

CARBON MARKET ANALYST



California-Acre partnership - setting the stage for compliance REDD credits

RESEARCH

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TO THE POINT

The Brazilian state of Acre is a frontrunner in REDD program development. In our view, Acre will be the first jurisdiction to issue credits usable for compliance in a mandatory cap-and-trade system. The first credits could be issued as early as 2013.

Based on carbon stocks and deforestation trends, as well as the parameters California regulators are likely to set for offsets, **Acre's program could generate 48 Mt of REDD credits over the 2012-2020 period.**

This supply **increases the availability of offsets in the WCI market by 60 percent**, a significant contribution given that we expect offset supply - and lack thereof - to be the main price driver in the WCI.

Acre's government aims to secure **a role for the private sector** in its REDD program by designing ways to "nest" privately-funded projects within the regional crediting mechanism.

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Executive summary

Regulations governing California's greenhouse gas cap-and-trade program allow emitters to use offsets from activities reducing emissions from deforestation and forest degradation (REDD) for compliance.

Reductions from such efforts are notoriously difficult to quantify and attribute tradable credits to, as they are not easily proven additional and permanent. California regulators are thus breaking new ground in carbon markets, and they have yet to define many of the key parameters around eligibility of REDD credits. The state has entered an agreement with Acre, a Brazilian state home to large tracts of Amazon rainforest, to cooperate on REDD crediting. Acre's government is implementing policies aimed at reducing deforestation in the state, such that eventual REDD credits from those efforts will be available for use as compliance units to California emitters. California is part of the Western Climate Initiative (WCI), a North American regional carbon market that also includes the Canadian province of Quebec.

We assess the potential volume of REDD credits Acre could supply to the WCI. Using mapping software, we combine information about Acre's carbon stocks with information about the areas most likely to be deforested over the next eight years to derive the state's total avoided deforestation potential in tonnage terms. We find that forest preservation in Acre could

avoid emissions in the order of 69 million tonnes carbon dioxide equivalent (MtCO₂e) in the 2012-2020 period. With about 70 percent of that total reduction potential actually credited, Acre could supply 48 Mt CO₂e to the WCI.

Offset demand in the WCI during that period will be much greater - if all emitters take full advantage of their sectoral credit quota, they will be seeking to offset 73 MtCO₂e. The cumulative offset supply from all project types currently allowed by California - excluding REDD credits - is 79Mt, compared with a total offset quota of 239Mt. Thus the REDD credit volume from Acre increases the current projected offset supply by 60 percent.

The supply picture is very different if California regulators do not allow REDD credits generated before 2015, however. We expect most of Acre's credits to come from the years 2012-2015, as the baseline from which emission reduction is measured becomes tighter in 2015. Counting credits after 2015, Acre could supply only 21 Mt through 2020.

An advisory group tasked with setting REDD crediting standards for California is scheduled to issue a set of recommendations this summer - these will likely kick-start discussions on REDD in California, eventually leading to the adoption of methodologies and regulations regarding such offsets in the North American state.

INTRODUCTION

California's greenhouse gas cap-and-trade program, which enters into force in January 2013, allows emitters to cover a portion of their compliance obligation with offset credits. Such offset credits may come from projects in the US that reduce emissions in sectors not covered by the program's cap - and also from certain sectors of developing country economies. The latter offset source presents an incentive for governments of such countries to implement greenhouse gas reduction policies - the credits they generate would be compliance units, which are valuable assets.

Land use is the sector in which the most progress has been made toward

sectoral crediting - California has been working with a coalition of rainforest nations on recognizing credits for reduced emissions from deforestation and forest degradation (REDD). The state has signed memoranda of understanding with the Brazilian state of Acre and the Mexican state of Chiapas, agreeing to cooperate on future sectoral REDD crediting. California's compliance market has therefore opened its doors for REDD credits, although state officials have not yet detailed eligibility criteria for those credits.

The state of Acre is designing a system to incentivize forest preservation, thereby reducing emissions. The program aims to quantify the reductions, which means

they could constitute REDD credits that emitters can use for compliance in California - depending on eligibility rules. Acre has adopted forest sector emission reduction targets and signed into law a sectoral REDD program, which according to state officials will issue credits as early as 2013. In addition, private project developer CarbonCo, LLC is currently developing the first REDD project in the state.

In this report, we analyze Acre's REDD program and estimate the emission reductions it could generate. Assuming that only some of this reduction potential is credited, we then forecast the amount of REDD credits Acre could supply to California's emitters. We discuss the implications of this potential

additional offset supply for the carbon market California and the Canadian province of Quebec comprise, the Western Climate Initiative (WCI).

