Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (REDD): Implications for the Carbon Market[*]

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Executive Summary

*R*educing *E*missions from *D*eforestation and Forest *D*egradation in tropical forest developing nations ("*REDD*") offers the potential for achieving multiple benefits in the areas of climate change mitigation, biodiversity protection, and sustainable development. To date, large-scale forest protection efforts have been financed primarily by official development assistance (ODA); even with generous ODA financing from many industrialized nations, the scale of economic incentives historically available has not been sufficient to serve as a counterweight to the economic pressures that favor deforestation in many nations.

Bringing emission reductions achieved by protecting forests at large scale into future carbon markets has the potential to be transformative. Carbon markets have the potential to marshal forest protection resources commensurate with the problem of deforestation globally – and none too soon. Failure to achieve significant progress in stemming the tide of global deforestation risks losing most of the world's remaining forests and all of the ecosystem and social services they provide. The current decade and the next are crucial.

While forest conservation represents a prime source of low-cost reductions of greenhouse gas emissions, especially over the next ten or twenty years, there is no place for these tons in existing carbon market policy frameworks (the Kyoto Protocol, the current EU Emissions Trading Scheme). Previous negotiations on these policy frameworks excluded these tons, primarily because of concerns about difficulties in measuring deforestation, and because of concerns about leakage. Substantial progress has been made in each of these areas. The world's remote sensing scientists are now in agreement that the tools are in hand to measure tropical forests with a high degree of accuracy. And a promising approach, namely to enable developing nations themselves to earn carbon credits for verified emissions reductions against an agreed national baseline, has made substantial progress in addressing leakage.

Allowing REDD credits to be used for compliance in cap-and-trade programs, both in the EU and the United States, could accomplish several goals at once: it would create a powerful incentive for the protection of tropical forests, transform the dynamics for forest protection world-wide, encourage large emissions reductions in tropical forest developing nations, and help preserve the world's options to avert global warming of more than two degrees above preindustrial levels. In addition, REDD credits could help to manage the costs of compliance in countries that take on economy-wide caps – helping to create and maintain the political will to achieve deep reductions in emissions.

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A prominent concern with REDD, however, has been that emissions reductions from forests will be so abundant as to "flood the carbon market," driving down the price of greenhouse gas (GHG) allowances and dampening incentives for emissions reductions in capped countries or for investment in clean technologies.

In this paper, we explore this concern using a simple spreadsheet-based tool developed by Environmental Defense Fund (EDF) to analyze carbon market conditions under various policy scenarios. Our main findings are as follows:

- Forest carbon credits from developing countries, including REDD credits, have considerable potential to help limit the costs of compliance with cap-and-trade programs in the EU and United States. In our model, allowing the use of REDD credits for compliance lowers the projected price of GHG allowances by roughly 13%. A more expansive policy allowing credits from all forestry activities in developing countries would reduce prices by as much as one third.

- Nonetheless, the concerns about forest carbon credits "flooding the market" and driving the price into the single digits are unfounded. Even if no regulatory limit were placed on the use of forest carbon credits for compliance with cap-and-trade programs, and even if forest carbon credits throughout the developing world became available within the next five years, our model projects that the market price of GHG allowances would be $16/tonne in the year 2012, rising to $24/tonne by 2020 and $40/tonne by 2030. These levels are high enough to ensure that critical low-carbon technologies, such as renewable energy sources and carbon capture and sequestration, remain economically viable.

- If REDD credits are allowed for compliance, but not credits from other forestry activities, the projected price of allowances in the US and EU markets is $21/tonne in the year 2012, rising to $30/tonne in 2020 and $49/tonne by 2030.

- These key qualitative conclusions are robust to alternative assumptions about the availability and cost of forest carbon credits. For example, even if we increase the supply of REDD credits by a factor of two above our base case – assuming that turn out to be twice as plentiful as the best available estimates – we still project an allowance price of $18/tonne in 2012, rising to $27/tonne by 2020 and $43/tonne by 2030.

- The crucial factor that sustains prices at a moderate level is the ability to bank allowances for the future. Forest carbon credits represent a promising reservoir of low-cost emissions reductions that are available in the short term. Their true economic value lies in their potential to be banked for the future — lowering costs over the course of decades, rather than being used all at once.

For purposes of this analysis, to be as conservative as possible, we assume that forest carbon credits are available in the near term, without quantitative limits. Consequently, our model may *overstate* the price impact of allowing these credits into the carbon market.

Policy makers may still decide it is prudent to impose limits on the allowable use of forest carbon credits for compliance. Our main conclusion, however, is that economic incentives alone will help to prevent forest carbon from "flooding the market." Forest carbon credits can be allowed into the US and G1 markets without fear that they will undermine incentives for investment in low-carbon technologies.

1 Introduction

The destruction of forests – principally in the tropics – emits massive amounts of carbon dioxide: approximately 20% of global greenhouse gas (GHG) emissions, or roughly as much each year as all the CO_2 emitted by all the fossil energy consumed in the United States. When forest carbon emissions are included, the third and fourth largest emitters of GHGs in the world are Indonesia and Brazil, respectively.

