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# CALIFORNIA CAP-AND-TRADE AND INTERNATIONAL FOREST CARBON OFFSETS FOR INSTITUTIONAL INVESTORS

## FOREST CARBON, MARKETS AND COMMUNITIES (FCMC) PROGRAM

DECEMBER 2012

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**DISCLAIMER**
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# ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| AB 32 | Assembly Bill 32 (also known as *Global Warming Solutions Act*) |
| ACR | American Carbon Registry |
| ARB | Air Resources Board (sometimes called CARB for California ARB) |
| CER | Certified Emission Reductions |
| CFC | Chloroflourocarbon |
| CRTs | Climate Reserve Tonnes |
| EDF | Environmental Defense Fund |
| ERPA | Emission Reduction Purchase Agreement |
| ETS | Emissions Trading System |
| EU-ETS | European Union Emissions Trading System |
| FCMC | Forest Carbon, Markets and Communities Program |
| GCF | The Governors' Forests and Climate Task Force |
| GHG | Greenhouse Gas |
| MOU | Memorandum of Understanding |
| MRV | Monitoring, Reporting and Verification |
| $MtCO_2e$ | Metric Ton Carbon Dioxide Equivalent |
| $MMtCO_2e$ | Million Metric Ton Carbon Dioxide Equivalent |
| ODS | Ozone Depleting Substance |
| PDR | Preliminary Draft Regulation |
| REDD+ | Reducing Emissions from Deforestation and Forest Degradation in Developing Countries; and the Role of Conservation, Sustainable Management of Forests and Enhancement of Forest Carbon Stocks |
| REDD+ SES | REDD+ Social and Environmental Standards Initiative |
| ROW | REDD Offset Working Group |
| UNFCCC | United Nations Framework Convention on Climate Change |
| USAID | United States Agency for International Development |
| WCI | Western Climate Initiative |

# 1.0 EXECUTIVE SUMMARY

In 2006, the State of California passed the most expansive greenhouse gas (GHG) reduction plan in the United States, titled the *Global Warming Solutions Act* (or AB 32, shorthand for "Assembly Bill 32"). The legislation requires California to reduce economy-wide emissions to 1990 levels by 2020. As the world's ninth largest economy,[1] California's cap will be on par with those of the United Kingdom and Germany.[2] The legislation may have a material impact on the valuation of companies with an energy footprint in California, and California is often a precursor to legislative changes in other states and at the federal level. To decrease emissions, California's lead air regulatory agency – the California Air Resources Board (ARB) – has developed a variety of emissions reductions strategies, including direct regulations, monetary and non-monetary incentives, voluntary actions, and market-based mechanisms.[3] A key strategy is a broad "cap-and-trade" program that limits the amount of GHGs certain entities can emit, while allowing trading of GHG permits that can be used to comply with the cap.

AB 32 and the cap-and-trade program present risks, as well as opportunities, for institutional investors. Although compliance costs could impact portfolio holdings, new avenues for investment are emerging. Companies subject to the program, along with other market participants, may spend $2 billion to $14 billion during the allowance auctions in some years.[4] However, the cap-and-trade program will also create investment opportunities for offset-generating activities, among which are activities such as emission reductions from avoiding deforestation and degradation (REDD)[5].

**The objective of this report is to educate institutional investors about forest carbon markets in general, and more specifically, how forest carbon elements of the new AB 32 law in California may impact institutional investors.**

## *Overview of carbon markets*

Carbon markets can be divided into "voluntary" markets, in which demand relies on voluntary initiatives to purchase offsets, and "compliance" markets where demand is created through legislation such as AB 32. The voluntary market volume has grown steadily. In 2011, the total market volume was 95 Million Metric Tons Carbon Dioxide Equivalent ($MMtCO_2e$), of which REDD represented 7.3 $MMtCO_2e$ and afforestation and reforestation credits (part of the full acronym of REDD+) were an additional 7.6 $MMtCO_2e$. Voluntary REDD credits transacted at a price of $12 per Metric Tonne Carbon Dioxide Equivalent ($MtCO_2e$) on average in 2011 with a total market value of $87 million.[6] While the voluntary markets are small compared to compliance markets, the voluntary market provides a testing ground for new methodologies, protocols, and

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[1] Center for Continuing Study of the California Economy, *Numbers in the News,* Sept. 2012. Accessed Oct. 16, 2012 at http://www.ccsce.com/PDF/Numbers-Sept-2012-CA-Economy-Rankings-2011.pdf

[2] European Commission press release "Emissions trading: 2007 verified emissions from EU ETS businesses," May 23, 2008. Accessed Oct. 16, 2012 at http://europa.eu/rapid/press-release_IP-08-787_en.htm?locale=en

[3] California Air Resources Board for the State of California (December 2008) *Climate Change Scoping Plan: A Framework for Change.* p.32. Available at http://www.arb.ca.gov/cc/scopingplan/scopingplan.htm.

[4] For the auction years 2015 – 2016, and 2016 – 2017, Nachbaur J., Roberts T. and Newton M., *Evaluating the Policy Trade-Offs in ARB's Cap-and-Trade Program*, The Legislative Analyst's Office, February 2012 at 13

[5] The UN climate change negotiations on this topic refer to "reducing emissions from deforestation and forest degradation in developing countries; and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks", known as REDD+, with deforestation and degradation accounting for the first two D's and the remaining activities lumped under the "+".

[6] Molly Peters-Stanley and Katherine Hamilton*, Developing Dimensions: State of the Voluntary Carbon Markets 2012*. A report by Ecosystem Marketplace and Bloomberg New Energy Finance. Accessed August 15, 2012 at http://www.forest-trends.org/documents/files/doc_3164.pdf

market infrastructure. Compliance markets bring larger volumes and more reliable demand to carbon and other environmental markets. AB 32 creates a compliance market through its cap-and-trade provisions.

### *Cap-and-trade under AB 32*

The cap-and-trade is a particularly important and innovative component of AB 32 and accounts for approximately 22.5% of anticipated emissions reductions within California. The program will cover major sources of GHG emissions, such as refineries, power plants, industrial facilities, and transportation fuels.[7] It places a cap on approximately 85% of the California's GHG emissions,[8] and the aggregate emissions cap will decline each year in order to reach the 2020 emissions target of 334 ($MMtCO_2e$).[9,10] Some entities will be covered from the outset of the program in 2013, while others will be phased in at the start of the second compliance period beginning in 2015. From 2013, the program will cover industrial sources, electricity generators, and electricity import sectors for any individual entity that produces more than 25,000 $MtCO_2e$ per year. In the second compliance period, commencing in 2015, the program additionally places compliance obligations on suppliers of transportation fuels (e.g. gasoline, diesel and ethanol), distillate fuel oil, and natural gas, if the use of these fuels from a given supplier would result in more than 25,000 $MtCO_2e$ per year.[11]

In addition to reducing GHG emissions, the cap-and-trade program is designed to keep compliance costs low and to promote investment and jobs in green technologies and businesses. Under the cap-and-trade program, covered entities can meet their GHG caps by i) reducing emissions; ii) surrendering GHG "allowances" that are issued by the State of California; or iii) surrendering GHG "offsets" that are generated by projects that reduce GHG emissions or sequester carbon (e.g. planting trees) not subject to the cap. Both an allowance and an offset credit are equal to one metric ton of GHG emissions ($MtCO_2e$). The first auction of allowances took place in November 2012. Allowance trading, together with use of offsets, provides maximum flexibility for covered entities seeking to cost-effectively meet emissions reductions targets.

