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Jason Gray
California Air Resources Board
1001 "I" Street
Sacramento, CA 95814

RE: Non-additional crediting from different REDD reference levels and crediting periods

Dear Jason,

Thank you for your hard work and responsiveness to concerns raised at the October 28 Workshop.

These comments present the results of a quantitative analysis of the level of non-additional crediting that could result from a credit-based REDD for different reference levels and crediting periods in jurisdictions participating in the Governors' Climate & Forests Task Force (GCF).

Background

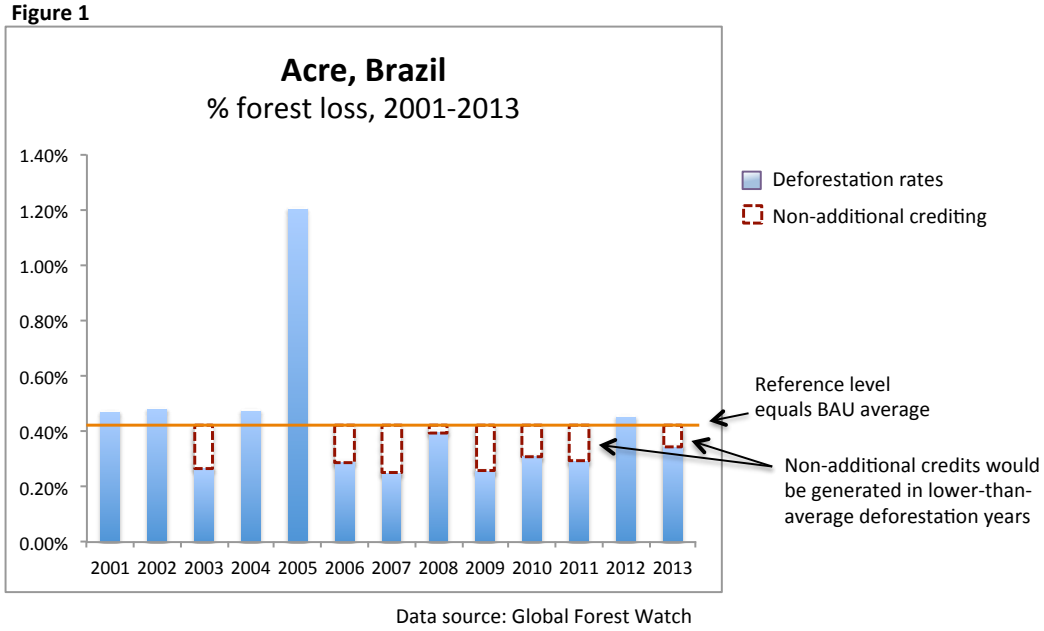
Deforestation rates around the world are affected by many factors. These include global commodity prices, local land prices, road building, government policy within and outside of the forest sector, and natural disasters.[1] These and other factors have resulted in both large annual fluctuations in deforestation rates, and trends upwards and downwards in deforestation rates over time.

A REDD program that provides funds in proportion to forest emissions reductions achieved can be structured as a grant giving program or as a credit generating program. While "results-based" REDD programs of either type would aim to make payments in proportion to the reductions achieved, it is imperative that a program that generates tradable carbon credits avoids crediting reductions occurring for reasons other than the program itself. Under California's proposed REDD program, California's emissions will be able to exceed the state's emissions cap by the amount of emissions the state's offset program (project and sectoral) reduces emissions outside of the cap. To the extent that the offset program generates credits from reductions that would have occurred regardless of the program, the state reduces emissions only on paper, and misses its emissions target. This is what is meant by the "additionality" requirement for all offset credits used under ARB's cap-and-trade program: all credited reductions must be "additional" to, or beyond, what would have happened without the program.

[1] Many of these factors are described in: Nepstad, D., D. McGrath, C. Stickler, A. Alencar, A. Azevedo, B. Swette, T. Bezerra, M. DiGiano, J. Shimada, R. Seroa da Motta, E. Armijo, L. Castello, P. Brando, M. C. Hansen, M. McGrath-Horn, O. Carvalho & L. Hess (2014) Slowing Amazon deforestation through public policy and interventions in beef and soy supply chains. *Science,* 344**,** 1118-1123.

