authors explore different ways of dealing with these challenges in order to identify the opt-in provisions for Parties willing to participate in the transfer of units that should be established. In this context, opt-in provisions relate to specific requirements Parties with a particular type of INDC must fulfil in order to be able to participate in units transfer. These provisions vary depending on the contribution's compatibility with the transfers of emissions units.

4.4.1 Parties With Multi-Year Targets

In terms of accounting, the participation of Parties that have put forward a multi-year contribution with absolute GHG reductions compared to a base year is relatively straightforward thanks to the experiences made under

the Kyoto Protocol. The GHG emission reductions target can be translated into a carbon budget for the entire period covered by the contribution. Such a procedure is explicitly contained in Norway's INDC, who commits to a GHG emissions reduction of 40% by 2030 compared to 1990 levels (Norway 2015). Under this carbon budget approach, exported units can be directly discounted from the carbon budget while those imported are added to the account, thereby maintaining environmental integrity.

As outlined above, there could be a risk to environmental integrity in form of double claiming when two Parties with quantified GHG contributions transfer units between each other and one country accounts for the transferred units while the other only expresses its contribution in the form of information on its inventory emissions, that is, the actual emission reductions (Hood, Briner, and Rocha 2014). With a common accounting framework, however, this risk can be addressed. No further opt-in provisions for Parties with continuous multi-year targets willing to participate in unit transfer are needed.

In addition, Parties that have adopted multi-year targets that are not economy-wide or which do not relate to the entire national geographic area could export credits generated outside the scope of their contribution. Since such exports would not be accounted against the exporting Party's contribution, there is no incentive for the Party to ensure the additionality of the mitigation activity. Therefore, generation of credits from activities outside the scope of the contribution should be subject to international oversight.

	Export	Import (Use)
Credits	<p>Yes:</p> <p>Exported units generated from activities within the scope of the contribution must be fully accounted for.</p> <p>Exported units from activities outside the scope must be reported and subject to international oversight.</p>	Yes (common accounting framework needed)
Allowances	<p>Yes:</p> <p>Exported units generated from activities within the scope of the contribution must be fully accounted for.</p> <p>Exported units from activities out-side the scope must be reported and subject to international oversight.</p>	Yes (common accounting framework needed)

Table 1: Parties with Multi-Year Targets: Options to Participate in Unit Transfer

4.4.2 Parties With Single-Year Targets

In contrast to unit transfers among Parties with multi-year targets, ensuring environmental integrity is much more challenging if Parties with single-year targets participate in the transfer of units. More generally, single-year targets provide less certainty in terms of total GHGs emitted. This is related to the functioning of climate change as such, which is caused by the built-up of emissions over time. What matters most in terms of climate change are cumulative emissions, not the GHGs that are emitted at a specific point in time. Therefore, the emissions level a country has in a specific year does not necessarily provide an adequate picture of its impact on the global climate. Since emissions are influenced by changes of parameters such as climatic conditions (rise of emissions due to cold winter) or economy (low emissions in times of economic downturn), observing the evolution of emissions over several years is much more representative than using data from a single year. Accordingly, multi-year targets that require a reduction of cumulative emissions over a continuous period of time provide more certainty on the overall emissions level outcome

than single-year targets, which only require a reduction of the emissions level to the agreed target in the target year without determining emission levels for the years preceding the target year (Lazarus, Kollmuss, and Schneider 2014; Prag, Hood, and Barata 2013).

This uncertainty over total emissions may be further exacerbated if Parties with single-year targets participate in the transfer of GHG units. This holds for the import and use of GHG units as well as for the export of units.

The **export of units** from countries with single-year targets is particularly challenging if the units are from vintages not covered by its contribution. If a Party with a multi-year contribution transfers one unit from a specific year covered by its contribution to another Party, the transfer will be deducted from its emissions budget, its cumulative contribution will therefore be made stricter by the amount transferred (see above). However, if the unit is transferred from a Party with a single year contribution, there are no clear accounting rules for units transferred in a year not covered by the contribution (Lazarus, Kollmuss, and Schneider 2014).

Moreover, as exports of reductions from years not covered by the contribution are not accounted against the contribution, the exporting country has no incentive to ensure the additionality of the reductions (see above). Hence, without international oversight, Parties with single-year targets should only be allowed to export units from within the scope of their contribution if these units were generated in the target year vintage.