Free allowances for each industrial sector will be initially set at approximately 90% of total emissions. Between 2013 and 2020, the percent of freely allocated allowances will gradually decrease as more allowances are auctioned off in each successive period. In lieu of reducing emissions on-site or surrendering allowances, covered entities can buy offset credits. The number of offsets is limited to 8% of an entity's compliance obligation in each compliance period.

### *Cap-and-trade impact on investments*

The AB 32 cap-and-trade program could materially impact an institutional investor's portfolio holdings. Allowance allocation, combined with the rules around offset usage, can have a significant effect on subject entities' cash flow and valuations. The program will cover over 600 of the state's largest GHG-emitting stationary sources, consisting of approximately 350 businesses.[12] Less emission-intensive industries and

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[7] http://www.arb.ca.gov/cc/capandtrade/capandtrade.htm

[8] California Air Resources Board (December 2008) *Climate Change Scoping Plan: A Framework for Change,*. p.32. Available at http://www.arb.ca.gov/cc/scopingplan/scopingplan.htm.

[9] The cap will be set in 2013 at 2% below the emissions level forecast for 2013. The cap will decline by 2% in 2014, and by 3% annually from 2015-2020.

[10] California Air Resources Board, *Final Regulation Order, Subchapter 10 Climate Change, Article 5, Sections 95800 to 96023, Title 17, California Code of Regulations*, §95841, p 72. Accessed October 14, 2012 at http://www.arb.ca.gov/cc/capandtrade/september_2012_regulation.pdf.

[11] California Air Resources Board, *Final Regulation Order, Subchapter 10 Climate Change, Article 5, Sections 95800 to 96023, Title 17, California Code of Regulations*, §95811 - 95812, pp 45-48. Accessed October 14, 2012 at http://www.arb.ca.gov/cc/capandtrade/september_2012_regulation.pdf.

[11] Available at http://www.arb.ca.gov/cc/capandtrade/september_2012_regulation.pdf.

[12] A full list of covered entities is available at http://www.arb.ca.gov/cc/capandtrade/covered_entities_list.pdf

companies are at an advantage, while entities with higher emissions will need to optimize increased efficiencies and purchase allowances and offsets in order to minimize compliance costs.

The allocation method of emission allowancesto regulated entities under AB 32 has significant cost implications. While 90% of allowances will initially be provided for free, the exact amount an individual facility receives will vary based on trade exposure of the industrial sector and efficiency of a given facility.

The program contains several cost containment mechanisms in order to ease the compliance burden. One of these is the use of offsets. Protocols for four offset project types have been approved,[13] but recent analyses indicate a shortage in supply of offset credits in all three compliance periods if ARB does not approve additional protocols.[14,15] If the market is significantly short from the beginning, compliance costs to regulated entities are expected to be very high. REDD offsets could aid in keeping the compliance costs of affected industries within a workable range.

### *Role of international forestry offsets under AB 32*

In recognition of "the forest sector's unique capacity to sequester, store, and emit carbon dioxide and to facilitate the positive role that forests can play to address climate change," ARB has already developed protocols supporting the creation of offsets in U.S. forests and urban environments, and is interested in expanding this program beyond U.S. borders.[16]

As a precursor to ARB's final cap-and-trade regulation adopted in 2011, ARB's 2008 Climate Change Scoping Plan articulated California's commitment to working at the international level to reduce global GHG emissions. Affirming "the importance of establishing mechanisms that will facilitate global partnerships and sustainable financing mechanisms to support eligible forest carbon activities in the developing world," the plan embraces the opportunity to "provide incentives to developing countries to help cut emissions by preserving standing forests, and to sequester additional carbon through the restoration and reforestation of degraded lands and forests and improved forest management practices."[17] The final cap-and-trade regulation under AB 32 specifically recognizes REDD as a "sector-based" offset credit, though additional rule-making is required to operationalize this provision.

Two organizations – The Governors' Climate and Forests Task Force (GCF) and the REDD Offset Working Group (ROW) – have been working as partners with ARB to develop a framework for the inclusion of an international REDD+ offset program. The GCF has fifteen states and provinces seeking to integrate REDD+ and other forest carbon activities into emerging GHG compliance regimes and other market and non-market opportunities. The goal is to create a common understanding of the key substantive and procedural elements of REDD+ programs, facilitate the development of interoperable REDD+ programs in the GCF states and provinces and provide an important model for national-level linkages in the future.[18]

The ROW was developed out of the GCF and was specifically created through a Memorandum of Understanding (MOU) signed in November 2010 by then-Governor Schwarzenegger and the governors of Acre, Brazil and Chiapas, Mexico to explore ways to design and implement an international REDD offset program.

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[13] Forestry, destruction of ozone depleting substances, livestock, and urban forestry.
[14] American Carbon Registry, Offset Supply Forecast for California's Cap-and-Trade Program (2013-2020).
[15] Point Carbon Thomson Reuters, *The WCI in numbers: Quebec & California.* Slide presentation, Olga Chistyakova, June 4, 2012.
[16] California Air Resources Board (October 2011). *Compliance Offset Protocol U.S. Forest Projects.* p,8 Available at http://www.arb.ca.gov/regact/2010/capandtrade10/copusforest.pdf.
[17] California Air Resources Board (December 2008). *Climate Change Scoping Plan: A Framework for Change.* p.115. Available at http://www.arb.ca.gov/cc/scopingplan/scopingplan.htm .
[18] Governors' Climate & Forests Task Force (August 2011). *Task 1 Report: GCF Design Recommendations for Subnational REDD Frameworks.*

The ROW will produce a set of recommendations on how to include international REDD+ offsets in California. The initial recommendations are expected to be released in late 2012 or early 2013 and will cover i) legal and institutional mechanisms required for California to recognize international REDD-based emission offsets; and ii) the key policy and technical elements a sectoral REDD+ program should achieve in order for REDD-based offsets to be recognized in a compliance program. The initial ROW recommendations will be open to public comment, and a final version is to be issued by early 2013 for ARB's consideration after incorporating stakeholder input. If ARB develops regulations to allow international REDD or REDD+ offsets into California, it is expected to initially include offsets from only Chiapas and Acre, with potential to expand sources of supply in future years.