The BAU fluctuation in deforestation rates in all GCF jurisdictions has implications for the additionality of a California credit-based REDD program. This is in part because, as the program has been conceived, a jurisdiction would be able to sell credits if their emissions are below the reference level, but would not have to buy credits if their emissions are above the reference level. For illustration, let's looks at what would happen if Acre, Brazil were to accurately set its reference level at its business-as-usual (BAU) level (the amount of forest emissions that would have occurred in an average year without a REDD program), and if credits were generated each year that Acre's forest emissions were below that reference level without credits being deducted in years when emissions are above the average (a one-year crediting period). In this case, even if Acre didn't do anything to reduce its emissions below BAU rates, credits would still be generated in the years when deforestation rates are below the average BAU rate (see Figure 1). These credits would be non-additional. Non-additional crediting can be contained in two ways. If the program uses a multi-year crediting period (reductions would be averaged over several years and credits would be generated only if average reductions during a crediting period are below the reference level), annual fluctuations in deforestation rates would be smoothed out, and the program would only generate credits sustained over a multi-year period. Setting a lower reference level would also avoid non-additional crediting.

Figure 1



Data source: Global Forest Watch

The analysis

I quantitatively assessed the risk of non-additional crediting from the 24 GCF jurisdictions in Brazil, Indonesia, Mexico, Nigeria and Peru[2] for a range of reference levels and crediting periods. Using 2001 to 2013 deforestation rate data from Global Forest Watch[3] and FAO forest stock data,[4] I assess the risk of non-additional crediting from different reference level and crediting period combinations. Since ARB proposes using reference levels to estimate the impacts of the REDD program, instead of directly estimating the effects of the program on emissions, it is important to consider the quantity of offset credits generated if participating jurisdictions were to exert different

[2] These 24 jurisdictions are all of the jurisdictions in non-Annex 1 countries participating in the GCF except for Bélier and Cavally in Ivory Coast. I left out these two jurisdictions because the Global Forest Watch data does not separately report deforestation rates for those two regions.

[3] Global Forest Watch. 2014. World Resources Institute. Accessed on Nov 16, 2015. www.globalforestwatch.org.

[4] UN Food and Agriculture Organization 2010 Global Forest Resources Assessment, Global Tables. Accessed on Nov 16, 2015. http://www.fao.org/forestry/fra/fra2010/en/.

levels of effort to reduce forest emissions below BAU. The risk of non-additional crediting is the quantity of credits that would be generated if the jurisdiction were to make no additional effort to reduce forest emissions because of the REDD payments. All figures presented in these comments reflect this risk of non-additional crediting – the credits that would be generated from no additional effort.

This analysis uses past deforestation rates to inform the risk of non-additional crediting in the future, based on several assumptions. First, this analysis assumes perfect foresight in BAU deforestation rates. By setting the reference level according to actual BAU (without California's REDD program) deforestation rates in past years (2001-2013), I estimate the risk of non-additional crediting if it were possible to precisely predict average BAU deforestation rates. To the extent that average future BAU deforestation rates are uncertain, the risk of non-additional crediting is higher and reference levels need to be set deeper to avoid the same level of non-additional crediting. This analysis also assumes that the annual variability in deforestation rates will remain approximately the same over time for the jurisdictions studied.

Below I present the results of this analysis, and then a set of recommendations based on this analysis and existing literature on REDD pilot projects. This is followed by tables presenting a fuller set of results of this analysis for Acre, Chiapas, the median jurisdiction (half of the jurisdictions will generate more non-additional crediting than this amount) and the 75th percentile (one quarter of the jurisdictions will generate more non-additional crediting than this amount).