With international oversight, Parties with single-year targets might also be able to export credits from mitigation activities outside the scope of their contribution. A sector-by-sector approach could be applied and the Party decides which sectors can be used for crediting and which will be used for domestic mitigation (Nylander 2015).

For those sectors covered by the contribution, crediting could also be allowed for mitigation *actions in the target year* that are below a certain threshold for that sector. With this approach, crediting cannot jeopardise the achievement of the contribution because the credits are either from sectors beyond the scope of the contribution or the credits stem from activities beyond the target (threshold) in the specific sector (Nylander 2015).

Parties could also be allowed to export units from *years preceding the target year* if additionality of the underlying mitigation activities is ensured through international oversight. Hence, it must be ensured that the credited activities are not providing a basis or pathway for meeting the contribution.

As for **imports by countries with single-year targets**, until now, there is no experience with the use of units to meet single-year targets. All domestic and regional emissions trading schemes feature multi-year targets (Lazarus, Kollmuss, and Schneider 2014). The same holds for the Kyoto Protocol. As shown by Prag et al. (2013), accounting for units against single-year

targets can be problematic. They demonstrate that one Party with the same assumed emissions trajectory would have to purchase a larger number of units if its target was defined for more than one year. Therefore, for a Party with a single-year target it would be much easier to rely on transferrable units to achieve its contribution, since far fewer units would be needed than for a party with a multi-year target. This could make comparability of contributions even more difficult and lead to fewer cumulative emission reductions compared with continuous multi-year targets (even if partially met through imported units) or single-year targets fully met through domestic mitigation activities (Lazarus, Kollmuss, and Schneider 2014).

Lazarus et al. (2014) discuss different options to deal with the challenges associated with the use of units for meeting single-year targets. The first option discussed coincides with the suggestion of Prag et al. (2013) to allow use of international units only if the vintage year of the units corresponds to a year covered by a Party's contribution. However, Lazarus et al. (2014) show, first, that this restriction would make carbon markets less efficient by concentrating demand for units from vintages that coincide with Parties' contributions, and second, that it can also be easily defeated in the case of internationally transferred allowances: Parties with multi-year targets could buy units from other vintages to free-up units for sale to Parties with single-year targets, thereby undermining the regulation. Hence, for this option to function appropriately, all Parties would have to adopt single-year targets and use the same target year (=same timeframe).

According to Lazarus et al. (2014) this option would, however, not work as intended in the case of internationally transferred allowances, since allowances that have been freed up for the target year might not necessarily reflect additional emission reductions in that same year.

They point out that if, for instance, banked allowances from years prior to the target year allowed the seller Party to free up allowances which are then sold to another Party for pledge attainment, the overall emissions in the target year could be higher than without the transfer. However, this is a general feature of banking, not of the single target year. Use of banked units in a given year will in any case lead to emissions in that year being higher than if there was no banking. The question is therefore rather whether banking should be allowed or not. The enhanced flexibility provided by banking is generally viewed positively if the banked surplus results from actual emission reductions, but if the surplus results from over-allocation, banking makes it difficult to eliminate such “hot air”.

Lazarus et al. further argue that with the option of everyone adopting single-year targets, Parties would still be able to meet their contributions largely through the purchase of units. They therefore propose a second option (which could be combined with the first option) consisting in limiting the fraction of a Party’s contribution that can be met with units. This would

reduce the impact of the issues identified. In our view, however, the risk of Parties with single-year targets meeting their contribution largely through use of units from other Parties with the same target time-frame is moderate: If all Parties involved adopt single-year targets with the same target year, the supply of units will be limited in number, reducing the probability of single Parties meeting their contributions largely by using units from other Parties.

In consequence, Parties with single-year targets could be allowed to use units for meeting their contribution if all Parties involved also adopt single-year targets with the same target year. This, however, can be expected to remain a rather theoretical option as the global climate regime post-Paris is characterised by a large diversity of contributions. Hence, a translation of the single-year target into a multi-year emissions path would represent the most practical solution to solve the issues associated with the use of units for meeting single-year-targets (Lazarus, Kollmuss, and Schneider 2014).