ARB rules will greatly influence the available supply of REDD offsets. Modeling by the Environmental Defense Fund (EDF) indicates that the supply of REDD offset credits from the State of Acre alone could fill the demand for REDD credits under AB 32. However, the potential development of an internal carbon market in Brazil, as well as other demand drivers (including a potential compliance market for REDD+ in Australia), might counteract oversupply issues.[19] Based on the current rulemaking under AB 32, the maximum demand for all offsets is about 200 $MMtCO_2e$ from 2013 to 2020. Sector-based credits, such as those from REDD activities, are limited to one-quarter of these offsets from 2013 to 2017 and one-half from 2018 to 2020[20], which equates to about 71 $MMtCO_2e$ total from 2013 to 2020. As a comparison, the offset limit in the European Union Emissions Trading System (EU-ETS) is an average limit of 106 $MMtCO_2e$ per year approximately 1.7 billion $MtCO_2e$ between 2005 and 2020, or and estimated 848 $MMtC_2e$ from 2013 to 2020.[21] If REDD is admitted under AB 32 as a sector-based offset, this could create a primary market for REDD offsets valued at up to $900 million to $1.65 billion through to 2020,[22] with a larger total market value from the secondary market.

### *Pricing allowances and offsets*

The prices of allowances and offsets will vary to reflect the different risks associated with each unit. California Carbon Allowances (CCAs) are government-issued and their value will vary with market conditions, but they don't face the prospect of being deemed illegitimate and, consequently, being invalidated. The different types of compliance-eligible offset credits, on the other hand, carry several risks, and thus are of relatively lower value. Chief among these is the real or perceived risk that an offset from a given project type could be invalidated by ARB.[23] The only offset contracts trading are for yet-to-be-issued California Carbon Offsets (CCOs), which will be issued by the ARB, and for offset credits called Climate Reserve Tonnes (CRTs), issued by the California-based Climate Action Reserve (CAR). CRTs and CCOs trade at different discounts to CCAs. Note that, at this time, no international sector-based offset credits exist, such as those from REDD

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[19] Pedro Piris-Cabezas and Ruben Lubowski, Environmental Defense Fund, September 27, 2012. Potential supply to California of sectoral credits from REDD+ from the State of Acre, Brazil.

[20] California Air Resources Board, *Final Regulation Order, Subchapter 10 Climate Change, Article 5, Sections 95800 to 96023, Title 17, California Code of Regulations*, §95854(c ), p 91 and §95993(a), p 264. Accessed October 14, 2012 at http://www.arb.ca.gov/cc/capandtrade/september_2012_regulation.pdf.

[21] Alexandre Kossoy and Pierre Guigon, *State and Trends of the Carbon Market 2012*. A report by The World Bank. Accessed Oct. 16, 2012 at http://siteresources.worldbank.org/INTCARBONFINANCE/Resources/State_and_Trends_2012_Web_Optimized_19035_Cvr&Txt_LR.pdf

[22] This estimate contains a number of uncertainties and assumptions. It assumes no REDD offsets are used in the first compliance period and 75% of the allowable REDD offsets are recognized and used for the second and third compliance periods, and the price of credits is discounted by either 40% or 60% against Barclay's predicted allowance prices of $40 and $73 for the second and third compliance period respectively. If 100% of the allowable number of REDD credits are used, the range is $1.1 - $2.2 billion.

[23] California Air Resources Board, *Final Regulation Order, Subchapter 10 Climate Change, Article 5, Sections 95800 to 96023, Title 17, California Code of Regulations*, Section 95985. Accessed August 27, 2012 at http://www.arb.ca.gov/regact/2010/capandtrade10/finalrevfro.pdf

activities. They will likely be discounted against a CCA, but given that the rules are yet to be determined, the discount factor is hard to predict.

### *Investment opportunities*

Compliance markets are created by regulation so their supply and demand is inherently influenced by policy interventions. When more established, they also trade on fundamentals such as economic activity, fuel and power prices, and weather. The market for REDD compliance offsets is too immature to react to these fundamental factors. As the rules to allow REDD offsets in California have not yet passed (to create a functioning regulated market), the pre-compliance market is at a very early stage, still dependent on policy signals and therefore subject to a high level of "regulatory noise."

The development of a new tradable asset type and environmental market offers opportunity for early entrant investors that have developed an understanding of fundamental drivers as the market forms. There are different ways to gain exposure for investors looking to engage in the emerging REDD+ market:

1) direct investment into offset project development, with financing structured as equity, debt or advance payment for credits;
2) direct purchase of offsets from a project developer either via long-term forward purchase agreements or spot transactions, or lending against long-term purchase contracts;
3) investment through a fund managed by specialist investment managers investing in a well-diversified portfolio of projects;
4) secondary market trading (directly or via a hedge fund), which will in time offer trading opportunities as market liquidity and fundamental price drivers develop; and
5) structured products such as a REDD+ bond, which are new and yet-to-be-issued instruments.

Since the start of emissions trading under the UN system almost 10 years ago, exchange trading has developed within the European Union (EU) cap-and-trade system, and specialist hedge funds have raised capital and earned returns with little correlation to the market (as best proven through the financial crisis of 2008). However, the secondary market for REDD+ emissions trading remains highly illiquid and is likely beyond the risk mandate of many institutional investors.

### *Conclusion*

AB 32 alters the business landscape in California. Capping GHG emissions may impact the value of regulated entities as a function of their energy consumption mix, the response to emission reduction options (including offsetting), and the actual price of carbon that develops. New opportunities will emerge from the development of international forest carbon projects that have a high sustainable development impact and have been developed by experienced project developers under appropriate market standards. Such projects may provide opportunity for long-term institutional investors, particularly frontier investors with an appetite for new asset-class risk, investors already familiar with the forestry sector through timber portfolios, and investors motivated by sustainable development impact and socially responsible investing.

# 2.0 INTRODUCTION

## 2.1 WHY AB 32 MATTERS FOR INSTITUTIONAL INVESTORS

Institutional investors continuously screen the investment world for significant changes, in terms of both risks and opportunities. The AB 32 law is such a change. California represents the ninth largest economy in the world[24] and AB 32 is an economy-wide effort to reduce greenhouse gas (GHG) emissions. It will impact the state's industries—such as power generation, oil refining, and manufacturing—as well as the retail sector and private consumers through higher energy prices. Californian legislation has also been a precursor to legislative changes in other states and at the federal level. AB 32 will create both risks and opportunities for institutional investors.

