The Implications of International Greenhouse Gas Offsets on Global Climate Mitigation

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Abstract

With the United Nations Framework Convention on Climate Change Agreements reached in Cancún, Mexico, in December 2010 – agreements that build upon the Copenhagen Accord – the future role of international greenhouse gas offsets in climate action has become particularly uncertain. This paper focuses on one of the more immediate and vexing questions: how offsets will be accounted for in reporting and reviewing progress toward meeting countries' emission-reduction pledges under the Cancún Agreements. In particular, we quantify the implications of double-counting of international offsets by constructing and applying a spreadsheet model to analyze how potential offset supply and demand balances may evolve, based on specific assumptions about accounting rules, offset mechanisms, and country pledges for the year 2020. We find that the use of international offsets, if counted both by the supplying (developing) and buying (developed) country, could effectively reduce the ambition of current pledges by up to 1.6 billion tons CO_2e in 2020, suggesting that the current pledges could well fall even further short of the abatement needed to stay on a path consistent with limiting warming to 2°C or 1.5°C. These findings assume that each ton of offset credit represents a ton of emissions benefit. To the extent that offsets do not represent real, additional reductions, then the effective dilution of pledges could be even greater. We close the paper by describing several remedies to address the risks of offset double-counting.

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1. Introduction and Context

Until recently, discussions of national and international climate policy have focused on establishing cap-and-trade programs on greenhouse gases. Most such proposed regional, national, and international cap-and-trade systems have included greenhouse gas offsets as a central feature. A GHG offset credit represents a ton of carbon dioxide equivalent (CO_2e) reduced, avoided or sequestered by a project implemented specifically to compensate for emissions occurring elsewhere (Broekhoff and Zyla 2008). Ratified by 192 countries, the Kyoto Protocol created the basis for the principal international cap-and-trade system to date, with international offsets (i.e. those based on activities in developing countries) issued through the Clean Development Mechanism (CDM) as a central feature.[1] The European Union's emissions trading system (EU ETS) and proposed climate policies in the United States have included international offsets both to contain costs for regulated entities and to increase compliance flexibility for covered entities. For example, legislation considered in the U.S. Congress in 2009 and 2010 would have allowed for up to 2 billion tons per year of offsets from developing countries and uncapped domestic sectors (such as agriculture and forestry) to be used to meet reduction goals (Larsen et al. 2010; Larsen et al. 2009). In addition, Japan is already a major buyer of international offsets, which it could rely on heavily to meet its ambitious emissions target for 2020 (Kossoy and Ambrosi 2010).

With the Agreements reached in Cancún in December 2010 – agreements that build upon the Copenhagen Accord – the future role of international offsets in climate action has become particularly uncertain. The uncertainties exist on many levels, from the fate of United Nations Framework Convention on Climate Change (UNFCCC) negotiations over a post-2012 international framework and potential reforms of CDM, to the possible development of new multilateral and bilateral market mechanisms, to changing perceptions of the credibility and attractiveness of offsets as a tool to deliver emission reductions reliably and efficiently. In this paper, we focus on one of the more immediate and vexing questions: how international offsets will be counted in reporting and reviewing progress toward meeting countries' pledges.

To date, 42 developed countries have submitted quantified pledges to limit their emissions in 2020, as part of negotiations of the Ad Hoc Working Groups on Further Commitments under the Kyoto Protocol (AWG-KP) and on Long-term Cooperative Action under the UNFCCC (AWG-LCA) (UNEP 2010b).[2] These pledges are stated as a particular percent reduction (commonly between 17% and 30%) from a certain base year (commonly 1990, 2000, or 2005) and represent a departure from a "business as usual" emissions path of up to 4 billion tons (Gt) CO_2e in 2020 (UNEP 2010b). Furthermore, over 40 developing countries have submitted nationally appropriate mitigation actions, which several countries have expressed in terms of national emissions reductions by 2020 (AWG-LCA 2011). Both developing country targets and developing country actions have been widely referred to as "pledges" (UNEP 2010a).

However, the role of international offsets in fulfilling pledges remains notably unclear. Ambiguity in the existing agreements, as well as statements made by some parties,[3] suggest that emission reductions

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[1] The Kyoto Protocol also established Joint Implementation (JI) to create international offsets from developed countries. To date, JI has issued few offsets compared with CDM. While our focus here is on international offsets from developing countries, absent a consistent and comprehensive offsets accounting framework, some of the concerns we raise could also apply to offsets from developed countries.

[2] FCCC/SB/2011/INF.1, Compilation of economy-wide emission reduction targets to be implemented by Parties included in Annex I to the Convention, http://unfccc.int/resource/docs/2011/sb/eng/inf01.pdf

[3] For an example, see footnote 22.

from actions undertaken as offsets in developing countries could be credited toward the achievement of pledges both in the host country and in the developed country ("Annex I" countries under the UNFCCC) purchasing the offset.[4] Observers have noted that double-counting of offsets could create a major loophole in the pledges unless appropriately addressed (UNEP 2010b; Levin et al. 2010).[5]

Almost alone among developed countries, the European Union has articulated its position with respect to the accounting and intended use of international offsets.[6] First, it has reiterated its position with respect to supplementarity, i.e. that offsets should account for less than 50% of emission reductions. Second, and more recently, it has suggested that "any emission reductions achieved through the purchase of emission reduction units will count towards action of those purchasing and not towards the action of the country selling emission reductions" (European Commission 2011). This statement stands in contrast to Brazil, which has announced its intention to count international offsets towards its pledge, stating that the use of CDM credits "is not excluded" (AWG-LCA 2011). The United States and many other developed countries have thus far been silent on these questions.

While the accounting framework and extent of intended developed country use of offsets is unresolved, so too are the possible mechanisms for generating these offsets. In response to longstanding criticisms of CDM – in terms of its environmental integrity, project-based scope, impediments to project approval and credit issuance, and the fulfillment of its sustainable development mandate – the CDM is at a crossroads. CDM reforms are under way, and major buyers (e.g., the EU) have enacted or are considering major restrictions in use of the CDM's Certified Emissions Reductions (CERs) that could dramatically alter the volume and characteristics of future CDM activity.[7] Yet-to-be-developed mechanisms could perhaps also be used to help achieve developed country pledges. Indeed, the Cancún Agreements specifically call for Parties to "consider the establishment … of one or more market-based mechanisms" to support pledge achievement. In addition to CDM, possible options could include NAMA crediting and sectoral crediting approaches called for by the EU, Japan, California's cap-and-trade system, and prior proposed U.S. climate legislation.[8] The potential volume of credits that could be generated through sectoral or other mechanisms for reducing emissions from deforestation and degradation (REDD) – particularly in Brazil, Indonesia, and the Congo – is very large and highly uncertain (Murray et al. 2009). In addition, some regions, Japan and the California in particular, are developing new bilateral offset mechanisms in advance of common international accounting rules, which could presage the proliferation of offsets of potentially heterogeneous quality.

Ultimately, international climate policy should put nations on a path closer to the 1.5°or 2°C goal that they have embraced (UNFCCC 2010). As the recent UNEP (2010b) study demonstrates, not only do

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[4] Though rarely discussed, the possibility exists that some developing countries might elect to invest in offset projects in other developing countries, as a means to build markets for their low-emission technologies, to meet their own pledges, and/or to sell additional emission units to other countries.

[5] The Cancún Agreements recognized uncertainty regarding the role of offsets and called for workshops to clarify questions regarding the interpretation of pledges, the role of offsets among them.

[6] In its February 21, 2011, submission on market mechanisms, Norway notes the "need for clear rules for the accounting of the emission reductions, in order to avoid double-counting" and the need "to establish common accounting rules for tradable emission allowances in order to link different market based schemes." See http://unfccc.int/files/meetings/ad_hoc_working_groups/lca/application/pdf/norwegian_submission_market_based_mechanisms_21_feb_2011.pdf.

[7] The EU has enacted a post-2012 restriction for the EU-ETS on the use of CERs from industrial gas projects (HFC and N2O), and has stated the intent to move from CDM towards sectoral crediting, particularly in energy-intensive sectors, and to focus CDM activity largely on least-developed countries (LDCs).

[8] Decision 1/CP.16, paragraph 80.

the present pledges fall short of this goal, but loose accounting rules and the use of surplus emission units could further increase this emissions gap.[9] Under lenient accounting rules, the pledges, even if met, might fall 7 to 9 Gt CO2e short of needed 2020 abatement for an emissions trajectory reasonably consistent with a 2°C goal (according to median estimates).[10] According to the UNEP (2010b) report, using stricter rules for land use, land use change, and forestry (LULUCF) accounting, as well as for surplus emission units, could reduce the emissions gap by 1 to 2 Gt CO_2e, increasing total emission reductions by nearly 50%.

In addition, without rules to avoid offset double-counting, the use of international offsets could increase the gap by over 1 Gt CO_2e, according to UNEP's (2010b) estimate. UNEP developed this estimate – up to 1.3 Gt CO_2e in potential double-counting – simply by assuming that developed countries might meet up to one-third of their pledges using international offsets. In this paper, we take a deeper look at the risks associated with double-counting, by applying a model that considers the dynamics of offset supply and demand, considering regional abatement costs and opportunities and past experience with offset issuance. We develop estimates of international offset use under scenarios where offsets can count twice (buyer and seller) or once (buyer only), and how those estimates might vary depending on the availability of new sources of offset supply, such as REDD crediting, and on whether deeper, conditional pledge levels are achieved. We then consider the implications of our findings for the integrity of the pledges, and the design of new offset mechanisms.

Roadmap of this paper

In the next section, we describe our analytical approach and key assumptions. In subsequent sections, we examine two scenarios for how offsets could be counted. Section 3 looks at the implications of an "Offsets Count Twice" scenario, an outcome that would unfold if accounting rules to avoid it are not established and which is consistent with some parties' statements. One remedy would be to allow only offset buyers to take credit for reductions achieved through offsets activities. Section 4 discusses the possible implications of an "Offsets Count for Buyer Only" scenario. Alternative remedies might include split crediting or the exclusion of selected sectors and sources from pledges or offset mechanisms (Levin et al. 2010). In Section 5 we evaluate these and other options in terms of their ability to enable an international framework that can achieve global reductions that are as close to scientific targets as possible. We also reflect on offset quality considerations, and how the environmental integrity of the offsets themselves – e.g., non-additionality, impermanence, and leakage – might play out under new international offset accounting rules.

[9] In the first commitment period of the Kyoto Protocol, very weak targets were agreed to for some countries. These targets, which were set at levels considerably higher than projected business-as-usual emissions for the period, gave rise to large amounts of surplus allowances that could be banked for subsequent commitment periods.

[10] The UNEP (2010b) study reports reductions below BAU of 3 $GtCO_2$e for the unconditional (low) pledges and 5 $GtCO_2$e for the conditional (high) pledges (both under the lenient rules case). It separately estimates that offset double-counting could increase the gap by up to 1.3 $GtCO_2$e, but does not assume double-counting in the reduction figures.

2. Potential Scope for International Offsets in 2020

In principle, international offsets provide a means to meet emission targets or pledges in a more economically efficient manner, while ideally also delivering other benefits, such as additional finance, technology transfer, and local sustainability benefits in host countries and sectors. To the extent that each ton of offset credit represents a real, additional, and permanent ton of emission reduction, international offsets simply shift the location of emissions (and emission reductions) from one country to another (See Appendix 1). Because of the compliance flexibility and potential cost advantages they offer, international offsets also remain a key element in the design of domestic emissions trading systems (ETS).