	Export	Import (Use)
Credits	<p>Yes:</p> <p>Credits from sectors not covered by the contribution beyond the sectoral threshold and subject to international oversight.</p> <p>Exported credits from sectors covered by the contribution must be fully accounted for if they are generated in the target year vintage. If they are generated in years preceding the target year, international oversight must ensure additionality of underlying mitigation actions.</p>	<p>Yes:</p> <p>If all Parties use same timeframe (single-year target with same target year), import and use is possible.</p> <p>No:</p> <p>If selling Parties have multi-year targets or single year-targets with different target years, a conversion of the single-year target into a multi-year target is required.</p>
Allowances	<p>Yes:</p> <p>Exported allowances must be from the target year vintage and must be fully accounted for.</p> <p>Exported units from activities out-side the scope must be reported and subject to international oversight.</p>	<p>If all Parties use same timeframe (single-year target with same target year), import and use is possible.</p> <p>No:</p> <p>If selling Parties have multi-year targets or single year-targets with different target years, a conversion of the single-year target into a multi-year target is required.</p>

Table 2: Parties with Single-Year Targets: Options to Participate in Unit Transfer

4.4.3 Parties With Non-GHG Contributions

Countries with non-GHG contributions may also be willing to participate in transfers of units. One example is Samoa, which has put forward a conditional renewable energy target of 100% by 2025, and expressed its willingness to sell international units. The example of Samoa indicates what the main role of Parties with non-GHG targets will presumably be: the role of unit sellers. The import and use of carbon units for achieving a non-carbon contribution is rather a theoretical option, since a mechanism to translate the carbon unit into a non-carbon unit to fully account for it would be needed.

However, the **export of units** from a Party with a non-GHG contribution entails risks to environmental integrity in the form of double coverage. If the unit transferred is generated in sectors covered by the non-GHG contribution, the mitigation result might be counted twice: the exporting Party could count the achievements related to the action on which the transferred unit is based against its own non-GHG contribution (e.g. increased renewable energy capacity), while the importing Party would use the unit to account it against its GHG-based target. Another

example illustrates the risks associated with crediting of activities to reducing emissions from deforestation and forest degradation (REDD+): If a country with a forest cover target (expressed in hectares of forested area) reduces its deforestation and sells the associated REDD+ credits to another Party which uses these credits for UNFCCC accounting, then there is a significant risk that the emission reductions stemming from the REDD+ activity are counted twice.

One option to address these concerns consists in limiting the role of Parties with non-GHG contributions to only export units from activities that are outside the sectoral scope of their contributions, since would most effectively eliminate the risk for double coverage. At the same time, however, the possibilities for crediting activities would be drastically reduced.

A second option would be to give the Party the possibility to draw the line between activities intended to meet the contribution and activities that can be used for crediting. The possibilities for implementing this differentiation would depend on how the non-GHG contribution was formulated: If, for instance, a Party commits to generating 100% of its energy from renewable

	Export	Import (Use)
Credits	Yes: Exported units generated from activities within the scope of the contribution must be fully accounted for. Exported units from activities outside the scope must be reported and subject to international oversight.	Probably n.a.
Allowances	Yes: Exported units generated from activities within the scope of the contribution must be fully accounted for. Exported units from activities outside the scope must be reported and subject to international oversight.	Probably n.a.

Table 3: Parties With Non-GHG Contributions: Options to Participate in Unit Transfer

energy sources, generation of emission units from activities that increase its renewable energy capacities would no longer be possible, since double coverage would be inevitable.

A Party with a renewable energy target expressed in absolute terms could be allowed to generate units within the scope of its contribution if it commits to fully account for the units sold. For instance, assume a Party has adopted a target to increase its renewable energy capacity by 100MW while at the same time, carbon credits generated from a renewable power plant in that same country are sold to another Party which uses these credits to meet its emission target. In order to maintain environmental integrity, the MW installed capacity that was used to generate and export emission credits must not be counted against the selling countries' contribution. For this option to work properly, a clear differentiation of the contribution from creditable activities is needed.

If a Party has submitted specific policies and measures as its contribution, these policies and measures would need to be accounted for in the baseline and additionality determination of the activities that are to be credited.

More broadly, to avoid the results of the mitigation action to be counted twice, all parties involved should fully report on the transfer of units. If this is ensured, then at least the aggregate

global emissions can be accurately assessed ex-post. In addition, ex-ante uncertainty could be reduced to some extent if countries provide information on the estimated flow of units (Hood, Briner, and Rocha 2014).