Investment risks arise as a result of AB 32 putting a price on GHG emissions. This is done via, *inter alia,* the cap-and-trade program which "caps" emissions at over 600 installations belonging to approximately 350 companies. The cap-and-trade system is expected to increase the operating costs of the most polluting installations. There are, however, a number of design features of any cap-and-trade system that can significantly affect the cost of compliance. Any investor with holdings which might be directly or indirectly affected by AB 32 should then analyze, or seek specialized expert advice in analyzing, these effects. Overall effects might turn out to be positive or negative, or even neutral, but any investor is well advised to assess any potential relevance of the California climate change regulation on its holdings.

On the other hand, AB 32 also offers interesting investment opportunities. By making dirtier forms of energy production or goods bear their climate costs, cleaner operators and technologies should become more economically viable and, therefore, attract more investment. GHG "offsets" are used as a safety valve for cost containment (discussed in section 3.4 and chapter 4) and can also represent a new investment opportunity.

California regulators have indicated they may allow carbon offset credits from international forest activities, known as Reducing Emissions from Deforestation and Forest Degradation (REDD), to be accepted as compliance instruments in addition to offset credits issued to other approved emission reduction approaches. REDD, once formally approved and incorporated into the AB 32 rulemaking, is expected to provide a significant number of offset credits for the California carbon market. REDD activities typically include reducing emissions from reducing deforestation and forest degradation. The term REDD+ means that carbon enhancement activities are also included on the "plus" side of REDD+. At present, AB 32's domestic forest protocols include reforestation, improved forest management, and avoided conversion activities.[25] The early policy signal for the inclusion of REDD in the California cap-and-trade program warrants a closer look since this might offer an interesting opportunity for institutional investors in the near future.

## 2.2 REPORT OBJECTIVE, ORGANIZATION AND METHODOLOGY

The objective of this report is to provide information on California's forthcoming GHG cap-and-trade program, how the program could impact portfolio holdings, how mitigation of international forest carbon emissions fits into the program, and how institutional investors can find opportunities in these emissions reduction activities.

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[24] Center for Continuing Study of the California Economy, *Numbers in the News,* Sept. 2012. Accessed Oct. 16, 2012 at http://www.ccsce.com/PDF/Numbers-Sept-2012-CA-Economy-Rankings-2011.pdf

[25] "Avoided conversion" is the term for avoided deforestation in the lexicon of California's domestic protocols.

The report is organized into three main chapters. The first provides an overview of California's cap-and-trade program; the second explains how international forest carbon offsets fit in; and the final chapter describes the risks to institutional investors, while elucidating the emerging forest carbon opportunity.

The report was prepared by Terra Global Capital staff and consultants, and staff from the Forest Carbon, Markets and Communities (FCMC) Program, via a desk review of secondary sources and interviews of market participants. The report was further developed through the original analyses and insights of the authors, based on experience in the field. Extensive original modeling of the prospective market and its offsets component was beyond the scope of this report.

This report is accompanied by a webcast, "The California Carbon Market and the Role of International Forests: A Primer on Risks and Opportunities for Institutional Investors," available until November 6, 2013, at the Institutional Investor Journal website.[26] The paper and webcast are sponsored by the FCMC Program, and the webcast is hosted by Institutional Investor Journals.

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[26] See http://event.on24.com/r.htm?e=533462&s=1&k=73FD630A127EC65C7A47B919563F38CB

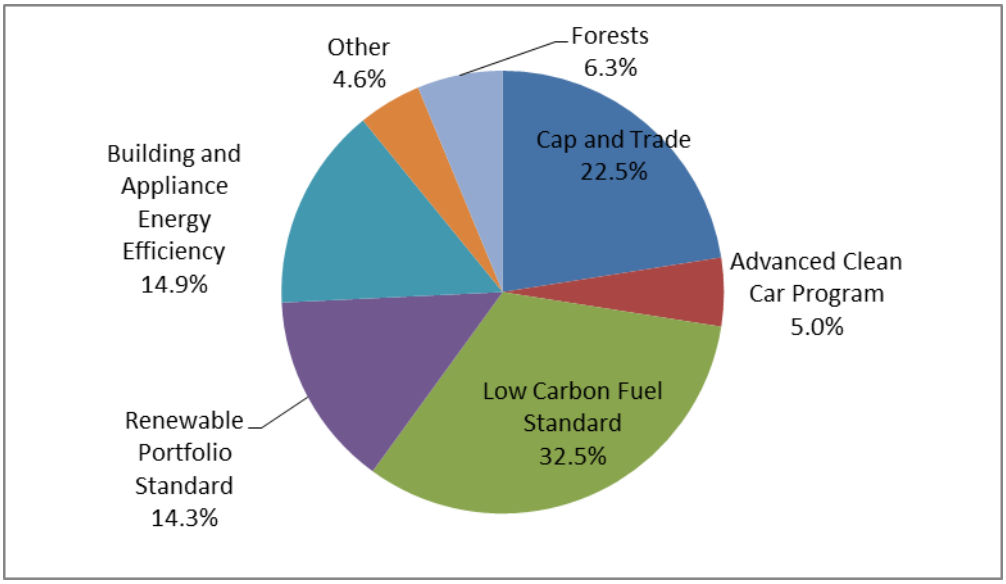
# 3.0 AB 32 CAP-AND-TRADE: OVERVIEW

## 3.1 PROGRAM DESIGN AND GOALS

The AB 32 law requires California to reduce economy-wide emissions to 1990 levels by 2020. The regulating entity for AB 32 is the California Air Resources Board (ARB), which is part of California's Environmental Protection Agency. To achieve this goal, the ARB has developed a variety of emissions reductions strategies, including direct regulations, monetary and non-monetary incentives, voluntary actions, and market-based mechanisms.[27]

A particularly important part of AB 32 is its cap-and-trade system – the first economy-wide program of its kind in the United States – expected to account for approximately 18 $MMtCO_2e$, 22.5% per year of the emissions reductions under AB 32 (See Figure 1). It was first adopted in December 2010 and the final regulations were approved in December 2011. The program will cover major sources of GHG emissions in California, such as refineries, power plants, industrial facilities, and transportation fuels.[28]

**Figure 1: Expected sources of emissions reduction under AB 32[29]**




Specifically, the cap-and-trade program establishes an emissions cap covering approximately 85% of the state's GHG emissions. However, since other regulations included under the AB 32 scoping plan aim to reduce emissions in the same sectors, the cap-and-trade program is expected to account for approximately

[27] California Air Resources Board for the State of California (December 2008), *Climate Change Scoping Plan: A Framework for Change.* p.32. Available at http://www.arb.ca.gov/cc/scopingplan/scopingplan.htm.
[28] http://www.arb.ca.gov/cc/capandtrade/capandtrade.htm
[29] See pp. 21-24 of ARB's Supplement to the AB 32 Scoping Plan Functional Equivalent Document for more information. Available at http://www.arb.ca.gov/cc/scopingplan/document/final_supplement_to_sp_fed.pdf.