Summary of analysis results

1. The program risks generating very large quantities of non-additional credits if reference levels and crediting periods are not carefully chosen. If reference levels were set at BAU levels, and credits were generated for each year emissions were below the reference level (one year crediting periods),
    a. Acre would generate non-additional credits equal to 4.8 million tonnes CO_2-e per year, or 8% of total reductions required by California's cap-and-trade program during 2018-2020.
    b. One quarter of jurisdictions could generate non-additional credits equal to greater than 18% of total reductions required by California's cap-and-trade program during 2018-2020.
2. If credits are generated annually, reference levels 40% below business-as-usual levels could generated non-additional credits equal to more than one percent of the reductions required in California in 2018-2020 in one quarter of GCF jurisdictions. For Acre, a reference level 30% below BAU levels could result in non-additional credits equal to one percent of total cap-and-trade reductions.
3. With a five-year crediting period, a reference level 25% below BAU would generate non-additional crediting equal to one percent of California cap-and-trade reductions for one quarter of jurisdictions, as would a reference level of 23% below BAU for Acre.
4. These are the levels of non-additional crediting with perfect foresight of BAU average emissions. Reference levels would need to be deeper than these levels to accommodate uncertainty in future BAU forest emissions rates.

Please see a more complete set of results in the Detailed Analysis Results section below.

Recommendations

1. An annual crediting period is not a viable option for any jurisdiction. The large quantity of non-additional crediting that could be generated due to annual fluctuations in deforestation rates in all GCF jurisdictions and uncertainty in future BAU average emissions poses too high a risk to California's cap-and-trade program.
2. A crediting period of at least five-years would credit reductions sustained over a half decade time scale and some crediting of annual fluctuations in deforestation rates. Historical deforestation data indicates that even with a five-year crediting period, reference levels would need to be well below BAU levels to avoid non-additional crediting due to BAU trends in deforestation rates and uncertainty in BAU projections. The analysis presented here shows that reference levels need to be set below 25% below BAU to avoid a level of non-additional crediting equal to one percent of the reductions required under California's cap-and-trade program during 2018-2020 for one quarter of all GCF jurisdictions studied including Acre. Reference levels would need to be deeper than 25% below BAU to account for uncertainty in BAU going forward. Reference levels at least lower than 30% below expected BAU is needed to avoid non-additional crediting and is also in line with the 80% reductions by 2020 committed to by all GCF jurisdictions under the Rio Branco Declaration.[5] Jurisdictions would still receive substantial payment for their reductions, and non-additional crediting would be avoided.
3. ARB should consider a REDD program with full cognizance of the large social risks associated with funding forest conservation programs internationally. ARB is proposing to purchase credits from programs in areas where land rights have been contested and where human right abuses have been suffered by minority communities. Forest governance and REDD pilot projects have been a growing topic of academic study. Researchers who have spent many months or years in the field have documented that many well-intentioned pilot REDD projects have resulted in displacement of people from their homes, barring of people from traditional use of forests, and in some instances violence. Funding programs for forest conservation has the potential to achieve tremendous benefit, but also for tremendous harm. This means that REDD programs must be very carefully designed, based on deep understanding of the drivers of deforestation and how those can be substantially lessened while supporting and not harming communities who live in, depend upon, and protect those forests. Many academic articles have published on the effects thus far of pilot REDD projects around the world, and on forest management policy and programs in the countries/regions in which you are considering a REDD linkage; these articles can provide important insight into the possible outcomes of a California REDD program and the conditions under which programs have succeeded and failed. It could be worth meeting with some of these researchers as well.
4. California's REDD program design should lay out how ARB will evaluate the social impacts of the program and the overall effects of the program on emissions including leakage before linkage. The design should also lay out how ARB will monitor these effects over time. Because of the large risks of negative social impact, non-additional crediting and leakage, a grounded understanding of the expected and actual effects of the program is needed. This requires a level of careful design, oversight, local knowledge, and building of trust and cooperation over time in other countries beyond the standard practice of California agencies, but this is essential for this program.
5. ARB must be prepared to sever a REDD linkage if there is evidence of social conflict or non-additional crediting (reductions caused by factors outside of the REDD program that are likely to be reversed as conditions change), or if the avoidance of leakage cannot be adequately

[5] http://www.gcftaskforce.org/documents/2014_annual_meeting/GCF_2014_RioBrancoDeclaration_26_Members_EN.PDF. Accessed on Nov 14, 2015.

documented, given the high risk of each of these effects. ARB should be prepared to find itself in a difficult position of needing to decide whether to continue with a harmful program or to shock the carbon market with an abrupt severing of a linkage and invalidation of credits. A clear program evaluation protocol, covering social impacts, additionality and leakage, with clear criteria and procedures for delinking will prepare market participants for the possibility of delinking. In addition, ARB could develop a mechanism that would buffer the carbon market from such shocks.