To explore how international offsets might be used to meet emissions pledges, we construct and apply a spreadsheet model to analyze potential outcomes in terms of future offset transactions. Our model is based on estimates of relative abatement potential and costs among countries, and on additional assumptions regarding accounting rules, offset mechanisms, and country pledges for the year 2020. In order to estimate the variation in offset demand and domestic abatement in response to changes in accounting frameworks, the model assumes countries pursue an economically efficient pathway to reducing emissions and meeting their pledges. This is an important simplification, since countries will pursue actions for reasons other than simply low abatement costs, such as energy security or technology development. Box 1 describes the key model features and assumptions. For reference, Appendix 2 compares the McKinsey marginal abatement cost curves used here to those of U.S. Environmental Protection Agency.

Clearly, the ambition of developed country pledges will be a key driver of demand for international offsets. Yet the demand for offsets will only exist if these countries actually comply with their pledges as if they were binding caps. Accordingly, in our analysis, we assume that developed countries' pledges are economy-wide and only consider the case where they are met fully. Table 1 displays the pledges we apply in our model.[11]

We also make similar assumptions regarding developing country pledges, i.e. that they are economy-wide and will be fully met (unless otherwise specified in Table 1 or its footnotes). Some developing countries (e.g., China and Brazil) have specifically underscored that their pledges, consisting of "nationally appropriate mitigation actions" (NAMAs), are "voluntary." For this paper, we take all pledges at face value in terms of ambition, recognizing that developing country pledges are, in many cases, contingent on adequate international support (whether through or outside support from carbon markets). To simplify the analysis, we consider quantified developing country pledges only and do not attempt to include additional abatement from non-quantified NAMAs targeted by other developing countries. In addition, we consider only the year 2020, and we assume no banking (of offsets or allowances) from any year prior to 2020.

[11] Unless otherwise specified, we apply the pledges to both CO_2 and non-CO_2 greenhouse gas emissions, including net CO_2 from forestry and other land use activities.

Table 1. Emissions Pledges Included in Our Analysis[12]

	Lower ambition	Higher ambition	Base Year	Notes
Developed Countries				
U.S.	17%	17%	2005	The U.S. submission states "in the range of 17%"
Europe	20%	30%	1990	We also apply the EU-27 pledge to other countries in Europe[13]
Japan	25%	25%	1990	
Canada	17%	17%	2005	
Australia	5%	25%	2000	
New Zealand	10%	20%	1990	
Developing Countries				
China	40%	45%	2005	Below 2005 intensity (per GDP)[14]
India	20%	25%	2005	Below 2005 intensity (per GDP) and excludes ag sector
Brazil	36%	39%	2020	Below 2020 reference emissions[15]
Mexico	30%	30%	2020	Below 2020 reference emissions
South Africa	34%	34%	2020	Below 2020 reference emissions
Indonesia	26%	41%	2020	Below 2020 reference emissions[16]
South Korea	30%	30%	2020	Below 2020 reference emissions
Others	Various		2020	We adopt the pledge assessment of Climate Analytics et al. (2010)[17]

[12]The primary source of pledges in this table is the UNEP Climate Pledges website (UNEP 2010a). Where pledges are stated on the UNEP site as a range (e.g., Europe, China, India, Brazil), we characterize the low end of the range as "lower ambition" and the high end of the range as "higher ambition." If no range is stated (e.g., U.S., Canada, Mexico), we consider the stated pledge as both the low and high end of ambition. We do not make separate assessments of what portion of the pledges are conditional or unconditional on international action or finance. As a result, the pledge reductions in our low and higher ambition cases differ from those in the conditional and unconditional cases examined in the UNEP Emissions Gap report (UNEP 2010b). Just as we don't consider the potential impact of excess allowances from Russia and Eastern Europe, we exclude their pledges in this analysis, as it is unlikely that they will seek offsets from developing countries.

[13] For simplicity and because McKinsey's (2010) emissions forecasts were not specified for most European countries, we apply the EU-27 stated pledge of 20% to 30% reduction from 1990 emissions to all OECD Europe countries, even as pledges of some individual non-EU-27 countries (e.g., Norway) may depart from this range.

[14] China's pledge was stated in terms of CO_2. We are unclear on whether the intent is to exclude non-CO_2 greenhouse gases from the pledge. Therefore, for modeling purposes, we interpret China's pledge like other countries', i.e. applying to all GHGs, and revisit the possible implications of the pledge being only on CO_2 later in this report.

[15] Brazil's pledge is based on the country's own bottom-up quantification of mitigation actions, available at http://www.mma.gov.br/estruturas/182/_arquivos/cenarioemissoes_182.pdf. Accordingly, we use Brazil's own absolute abatement estimates (by sector) rather than derive them from stated percent reductions. Of Brazil's 36.1% to 38.9% pledge, the biggest fraction (24.7%), representing over two-thirds of the pledge, is to reduce deforestation.

[16] Ecofys et al. (2010) report that most abatement is expected to come from avoided deforestation, and in the related quantification (Climate Analytics et al. 2010), the same analysts assume that none of the abatement comes from sectors other than avoided deforestation. We make the same simplifying assumption here, even as we note that Indonesia's submission to Appendix II of the Copenhagen Accord also lists energy efficiency, renewables, and other actions that might contribute to the goal.

[17] Rather than try to disaggregate McKinsey's emissions forecasts for the many other developing countries that have made pledges, we simply adopt the assessments of 2020 pledged abatement in Table 3 of a recent Climate Action Tracker summary (Climate Analytics et al. 2010) for Chile, Costa Rica, Israel, Moldova, Papua New Guinea, and Singapore. At the time of this writing, the Appendix detailing the similar assessment for the UNEP Emissions Gap Report (UNEP 2010b) was not available.

Box 1: Modeling Methodology

Our model relies on marginal abatement cost curves of McKinsey & Company (2010), the UNEP Risoe Centre's method for forecasting CDM offset volumes (UNEP Risoe Centre 2010), UNEP's tracking of national emission reduction pledges (UNEP 2010a), and several assumptions about the nature of the offset market, as described below. Our model finds the market-clearing level of offsets assuming demand from developed countries and supply from developing countries. More specifically, our method is to:

1. **Develop marginal abatement cost curves (MACs) by country/region**. We use McKinsey's version 2.1 abatement cost analysis, owing to its consistency and sectoral and regional detail (McKinsey & Company 2010).[18] Note that what is relevant for our analysis is the *relative* costs of abatement among regions, sectors, rather than the *absolute* costs, as we are not attempting to assess the cost of offsets, only where global abatement is more cost-effective.
2. **Translate MACs into offset supply curves based on mechanism and market factors** (Erickson et al. 2010). For example, if the mechanism is assumed to be project-based offsets as in the CDM, constrain growth in offset supply by observed growth rates in the CDM.
3. **Assume all countries, both developed and developing, will meet their pledges**, regardless of crediting approaches, based on assessments by UNEP (UNEP 2010a) and the Climate Action Tracker (Ecofys et al. 2010). The global demand for abatement is therefore the total abatement required to meet all pledges.
4. **Determine the market-clearing level of abatement** that would equalize carbon costs among countries.
5. **Calculate offset usage** as the difference between a developed country's own pledged abatement and the abatement realized within the country, while considering any limitations on offset use imposed by the country (e.g., the EU's position on supplementarity). Our model can then consider offset discounting, or sectoral- or project-type limitations, as well as alternative mechanisms, though we do not analyze these options in this paper.
6. **Estimate what fraction of offsets are double-counted** by considering what fraction of the offsets supplied to developed countries originate from developing countries with quantified pledges, as listed in Table 1 and footnote 12.[19] Offsets from countries without such pledges are assumed in our model not to be double-counted, since they are counted toward only the pledge of the developed, buyer country.[20]

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[18] By its very nature as a bottom-up cost curve, the McKinsey abatement analysis is static and path-dependent. It also does not account for interactions between supply and demand and assumes that large potential is available at negative cost. Despite these limitations, McKinsey's cost curve is among the more complete, consistent, global by sector and country. Its potentials are generally in line with other global and sector-specific studies, even as deviations do exist in particular sectors in certain world regions.

[19] In some cases, our model also shows relatively small flows of offsets from developing countries to other developing countries. We do not focus on these flows in this paper or consider them as being double-counted, since few discussions have focused on the possibility of such offsets.

[20] If offsets were sourced instead from countries with quantified pledges – or if developing countries without quantified pledges established quantified pledges – then in theory all offsets could be double-counted. Accordingly, we report double-counting as a range from our model results (on the low end) to the full amount of offsets used (on the high end). For comparison, UNEP (2010b) assumed all international offsets were double-counted.

The main focus of our analysis is on assessing the magnitude of change to global abatement under two alternative scenarios for how offsets might be counted by developed country buyers and developing country sellers. The two scenarios are:

- **Offsets Count Twice**, in which both the buyer and seller country count the offset towards their emissions pledges. This scenario is congruent with existing statements by some countries (Chen et al. 2011) and is a possible outcome if steps are not taken to avoid it.
- **Offsets Count for Buyer Only**, which has been the understanding under the Kyoto Protocol. This position was recently articulated by the EU in its communications to the AWG LCA, at least for new market mechanisms (European Commission 2011).

Without strong, internationally coordinated offset accounting rules, there is also a risk of counting a given ton of emission reductions *even more than twice* towards pledge attainment. This could occur if, in addition to offsets counting for both buyer and seller, multiple crediting systems cover the same regions and sectors, and each system issues offsets for the same avoided emissions. This could result from uncoordinated bilateral mechanisms or from inadequately designed multilateral ones, such as sectoral mechanisms that do not adequately account for CDM activity in the same sectors. Although we do not analyze a scenario where offsets count more than twice, these issues further underscore the need for a careful, robust, and internationally coordinated offset accounting system with minimum standards that all countries agree to meet in their respective systems.

It is important to note that much is unknown about the future evolution of the offset market, and how mechanisms or methodologies to scale up the market will evolve. Accordingly, for each scenario we consider two cases for how offset supply might develop: a *current mechanisms* case and an *expanded mechanisms* case. In the current mechanisms case, we assume that the offset market will continue to grow at rates observed in the CDM in 2008 and 2009, prior to the precipitous slowdown in CDM project activity due to the global economic recession and uncertainty in post-2012 demand.[21] At these rates of growth, expected annual offset issuance would increase from about 0.34 Gt CO_2e annually in 2010 to about 1.3 Gt CO_2e annually in 2020. To achieve such rates of growth, CDM reforms, such as greater standardization in methodologies and procedures, would likely be needed.

In the *expanded mechanisms* case, we assume instead that new instruments to expand offset supply (e.g., REDD, sectoral crediting) become available. Under this case, we no longer limit offset supply to historical trends in CDM development, and we allow access to abatement opportunities in avoided deforestation.

These two cases of offset supply, combined with two cases of pledge ambition (high and low), combine to form four estimates of possible offset use in both the *Offsets Count Twice* and *Offsets Count for Buyer Only* scenarios. We devote most attention to the case of *current mechanisms* of offset supply and the low end of pledge ambition (Table 2), due to high uncertainties about the development and feasibility of mechanisms to expand offset supply, and because of the greater level of effort required to meet the higher pledges, many of which are conditional on actions yet to occur (significant international finance or deeper pledges by some countries). However, we will summarize the range of

[21] We arrive at an annual increase in offset issuance of about 80 million tons CO2e based on extending the rate of project inflow in the CDM pipeline database (UNEP Risoe Centre 2010) on a country and project-type-specific basis through 2020, and considering historic average registration and issuance success rates.

results from all cases, where applicable, throughout this paper. Detailed results for all cases are presented in Appendix 3.