Forestry activities in the developing world represent a prime source of low-cost reductions of greenhouse gas emissions, especially over the next ten or twenty years. A range of estimates indicate that the cost of forest protection in some parts of the world is far less than the cost per ton of more expensive means of reducing CO_2 emissions given today's technologies.[1] In particular, reducing deforestation in tropical forest nations could make a substantial contribution to addressing climate change. Afforestation and changes in forest management also offer considerable potential for carbon sequestration, reducing net emissions of carbon into the atmosphere.

On the other hand, if the world waits a decade or two to create powerful incentives for compensating those who protect tropical forests, the forests – and the approximately 300 billion tons of carbon they hold – will already be gone.

Because tropical forest nations are unlikely to take on mandatory caps on emissions in the near term, a policy mechanism is needed to compensate them for emissions reductions achieved in the near term. A promising approach is to give credits for verified emissions reductions against a national baseline — credits that could then be used for compliance in cap-and-trade programs in the European Union (and eventually, perhaps, the United States). This proposal, known as *R*educing *E*missions from *D*eforestation and Forest *D*egradation (REDD) crediting, would encourage emissions reductions in tropical forest nations while helping to manage the costs of compliance in countries that take on economy-wide caps. At the same time, REDD crediting would leverage the carbon market to create a powerful incentive for the protection of tropical forests. Over time, this approach could be supplemented with credits for rigorously verified and measured sequestration by afforestation and changes in forest management.

Although the argument for this policy mechanism is compelling, the scope of emissions reduction and sequestration opportunities in developing countries — and the potential for forest carbon credits to lower compliance costs in cap-and-trade programs — have not been well estimated. At the same time, several observers (particularly in Europe and in the environmental community) have expressed concerns that forest carbon credits might be so inexpensive and plentiful that they will be "flood the market," and will drive down the price of allowances far enough to undermine incentives for the industrial and electric power sectors to invest in reducing their own emissions. If forest carbon credits were "too cheap to meter," these observers ask, will they end up hindering the development of the new clean technologies that will be needed to make deep emissions cuts in the long run?

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[1] Intergovernmental Panel on Climate Change, *Climate Change 2007: Mitigation of Climate Change, Summary for Policymakers* (4 May 2007), page 21. Published on the Internet at: (http://www.ipcc.ch/SPM040507.pdf). Nicholas Stern, *The Economics of Climate Change: The Stern Review* (October 2006), page 537 ("The Stern Review: The Economics of Climate Change"). Nepstad, D., B. Soares Filho *et al.*, 2007. The Costs and Benefits of Reducing Carbon Emissions from Deforestation and Forest Degradation in the Brazilian Amazon. (www.whrc.org/BaliReports/).

As a first cut at exploring these issues, EDF has developed a spreadsheet-based tool to assess the supply of international forest carbon credits from the developing world. Using this tool, EDF has conducted a simple modeling exercise to assess the potential impact of on GHG markets of allowing such credits to be used for compliance in the EU and United States. Our analysis takes into account the interplay of the *supply* of emissions reductions (through abatement and sequestration) and the *demand* for those reductions (driven by government policies). Banking is also modeled explicitly – a crucial feature, given that forest carbon tons in particular represent a reservoir of low-cost abatement that could allow entities to build up an allowance bank in the early years of a cap-and-trade program.

We model a global market for emissions credits, and consider a policy scenario in which the United States enacts the Lieberman-Warner legislation; the European Union, Japan, Canada, Australia, and New Zealand reduce emissions 60% below 1990 level; and the rest of the world begins reducing emissions in 2020 and reaches 1990 levels by 2050. We assume that there are no quantitative restrictions on the number of forest carbon credits that can be used by regulated entities in the United States or European Union for compliance with their domestic cap-and-trade programs. This assumption does not reflect current reality. The European Union's Emissions Trading Scheme (ETS) does not allow forest carbon tons at all in its current phase; nor are such credits envisioned as part of the EU Climate Change Package. Meanwhile, the current version of the Lieberman-Warner bill (manager's amendment, released 21 May 2008) would allow REDD credits, but only under strict quantitative limits. Nonetheless, we consider scenarios without quantitative restrictions in order to explore the *potential* impact of forest carbon credits on the global carbon market.

By the same token, the supply curves we use attempt to capture the economic potential for sequestration from reduced tropical deforestation, forest management, and afforestation. They do not take into account the needs for institutional capacity building, implementation, transactions costs, and so on. As a result, the results presented here should be viewed as a "scoping exercise" to convey the potential magnitude of the opportunity from forest carbon credits.

The bottom line from our analysis is that there is a large reservoir of potential net emissions reductions from forests in the developing world – especially from reduced deforestation in tropical areas. These forest carbon tons can play a crucial role in keeping open options for averting 2° C of warming, as they can serve as a bridge to the time when low-carbon energy technologies are more affordable and more widely deployed. At the same time, they can help moderate the long-term path of GHG allowance prices in the European Union and the United States, helping entities in those countries to manage their costs of compliance with a cap-and-trade program and bolstering political support for deep reductions in emissions.

We find that the short-run price impact of allowing forest carbon credits into the market will be mitigated by "banking," provided that banking is allowed in policy frameworks. By "banking" we refer to the ability of regulated entities, in any given year, to save surplus allowances and credits for use in future years. Banking plays a crucial role in our results because it creates an economic link across years – so that the value of a ton of abatement in the early years of a program is driven in part by the cost of reducing emissions later, when caps are more stringent. Rather than flooding the market and driving down the price in the short run, only to have the price rise sharply again later, forest carbon credits will represent a deep reservoir of low-cost abatement that is available now but can be banked to help manage costs in the future.