22.5% of total emissions reductions under AB 32. The aggregate emissions cap will decline each year in order to reach the 2020 emissions target.[30] As shown in Table 1, California's 2020 emissions forecast is 507 $MMtCO_2e$, up from an estimated 427 $MMtCO_2e$ emitted in 1990. This leaves an estimated 80 $MMtCO_2e$ emissions gap between 2020 and 1990 levels. All other measures, besides cap-and-trade, are estimated to provide 62 $MMtCO_2e$ of reductions. Cap-and-trade reductions are projected to equal the remaining 18 $MMtCO_2e$, or 22.5% (18 $MMtCO_2e$/80 $MMtCO_2e$) of the reductions that AB 32 necessitates.[31] For the remaining 15% of emissions not included in the cap-and-trade program, covered sectors will be governed by complementary measures, including performance standards, efficiency programs, and direct regulations.[32]

**Table 1: Annual GHG Cap by Sector ($MMtCO_2E$ in 2020)**

| Sector | Projected 2020 Business-as-usual Emissions[33] | | 2020 Emissions Limit under Cap-and-Trade Program[34] |
|---|---|---|---|
| | By Sector | Total | |
| Transportation | 184 | | |
| Electricity | 110 | | |
| Commercial and Residential | 45 | | |
| Industry | 92 | 507 | 334 |
| Recycling & Waste | 9 | | |
| High GWP Gases | 9 | | |
| Agriculture | 29 | | |

In addition to reducing GHG emissions, California's cap-and-trade program is designed to keep compliance costs low and promote investment and jobs in green technologies and businesses. To this end, it permits allowance trading and limited use of offsets to provide flexibility for covered entities. There are two basic compliance units – allowances and offsets:

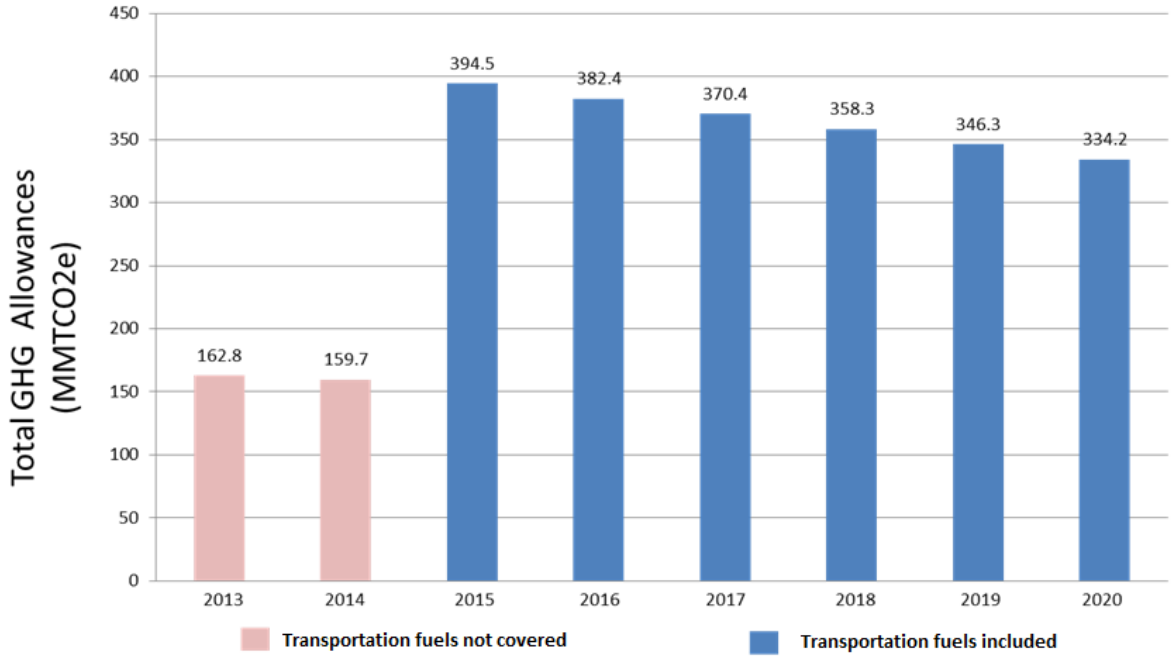
1) **Allowances**: The cap is quantified in $MtCO_2e$ and a corresponding number of allowances are issued in a given year either for free or sold at auction. As the cap declines each year, fewer allowances are issued. Limiting the number of allowances issued in this fashion ensures emissions continue to decline.

[30] The cap will be set in 2013 at 2% below the emissions level forecast for 2013. The cap will decline by 2% in 2014, and by 3% annually from 2015-2020.
[31] See Pg 20 of ARB's Supplement to the AB 32 Scoping Plan Functional Equivalent Document for more information
[32]California Air Resources Board (December 2008), *Climate Change Scoping Plan: A Framework for Change.* p.32. Available at http://www.arb.ca.gov/cc/scopingplan/scopingplan.htm.
[33] California Air Resources Board, *2020 GHG Emissions Forecast*, April 6, 2012. Available at http://www.arb.ca.gov/cc/inventory/data/forecast.htm.
[34] California Air Resources Board, *Final Regulation Order, Subchapter 10 Climate Change, Article 5, Sections 95800 to 96023, Title 17, California Code of Regulations*, §95841, p 72. Accessed October 14, 2012 at http://www.arb.ca.gov/cc/capandtrade/september_2012_regulation.pdf.

2) **Offsets**: Covered entities are able to purchase offset credits in lieu of buying allowances or reducing their emissions on-site. Offsets are tradable credits that represent GHG emissions reductions made in areas or sectors not covered by the cap-and-trade program. Offset credits are also expressed in $MtCO_2e$.

The remainder of this section outlines the key features of California's cap-and-trade program under the Final Regulation Order passed in December 2011. Specific topics include entities covered, allocation and trading of allowances, offsets, and linkage with other programs.

**Figure 2: Annual AB 32 Cap-and-Trade Allowances**[35]




## 3.2 COVERED ENTITIES

Overall, the program will cover over 600 of the state's largest GHG-emitting stationary sources, consisting of approximately 350 businesses. Some entities will be covered from the outset of the program in 2013, while others will be phased in at the start of the second compliance period beginning in 2015.