Table 2. Cases Considered: Pledge Ambition and Offset Mechanisms

	Pledge Ambition	
Offset Mechanisms	Low	High
Current mechanisms	Detailed Results and Chart Presented Below	Detailed Results Presented Below (Chart in Appendix 3)
Expanded mechanisms	Detailed Results and Chart in Appendix 3	Detailed Results and Chart in Appendix 3

3. Scenario: Offsets Count Twice

In this section, we explore a scenario wherein both developed and developing countries (with pledges) count emission reductions realized as a result of offset projects towards their respective pledges. To some observers and negotiators, this is the default current understanding in the international negotiations (Chen et al. 2011),[22] even though it might seem to violate basic principles of emissions accounting under current existing frameworks such as the Kyoto Protocol.

The volume of offset transactions in this scenario is 1.2 Gt CO_2e under lower-ambition pledges and 1.3 Gt CO_2e under higher-ambition pledges, where 1.3 Gt CO_2e is the maximum quantity allowed in our model for the *current mechanisms* case (based on forecasts of an offset market scaling up to 2020 at the pace of the CDM in 2008 and 2009), as displayed in Table 3. Under this forecast, the United States, Europe, and other developed countries (e.g., Japan, Canada) all use offsets for over one-quarter of their abatement needs under the lower ambition pledges. (Recall from Table 1 that pledges for the United States, Canada, and Japan are assumed to be the same in both the high and low cases.) Under higher ambition pledges, Europe's deeper pledge increases its demand for offsets, which results in a shift of offsets from buyers in the United States and other developed countries to meet the increased demand from Europe.

[22] In its submission to the Appendix of the Copenhagen Accord, Brazil stated: "The envisaged domestic actions as indicated are voluntary in nature. … The use of the Clean Development Mechanism established under the Kyoto Protocol is not excluded" (AWG-LCA 2011). This statement implies that emission reductions in Brazil that result from CDM projects could be counted towards Brazil's fulfillment of its pledge. If China and other developing countries were to take the same position, then both the buyer (developed) and supplier (developing) countries might claim full credit for the same emissions reduction.

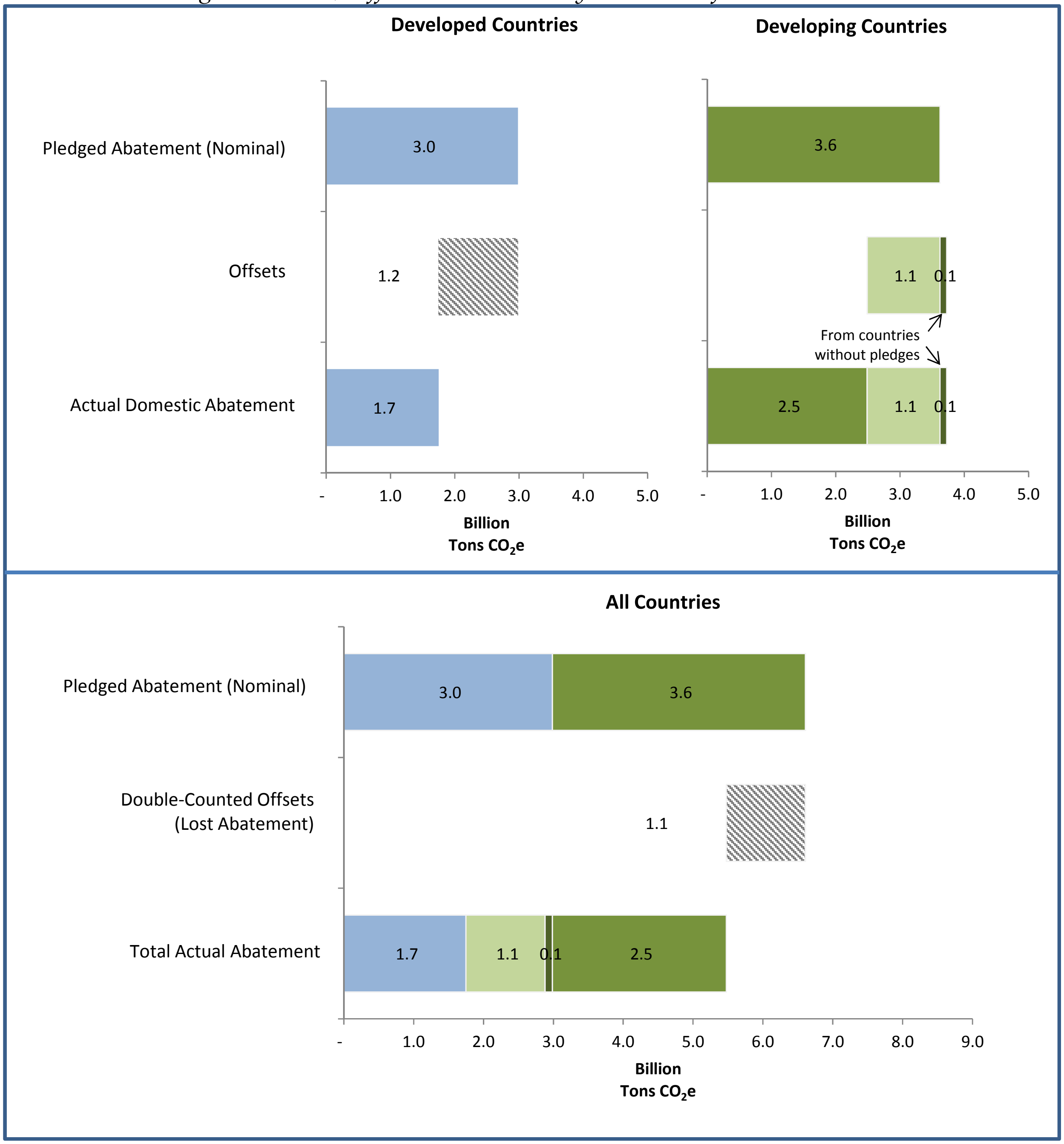
Table 3. Forecast Emissions, Offset Usage, and Abatement in 2020 in Developed Countries under Offsets Count Twice Scenario (Gt CO_2e in 2020); Offset Use Limited by Potential of Current Mechanisms to 1.3 Gt CO_2e.

	U.S.	Europe	All Other Developed	Total
BAU Emissions	6.8	5.5	6.1	18.4
Pledged Abatement – Lower ambition	1.3	1.0	0.7	3.0
Pledged Abatement – Higher ambition	1.3	1.5	0.8	3.7
Assumed Offset Limit – Lower ambition	None	0.5	None	
Assumed Offset Limit – Higher ambition	None	0.8	None	
Forecast Offset Usage – Lower ambition	0.3	0.5	0.4	1.2
Forecast Offset Usage – Higher ambition	0.2	0.7	0.4	1.3
Forecast Internal Abatement – Lower ambition	0.9	0.5	0.3	1.7
Forecast Internal Abatement – Higher ambition	1.1	0.8	0.4	2.4
Fraction of Abatement as Offsets – Lower ambition	26%	47%	61%	41%
Fraction of Abatement as Offsets – Higher ambition	15%	45%	49%	35%

Most of these offsets – estimated at 1.1 of the 1.2 to 1.3 Gt CO_2e – are estimated to come from developing countries that have submitted quantified pledges, especially China and India. Since, in this scenario, these offsets are counted by the host (developing) countries that have pledges as well as by the buyer countries, total (global) abatement is therefore 1.1 Gt CO_2e less than the nominal pledges. Figure 1 displays how double-counting results in substantially less global abatement than pledged under the low pledge ambition case.[23]

[23] For a similar chart for the high pledge case, see Appendix 2.

Figure 1. Offset Usage and Accounting Under Offsets Count Twice *Scenario (Low Pledge Ambition, Offset Use Limited by Potential of Current Mechanisms)*



Across all countries, this scenario suggests that about one-fifth of total pledged abatement in 2020 is double-counted, resulting in a loss of abatement equivalent to the current emissions of the world's fifth largest emitter, Japan.

These results assume, however, that total offset usage could not exceed 1.3 Gt CO_2e, which is our forecast of potential offset supply in 2020 if the market continues to scale at recently observed rates. If expanded mechanisms (e.g., REDD, sectoral crediting) become available, as foreseen by the Cancún agreements, total offset usage could be greater. In particular, our model indicates that efforts to expand offset availability could lead to offset usage of 1.2 (under low pledge ambition) to 1.6 Gt CO_2e (under high pledge ambition), as displayed in Table 4.

Table 4. Estimate of Offset Usage and Double-Counting Under Four Combinations of Pledge Ambition and Offset Mechanism

	Pledge Ambition	
Offset Mechanisms	Lower	Higher
Current mechanisms		
Total Offset Usage	1.2	1.3
Double-counted Offsets	1.1	1.1
Expanded mechanisms		
Total Offset Usage	1.2	1.6
Double-counted Offsets	0.8-1.2	0.6-1.6

Given the CDM's limitations in scope and offset flow, and the intent of new mechanisms to overcome them, readers may be surprised that offset usage is no greater, and less than 25% greater, in the two *expanded mechanisms* cases, respectively. There are two primary reasons for this outcome. First, CDM activity in the *current mechanisms* case is significantly expanded (1.3 Gt CO_2e in 2020) relative to the present, as we make the assumption that growth in CDM activity can resume at the pace seen a couple of years ago. Second, offset use in both the *current mechanisms* and *expanded mechanisms* cases is restricted by supplementarity constraints in the EU and competition with domestic abatement opportunities in developed countries.

Nonetheless, while the offset volume is similar between the current and expanded mechanisms cases, the origin of offsets is not. Under the *expanded mechanisms* case, our model finds a much larger fraction of offsets originating from developing countries without pledges (or more precisely, that have not communicated NAMAs in the form of national emissions goals). Since offsets from these countries cannot be counted toward an own-country pledge, they are not double-counted in our model. [24] As a result of this shift in the country origin of offsets, we find, rather counter-intuitively, that the extent of offset double-counting could be lower in the *expanded mechanisms* case than in the *current mechanisms* case.[25] This finding is illustrated by the low end of the range of double-counted offsets reported in Table 4 for the *expanded mechanisms* case. The high end of the range shows the outcome if all offsets were instead sourced from countries with pledges (therefore leading to nearly all offsets being double-counted).[26]

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[24] Table 1 and its footnotes list the countries we consider to have quantified pledges. Based on data and methods of the UNEP Risoe Centre (2010), we forecast CER issuance from countries other than these to be about 0.1 Gt CO_2e in 2020 in the *current mechanisms case*. In the *expanded mechanisms case*, offset supply is constrained only by the MAC curves.

[25] In the expanded mechanism case, we relax constraints due to historical CDM experience, and make available for the offset market, abatement potentials in the buildings, transportation, agriculture, and forestry sectors that have proven difficult to access (or been ineligible) through CDM.

[26] The effective cost of offsets from countries with pledges could much be lower than the abatement costs in our model might indicate, if abatement opportunities are being supported domestically. See Box 2 below for further discussion.

4. Scenario: Offsets Count for Buyer Only

As indicated in the Section 3, full double-counting of offsets by developing countries could result in global abatement falling short of stated pledges by up to 1.6 Gt CO_2e. An obvious solution to this problem is to eliminate double-counting through clear accounting procedures.