The next section discusses our methodology and assumptions in more detail. Section 3 presents our key results, and Section 4 concludes.

2 Methodology

Our simple model solves for an intertemporal equilibrium for the period 2012-2050 in which two conditions are met in every year: (1) the market clears (i.e. the quantity of credits demanded at the current price, including banked tons, equals the quantity supplied at that price); and (2) the present value of the international credit price is equal in every period (i.e., the price rises at the market rate of interest).

Throughout this paper, all monetary values are stated in real (inflation-adjusted) terms and in 2005 dollars. Emissions and abatement are expressed in metric tonnes of carbon dioxide equivalent (mtCO2e).

Supply of emissions reduction credits

The supply of credits comes from abatement and sequestration activities throughout the world. We use EPA's marginal abatement cost curves for energy-related and non-CO2 emissions reductions in industrialized and developing countries, and for non-CO2 abatement in the United States.[2] The estimates of U.S. energy-related abatement supply curves are taken from an analysis by researchers at the Massachusetts Institute of Technology, using the EPPA model.[3] Finally, for international forest carbon activities we draw on estimates by Brent Sohngen of Ohio State University.[4] These marginal abatement cost curves shift over time, reflecting assumed changes in technology and underlying conditions (e.g. baseline rates of deforestation).

As discussed in more detail below, we also perform sensitivity analyses by running the model with more or less generous assumptions about the quantity of forest carbon credits available.

Demand for abatement

The demand for allowances is driven by the emissions caps imposed by government policy. Policy assumptions are as follows:

- The United States enacts the Lieberman-Warner legislation, reducing emissions to 70% below 2005 levels for the 85% of the economy covered by the bill.

- Group 1 countries (European Union, Japan, Canada, Australia, New Zealand) continue reducing emissions roughly in line with the current Kyoto Protocol, reaching 20% below 1990 by 2050 and 50% below 1990 levels by 2050.

- Group 2 countries (rest of the world – that is, developing countries plus Russia) emit at business-as-usual levels until 2020, and then reduce emissions steadily to 1990 levels by 2050.

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[2] These estimated marginal abatement cost curves are included in the technical materials provided by the EPA in its Data Annex to its report on S.2191, available at http://www.epa.gov/climatechange/downloads/DataAnnex-S.2191.zip.

[3] We derive energy-related marginal cost curves from the results of MIT's modeling of U.S. climate policy presented in Sergey Paltsev, John M. Reilly, Henry D. Jacoby, Angelo C. Gurgel,
Gilbert E. Metcalf, Andrei P. Sokolov, and Jennifer F. Holak, "Assessment of U.S. Cap-and-Trade Proposals,"' MIT Joint Program on the Science and Policy of Global Change Report No. 146 (April 2007), 66 pp.

[4] We use Sohngen's curves from the Energy Modeling Forum 21 based on rising carbon price scenarios, which are the most internally consistent with our model structure. These data are available at: http://www.stanford.edu/group/EMF/projects/group21/EMF21sinkspagenew.htm

Although our focus is on forest carbon credits from developing countries, we also take into account offsets from energy-related emissions in developing countries, as well as non-CO2 gases; in the Kyoto Protocol framework, these correspond to Certified Emissions Reductions under the Clean Development Mechanism. Throughout this paper, we refer to credits arising from these emissions reductions as "offsets," and refer to reductions and sequestration from forest activities exclusively as "forest carbon credits." We assume that G1 countries allow up to 10% of abatement to come from these offsets. On the other hand, we assume that the United States does *not* allow such offsets for compliance, until developing countries begin reducing their emissions. We do, however, assume that the United States allows the use of credits from other capped nations — meaning the G1 countries in the first eight years of the program, and the entire world from 2020 onward.

Policy scenarios for forest carbon

In order to assess the potential role played by forest carbon credits, and REDD credits in particular, we compare model results from several scenarios. In all scenarios, we use the overarching targets described above. All scenarios allow offsets for emissions reductions from forestry in the US, G1, and Russia.

1. Benchmark scenario. No forest carbon credits from developing countries allowed for compliance in the US or G1.

2. Core REDD scenario. Forest carbon credits from reduced deforestation in tropical forest nations only (i.e., South America, Asia Pacific, and Africa).

3. REDD sensitivity scenarios: (a) Twice as many REDD credits available at every given price, relative to the baseline assumptions in Scenario 2; (b) Half as many REDD credits available at any given price.

4. Core All-Forestry scenario. Forest carbon credits allowed from all forestry activities in developing countries, including afforestation and forest management as well as reduced tropical deforestation.

5. All-Forestry sensitivity scenarios: (a) Twice as many forest carbon credits available at every given price, relative to Scenario 4; (b) Half as many forest carbon credits available at any given price.

Banking

A crucial feature of our approach is the assumption that agents optimize abatement decisions across time by "over-complying" in early years (or purchasing forest carbon credits on the market) and banking the resulting allowances for later. The ability to bank allowances is especially important in the context of international offsets from forestry. Since forest tons represent a large pool of relatively low-cost emissions reductions opportunities in the early years, they are a natural candidate for banking. This is true both for the U.S. and G1 countries (whose demand for forest carbon credits in early years increases when those credits can be banked for later) and for the developing countries where the emissions reductions occur (since they can now prepare for their eventual acceptance of mandatory emissions reductions).