Beginning in 2013, the program will cover industrial sources, electricity generators, and electricity imports that produce more than 25,000 $MtCO_2e$ per year. In the second compliance period, beginning in 2015, the program additionally places compliance obligations on suppliers of transportation fuels (for example, gasoline, diesel and ethanol), distillate fuel oil, and natural gas if the use of these fuels from a given supplier

[35] California Air Resources Board, *Final Regulation Order, Subchapter 10 Climate Change, Article 5, Sections 95800 to 96023, Title 17, California Code of Regulations* §95841, Table 6-1, p. 70.

**BOX 1: MAIN COVERED SECTORS**

- Electric power generation, including electricity imports
- Petroleum refineries
- Oil & natural gas combustion; natural gas distribution
- Mining
- Sewage treatment facilities
- Food manufacturing and processing
- Dairy product manufacturing
- Animal processing and slaughtering
- Breweries and wineries
- Pulp and paper mills
- Industrial gas and other chemical manufacturing
- Glass, cement and gypsum product manufacturing
- Iron and steel mills, smelters and foundries

would result in 25,000 $MtCO_2e$ per year.[36] A list of the main covered sectors is included in Box 1 and a full list of covered entities is available on the ARB website.[37]

## 3.3 ALLOWANCES

A portion of allowances will be freely allocated each year. This will initially be set at about 90% of total emissions. Between 2013 and 2020, the percent of free allowances will gradually decrease as more allowances are auctioned in each successive period. The allocation of free allowances is determined differently for the industrial, refinery and electricity sectors. For industrial facilities, the allowances will be based on a benchmark that rewards efficient facilities, while also considering the extent to which certain industries are disadvantaged due to out-of-state competition that does not incur a carbon price. For electric utilities the value of allowances will be designed to benefit ratepayers. The distribution of allowances will be updated annually for refineries according to the production and efficiency of each facility.[38]

The initial compliance period is two years, running from 2013-2014, and successive compliance periods are three years. The program is currently slated to run through 2020. Covered entities have compliance obligations both annually and at the end of each compliance period. Each entity must surrender allowances annually, by November 1st, to cover at least 30% of its previous year's emissions.[39] For example, the first deadline for surrendering allowances is 1 November 2014. By this date, a facility must surrender allowances worth 30% of its emissions from 2013. After the end of a compliance period, each entity must surrender an amount of allowances equal to total emissions for that period minus emissions already covered through its annual compliance obligations.[40] Once surrendered, the allowances and offsets are permanently retired by ARB. Failure by a covered entity to surrender sufficient allowances and offsets to match its emissions would result in an obligation to submit a number of allowances and offsets equal to four times the shortfall. Offsets can compose up to one-fourth of this shortfall, while also subject to the quantitative limit discussed in section 3.4.[41]

Trading and banking of allowances (and offsets) will be allowed in order to minimize the cost of pollution controls and to guard against shortages and price swings in the California carbon market. To contain costs, the State of California will hold 4% of allowances in strategic reserve. Compliance periods are set at three years to buffer annual variations in product output. Allowances from current and future compliance years will be auctioned, with a unique auction for each vintage. Auctions began in November 2012 and will be held

[36] California Air Resources Board, *Final Regulation Order, Subchapter 10 Climate Change, Article 5, Sections 95800 to 96023, Title 17, California Code of Regulations*, §95811 - 95812, pp 45-48. Accessed October 14, 2012 at http://www.arb.ca.gov/cc/capandtrade/september_2012_regulation.pdf.

[37] The preliminary list of covered entities is available here: http://www.arb.ca.gov/cc/capandtrade/covered_entities_list.pdf

[38] California Environmental Protection Agency Air Resources Board. "Overview of ARB Emissions Trading Program." Accessed August 8, 2012 at http://www.arb.ca.gov/cc/capandtrade/capandtrade.htm

[39] Offsets may be surrendered in lieu of allowances, as discussed in section 3.4.

[40] California Air Resources Board, *Final Regulation Order, Subchapter 10 Climate Change, Article 5, Sections 95800 to 96023, Title 17, California Code of Regulations* §95856 see sub-sections (a) to (g), p. 91.

[41] California Air Resources Board, *Final Regulation Order, Subchapter 10 Climate Change, Article 5, Sections 95800 to 96023, Title 17, California Code of Regulations* §95857 (b).

quarterly.[42] The first auction saw prices just above the floor. The amount of allowances up for bid will grow each subsequent year, as the number of free allowances is reduced and the scope of the program is increased. Auctions will have a floor price starting at $10 for 2013 allowances. The floor price will rise annually by 5% plus the rate of inflation, which is calculated by the Consumer Price Index[43]

## 3.4 OFFSETS

The program contains several cost containment mechanisms in order to ease the compliance burden for participants. One of these is the use of offsets. In lieu of reducing emissions on-site or trading allowances, covered entities can buy offset credits for up to 8% of their compliance obligations in each compliance period. This amounts to a maximum of about 200 $MMtCO_2e$ of offsets over the three compliance periods: 25.8 $MMtCO_2e$ in the first compliance period 2013-2014, 91.8 $MMtCO_2e$ in the second compliance period from 2015-2017, and 83.1 $MMtCO_2e$ in the third compliance period from 2018-2020. Offsets are tradable credits that represent GHG emissions reductions or removals measured in $MtCO_2e$ that occurred in areas or sectors not covered by the cap-and-trade program. According to ARB's scoping plan, this quantitative limit helps provide a balance between the need to achieve meaningful emissions reductions from capped sources with the need to provide low-cost reduction opportunities for emission sources within capped sectors.[44]

Multiple paths toward allowing offsets into the system are described in the regulation, and ARB is continuing to evaluate which of these should be incorporated into the program in the future. Offsets must meet rigorous criteria that demonstrate that the emissions reductions are real, permanent, verifiable, enforceable, and quantifiable. To be credited as an offset, the action or project must be additional to what is required by law, regulation or would have otherwise occurred. The reductions must also result from activities that are not already covered by the cap-and-trade program. The regulation describes in more detail the requirements that would need to be met for ARB to issue or approve an offset credit.[45]

There are two broad categories of offset credits: those created by ARB; and those created by an external program approved by the board. For offset credits created by ARB, ARB would be the credit issuing body. A credit issuing body reviews all project quantification and verification information to determine if a reduction, avoidance, or sequestration of GHGs has occurred. Once the credit issuing body determines that the reduction occurred, it issues an offset credit by assigning a unique serial number for that specific tonne. In this scenario, projects being issued offset credits by ARB must use quantification methodologies that are approved by the board. Board-approved methodologies consist of standardized methods for estimating project baselines and determining additionality.