In this section, we explore a scenario where offsets function largely as they have under the Kyoto Protocol and domestic emission trading systems. In this scenario, buyer countries receive all credit for offset purchases, and developing countries cannot count reductions in emissions as a result of CDM or other offset activities towards their pledges. Under such a scenario, developing countries would need to reduce emissions further to compensate for the credits sold.

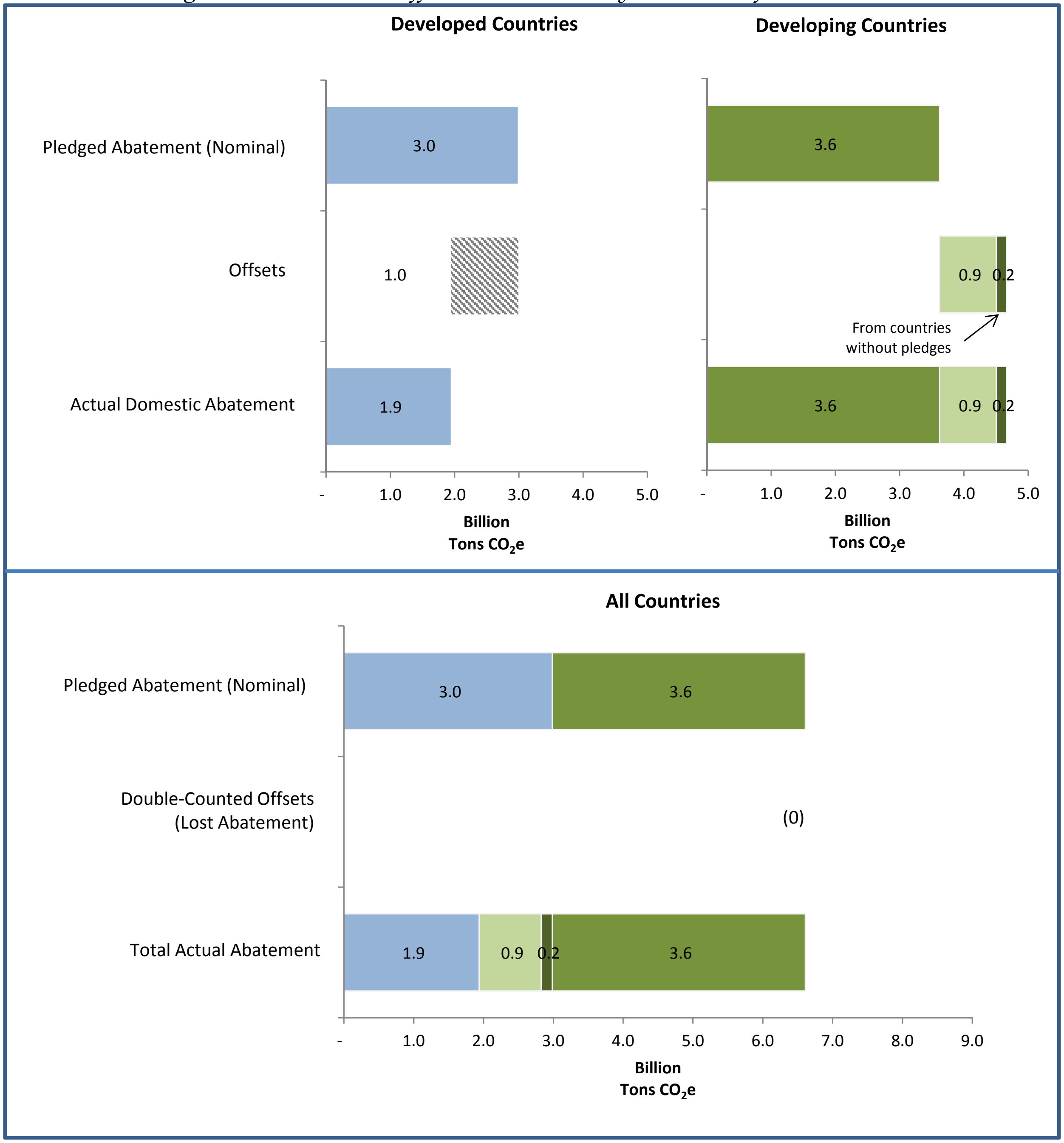
Table 2, below, displays our estimates of offset usage assuming that offsets count for the buyer country only. Offset usage under the low pledge case is estimated here at 1.0 Gt CO_2e, slightly lower than the 1.2 Gt CO_2e estimated under the double-counting scenario – a decline attributable to decreased offset supply from China and other developing countries that would need to pursue more internal abatement if offsets cannot be counted towards attainment of their pledges. Offset usage under the high pledge case is even lower – estimated here at 0.9 Gt CO_2e, as deepened pledges in China (and, to a lesser extent, India and Brazil) further restrict offset supply. Under the high pledge case, our model indicates that Europe's conditional 30% pledge increases the region's demand for abatement and leads it to be the dominant buyer of offsets, leaving the United States to meet almost all of its pledge through domestic action.

Table 5. Forecast Emissions, Offset Usage, and Abatement in 2020 in Developed Countries under Offsets Count for Buyer Only Scenario (Gt CO_2e in 2020); Offset Use Limited by Potential of Current Mechanisms to 1.3 Gt CO_2e

	U.S.	Europe	All Other Developed	Total
BAU	6.8	5.5	6.1	18.4
Pledged Abatement – Lower Ambition	1.3	1.0	0.7	3.0
Pledged Abatement – Higher Ambition	1.3	1.5	0.8	3.7
Assumed Offset Limit – Lower Ambition	None	0.5	None	
Assumed Offset Limit – Higher Ambition	None	0.8	None	
Forecast Offset Usage – Lower Ambition	0.3	0.4	0.4	1.0
Forecast Offset Usage – Higher Ambition	0.1	0.6	0.3	0.9
Forecast Internal Abatement – Lower Ambition	1.0	0.6	0.4	1.9
Forecast Internal Abatement – Higher Ambition	1.2	1.0	0.6	2.8
Fraction of Abatement as Offsets – Lower Ambition	21%	42%	50%	35%
Fraction of Abatement as Offsets – Higher Ambition	5%	37%	34%	25%

Figure 2, below, displays how offsets affect global abatement if they are counted only once.

Figure 2. Offset Usage and Accounting Under Offsets Count for Buyer Only Scenario (Lower Pledge Ambition Case, Offset Use Limited by Potential of Current Mechanisms)



If developing countries with pledges issued the 0.9 Gt CO_2e of offsets projected in Figure 2, then under common accounting rules in place for existing regimes such as JI, where offset host countries have emissions targets, these countries would no longer be able to count those reductions toward pledge achievement figures (since credit for these reductions was assigned to developed countries). This could be addressed, for instance, by adding the amount of offsets issued to a country's emission total when reviewing pledge attainment. [27] Therefore, in effect, to meet their targets, developing countries would need approximately 4.5 Gt CO_2e of abatement, 25% more than the amount implied by their pledges – an outcome that may dissuade some developing countries from allowing offsets to be issued, especially for low-cost or otherwise attractive actions (Lutken 2010).

5. Issues and Options

Should offsets prove to be an attractive and feasible option for developed countries to use in meeting their emissions pledges, the amount of offsets transacted internationally could be quite large, on the order of 1 to 2 Gt CO_2e in 2020, based on our assessment of the relative costs of abatement among regions. If managed efficiently and with strong environmental integrity, these offset flows could increase the cost-effectiveness and likelihood of pledge attainment, while spurring additional investment in low-carbon technologies and practices in developing countries. In fact, by reducing costs, offset mechanisms could even enable developed country parties to adopt more ambitious pledges, leading to a net benefit for the climate.

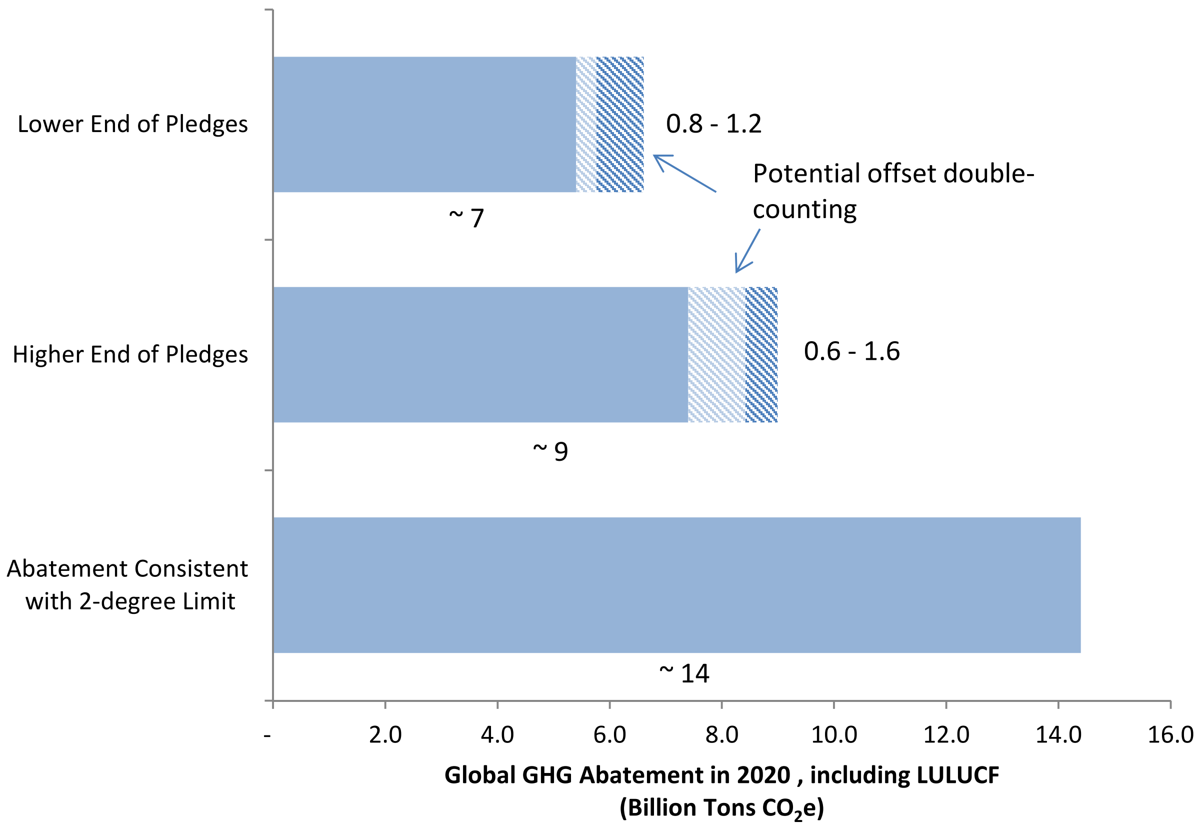
Achieving a net emissions benefit, or merely ensuring that global emissions do not increase as a result of international offsets transactions, will require that all countries involved in international offset transactions adopt consistent and rigorous rules for offset accounting. Without such rules, however, international offsets could well lead to the weakening of ambition in at least three ways: by allowing for offsets of dubious quality, i.e. where one ton of credit represents less than a ton of reductions; by the counting of same reductions more than once by multiple, overlapping offset mechanisms (among CDM and sectoral mechanisms, or among various bilateral mechanisms); and for double-counting of reductions towards the pledges of purchasing (developed) and supplying (developing) countries. As our analysis demonstrates, double-counting between buyer and seller alone could weaken pledges by up to 1.6 GtCO_2e, an amount on par with the current emissions of the world's fifth largest emitter, Japan (1.3 Gt CO_2e) (World Resources Institute 2011).