Setting the scene: Evolution of REDD in Acre

Brazil is home to 14 percent of the world's forest, but also accounts for 40 percent of global deforestation, making the country a critical priority for implementing REDD. The tropical nation has shown commitment to forest preservation through its

Plan for Prevention and Control of Deforestation (PPCD), a set of policies launched in 2004 to improve forest monitoring, strengthen enforcement, and define conservation areas.

The federal government requires that states situated in the Amazon reduce deforestation by adopting their own PPCDs. Acre is one of the front-runners in this regard, having enacted a number of land use planning and forest governance policies since the Worker's party took power of the state legislature in 1998. Landmark achievements include adoption of a land zoning system, which helps

define property rights, as well as the use of satellite technology to monitor deforestation in the state.

In 2008, Acre adopted its PPCD – the state's target is to reduce deforestation 80 percent by 2020, compared to the average deforestation rate during the decade from 1996 to 2005. This laid the foundation for forest preservation legislation, which was signed into law in 2010 and is known as the State System of Incentives for Environmental Services - abbreviated SISA from Portuguese. SISA is the main instrument to reach Acre's

Textbox 1: REDD risks

REDD efforts are more complex than other emission reduction programs because they deal with living, changing ecosystems. Carbon stocks stored in forest biomass are difficult to measure, and they are in constant flux. Humans' changing use of land, the main cause of deforestation, is due to a multitude of factors that are both global and local – rising global beef prices constitute an incentive for large ranchers to cut down forest for livestock pasture, whereas at the local level families cut down forest for wood or charcoal fuel and housing materials. Since it is difficult to define concrete business-as-usual scenarios for deforestation given this diversity of drivers, it is also difficult to quantify and attribute tradable credits to the emission reductions that REDD efforts cause.

Citing these difficulties, regulators in the European Union's emissions trading system have not allowed emitters to use offset credits from projects involving avoided deforestation. California regulators' mere act of announcing their intent to allow sectoral credits thus proved a watershed moment for avoided deforestation efforts, as it introduced the possibility that REDD credits could constitute compliance units in a mandatory carbon market – it created demand for REDD. All eyes are now on Acre as the first jurisdiction to meet this demand - like all REDD efforts, Acre's program faces concerns about *additionality* and *permanence*.

To produce credits that are clearly *additional* to a business-as-usual scenario, REDD efforts must go above and beyond not only a historic emission trajectory, but also beyond what existing laws or policies require. This is particularly tricky in Acre, as the state aims to reduce its deforestation rate beyond historic levels, but is required to do so by the federal government's mandate that every Amazon state make a deforestation reduction plan aimed at helping achieve the country's national target.

To be *permanent*, a credit must represent a ton of carbon dioxide (CO₂) that did not enter the atmosphere and never will. The CO₂ stored in a tree counts as having been "reduced" because it did not enter the atmosphere as it would have if the tree had been cut down. But biomass can be lost due to events over which policymakers and project developers have no influence, such as fires and insect infestations. Despite success of the REDD program itself (change in human behavior), the net outcome in these cases is increased CO₂ emissions. No program can ensure credits' permanence, but the crediting method can accommodate the risk by accounting for only a portion of the CO₂ actually sequestered. The remaining portion goes into a "buffer pool" that makes up for the carbon loss in the event of a reversal. We assume that California will require some kind of reversal insurance of this kind, see the section "REDD credit supply for the WCI."

80 percent deforestation goal and defines elements of a REDD program, which will be implemented through a basket of measures that includes both public and private sector initiatives.

Specifically, the Acre government has defined three types of activities: (i) programs, (ii) subprograms, and (iii) "special projects". Programs and subprograms will be large-scale initiatives aimed at a certain sector of the economy or a specific group of land owners. They will be carried out by a quasi-public development agency which is to be set up with both public and private funding. Special projects will be smaller-scale REDD activities developed by private sector players. They will be authorized if they cover activities not already included in programs and subprograms.

In other words, individual projects in which private sector entities have a stake must be additional to state initiatives run by the development agency. These projects will have to be registered with government authorities to be part of Acre's REDD program. A newly created Institute for Regulation Control and Registration will serve as the overarching regulatory body that reviews and approves project activities, issues credits, and runs a registry where emission reductions will be recorded and tracked.