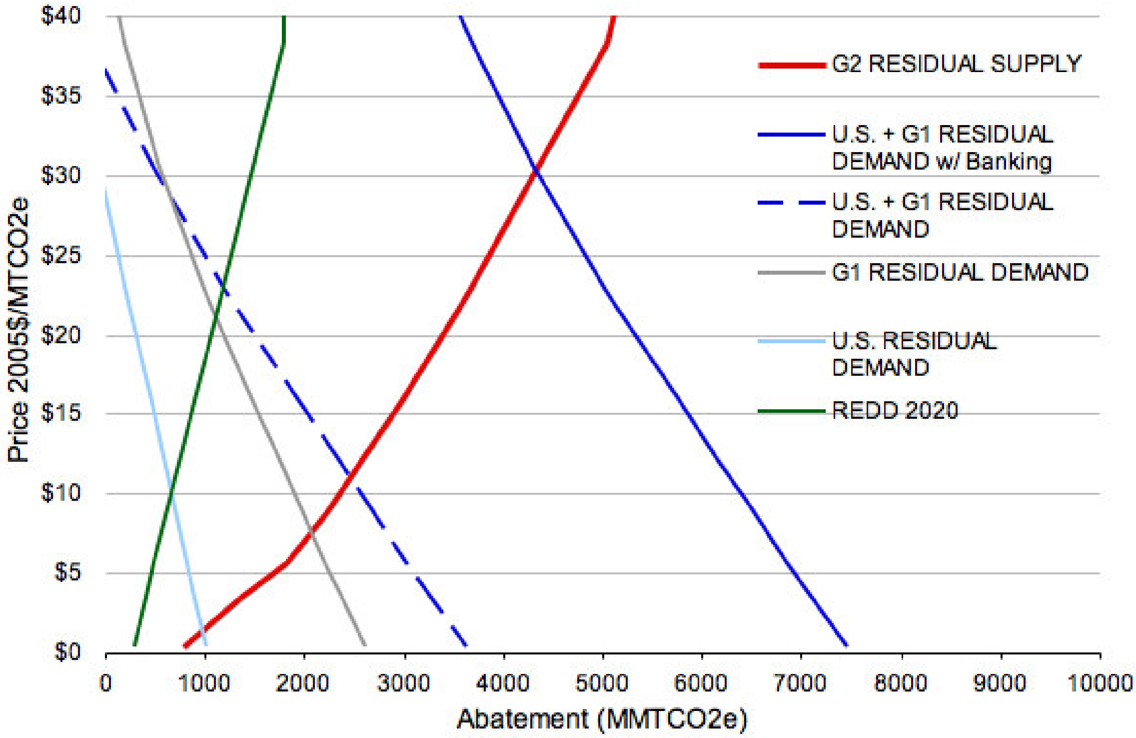


Figure 1 – Supply and demand in 2020: the importance of banking. The dashed blue line represents "current-use" demand, while the solid blue line depicts total demand. The difference between the two represents banking for compliance in future years. Demand and supply correspond to the REDD-only core scenario (Scenario 2).

Figure 1 demonstrates the importance of banking. The figure depicts the market for GHG allowances in the year 2020, with price (in dollars per ton) on the vertical axis and allowances (i.e., abatement, in millions of metric tonnes of CO2-equivalent, or MMTCO2e) on the horizontal axis. The upward-sloping red line represents the projected supply of offsets from developing countries; forest carbon credits, which are a subset of these offsets (and are included in the red line), are highlighted in green.

The dashed blue line represents current demand for allowances from the United States and G1 countries, given the policy assumptions described above. The *solid* blue line represents total demand, including demand for banked tons (effectively, demand for tons in 2020 that is driven by future compliance needs). In the early years, as in 2020, banking is positive (the bank is being built up), hence the solid line lies to the right of the dashed line. In effect, the demand for allowances increases because it now takes into account future demand. (In later years, banking is negative – the bank is being drawn down – hence the positions of the solid and dashed lines are reversed.)

As Figure 1 shows, banking raises allowance prices in the near term, as market participants build up the allowance bank. In our model, the projected price of allowances in the year 2020 is $30/tonne, under the REDD core scenario depicted in the figure. This price corresponds to the intersection of the solid red and blue lines. Without banking, the price would be driven only by current demand, and would correspond to the intersection of the solid red line and the dashed blue line, around $11/tonne.

To model banking, we treat agents as if they have rational expectations about the future, in line with standard economic theory.[5] As a result, allowance prices must increase at a constant rate of interest reflecting the real rate of return in the market. In our analysis, this interest rate is an exogenous parameter which must be chosen: here, we present results with a 5% interest rate. (A higher assumed interest rate would "tilt" the time profile of offset prices, so that they started out lower but increased more rapidly.)

The intuition behind the steadily rising prices is a simple arbitrage argument. If prices were expected to rise at any rate other than the prevailing market rate of return, investors could make a pure profit by buying or selling allowances relative to other assets. For example, if prices rose at a faster rate, it would pay investors to buy and hold allowances in order to sell them later at a profit. The resulting current increase in demand would raise prices today, forcing them to rise more slowly in the future and bringing the market back into intertemporal equilibrium.