6. ARB might consider a REDD program that is grant-based rather than credit generating. A grant-based program would allow ARB to more carefully engage with the programs and policies it will support and lessen or eliminate the risk of non-additional crediting associated with a credit-based program. ARB might consider funding a REDD program with an expanded compliance reserve that would sell an unlimited number of credits at a pre-determined price. If it were to do so, ARB could allow the allowance prices to increase to levels closer to the social cost of carbon. This would result in more reductions in California while guaranteeing that carbon prices will not increase to levels deemed unacceptably high. California could then use the revenues generated by the sales of credits from the compliance reserve to support a carefully designed grant-based REDD program.
7. ARB should also consider implementing policy in the state to reduce the impacts of California's consumption of goods and investments on tropical deforestation. Such commodities could include palm oil, oil extraction in specific regions, and meat.
8. Lastly, in response to the discussion at the October 28 workshop, I wish to highlight the very large quantity of credits associated with California's limit on the use of offsets. The total offset limit is equal to eight percent of California's cap-and-trade sector emissions. This amount is equal to all of the reductions expected to result from the cap-and-trade program.[6] Assuming that the allowance credits placed in California's compliance reserve are not used, and without an offset program, California's 2020 emissions would drop to seven percent below its emissions in 1990. California expects approximately half of its reductions through 2020 to occur from the suite of policies and programs implemented by the state not including the cap-and-trade program (the "complementary measures"). That leaves the other half of the reductions to be achieved by the price on carbon created by the cap-and-trade program. If all covered entities were to use the maximum quantity of offset credits allowed, the total offsets used would approximately equal the total reductions expected from the cap-and-trade program – around half of the reductions expected from AB32. California's offset limit is a limit on the offset credits used by individual facilities regulated under the state's cap-and-trade program. Each time ARB decides to implement a new offset protocol or program it affects the state's carbon price and the size if its offset program. The size of California's offset program and the effect of the offset program on California's allowance prices are being decided by the choices ARB makes in the implementation of its cap-and-trade and offsets programs, and are not fundamental to the design of the program.

Detailed analysis results

Below are two tables presenting the results of this analysis for a range of crediting periods and reference levels for Acre, Chiapas, the median jurisdiction (half of the jurisdictions will generate more non-additional crediting than this amount) and the 75th percentile (one quarter of the jurisdictions will generate more non-additional crediting than this amount). Table 1 presents the

[6] For a full description of this analysis see the spreadsheet here:
http://bhaya.berkeley.edu/docs/QuantityofAB32offsetscredits.xlsx

quantity of non-additional credits that could result from the program (calculated based on the methods described above) as a percent of the total reductions required under California's cap-and-trade program during 2018 to 2020. Table 2 presents the quantity of non-additional credits that could result from the program in terms of a percent reduction in deforestation rate in the REDD jurisdiction falsely credited.

Chiapas is one of the least variable jurisdictions in terms of annual fluctuations in deforestation rates, and a small jurisdiction in terms of forest cover. Dashes ("-") indicate no non-additional crediting; a value of "0.0%" indicates that a small amount of non-additional crediting rounds to 0.0%.