To put these figures into context, Figure 3, below, displays the scale of potential offset double-counting relative to the pledges, and to the total global abatement needed in 2020 to stay on a pathway with reasonable chance of limiting warming to 2°C. The overall gap between pledged and required abatement shown here, 5 to 7 Gt CO_2e, is in line with the gap estimated by UNEP (2010). [28] The figure shows that **double-counting of international offsets could lead to Copenhagen pledges being diluted by as much as 1.6 Gt CO_2e in 2020, or 10% of the total abatement required in 2020 to stay on an emissions pathway consistent with a 2°C temperature limit.** Or put another way, if double-counting is not effectively addressed, it could increase the 5-7 Gt CO_2e abatement gap by as much as 20%.

[27] Under JI, for each offset (ERU) issued, a corresponding allowance (AAU) is cancelled. This is unlikely to be an option, as developing countries will not be operating under assigned amounts and holding allowance accounts, as in the Kyoto system.

[28] While the UNEP study (2010b) develops its estimates using a meta-analysis of several emissions studies, we rely solely on the McKinsey BAU and abatement cost estimates for simplicity, consistency, and availability of regional and sectoral detail (McKinsey & Company 2010). The UNEP (2010b) median estimates use a lower median BAU emissions projection for 2020, and thus both the required abatement and pledge levels (some of which are relative to 2020 BAU emissions) are lower in the UNEP analysis than shown here.

Figure 3. Scale of Potential Offset Double-Counting Compared to Copenhagen Pledges and Required Global Abatement



As noted earlier, offset double-counting is one of several key accounting issues that remain unaddressed. Other unresolved issues include: the scope of covered greenhouse gases and sectors, accounting for LULUCF, and the disposition of surplus emission units carried over from the first commitment period of the Kyoto Protocol (Levin et al. 2010). For example, analysts have estimated that 11 Gt CO_2e in surplus allowances may be generated in 2008 to 2012, when some Kyoto Protocol countries have and will reduce emissions below the level of their caps due to factors (e.g., the economy) other than climate policy (Rogelj et al. 2010; Kartha 2010). These allowances could potentially be banked and used in future years to satisfy pledges. UNEP estimates that surplus emissions units, if used towards pledge attainment, could reduce pledged abatement by 1 to 2 Gt CO_2e in 2020.

Box 2. Key Uncertainties in Offset Estimates

Our analysis is based on assumptions of full pledge attainment, relatively ambitious abatement potentials (McKinsey & Company 2010), and high fungibility of emission reductions among regions. Because of the following issues, it is important to note that uncertainties may be larger than the range of our estimates of offset flow and potential double-counting might suggest:

- Not all countries are likely to pursue the most economically efficient pathway to meeting their pledges, at least in the sense of minimizing GHG abatement costs. Other national priorities, such as competitiveness and national security, may induce some countries to pursue more abatement internally or buy more offsets than our model suggests. In addition, domestic politics could lead some countries not to meet their pledges or to exceed them, also affecting the level of offset purchases.
- Abatement options in developed countries could be far more expensive than expected, or otherwise not attainable for political or technical reasons, leading to increased demand for international offsets. Likewise, developed countries could place further limits on the use of international offsets for political or other reasons.
- Availability of abatement in developing countries and of developed country finance to support pledge achievement. Developing country pledges may depend upon significant levels of additional finance, yet to materialize. Furthermore, the degree of economic growth directly affects pledge ambition where the pledges are based on emissions intensity per GDP (i.e., China and India) or are relative to a future BAU (e.g., Brazil).
- The ability of new or reformed offset mechanisms to increase offset supply is unknown. Analysts have suggested that REDD crediting could provide well over 1.0 Gt CO_2e of credits in 2020 (Parpia 2009; ONF International 2008). In our *expanded mechanisms* case of offset supply, we assume that new or expanded mechanisms (sectoral crediting, sectoral trading, REDD crediting, or NAMA crediting) will enable the crediting of reductions from sectors thus-far less amenable to project-based crediting (REDD, buildings, transportation, agriculture). However, such mechanisms face significant hurdles, and their ability to deliver real and additional credits is by no means assured.
- The country sources of offsets and whether those countries have quantified pledges. Our model assumes offsets from countries without quantified pledges are not double-counted, but if more offsets were instead sourced from countries with pledges (particularly because these countries may be willing to subsidize the cost of the abatement projects), double-counting could increase. Furthermore, many countries have communicated their NAMAs in forms other than emissions pledges, such as renewable energy targets, for which questions of offset double-counting might also arise. Accordingly, we have reported results as ranges, and suggest further exploration of this issue.

This analysis demonstrates that offset double-counting threatens not only the future credibility of international offset mechanisms, but the environmental integrity of the Cancún Agreements as a whole. Policymakers have several options that could directly or indirectly address these concerns. Three of these options would directly guard against double-counting by establishing where on the "pledge-attainment ledger" offsets would be counted (Levin et al. 2010):

- **Counting offsets for the buyer only,** as analyzed in section 4 above;
- **Sharing crediting between buyer and seller,** and;
- **Partitioning emission sources covered and not covered by developing country pledges, with only the latter available for crediting,** as discussed below.

In conjunction with one of the above accounting approaches, complementary efforts could be helpful in managing offset double-counting, as well as improving the rigor and credibility of offset mechanisms in general. These efforts include:

- **The use of a common international transaction tracking mechanism for all offsets** counted towards pledge attainment (Levin et al. 2010), with assignment of unique serial numbers to each ton transacted or registered;
- **The use of methodologies that ensure high quality** for all such offsets that preclude double-counting both domestically and internationally and reduce the risk of compounding efficiency and environmental integrity concerns through non-additional credits, and
- **Development of new crediting mechanisms** capable of clearly delineating reductions that could be attributed to domestic vs. international support, and thus awarding offsets only to reductions that exceed a certain level of domestic ambition, for example, for a given sector.

We discuss each of these options below, and consider how they fare against some common objectives: effectiveness at reducing emissions (does option support attainment of pledged reductions, exceeding of pledges, and/or deeper reductions post-2020?), technical feasibility and administrative capacity, and efficiency in terms of global cost-effectiveness. We summarize the key issues with each option below, and gauge their ability to meet the above objectives in Table 6. Note that these three objectives shown here are not comprehensive; we do not review, for example, the ability of these remedies to deliver sustainable development benefits, a key mandate of the CDM.

Counting offsets for the buyer only is the most straightforward accounting remedy to double-counting between buyer and seller. It is consistent with how offsets have been traditionally managed in cap-and-trade systems such as the Regional Greenhouse Gas Initiative (RGGI) in the United States, as well as under the Kyoto Protocol for national emission reduction obligations. The EU has supported this accounting approach for new mechanisms in the LCA track. However, it stands in contrast to the stated positions of some developing countries to count CDM-driven reductions toward their mitigation pledges (Federative Republic of Brazil 2010). Crediting the buyer also presents a scenario where developing countries may lose the ability to take credit for their lowest-cost or most attractive abatement options, and are thus required to rely upon more expensive or difficult measures to achieve their pledges. Such issues could be addressed by guaranteeing the provision of sufficient additional finance not associated with offsets, or by developing countries allowing credit issuance only for higher cost or otherwise more difficult-to-implement abatement options. Otherwise, developing countries with pledges might not support crediting of offsets only to buyer countries, and those without pledges may be dissuaded from taking on pledges in the future.

Sharing the credit of a given offset activity as a function of the financial or other contribution of each country (or by a fixed 50/50 or other ratio) could also help address these concerns (Levin et al. 2010). In other words, assuming that one ton of offset credit led to one ton of emissions benefit, then the buyer (developed) country would get to count some fraction of the credit, and the seller (developing) country would get to count the remaining portion. Yet the mechanics of how such a shared credit scenario could be implemented are far from clear. On one hand, a shared crediting system is as simple as the developing country adding the offset credit awarded to another country back to its emissions ledger. The accounting would be just as in the *Offsets Count for Buyer Only* scenario, except that in this case the country would add only a fraction (in this example, half) of a ton of credit for each ton of emissions reduction expected from the offset project. However, if the shared credit system involved only this accounting and no supplemental incentives from the host country, offset project developers would realize only half the income they might otherwise expect from the offset project, potentially compromising the viability of projects that might depend on expected revenue at full crediting to proceed.[29] Accordingly, the host government may need to be an active participant in the carbon market, subsidizing a portion of each project. Alternatively, international finance mechanisms could be used to provide matching funds or other complementary support. In either case, the developing county would still need to consider whether the added burden on its pledge (by undertaking mitigation actions for which it must share credit with another country) is worthwhile.

Clearly partitioning potential sources of offsets – whether by sector, subsector, or gas – from the actions that may be used by developing countries to fulfill pledges, could limit double-counting, while also giving clarity to offset project developers, since sources of offsets and associated financing (the international carbon market) would be clarified (Levin et al. 2010). Delineating the sources of offsets could be undertaken through either developing country (supply-side) or developed country (demand-side) policies (or both). For example, China could state that it intends to sell offsets only from certain non-CO_2 project types, and clarify that its pledge is indeed on CO_2 only.[30] Or, as is already being explored in the EU, developed countries could limit their sources of offsets to combinations of project types and country sources that are not covered by pledges (e.g., Least Developed Countries). While offering a fairly clean method to avoid double-counting, this option might weaken the ambition of pledges, if key, fast growing sectors of developing country economies were to be excluded from the accountable pledge. It might also prove very difficult to make good decisions on which sectors to include, or to distinguish activities within a broad sector (e.g. power) that countries might undertake on their own accord (e.g. wind or hydro) from those that might require international (carbon) finance (e.g. CCS, large-scale solar).

The UNFCCC currently maintains a **comprehensive international transaction log** (ITL) that links to domestic registries, and tracks the transfer of emission units among Parties under the Kyoto Protocol. The ITL could be maintained and expanded to track all international offset transactions among

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[29] In such a case, a shared credit would add much like a discount. From a purely theoretical perspective, and ignoring risk factors, projects with abatement costs approximately half or more of the of the expected value of offset sales would not otherwise proceed. For a summary of the effects of discounting on the economics of offset project initiation, see Dixon et al. (2008).

[30] China's pledge (as submitted) is stated in terms of CO_2: "China will endeavor to lower its carbon dioxide emissions per unit of GDP by 40-45" by 2020 compared to the 2005 level." As noted earlier, it is unclear whether the exclusion the term "equivalent", as in CO_2e, was intentional. Due to projected autonomous improvement in its non-CO_2 intensity (US EPA 2006; McKinsey & Company 2010), China's 40-45% intensity target may actually more ambitious on a CO_2 basis than if on a CO_2e basis.

countries, or a new independent tracking system established, which could be an important element of any approach to systematically limit the double-counting of offsets (Levin et al. 2010). Establishing such an international transaction log or registry, as has been suggested by Norway[31], could also help to reduce some of the market uncertainty created by the development of new offset mechanisms (Aasrud et al. 2010).