Of course, in reality prices will not rise as smoothly as this model would predict. Shocks and unexpected events constantly force the market to readjust its expectations of the future, and prices move as a result. However, such a smooth price path is the best single prediction of the future, since it is the only predicted path that is consistent with market equilibrium and profit- maximizing behavior by market agents.

3 Results

We now present the main results of our modeling exercise. What is the likely impact on GHG allowance prices of allowing international forest carbon credits? How many such credits are likely to be available at prevailing prices? And what is the profile of these credits over time?

Allowance prices

Figure 2 address the first question, showing the effect of forest carbon on projected allowance price paths. Under our baseline scenario, the allowance price is projected to be $23/tonne in the year 2012 (rising thereafter at 5% in real terms). Under Scenario 2, with REDD credits allowed, the projected price falls by 13% to $21/tonne.[6] Under Scenario 4, with credits from all forestry activities in developing countries, the projected price falls an additional $5, to $16/tonne. Table 1 presents results for all scenarios.

Table 1 – Allowance price forecasts. Core scenarios are shaded.

SCENARIO		2012	2020	2030	2040	2050
1	Baseline (no forest credits)	$23	$35	$56	$92	$150
2	REDD-only core	$21	$30	$49	$80	$131
3a	REDD x2	$18	$27	$43	$70	$115
3b	REDD x1/2	$22	$32	$53	$86	$140
4	All Forest core	$16	$24	$40	$65	$105
5a	All Forest x2	$12	$18	$30	$49	$79
5b	All Forest x1/2	$20	$29	$48	$78	$127

[5] To implement banking, we use the macro program included in the Offset Market Tool program developed by the EPA and made available in the Data Annex to its analysis of the Lieberman-Warner legislation.
[6] The numerical values given are rounded to the nearest dollar. The percentage numbers reflect the more precise estimates, and thus may not match the apparent percentage changes from the figures given in the table.

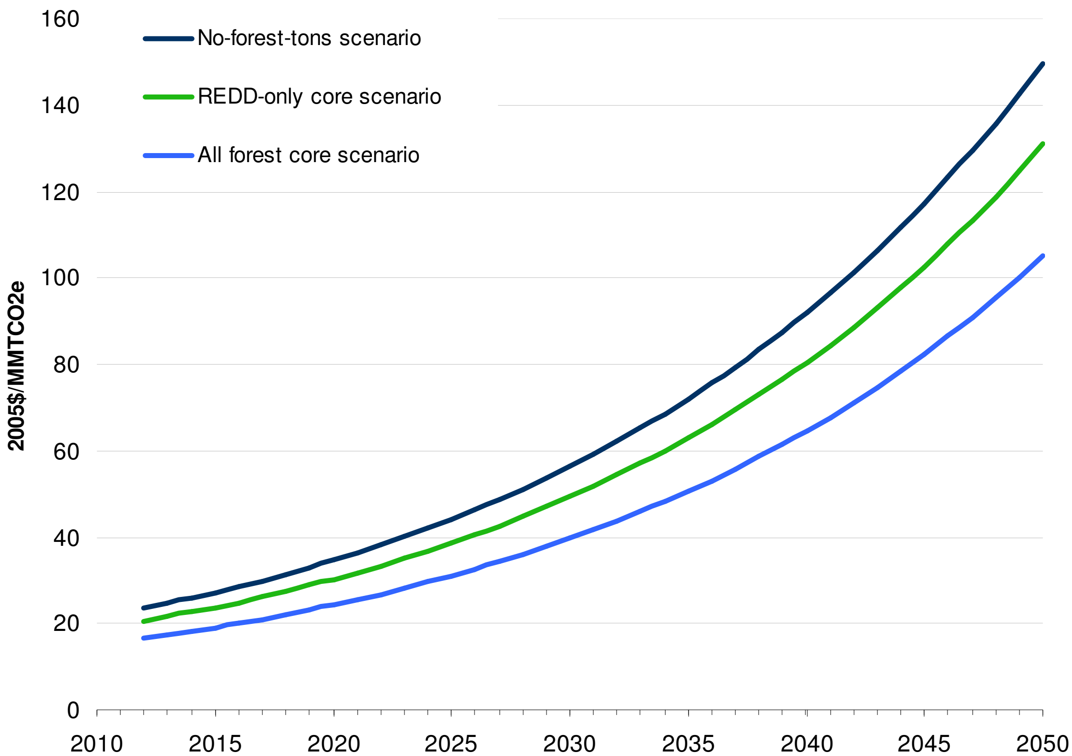


Figure 2 – Impact of international forest carbon credits on projected GHG allowance prices. The top line shows projected prices in the baseline scenario without forest carbon credits; the middle line shows the scenario with REDD tons; and the bottom line shows prices with all forest activities. (As noted in the text, all price paths rise at an assumed rate of 5% per year in real terms.) According to these estimates, allowing REDD credits will reduce the initial price in 2012 by three dollars per tonne, from $23/tonne to $20/tonne. Allowing credits from all forestry activities reduces the projected price by another $4/tonne.

Quantity of international forest carbon credits

We now turn to the quantity of international forest carbon credits under the two core scenarios (Scenarios 2 and 4). The next several figures offer a comprehensive look at the composition of abatement from all sources used for compliance in the United States and G1 markets.