There are four ways to generate eligible offset credits:

### *1) California Carbon Offsets (CCOs)*

ARB has approved four compliance offset protocols for emission reduction projects in the following areas: forestry (two protocols – see section 4.1.1), destruction of ozone depleting substances (ODS)[46], and livestock waste management. ARB will issue credits to eligible project activities. Emission reductions or sequestration activities must have occurred after December 31, 2006, unless otherwise stipulated in the applicable

[42] California Air Resources Board, *Final Regulation Order, Subchapter 10 Climate Change, Article 5, Sections 95800 to 96023, Title 17, California Code of Regulations* §95910, p. 126.
[43] California Air Resources Board, *Final Regulation Order, Subchapter 10 Climate Change, Article 5, Sections 95800 to 96023, Title 17, California Code of Regulations* §95911 (b)(6), p.129.
[44] California Environmental Protection Agency Air Resources Board. *Overview of ARB Emissions Trading Program.* Accessed August 8, 2012 at http://www.arb.ca.gov/cc/capandtrade/capandtrade.htm
[45] Procedures for Approval of Compliance Offset Protocols are described in §95971 beginning on p. A155.
[46] These ozone depleting substances or "ODS" are chlorofluorocarbon (CFC) refrigerants. Due to their damage to the ozone layer, CFC production is generally banned under the Montreal Protocol, but existing stocks continue to be used and reused, leaking in the process. In addition to harming the ozone layer, CFCs are potent GHGs.

protocol.[47] At present, the approved offset protocols for CCOs and Climate Reserve Tonnes (CRTs, see "Early Action Credits" below) are only applicable to U.S. projects, but the program allows the possibility of CCO generation in three countries: the U.S., Canada and Mexico. All offsets will require independent verification.[48] Additional protocols are under consideration.

### *2) Early Action Offset Credits*

These offset credits can be issued by voluntary programs approved by ARB. Four Climate Action Reserve (CAR) project types (same as CCO project types above) can generate Early Action Offset Credits. CAR offsets are called Climate Reserve Tonnes. Projects have to be located in the U.S. and be developed according to an ARB-approved protocol. Emission reductions or sequestration activities must occur between January 2005 and December 2014. In order for an Early Action Offset Credit to count under ARB's compliance program, it has to be verified and reviewed before the CCOs are issued on a one-to-one exchange basis per ton of Early Action Credit.

### *3) Offsets from approved external GHG Emission Trading Schemes*

Offset credits issued by another regulatory program outside of California. Such a linkage would require further rulemaking by ARB. See section 3.5 for further explanation of this issue.

### *4) Sector-based Offset Credits*

Under AB 32, sector-based credits that respresent "a group or subgroup of an economic activity, or a group or cross-section of a group of economic activities, within a jurisdiction" are allowed. The final ruling in section 95993, allows for sector-based credits from REDD which creates a potential pathway for international REDD offsets in the AB 32 cap and trade system. There are sublimits for such sector-based credits under ARB where are: 25% of the 8% limit on all offsets, which equals 2% of the cap for 2013-2017, and 50% of the 8% limit on all offsets, which equals 4% thereafter. Therefore, the total maximum demand for REDD credits under the ARB cap-and-trade program between 2013 and 2020 is around 71 $MMtCO_2e$. Additional rule making is needed by ARB to operationalize this offset category (see section 4.1.2).

ARB's Preliminary Draft Regulation (PDR) includes a lengthy narrative discussion of ARB staff's preliminary thinking about international offset credits. The next section of this report discusses California's desire to work at the international level to reduce GHG emissions and support the adoption of low-carbon technologies and sustainable development in developing countries. In particular, the PDR acknowledges California's ongoing participation in international forest carbon activities including subnational REDD efforts.[49] The ARB's Scoping Plan further describes California's intent to move beyond international project-based crediting towards the development of international sector-based crediting mechanisms to achieve emission reductions, which is discussed in more detail in section 4.2 of this report. The detailed rules and/or protocols prescribing on how REDD sector-based credits could be used for compliance under AB 32 have not been developed and will require AB 32 board approval before any REDD offsets may be used under AB 32.

Recent analyses by various entities indicate a shortage in supply of offset credits in all three compliance periods if ARB does not approve additional offset protocols.[50,51] ARB is currently in the process of assessing additional offset protocols. The American Carbon Registry (ACR) recently estimated that even with three additional protocols currently under consideration, the market will still face a 35% shortfall (around 70 $MMtCO_2e$) by 2020 if full demand for offsets is reached.

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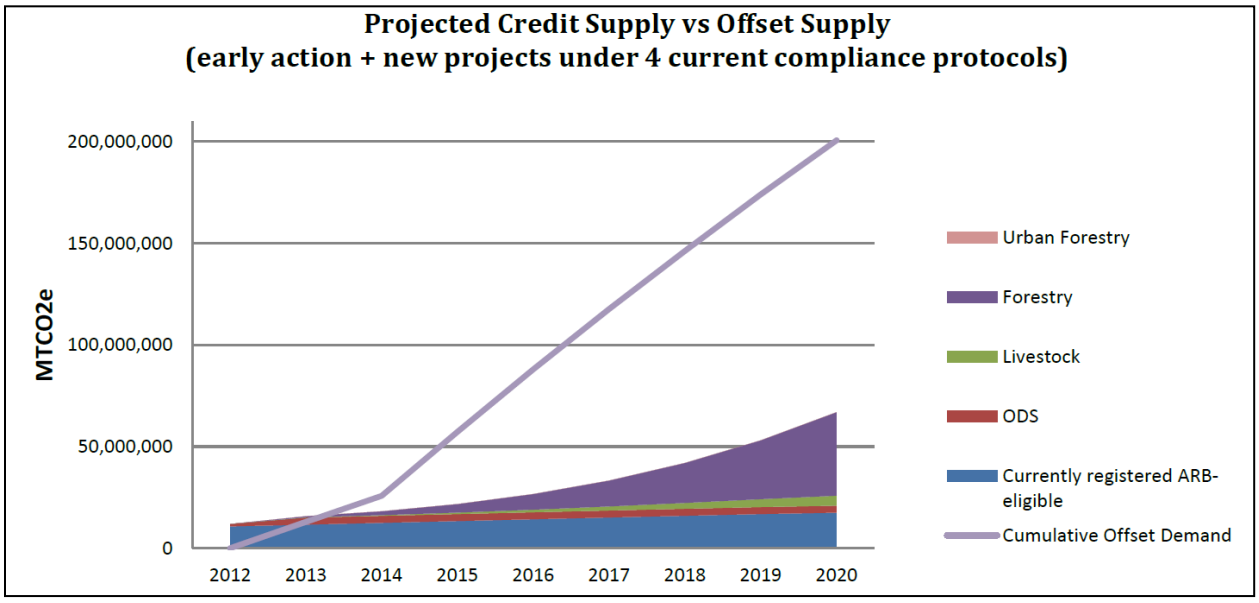
[47] California Air Resources Board, *Final Regulation Order, Subchapter 10 Climate Change, Article 5, Sections 95800 to 96023, Title 17, California Code of Regulations* §95973 (a)(2)(B).
[48] See http://www.arb.ca.gov/cc/capandtrade/offsets/offsets.htm for ARB's approved offset protocols
[49] California Air Resources Board. *Background and Description California's Cap and Trade Regulation.* p.4
[50] American Carbon Registry, *Offset Supply Forecast for California's Cap-and-Trade Program* (2013-2020).
[51] Point Carbon Thomson Reuters, *The WCI in numbers: Quebec & California.* Slide presentation, Olga Chistyakova, June 4, 2012.