Another important tool in managing the environmental risks of international offset transactions is **the development and use of consistent and stringent offset methodologies**. By consistent, we mean that offset methodologies should be consistent across regions, sectors and project types as well as consistent across current (CDM) and potential new mechanisms. For example, sectoral mechanisms will need to account for the possible presence of CDM activities or activities from other offset mechanisms that might be established (bilateral or multilateral) in the sectors covered (and vice versa) to avoid counting the same reductions twice (or more). Furthermore, new offset mechanisms should award a similar level of credits for similar activities, through the use of similar baseline and monitoring methodologies. Consistency will be essential in ensuring that a ton is a ton across accounting systems, even if it is impossible to know with certainty whether a ton of offsets equals a ton of reductions, due to the counterfactual nature of offsets.

In fact, it is the fundamental uncertainty surrounding offset projects – i.e. the extent to which they might be non-additional, that high baselines might overstate the emissions avoided, or that leakage or other risks to offset quality causes offset use to actually *increase* net emissions – that has led to calls for stringent or conservative offset methodologies (Offset Quality Initiative 2008). The risks associated with non-additional offsets, as well as the difficulty in adhering to a strict additionality definition, have been well documented elsewhere (Schneider 2007; Wara and Victor 2008; Michaelowa and Purohit 2007).[32] In general, offset projects may yield fewer (or more) emission reductions than the number of credits issued (Erickson et al. 2011). It is important to note that our analysis has thus far implicitly assumed that each ton of offsets represents a corresponding ton of emission reduction, where in all likelihood, a significant fraction may not. The presence of significant "over-crediting" due to non-additionality, inflated baselines, or other factors, could have different impacts depending on the offset accounting approach.

Suppose, for example, that all new wind and hydro power capacity in developing countries (with pledges) installed between 2010 and 2020 under our "business-as-usual" projection were credited as offsets.[33] Of course, we cannot know that these BAU wind and hydro plants were not influenced by the prospect of CDM, given that the CERs are now issued for a significant fraction of wind and hydro development, and no BAU scenario is fully prescient. But let's assume for the sake of analysis, that this BAU projection – drawn from McKinsey, which in turn drew on the IEA's World Energy Outlook 2009 – is a reasonable metric of new wind and hydro capacity that would be installed in the absence of incentives from international offsets. If the more than 700 TWh of new wind and hydro generation were credited at CDM rates, then by 2020, it could result in approximately 0.6 Gt CO_2e of non-

[31] February 21, 2011, submission on market mechanisms, http://unfccc.int/files/meetings/ad_hoc_working_groups/lca/application/pdf/norwegian_submission_market_based_mechanisms_21_feb_2011.pdf.

[32] Estimates of the fraction of CDM credits that are non-additional are inherently speculative. Schneider (2007) estimated that additionality is unlikely or questionable for 40% of registered CDM projects. David Victor of Stanford University has estimated that between one-third and two-thirds of CDM credits could be non-additional (McCully 2008). An assessment of hydro projects in China concluded that a "great majority" are non-additional (Haya 2007).

[33] Wara and Victor (2008) show that nearly all new wind and hydro capacity in China in a recent year (2007) had applied for CDM crediting.

additional offsets. If this level of offsets were used to meet pledges in developed countries in 2020, under an *Offsets Count Twice* scenario, global abatement would be 0.6 Gt CO_2e lower than would have occurred had those pledges been met with additional offsets or domestic abatement.[34]

However, under the *Offsets Count for Buyer Only* scenario, developing countries would, in principle, need to add the issued offset credits to the emissions ledgers. In order to meet their pledges, developing countries would need to pursue an added 0.6 Gt CO_2e of abatement to cover the non-additional projects. This amount would represent an increase in targeted abatement by developing countries of over 15%. While non-additional or over-credited offsets would not present the same risk to global abatement levels as they would if the offsets were double-counted per the prior scenario, they are still problematic, in this case presenting an added burden for developing countries in pursuit of emission reduction pledges.

While these hypothetical non-additional offset projects might bring added investment to developing countries in 2020, these same countries would need to pursue large quantities of additional abatement to meet their pledges. Perhaps such a realization would increase calls for very stringent offset methodologies, so only projects and actions well beyond BAU are credited. But what if, instead, developing countries with pledges stopped issuing offsets after 2012 at all? Doing so would give them more certainty in meeting their pledges (under an *Offsets Count for Buyer Only* scenario), while constraining offset supply to developed countries. One observer has proffered this could have the outcome of driving up abatement costs in developed countries and increasing purchases of renewable energy technologies increasingly made in China and other developing countries (Lutken 2010).

Finally, the design of **new crediting mechanisms** could build in, from the outset, a partitioning of credit for emissions reductions among host countries, offset mechanisms, and other additional finance from developed countries. Some proposed approaches to sectoral and NAMA crediting mechanisms (including REDD+ crediting) would work in just this fashion, by setting separate baselines for unilateral, supported, and credited actions (Ward et al. 2008). At the same time, NAMA crediting is an unpopular concept among some developing countries, and sectoral mechanisms face significant implementation challenges (Carnahan 2010).

[34] Because under this scenario, abatement in developing countries is counted whether or not CDM offsets are awarded, the issuance of non-additional offsets would have no direct effect on developing country emissions, and thus on pledge attainment. In contrast, because developed countries could count these offsets towards their pledges, these non-additional offsets would allow them to increase emissions by 0.6 $GtCO_2$e.

Table 6. Assessment of Potential Remedies for International Offset Double-Counting and Related Concerns

		Effectiveness at Reducing Emissions	Technical Feasibility / Administrative Complexity	Efficiency/ Cost-effectiveness
Accounting Approach	*Offsets Count Twice*	May result in significant dilution of pledged global abatement. Non-additional credits remain an added risk.	Simple to administer.	Creates economic distortion (artificially reduces apparent abatement costs).
	Offsets Count for Buyer Only	Shifts location of emissions but no net reduction of emissions beyond pledges. Non-additional credits (from developing countries with pledges) are a risk only if these developing country pledges not met.	Adds the need for developing (host) countries to add offset credits back on to emissions account for purposes of tracking progress towards pledge.	Increases apparent abatement costs faced by seller countries in meeting their pledges (unless supplemental financing is available).
	Shared Crediting	Shifts location of emissions but no net reduction of emissions beyond pledges.	Same as for *Offsets Count for Buyer Only* scenario. May create need for supplemental financing from host country or international body.	Increases apparent abatement costs faced by buyer countries (unless supplemental financing is available).
	Delineate sectors and sources eligible for offsets but not included in pledges	Would address double-counting between buyers and sellers. May dilute (or deepen) existing pledges depending on BAU trends in the respective sectors.[35]	Simple to administer.	Reduces potential size of the offset market. May increase disparity in marginal abatement costs among parties.
Complementary Options to Address Offset Accounting and Quality	International transaction log	Provides essential function in avoiding double-counting, whether between buyer and seller or multiple buyers of similar offsets (if there are multiple offsets mechanisms).	ITL already exists; ability to manage a more decentralized offset system is unclear.	n/a
	Stringent, and consistent offset protocols	Helps control magnitude of double-counting. Aims to reduce non-additionality and other quality risks. Can leverage additional reductions if applied outside targeted countries/sectors.	Requires process (or third party) to develop and/or review methodologies.	Improves efficiency to the extent crediting ratio moves closer to 1 credit per actual ton abated. Reduces efficiency to the extent new investment opportunities are lost.
	New mechanism design	Can build in a partitioning of credit between host and buyer based on contribution (e.g. sectoral crediting).	Sectoral mechanisms (including REDD+) are relatively complex and face significant implementation challenges.	Depends on mechanism design.

[35] For example, if taken literally, China's pledge (stated as CO_2, not CO_2e) excludes non-CO_2 gases which are growing more slowly in the country than CO_2, and so an intensity-based pledge on CO_2 in China is actually more ambitious than a pledge on all gases. In such a case, delineating offsets to be sources from non-CO_2 gases would not dilute China's pledge.

6. Conclusions

This report has forecast the potential scale of offset transactions in 2020 assuming minimal limits on their use by developed countries, continued scaling up of the offset market according to recent rates observed in the CDM, relative costs of abatement between countries as assessed by McKinsey and Company (2010), and pledges as submitted under the Copenhagen Accord. Given these assumptions, we find that offsets could play a significant role in meeting developed-country pledges in 2020 – providing abatement to these countries exceeding 1 Gt CO_2e.

For example, our economic analysis suggests that with major access to, and ability to acquire, developing country abatement through offsets, the United States would meet its 2020 pledge – a 17% reduction in emissions from 2005 levels corresponding to an estimated 1.3 Gt CO_2e of abatement relative to business-as-usual, through domestic abatement of about 1.0 Gt CO_2e and international offsets of about 0.3 Gt CO_2e.[36] This suggests a scale of domestic abatement in the United States consistent with an ambitious scenario of federal and state action and largely consistent with a previous WRI analysis that charted a path for the United States to reduce emissions by 14% compared to 2005 levels in 2020 (Bianco et al. 2010). If the United States realized only a 14% reduction through domestic measures, then international offsets may prove a key element of how the United States might achieve its pledge. Perhaps, more importantly, given that the pledges fall short on ambition, international offsets could offer a mechanism to help developed countries, like the United States, to deepen their respective pledges.

Yet significant decisions remain that will substantially determine whether offsets will contribute productively to meeting a global mandate to reduce emissions on a pathway consistent with limiting warming to 1.5 or 2°C . As described in this paper, the prospect of double-counting is a loophole that could weaken the lower end of pledges by as much as 1.2 – 1.4 Gt CO_2e, and on the higher end of pledges by 1.2-1.7 Gt CO_2e. Coupled to this is the possibility of considerable non-additional credits, which could lead to the further weakening of pledges.

Upcoming international meetings will provide the opportunity to address these concerns directly. Building on prior work (Levin et al. 2010; UNEP 2010b), this paper lays out a series of broad, potential remedies that can help to address double-counting, as well as other key concerns related to international offsets.

[36] Assuming the offset market continues to scale as in our *current mechanisms* case and under the assumption that countries meet the low end of their pledges.

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Appendix 1: How Offsets Shift the Location of Emissions (Cap-and-trade example)

In a cap-and-trade program, offsets provide an additional compliance option to capped entities by allowing them to surrender an offset credit in lieu of an allowance, where an allowance is the right to emit one ton of CO_2e by an entity subject to binding emissions regulation. When offsets are surrendered in place of allowances, the total number of allowances in the system remains unchanged. As a result, offsets allow for emissions in capped sectors or regions to exceed the cap as they are, in effect, simply shifting emissions from uncapped to capped sectors or regions, as illustrated in Figure 4 below.