How REDD crediting will work

The Institute will issue credits based on overall emission reductions below a statewide baseline. To reflect changes in deforestation levels over time, the Institute has defined a different baseline for each five year period from 2006 through 2020, with each being equal to the average deforestation rate from the previous ten years. Thus, the baseline for the

2006-2010 period is the annual average deforestation in 1996-2005, while the baselines for 2011-2015 and 2016-2020 depend on the deforestation in the periods 2001-2010 and 2006-2015, respectively. Table 1 shows the corresponding baselines for each year up to 2020.

Acre will not issue credits for all reductions below the baseline deforestation level in the respective period. Rather, only the reductions needed to close the gap between the baseline level and the overall 80 percent deforestation reduction target will be credited. Thus for each year, the creditable reduction in deforestation equals the baseline minus the deforestation target (Table 1). Through 2020, credits can be issued for emissions sequestered in a cumulative 369 000 hectares.

The Institute will then distribute the credits issued according to this method to registered programs, subprograms, and projects - although how exactly that will happen is still unclear. The state aims to integrate reductions generated at the local level into the overall jurisdictional program so that they can get credit for contributing to the state's total emission reduction goal - a concept known as nesting. This approach retains an incentive for small and privately-run projects that would not exist if all reductions were credited at the state level only, but prevents "leakage" - a situation where the project reduces emissions but deforestation activities simply move elsewhere in the state, causing a net emission increase. In this nested approach, the amount of credits a project receives depends not only on

Table 1: Crediting reduced deforestation in Acre

Deforestation figures are historical up to 2010. For 2011 and beyond, they represent the deforestation rate that corresponds to Acre achieving its target of reducing deforestation 80 percent. All numbers are in thousand hectares.

Year	Deforestation rate (in thousand hectares)	Baseline (in thousand hectares)	Creditable reduction in deforestation (in thousand hectares)
2006	39.8	60.2	20.4
2007	18.4	60.2	41.8
2008	25.4	60.2	34.8
2009	16.7	60.2	43.5
2010	27.3	60.2	32.9
2011	25.8	51.4	25.6
2012	24.2	51.4	27.2
2013	22.7	51.4	28.7
2014	21.2	51.4	30.2
2015	19.7	51.4	31.7
2016	18.1	25.5	7.4
2017	16.6	25.5	8.9
2018	15.1	25.5	10.4
2019	13.6	25.5	11.9
2020	12.0	25.5	13.5
Total	317		369

Textbox 2 - The role of the private sector

Acre authorities wish to leave room for private sector participation in – and especially funding of – forest preservation efforts. However, REDD credits must be assessed and achieved at the state level rather than at a project level if they are to reflect real reductions – otherwise Acre’s program merely credits actors for managing to protect a piece of forest, while deforestation could be occurring elsewhere in the state outside of project boundaries. The nested concept aims to combine a statewide approach with incentives for private projects. This is necessary because privately-owned land faces a greater risk of deforestation according to the Amazon Environmental Research Institute, which finds that 34 percent of deforestation reduction between 2006 and 2050 can occur on private properties. Acre’s government programs cannot affect most forest property owners’ land use decisions, but the private sector can – often simply by buying the property to ensure it is not deforested.

Due to the power of the private sector in this regard, finding a workable way to implement a nested approach has become a priority for the international community. Negotiations under the UN Framework Convention on Climate Change regularly involve this topic, again putting all eyes on Acre as a “proof of concept.” In practice, however, REDD project potential remains uncertain – officials have not yet declared what project methodologies will be accepted, which verification standards are to be applied, and how the nested crediting will proceed once reductions are proven.

CarbonCo LLC, a subsidiary of Carbonfund.org, is currently developing an avoided deforestation project in Acre. Proponents expect the project to receive validation under the Verified Carbon Standard (VCS) and the Climate Community and Biodiversity (CCB) standard in September 2012, and to be issued credits by mid-2013. According to CarbonCo, the project has the support of the Acre government and the developers will register it with the state. CarboCo aims to generate credits eligible in the WCI.

the amount of deforestation avoided in the project area, but also in the state as a whole – see Textbox 2.

Quantifying emission reductions

To estimate the potential emission reductions from Acre, we assume that REDD activities will focus on areas under high risk of deforestation, as preserving forest in those areas diverges most from any “business-as-usual” land use trajectory and is therefore most clearly additional.