4.4.4 Parties with Emission Intensity Targets

Intensity targets relate the GHG target to another factor, such as GDP or kWh. Using these targets as a basis for the transfer of units is difficult because the actual amount of the countries' allowable emissions is difficult to predict. To allow trading with intensity targets, the intensity target could be transformed to an absolute amount by using projections on the respective output factor (GDP or other). The absolute emission amount would need to be adapted ex-post on the basis of the actual value of the index (GDP or other). While this might be a theoretical option to allow for the participation of Parties with intensity targets, it involves a considerable ex-ante uncertainty.

This uncertainty might significantly reduce the attractiveness of units from Parties with intensity targets. In addition, in order to deal with the risk of over-allocation and subsequent over-selling, additional safeguarding mechanism may be needed, further increasing transaction costs.

	Export	Import (Use)
Credits	Yes: Crediting threshold must be set below intensity target.	Yes (common accounting framework needed)
Allowances	Yes: Intensity target needs to be translated to absolute figure and adjusted ex-post	Yes (common accounting framework needed)

Table 4: Parties With Emission Intensity Targets: Options to Participate in Unit Transfer

At first sight, the interest of a Party with an intensity target to import and use units seems questionable, since you might expect the Party to first translate its intensity target into an absolute GHG target based on projections in order to then use the imported credits or allowances for meeting its projected absolute GHG target. However, Parties could also proceed much more pragmatically: They could first import units and then discount the respective amount of GHG reductions from their actual emissions level. In a next step the net amount of emissions would be put in relation to the factor (e.g. GDP) on which their intensity target is based. By proceeding this way, Parties with emissions intensity targets can also benefit from the import and use of internally transferred units.

In addition, as highlighted by Nylander, intensity targets might be compatible with the generation and export of credits, if the crediting threshold is set below the intensity target (Nylander 2015). Since the success in achieving the intensity target depends on exogenous factors, the amount of creditable activities might however vary. This can be expected to reduce the attractiveness for implementing crediting activities.

4.4.5 Parties With Multiple Contributions

Some Parties, such as India, have put forward a combination of a GHG based goal with non-GHG targets. Other Parties have adopted a contribution with a combination of different non-GHG targets. These multiple contributions can have a mutually reinforcing effect and provide more certainty for reaching the goal than a GHG goal only. However, they can also be more challenging in terms of accounting, first to avoid double counting, and second to estimate future emissions levels.

Parties that have adopted multiple non-GHG contributions would have to convert these contributions into a GHG-based goal if they do not

only want to participate in crediting but also in trading of allowances. In general terms, however, Parties with non-GHG contributions can be expected to mainly be interested in exporting of credits, since import and use of external units would require translating non-GHG contributions to a GHG-target. Here, the situation is similar to those countries that have adopted one non-GHG contribution only (see section 4.4.3 above).

If Parties with contributions combining a GHG-goal and non-GHG targets intend to participate in trading of allowances, the GHG-contribution could be used to allocate the total amount of allowances.

However, it seems evident that Parties that have put forward multiple non-GHG goals such as renewable energy or energy efficiency targets in addition to their GHG goal are primarily interested in domestic actions. Import and use of units could, nonetheless, be of interest as a supplementary tool for ensuring the GHG goal is met.

As for crediting, the Party could define activities that are beyond the scope of the contribution. Another possibility would be to generate transferable units within the scope of the contribution. Exporting these units would require separate accounting of each target. For instance, assume a Party adopted a multiple contribution consisting of a GHG-goal and a renewable energy target. In that same country, a new installed renewable energy power plant is to generate credits that are to be sold internationally. In order to ensure environmental integrity, the exporting Party will have to account for the installed capacity of that power plant. At the same time, the GHG emissions mitigated will have to be accounted towards the GHG target. However, there might be cases of multiple contributions where such allocation might not be as straight forward, in particular if multiple non-

GHG targets are linked and possibly combined with individual actions.