Figure 4. How Offsets Shift Emissions in a Typical Cap-and-Trade Program

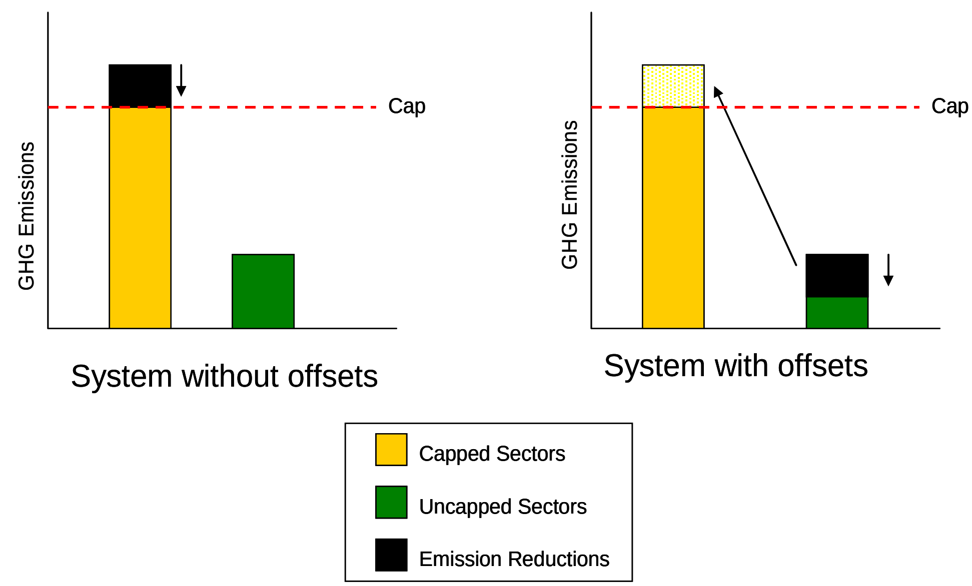
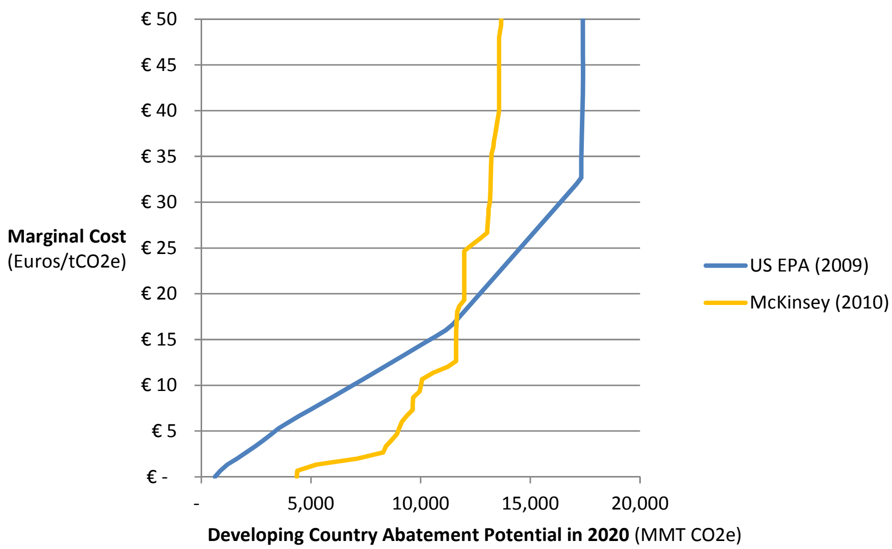


Figure 4 illustrates the most common context for offsets, where offsets come from sectors or regions not covered by an emissions pledge or cap. This is the case, for instance, for CDM offsets from developing countries in the Kyoto Protocol and certain sectors such as landfills and forestry in proposed US domestic cap-and-trade systems (or within the confines of the EU ETS). However, there are other contexts under which offsets can come from sources subject to an overall emissions cap. This is the case, for example, under the Kyoto Protocol's Joint Implementation (JI), where offsets can be generated in countries subject to an overall emissions limit under the Kyoto Protocol. When offsets are issued for JI project activities, a corresponding number of emissions allowances are cancelled in that country's account, effectively increasing the emission reductions that might be needed for that country to meet its target (unless those same offsets are used domestically). This distinction between JI and CDM accounting suggests two very different ways in which offsets from developing countries with voluntary pledges might be accounted for, each with quite different implications for double-counting, on the one hand, and for the attractiveness of offset issuance, on the other.

Appendix 2: Comparison of McKinsey to U.S. EPA Marginal Abatement Curves

Our analysis forecasts use of less than 0.1 up to 0.5 Gt_2e of international offsets by the United States in 2020, depending on the ability of offset supply to grow rapidly and on the ambition of other countries' pledges. Recent analyses by U.S. government agencies have forecasted offset usage between 0.4 and well over 1.0 Gt CO_2e in 2020 for legislation with similar ambition as the current 17% pledge (EPA 2009). All of these government analyses use MACs derived from underlying modeling by the U.S. Environmental Protection Agency to characterize the costs of abatement in U.S. and other countries. Given that both the U.S. agency and our analyses start with marginal abatement cost curves, it is useful to compare these underlying assessments of abatement potential in developing countries. In particular, below we compare the two MACs in the year 2020 for developing countries. As can be seen, the EPA assessment shows much less abatement potential at costs under 10 euros. The key reason for this difference is that for both energy-related and forestry abatement, the EPA assessment relies on top-down models that assume (by definition) that no abatement is possible at zero cost and that also have a more comprehensive treatment of leakage.



Compounding the differences in choice of MAC used, analysts use dramatically different assumptions about the ability of markets to scale up and access the abatement potential embedded in a MAC (EPA 2009). For example, in this study, we assume in our *current mechanisms* case that offset potential is limited by the ability of project-based offset mechanisms to grow at the rate observed in the CDM in 2008 and 2009 – constraining offset transactions to about 1.3 Gt CO_2e in 2020 globally, a much more constrained assumption than that generally used in the EPA's legislative analyses (EPA 2009). Furthermore, studies can use much different assumptions about the demand for offsets from the United States and other developed countries, based on differences in the costs and quantities of abatement available internally in these countries.

Appendix 3: Additional Model Results

The main body of this report presents modeling results on international offset usage and double-counting. The report described two scenarios –*Offsets Count Twice* and *Offsets Count for Buyer Only* – and four cases of potential offset supply and demand (corresponding to low and high supply, assessed as offset supply from *current mechanisms* versus *expanded mechanisms*, crossed with low and high demand, assessed as pledges with lower and higher ambition of emission reductions). The report focused discussion (including charts and detailed results) primarily on the case of offset supply assuming *current mechanisms* and lower ambition pledges, with results from other cases presented to help characterize the potential range of results. This appendix presents modeling results for all cases applied to both scenarios. (Charts are only presented for the *Offsets Count Twice* scenarios but are available upon request.)

The following table maps out which of the following tables and figures address each scenario and case.

Scenario	Offset Mechanisms	Pledge Ambition	
		Lower	Higher
Offsets Count Twice	Current mechanisms	Table 7 Figure 5	Table 7 Figure 6
	Expanded mechanisms	Table 8 Figure 7	Table 8 Figure 8
Offsets Count for Buyer Only	Current mechanisms	Table 9	Table 9
	Expanded mechanisms	Table 10	Table 10

Table 7. Forecast Emissions, Offset Usage, and Abatement in 2020 in Developed Countries under Offsets Count Twice Scenario, Current Offset Mechanisms Case (Gt CO_2e in 2020)

	U.S.	Europe	All Other Developed	Total
BAU	6.8	5.5	6.1	18.4
Pledged Abatement – Lower Ambition	1.3	1.0	0.7	3.0
Pledged Abatement – Higher Ambition	1.3	1.5	0.8	3.7
Assumed Offset Limit – Lower Ambition	None	0.5	None	
Assumed Offset Limit – Higher Ambition	None	0.8	None	
Forecast Offset Usage – Lower Ambition	0.3	0.5	0.4	1.2
Forecast Offset Usage – Higher Ambition	0.2	0.7	0.4	1.3
Forecast Internal Abatement – Lower Ambition	0.9	0.5	0.3	1.7
Forecast Internal Abatement – Higher Ambition	1.1	0.8	0.4	2.4
Fraction of Abatement as Offsets – Lower Ambition	26%	47%	61%	41%
Fraction of Abatement as Offsets – Higher Ambition	15%	45%	49%	35%

Table 8. Forecast Emissions, Offset Usage, and Abatement in 2020 in Developed Countries under Offsets Count Twice Scenario, Expanded Offset Mechanisms Case (Gt CO_2e in 2020)

	U.S.	Europe	All Other Developed	Total
BAU	6.8	5.5	6.1	18.4
Pledged Abatement – Lower Ambition	1.3	1.0	0.7	3.0
Pledged Abatement – Higher Ambition	1.3	1.5	0.8	3.7
Assumed Offset Limit – Lower Ambition	None	0.5	None	
Assumed Offset Limit – Higher Ambition	None	0.8	None	
Forecast Offset Usage – Lower Ambition	0.3	0.4	0.4	1.2
Forecast Offset Usage – Higher Ambition	0.3	0.8	0.5	1.6
Forecast Internal Abatement – Lower Ambition	1.0	0.5	0.3	1.8
Forecast Internal Abatement – Higher Ambition	1.0	0.8	0.3	2.1
Fraction of Abatement as Offsets – Lower Ambition	25%	45%	56%	39%
Fraction of Abatement as Offsets – Higher Ambition	23%	50%	60%	43%

Table 9. Forecast Emissions, Offset Usage, and Abatement in 2020 in Developed Countries Under Offsets Count for Buyer Only Scenario, Current Offset Mechanisms Case (Gt CO_2e in 2020)

	U.S.	Europe	All Other Developed	Total
BAU	6.8	5.5	6.1	18.4
Pledged Abatement – Lower Ambition	1.3	1.0	0.7	3.0
Pledged Abatement – Higher Ambition	1.3	1.5	0.8	3.7
Assumed Offset Limit – Lower Ambition	None	0.5	None	
Assumed Offset Limit – Higher Ambition	None	0.8	None	
Forecast Offset Usage – Lower Ambition	0.3	0.4	0.4	1.0
Forecast Offset Usage – Higher Ambition	0.1	0.6	0.3	0.9
Forecast Internal Abatement – Lower Ambition	1.0	0.6	0.4	1.9
Forecast Internal Abatement – Higher Ambition	1.2	1.0	0.6	2.8
Fraction of Abatement as Offsets – Lower Ambition	21%	42%	50%	35%
Fraction of Abatement as Offsets – Higher Ambition	5%	37%	34%	25%

Table 10. Forecast Emissions, Offset Usage, and Abatement in 2020 in Developed Countries Under Offsets Count for Buyer Only Scenario, Expanded Offset Mechanisms Case (Gt CO_2e in 2020)

	U.S.	Europe	All Other Developed	Total
BAU	6.8	5.5	6.1	18.4
Pledged Abatement – Lower Ambition	1.3	1.0	0.7	3.0
Pledged Abatement – Higher Ambition	1.3	1.5	0.8	3.7
Assumed Offset Limit – Lower Ambition	None	0.5	None	
Assumed Offset Limit – Higher Ambition	None	0.8	None	
Forecast Offset Usage – Lower Ambition	0.3	0.4	0.4	1.2
Forecast Offset Usage – Higher Ambition	0.3	0.8	0.5	1.6
Forecast Internal Abatement – Lower Ambition	1.0	0.6	0.4	1.9
Forecast Internal Abatement – Higher Ambition	1.2	1.0	0.6	2.8
Fraction of Abatement as Offsets – Lower Ambition	25%	44%	56%	39%
Fraction of Abatement as Offsets – Higher Ambition	22%	50%	59%	42%

Figure 5. Offset Usage and Accounting Under Offsets Count Twice Scenario (Lower Pledge Ambition, Current Offset Mechanisms Case)