We combine information about Acre’s carbon stocks with information about areas most likely to be deforested over the next eight years to derive the state’s total avoided deforestation potential in tonnage terms. Using the mapping software Quantum GIS and Matlab, we overlay a map of the areas under risk of deforestation with a map of forecast carbon stock to find the average carbon content in the at-risk areas – see Figure 1.

Average carbon stock in areas under threat of deforestation in the period 2012-2020 is 425 tCO₂ per hectare.

As Figure 1 shows, Acre’s richest carbon stocks occur around previously deforested areas near urban centers, and in the northwestern corner of the state. Precisely these areas are also among those most likely to be deforested in the next eight years.

“Precisely the carbon rich areas are most likely to be deforested

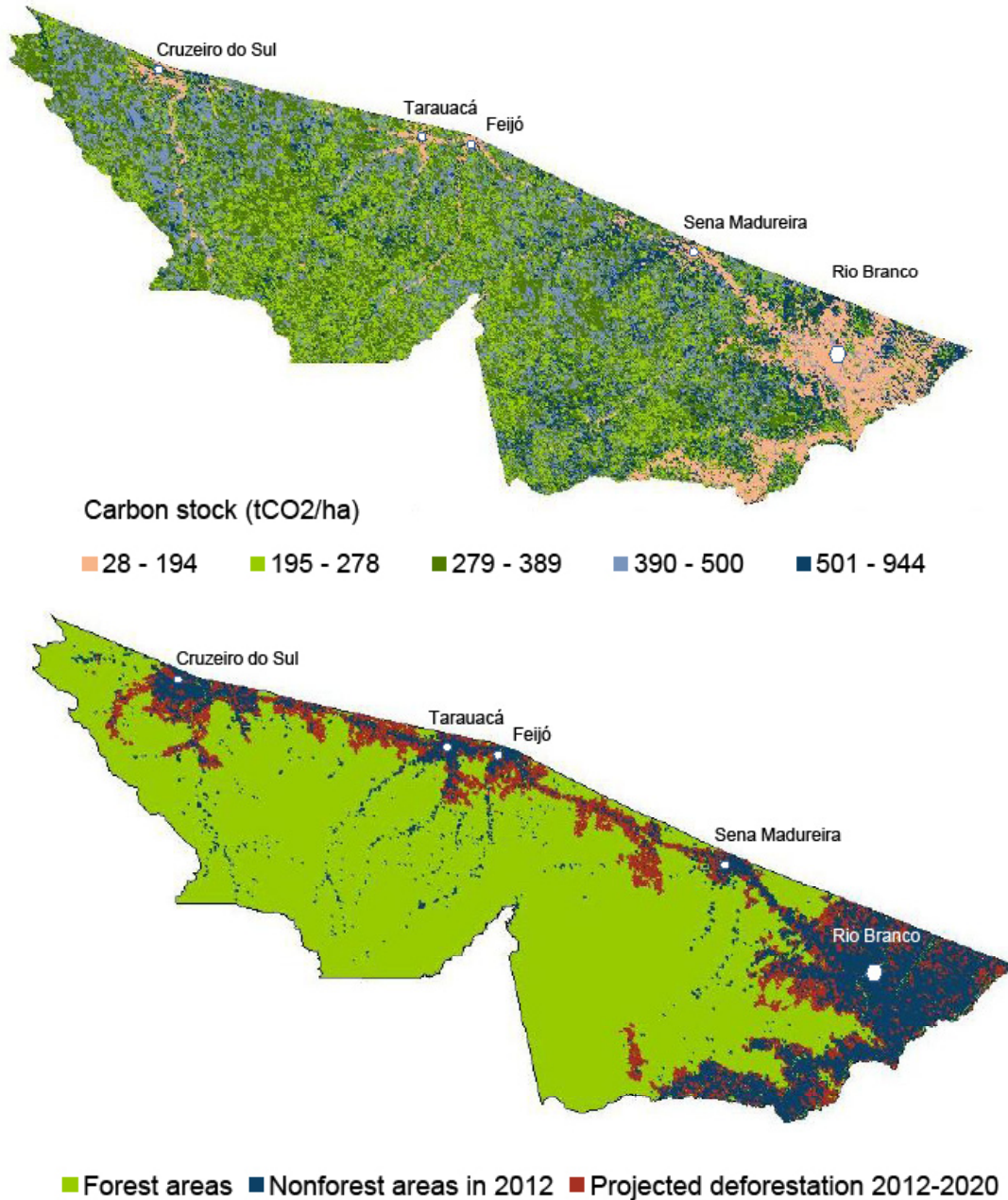
In a business as usual scenario, the emissions from deforestation are equal to the amount of forest carbon minus the amount of carbon in and on the land after its conversion. We assume that deforestation constitutes conversion of “forests” to “cultivated areas,” with the latter storing only 18 tons carbon dioxide (tCO₂) per hectare on average. Therefore, the emissions that would result from

deforestation are equal to 407 tCO₂ per hectare. We multiply this by the annual reductions in deforestation that are creditable according to Acre’s REDD program to estimate the potential annual emission reductions (Figure 2).