Figures 3a and 3b, on the next page, show projected worldwide abatement by source under the two scenarios. The green areas in each chart correspond to forest carbon credits due to reduced deforestation, afforestation, and forest management in tropical nations; the orange and yellow layers correspond to emissions credits from forestry activities elsewhere in non-G1 countries (including countries in the former Soviet Union). The blue areas correspond to energy-related and non-CO2 offsets from the developing world; the gray areas at the bottom correspond to abatement within the G1 countries (light gray) and United States (dark gray). The upward-sloping line represents total demand for allowances.

Two conclusions emerge. First, total abatement exceeds demand in the first two decades of the program. In the figure, the colored areas rise above the line representing demand: The difference corresponds exactly to banking. (In later years, of course, the colored areas fall below demand, as the allowance bank is drawn down.) Moreover, the bank is comparable in magnitude to the quantity of forest carbon credits on the market. Hence forest carbon credits are crucial in providing a source of supply for the bank.

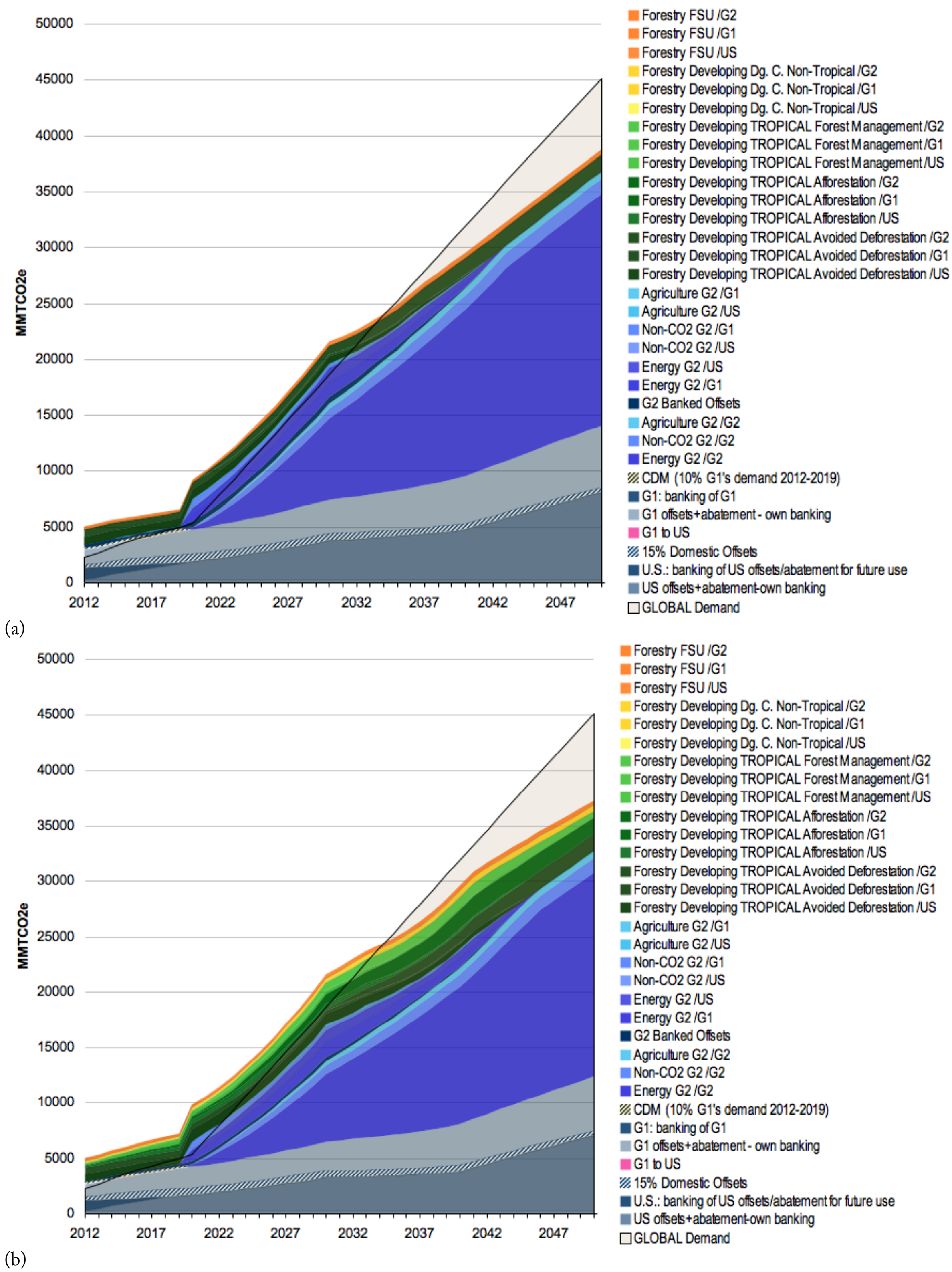
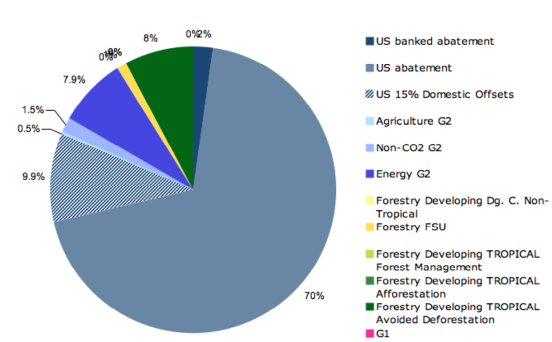
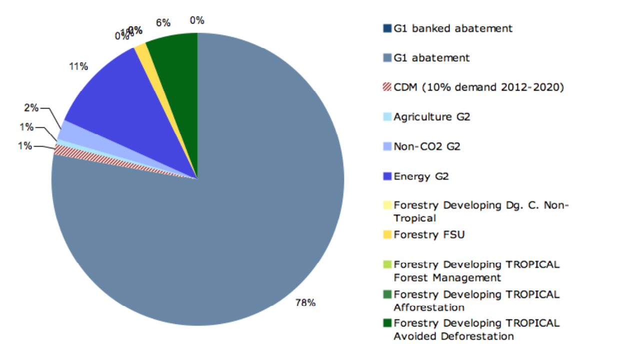