Table 1:

Potential for Non-Additional Crediting

as % of California 2018-2020 cap-and-trade reductions

for Acre Brazil, Chiapas Mexico, the 50th percentile (half the jurisdictions generate more non-additional credits than these amounts), and the 75th percentile (one quarter of jurisdictions generate more non-additional credits than these amounts)

Reference level (% below BAU)		**Crediting period** (years) 1	3	5	8
0%	Acre	7.6%	5.4%	6.9%	3.9%
	Chiapas	0.4%	0.4%	0.3%	0.2%
	50th	3.6%	2.5%	2.2%	1.7%
	75th	18.8%	12.6%	13.2%	5.3%
10%	Acre	5.1%	2.7%	4.3%	2.2%
	Chiapas	0.2%	0.2%	0.1%	-
	50th	2.1%	1.4%	0.8%	0.2%
	75th	12.0%	9.4%	8.4%	2.3%
20%	Acre	2.9%	0.8%	1.6%	0.5%
	Chiapas	0.1%	0.1%	-	-
	50th	1.3%	0.4%	0.2%	-
	75th	8.1%	3.0%	3.9%	0.9%
25%	Acre	1.9%	0.4%	0.6%	-
	Chiapas	0.0%	-	-	-
	50th	0.7%	0.2%	0.0%	-
	75th	5.8%	2.1%	1.3%	0.4%
30%	Acre	1.0%	-	-	-
	Chiapas	0.0%	-	-	-
	50th	0.3%	0.0%	-	-
	75th	2.7%	1.6%	0.2%	-
35%	Acre	0.4%	-	-	-
	Chiapas	0.0%	-	-	-
	50th	0.2%	-	-	-
	75th	1.4%	1.3%	-	-
40%	Acre	0.0%	-	-	-
	Chiapas	-	-	-	-
	50th	0.0%	-	-	-
	75th	1.0%	0.4%	-	-
45%	Acre	-	-	-	-
	Chiapas	-	-	-	-
	50th	0.0%	-	-	-
	75th	0.7%	0.0%	-	-
50%	Acre	-	-	-	-
	Chiapas	-	-	-	-
	50th	0.0%	-	-	-
	75th	0.5%	-	-	-

Table 2:

Potential for Non-Additional Crediting

as % reduction in deforestation rates falsly credited

for Acre Brazil, Chiapas Mexico, the 50th percentile (half the jurisdictions generate more non-additional credits than these amounts), and the 75th percentile (one quarter of jurisdictions generate more non-additional credits than these amounts)

Reference level (% below BAU)		**Crediting period** (years) 1	3	5	8
0%	Acre	17.7%	12.5%	16.1%	8.9%
	Chiapas	8.1%	8.1%	6.4%	4.9%
	50th	16.6%	12.5%	9.0%	9.5%
	75th	19.8%	16.6%	16.1%	13.9%
10%	Acre	11.9%	6.1%	9.9%	5.1%
	Chiapas	4.2%	3.4%	2.6%	-
	50th	11.1%	7.1%	5.0%	4.0%
	75th	14.6%	11.4%	9.6%	8.4%
20%	Acre	6.6%	2.0%	3.7%	1.2%
	Chiapas	1.5%	1.1%	-	-
	50th	6.7%	3.2%	1.1%	-
	75th	10.5%	6.5%	4.2%	3.1%
25%	Acre	4.3%	0.8%	1.5%	0.0%
	Chiapas	0.8%	-	-	-
	50th	4.8%	2.0%	-	-
	75th	8.6%	5.0%	2.5%	0.7%
30%	Acre	2.3%	-	-	-
	Chiapas	0.4%	-	-	-
	50th	3.4%	0.9%	-	-
	75th	6.6%	3.5%	0.8%	-
35%	Acre	0.9%	-	-	-
	Chiapas	0.0%	-	-	-
	50th	2.1%	-	-	-
	75th	4.9%	2.2%	-	-
40%	Acre	0.1%	-	-	-
	Chiapas	-	-	-	-
	50th	1.1%	-	-	-
	75th	3.6%	1.1%	-	-
45%	Acre	-	-	-	-
	Chiapas	-	-	-	-
	50th	0.3%	-	-	-
	75th	2.5%	0.0%	-	-
50%	Acre	-	-	-	-
	Chiapas	-	-	-	-
	50th	0.0%	-	-	-
	75th	1.6%	-	-	-

Thank you for taking these comments and this analysis into account in your consideration of a California REDD program. I am very happy to share the spreadsheet and data used, and to answer any questions about this analysis.

Sincerely,
Barbara Haya