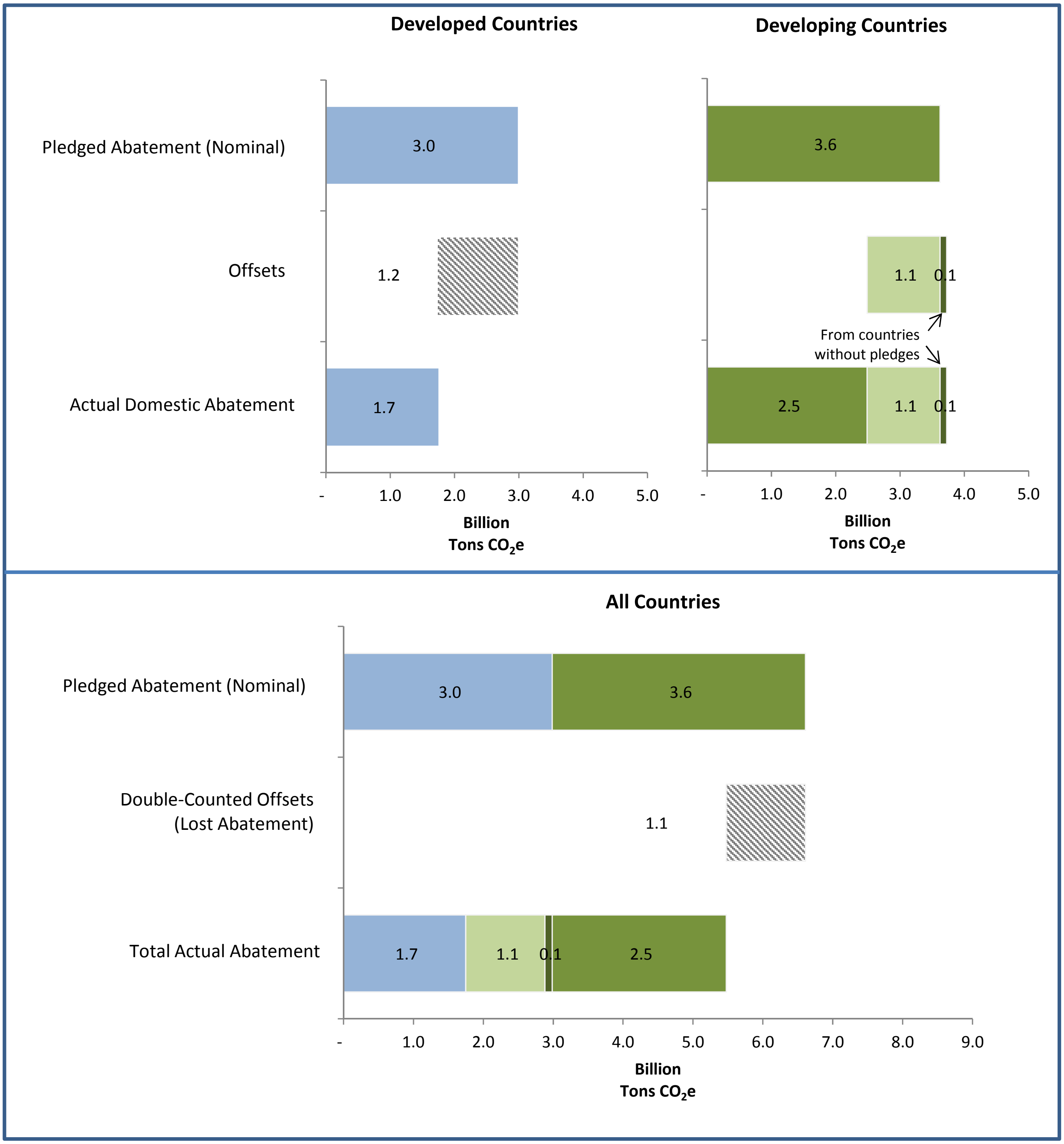


Figure 6. Offset Usage and Accounting Under Offsets Count Twice *Scenario (Higher Pledge Ambition, Current Offset Mechanisms Case)*

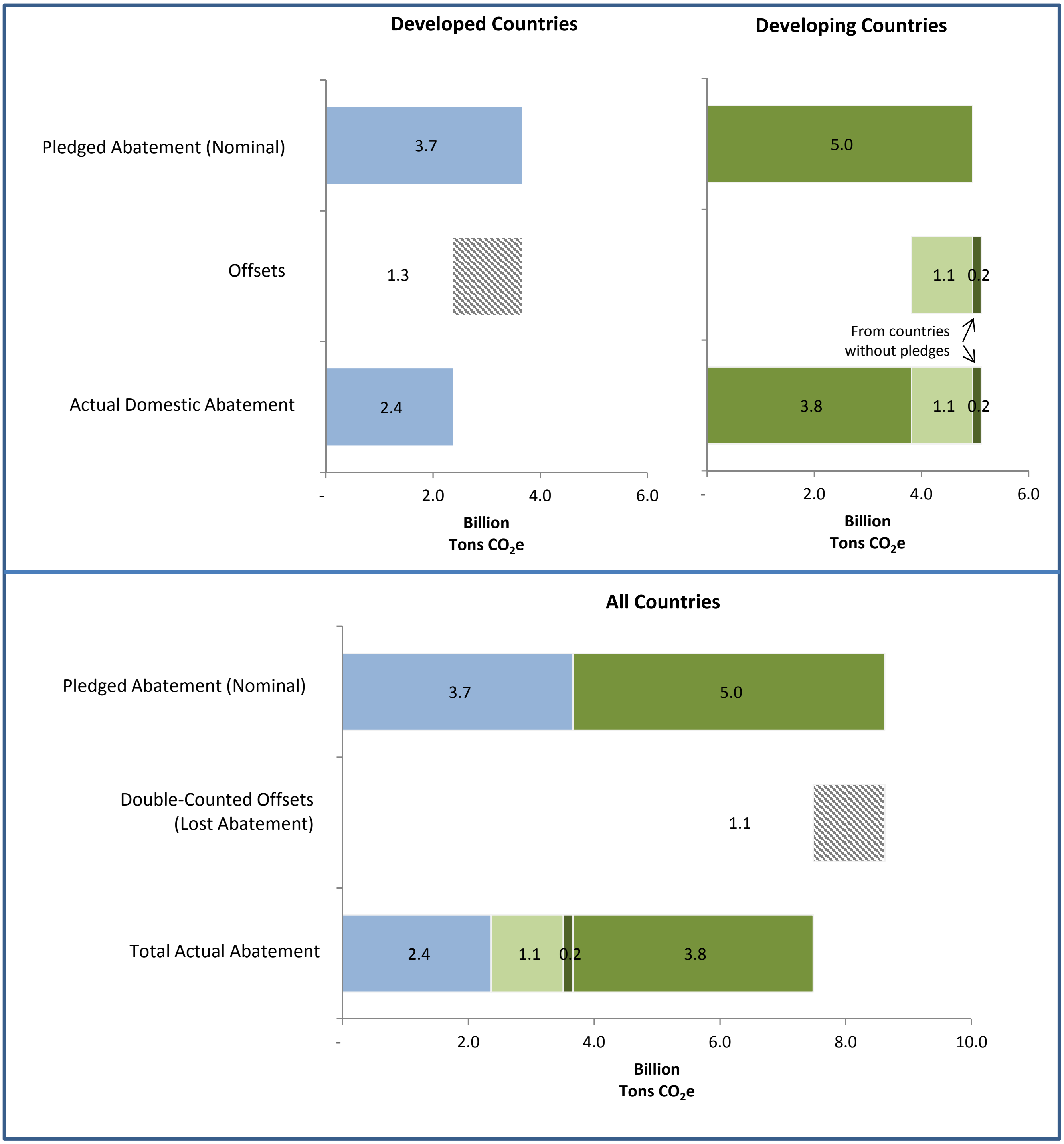


Figure 7. Offset Usage and Accounting Under Offsets Count Twice *Scenario (Lower Pledge Ambition, Expanded Mechanisms Case)*

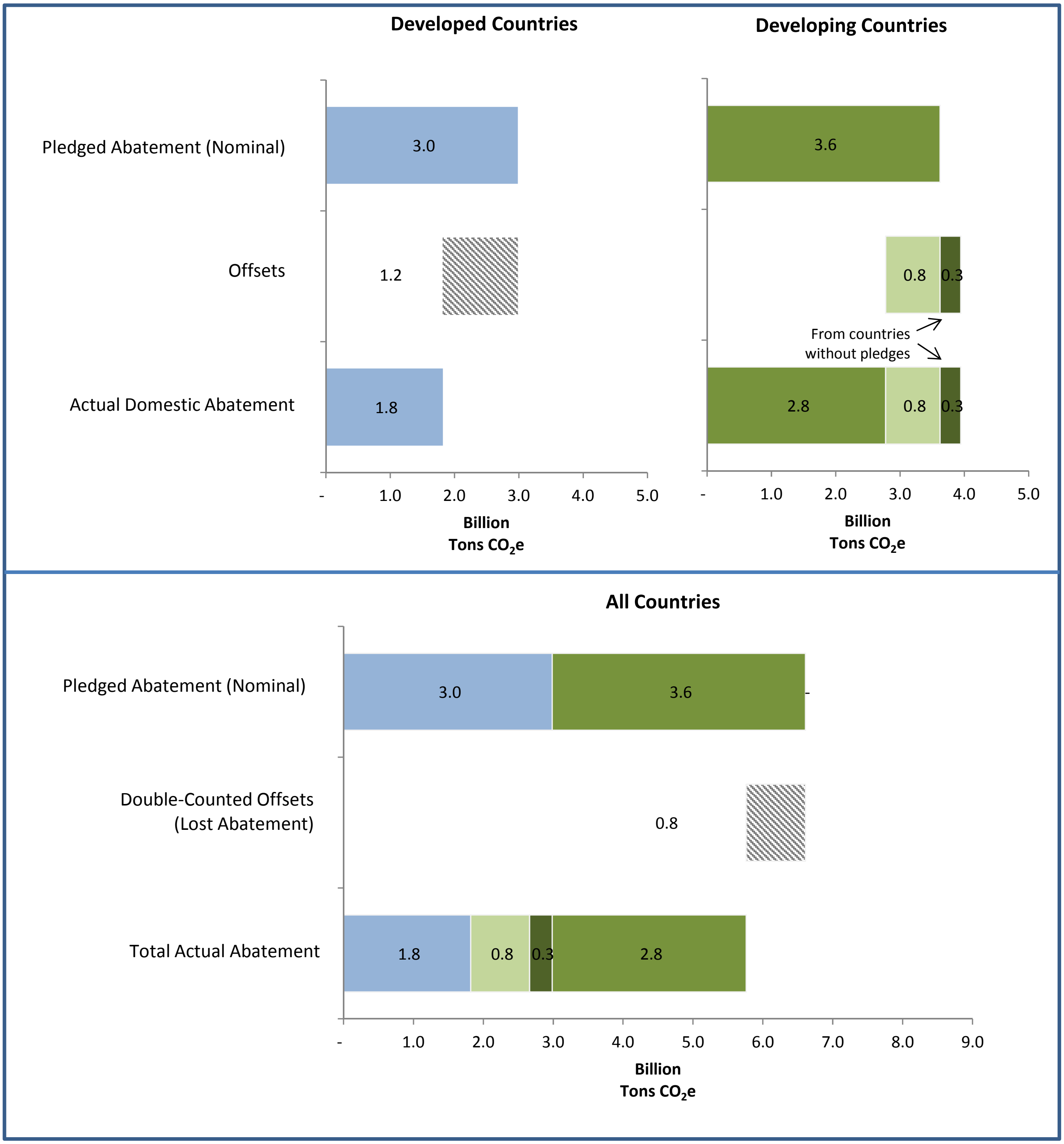


Figure 8. Offset Usage and Accounting Under Offsets Count Twice *Scenario (Higher Pledge Ambition, Expanded Mechanisms Case)*