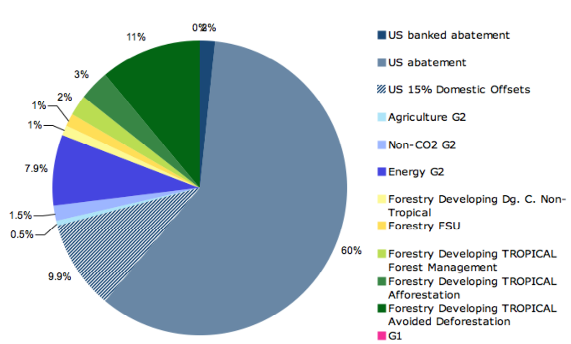
Figure 3 – Abatement by source activity. The charts depict worldwide abatement by source activity, for the REDD core scenario (top panel) and the All forestry core scenario (lower panel). In both scenarios, total abatement exceeds demand in the first two decades of the program, as the allowance bank is built up.



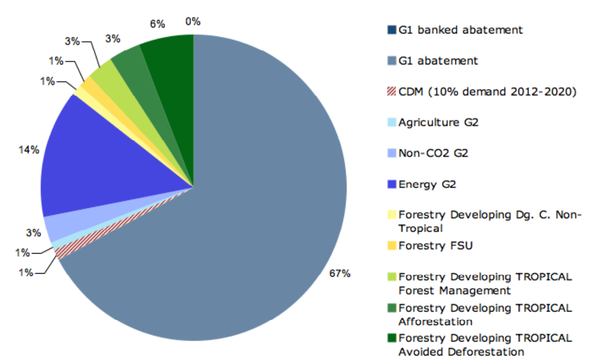
(a) REDD only; US. Total abatement: 213 GTCO2e.



(b) REDD only; G1 countries. Total abatement: 166 GTCO2e.



(c) All forestry; US.



(d) All forestry; G1 countries.

Figure 4 – Composition of total abatement for the US and G1 countries. Each chart depicts the breakdown of abatement by source activity, for the US (panels (a) and (c)) and G1 countries (panels (b) and (d)). The top two panels depict the REDD core scenario, while the bottom two correspond to the All Forestry core scenario.

The second conclusion to emerge from the figures is that forest carbon credits account for a significant portion of abatement, they are hardly "flooding the market." This point is reinforced by the pie charts in Figure 4 (above). Each chart shows the breakdown of total abatement by source. The top two charts correspond to the REDD-only core scenario; the bottom two include all forestry activities. The left-hand charts depict the United States, while the right-hand charts show G1 countries.

In the REDD-only core scenario, REDD credits used for compliance in the US and G1 countries account for 27 gigatonnes of abatement over the period modeled here (2012-2050), with roughly two-thirds of that going to the US. This amounts to about 10% of total abatement in the US and G1 markets combined. In the All Forestry core scenario, forest carbon credits altogether account for 51 gigatonnes, or 18%.

For both the US and G1 markets, however, the great majority of abatement over time – 60 to 75% – comes from reduced energy-related CO2 emissions within those countries. (These are the gray-blue areas in the pie charts in Figure 4.)