Based on the assumption outlined above, Acre could reduce 69 MtCO₂ by achieving its avoided deforestation target from 2012 to 2020. This represents an average annual reduction of 12 MtCO₂ between 2012 and 2015 and 4 MtCO₂ between 2015 and 2020. The amount of credits generated decline substantially after 2015 due to the tightening baselines.

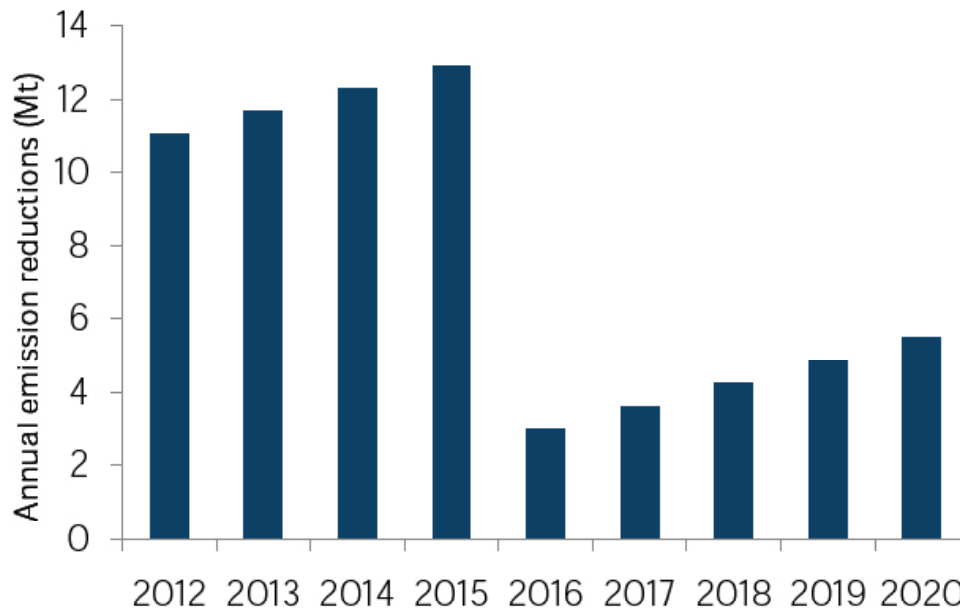
Uncertainties around these estimates include the fact that the government of Acre has not yet determined methodologies for quantification and verification of emission reductions. Emission reduction estimates also depend on assumptions about the amount of carbon stored in the forest, which vary depending on the method used.

Figure 1: Acre's carbon stocks and projected deforestation - average carbon stock in areas under threat of deforestation in the period 2012-2020 is 425 tCO₂ per hectare.



Source: Spatial data of biomass concentrations (top) were developed by the Brazilian National Institute for Space Research and includes above- and below-ground biomass concentrations. Projected deforestation areas (bottom) are results from the SIMAMAZONIA mapping model, developed by the Amazon Environmental Research Institute. Contributing factors include slope, soil quality, vegetation, altitude, proximity to roads, rivers, and urban areas, as well as government policies.

Figure 2: Emission reductions from REDD activities in Acre, through 2020



REDD credit supply for the WCI

The amount of REDD offset credits available to California emitters market is likely to be much lower than the total amount of emission reductions generated from Acre's REDD program. We expect California regulators to apply the same discount considerations to Acre's projects as they do to US forest projects because of similar risks associated with reversal.

Regulators require forestry projects in the US to hold a percentage of their annual reductions in a buffer pool, to ensure against non-permanence - forest fires or the case that the area is deforested after all due to poor project enforcement, see Textbox 1. We assume that project risk ratings in the US range from 10-20 percent. Given the higher risk associated with sourcing projects from other

countries, we assume a buffer pool requirement of 30 percent for REDD credits in Acre. This means that the potential amount of credits will be at least 30 percent lower than the total estimated credits issued by Acre. The remaining 70 percent of credits would be available to WCI emitters (see Table 2), unless other markets emerge that create competing demand.