	Export	Import (Use)
Credits / Allowances	<p>Yes:</p> <p>Exported units from activities outside the scope must be reported and subject to international oversight.</p> <p>Exported units generated from activities within the scope of the contribution must be accounted for all goals concerned.</p>	<p>Yes:</p> <p>Parties with a combination of GHG goal and non-GHG contributions could use GHG goal for accounting (common accounting framework needed)</p> <p>n.a. to Parties with multiple contributions consisting of non-GHG goals.</p>

Table 5: Parties With Multiple Contributions: Options to Participate in Unit Transfer

5 Conclusions

The structure of the new climate regime building on the Paris Agreement will be very different from the Kyoto Protocol's. Truly global in reach, the Paris Agreement allows Parties to autonomously define their individual contributions to limit the increase of the global mean temperature to 2° Celsius compared to pre-industrial levels. The open structure of the agreement can be expected to serve different goals by increasing the participation of Parties, allowing for more creativity when determining the contributions and providing a basis for mutually reinforcing (non-GHG) targets. However, the large diversity of contributions resulting from this open process also leads to significant accounting challenges, in particular given the fact that the future regime will allow for the transfer of GHG emissions units among Parties. Hence, a balance must be struck between allowing for large participation of Parties on the one hand and ensuring environmental integrity and reduce ex-ante uncertainty on the other.

The analysis has shown that unit transfers of Parties with different types of contributions are associated with different levels of risks for double counting. Hence, participation of Parties whose contribution is expressed as a **continuous multi-year GHG target** is fairly straightforward. Multi-year targets are compatible with a carbon budget approach that can be used to directly account for the units transferred. In order to reduce the risk of double claiming and increase ex-ante certainty, Parties should be required to fully account for net unit flows of units.

Single-year targets, in contrast, are less compatible with the transfer of mitigation results: Both the import (use) and the export of allow-

ances could undermine the environmental integrity of the entire system, the same holds for the use of credits. Hence, to allow the participation of Parties with single-year targets in these activities, a conversion into a continuous multi-year target is needed. Without such conversion, the export and particularly the use of units would need to be tied to very strict preconditions, significantly limiting the practicability of these transfers.

Contributions expressed in terms of **non-GHG targets** and **contributions with multiple non-GHG targets** are also associated with significant risks of double counting. While the import and use of emission units by these countries is rather unlikely since this would require a conversion of the carbon unit into the metric of the respective non-GHG target, the export of units could be envisaged by several countries. Here, the main risk is double coverage. To address this specific double counting risk countries could limit themselves to selling credits from units outside the scope of the contribution. If units (credits or allowances) from within the scope of the contribution are also to be exported, all units transferred should be fully accounted against the non-GHG-contribution(s). However, there might be non-GHG contributions where this can be challenging.

Parties with **multiple contributions that combine a GHG target with non-GHG targets** can import GHG units and account them for the GHG target. Exported units from within the scope of the contribution, however, would have to be fully accounted against the GHG targets as well as the respective non-GHG contributions concerned.

In general terms, contributions expressed as **intensity targets** are less compatible with allowance trading approaches. Since the total amount of allowances a Party would be allocated would depend on dynamic factors, projections on the evolution of these factors would be needed ex-ante while the actual amount of allowances would then have to be adjusted ex-post. Under these circumstances, trading is much more susceptible to the risks of speculation and over-selling. By contrast, import and use of units as well as crediting of activities might be possible, with a crediting threshold set below the intensity targets.

In addition to these opt-in requirements for Parties willing to participate in unit transfers and regardless of the type of contribution in question, the scope of the contribution must be properly defined. In addition, there are some **general possibilities to minimize, reduce or avoid different forms of double counting**: If the primary goal is to ensure environmental integrity ex-post, Parties involved would at least have to report on net unit transfers. As shown, this option would, however, not address the risk of double claiming ex-ante. Given the urgent need to act on climate change and increase mitigation ambition, the risk of double claiming should not be underestimated. The consequences of further delaying climate action due to double claiming can be expected to be disastrous, increasing the costs of mitigating climate change and bringing us nearer to the climatic tipping points. Hence, increasing ex-ante certainty is key for properly addressing climate change. To maintain environmental integrity *and* increase ex-ante certainty, Parties should be required to fully account for exported units generated from mitigation activities inside the scope of their contribution, while transfers of units generated outside the scope of the contributions must be reported and should be subject to international oversight. Moreover, international oversight might be re-

quired for all types of unit transfers if additionality of underlying mitigation activities is not ensured by high ambition of Parties' contributions.

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