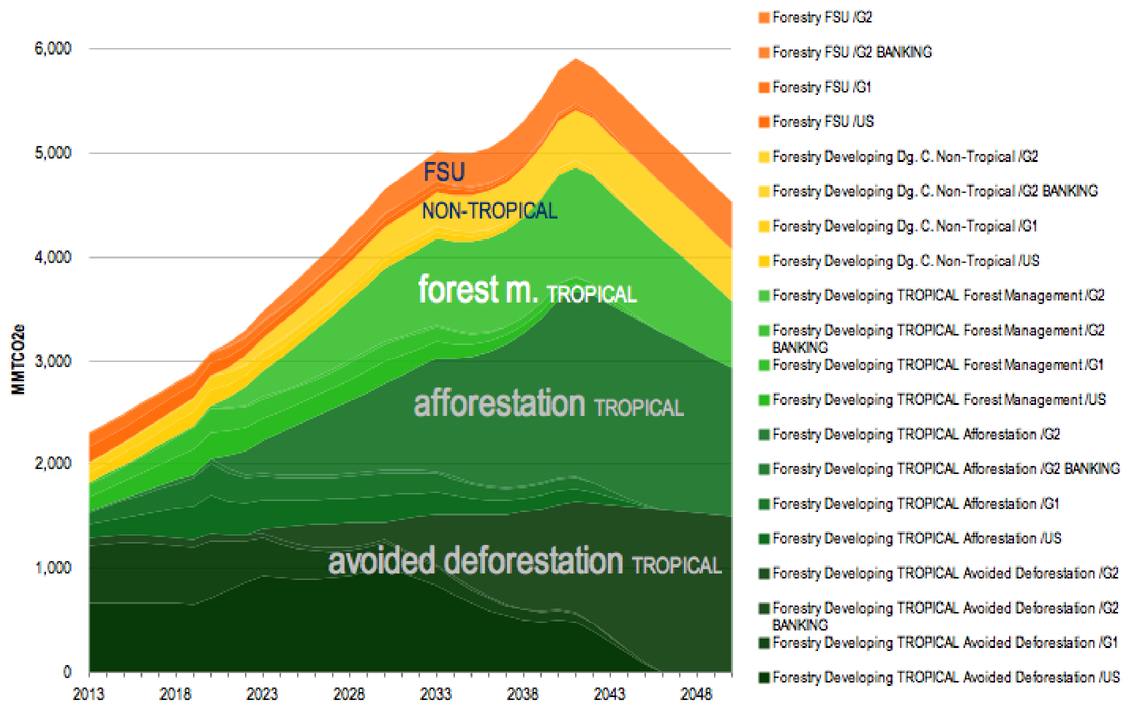


Figure 5 – Composition of forest carbon credits. This chart depicts forest carbon credits only, for the All Forestry core scenario. Avoided tropical deforestation is represented by the dark green band at the bottom of the chart.

Reduced deforestation in comparison to other forestry activities

As Figures 3 and 4 illustrate, reduced deforestation in tropical nations accounts for the majority of credits from forest activities that are used for compliance in the US and G1 countries, even when other sources of forest credits are allowed. Figure 5 shows the breakdown of all forest abatement by source for the All Forestry core case. When developing countries are taken into account, as in Figure 5, avoided deforestation continues to account for a substantial share of abatement, although it plays a proportionally smaller role than afforestation in cumulative terms.

Robustness to alternative assumptions about availability of forest tons

Given the considerable uncertainty surrounding the availability and cost of emissions reductions from forestry, it is worth exploring how our results might change under alternative assumptions of the supply of forest carbon credits. Accordingly, we performed a simple sensitivity analysis (Scenarios 3a,b and 5a,b), first doubling and then halving the number of REDD and forest carbon credits available at any given price. (Recall the presentation of the results in Table 1.)

The striking conclusion from the sensitivity analysis is how little the qualitative conclusions are affected. In the REDD-only policy case, the initial allowance price ranges from $18/tonne (when the supply of REDD credits is doubled) to $22/tonne (when it is halved) – relative to $21/scenario in our core scenario. Again, banking plays a crucial role. Even when the supply of REDD credits is doubled, the impact on near-term prices is still moderated by the opportunity to save the resulting tons for compliance in future years. A similar conclusion holds for the All Forestry scenarios, where the projected price in 2012 ranges from $12/tonne (if forest carbon credits are plentiful) to $20/tonne (if they are scarce).

4 Conclusion

The precise projections to come out of this analysis, of course, depend heavily on the underlying assumptions that must be made. The results are driven by assumptions about the timing and stringency of international policy, the availability and cost forest carbon credits, and the extent to which they are allowed into the market. Nonetheless, several conclusions emerge from this analysis that are likely to be robust to a range of alternative assumptions and scenarios.

1. Forest carbon credits from developing countries, including REDD credits, have considerable potential to help limit the costs of compliance with cap-and-trade programs in the EU and United States. In our model, allowing the use of REDD credits for compliance lowers the projected price of GHG allowances by roughly 13%. A more expansive policy allowing credits from all forestry activities in developing countries would reduce prices by as much as one third.

2. Even if no regulatory limit were placed on the use of forest carbon credits for compliance with cap-and-trade programs, and even if forest carbon credits throughout the developing world became available within the next five years, our model projects that the market price of GHG allowances would be $16/tonne in the year 2012, rising to $24/tonne by 2020 and $40/tonne by 2030. These levels are high enough to ensure that critical low-carbon technologies, such as renewable energy sources and carbon capture and sequestration, remain economically viable.

3. If REDD credits are allowed for compliance, but not credits from other forestry activities, the projected price of allowances in the US and EU markets is $21/tonne in the year 2012, rising to $30/tonne in 2020 and $49/tonne by 2030.

4. These key qualitative conclusions are robust to alternative assumptions about the availability and cost of forest carbon credits. For example, even if we increase the supply of REDD credits by a factor of two above our base case – assuming that turn out to be twice as plentiful as the best available estimates – we still project an allowance price of $18/tonne in 2012, rising to $27/tonne by 2020 and $43/tonne by 2030.

5. The crucial factor that sustains prices at a moderate level is the ability to bank allowances for the future. Forest carbon credits represent a promising reservoir of low-cost emissions reductions that are available in the short term. Their true economic value lies in their potential to be banked for the future — lowering costs over the course of decades, rather than being used all at once.

Importantly, we have focused solely on the potential for forest carbon credits in the abstract. By giving a sense of the magnitude of the opportunity available, this analysis provides the necessary starting point for a more detailed exploration of the policy mechanisms to help entities realize that potential.