“there may be other sources of demand for Acre's REDD credits

One such other market might be close to home: Acre signed a Memorandum of Understanding with regulators of charge of Rio de Janeiro's proposed local carbon market in April this year. This could allow credits generated in Acre to be used for compliance in Rio. Though demand from the fellow Brazilian state is currently uncertain,

this introduces a certain downside risk to the amount of credits available to WCI.

On the demand side, California's carbon market regulation includes a limit on the extent to which emitters may use offsets to cover their compliance obligation. Eight percent of the units surrendered to cover emissions may be offsets. Of those, one-fourth may be REDD credits in the first (2013-2014) and second (2015-2017) compliance periods. Half the quota may be REDD credits in the third (2018-2020) compliance period. Table 2 shows this theoretical maximum demand for REDD credits from California in volume terms along with the expected supply of REDD credits from Acre.

We forecast a cumulative total supply of REDD credits from Acre in the 2012-2020 period at 48 Mt. This is more than half of the 73 Mt total theoretical demand, adding crucial

volume to a market that is currently short offsets. The cumulative offset supply from all project types currently allowed by California - excluding REDD credits - is 79Mt, compared with a total offset quota of 239Mt.

“ Acre could supply 48 Mt offsets from 2012 to 2020

That shortage leaves emitters with no low-cost compliance options in the face of high abatement costs and thus drives up WCI carbon prices - see our report *WCI Price forecast – show me the offsets!* The REDD credit volume from Acre described above increases the offset supply by 60 percent, helping to fill the current gap in offset supply.

The supply contribution is significantly lower if WCI regulators do not accept credits generated before 2015. Since it will take years to develop protocols and to define eligibility, we expect regulators will not formulate criteria for REDD offsets until around 2015 – if at that time they do not allow credits that have been generated before that date, the expected volume of REDD offsets that can be sourced from Acre will be reduced to a mere 21 MtCO₂ through 2020.

Just as demand for Acre's REDD credits could come from carbon markets other than the WCI, supply of eligible REDD offsets could come from outside of Acre in the future. Chiapas, Mexico, is California's other partner in its REDD agreement – the state has started designing a REDD program under its Law for Adaptation and Mitigation of Climate Change, which was approved by the State Congress in December 2010. Conservation International

is conducting a pilot project in the Selva Lacadona rainforest that could help facilitate the design of REDD in Chiapas and perhaps bring REDD credits to market, but volume estimates are unavailable to date.

Table 2: Supply and demand for REDD in the WCI

Supply figures show estimated supply from Acre. Demand refers to the estimated amount of REDD credits Californian emitters will be allowed to use for compliance. Figures are in million tons.

Year	Supply (Mt)	Demand (Mt)
2012	7.7	-
2013	8.2	3.5
2014	8.6	3.5
2015	9.0	8.3
2016	2.1	8.0
2017	2.5	7.8
2018	3.0	14.5
2019	3.4	14.0
2020	3.8	13.5
Total	48.4	73.0

Conclusion

The Brazilian state of Acre is slated to be the first jurisdiction to issue REDD credits, possibly as early as 2013. While the program is still being developed, state law has already laid out some of its most important elements. Assuming Acre's regulators ensure their program's credits are additional to an extent accepted by California regulators, WCI emitters could use offsets from Acre for compliance. If these credits become eligible, we expect them to enter the WCI market in 2015.

In volume terms, the additional supply of compliance units from Acre could be quite significant, particularly in light of the WCI's projected offset shortage given the offset protocols currently allowed. However, the supply of REDD credits from Acre is highly sensitive to the crediting timeframe California regulators consider eligible – Acre's program will generate most credits before 2015, as the baseline used for crediting emission reductions tightens after that year. Limiting eligibility to credits generated in 2015 and beyond cuts Acre's potential offset supply to the WCI by more than half.

The next major step toward REDD crediting is an expected announcement from California's REDD offset working group. This mix of regulators, forest experts, and representatives from think tanks and nongovernmental institutions is tasked with issuing recommendations about standards and definitions for REDD credits eligible for compliance in California.

Since its inception in February 2011, the group has received stakeholder input and is due to publish recommendations "by summer 2012" which could be anytime in

“ California's REDD offset working group holds key to next steps

the coming months. We expect the recommendations to help shape California's REDD regulations going forward, and, depending on their level of detail, to offer more insight into potential future REDD offset volumes. Stay tuned for further analysis.

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