**Figure 3: Projected Credit Supply vs. Offset Supply**




Source: ACR 2012[52]

If the market is significantly short from the beginning, the compliance costs to regulated entities are expected to be very high. By putting a price on emissions, the cap-and-trade program should incentivize investments in emission reductions. However, if the marginal cost of abatement, along with prices of allowances and offset credits, becomes too high, public support for the cap-and-trade program might wane. ARB is thus tasked with fine-tuning supply and demand to deliver a viable, workable system, with a carbon price high enough to trigger investments in cleaner technologies, but not so high as to threaten businesses in California. REDD offsets could aid in keeping the compliance costs of affected industries within an acceptable range, with analysis by EDF indicating that credits from REDD activities can fill the compliance gap.[53]

## 3.5 LINKAGE

The regulation allows California to develop a cap-and-trade program that would link to other trading systems. These trading systems could be other emissions trading systems, such as those of Western Climate Initiative (WCI)[54] partner jurisdictions, or systems that only credit offset reductions. Linkage would be implemented through agreements with other systems outlining details of the cap-and-trade program operations.[55] Within

[52] American Carbon Registry, Offset Supply Forecast for California's Cap-and-Trade Program (2013-2020).
[53] Pedro Piris-Cabezas and Ruben Lubowski, Environmental Defense Fund, September 27, 2012. Potential supply to California of sectoral credits from REDD+ from the State of Acre, Brazil.
[54] The WCI is comprised of one U.S. state and four Canadian provinces that have signed agreements to use a market-based approach to reduce GHG emissions to 15% below 2005 levels by 2020. British Columbia, Ontario and Manitoba are anticipated to join after the program starts. California is the lone U.S. state proceeding with WCI's cap-and-trade program. On December 14, 2011, Quebec confirmed that it had adopted a cap-and-trade regulation that would link with California, with obligations coming into force on January 1, 2013. See Government of Quebec (December 2011). *Cap and Trade System for Greenhouse Gas Emissions Allowances* Accessed December 7 2012 at
http://www.mddep.gouv.qc.ca/changements/carbone/Systeme-plafonnement-droits-GES-en.htm
[55] California Air Resources Board, *Final Regulation Order, Subchapter 10 Climate Change, Article 5, Sections 95800 to 96023, Title 17, California Code of Regulations* § 95940, beginning on p. 153.

the WCI, only California and Quebec are actively establishing cap-and-trade systems, and they are steadily working towards linkages.

For offset credits issued by an external program, Subarticle 12 of the Final Regulation Order eligibility sets out procedures and eligibility criteria to link external GHG emissions trading systems (ETS) and GHG offset crediting systems.[56] All linkages would need to be approved by the board. In particular, mechanisms needed for enforcement purposes, such as an MOU, would need to formalize enforcement agreements for all phases of cap-and-trade program operations with other jurisdictions, as well as program operation agreements with the linked program. Offset credits from WCI partner jurisdictions would need to be approved through linkage provisions. In addition, a law was signed by Governor Brown on Sept 30, 2012 (titled Assembly Bill 1532), that would require any linkage to be approved by the Governor with an informal review by the legislature.

[56] Subchapter 10 Climate Change, Article 5, Sections 95800 to 96023, Title 17: Article 5: CALIFORNIA CAP ON GREENHOUSE GAS EMISSIONS AND MARKET-BASED COMPLIANCE MECHANISMS available at http://www.arb.ca.gov/regact/2010/capandtrade10/ctfro.pdf.

# 4.0 AB 32 CAP-AND-TRADE AND FOREST OFFSETS

In recognition of "the forest sector's unique capacity to sequester, store, and emit carbon dioxide and to facilitate the positive role that forests can play to address climate change," ARB has already developed protocols supporting compliance offsets in U.S. forests and urban environments, and is interested in expanding this program beyond the U.S. borders.[57] This section provides an overview of current and proposed regulations regarding AB 32's offset program as it relates to forest and land-use projects. While approved protocols for offsets from U.S. forests will be covered briefly, the bulk of this section focuses on plans for a REDD offset program connecting California to subnational jurisdictions in the developing world, such as the State of Chiapas in Mexico and the State of Acre in Brazil.[58]

## 4.1 CURRENT STRUCTURE

ARB has already approved two protocols for offset credits that use U.S. and urban forest projects. ARB is currently considering international offsets through the WCI in a number of identified sectors that include forestry. The legislation also allows for using sector-based REDD offsets[59] but additional rule making is needed to operationalize this provision and ARB has not set a definitive timeframe for considering additional work. In the interim, ARB has been working in collaboration with the Governors' Climate and Forest Task Force (GCF) and the REDD Offset Working Group (ROW) to explore ways to incorporate international REDD offsets into California's cap-and-trade program.

### 4.1.1 Domestic forest offset protocol

There are two forest offset protocols – Compliance Offset Protocol for U.S. Forest Projects and the Compliance Offset Protocol for Urban Forest Projects. In October 2011, ARB approved the Compliance Offset Protocol for U.S. Forest Projects. This protocol ensures the net GHG reductions and GHG removal enhancements caused by an offset project are accounted for in a complete, consistent, transparent, accurate, and conservative manner and may therefore be reported as the basis for issuing offset credits.[60] The protocol involves three types of projects: i) reforestation; ii) improved forest management; and iii) avoided conversion. To qualify, reforestation projects and improved forest management projects may be located on private land or on state or municipal land. Avoided Conversion Projects, however, must be implemented on private land, unless the land is transferred to public ownership as part of the project. The protocol furthermore outlines detailed methods of quantifying net GHG reductions and GHG removal enhancements for each type of forest project.

The Compliance Offset Protocol for Urban Forest Projects was also passed by ARB and operates much like the offsets from U.S. Forest Projects. Urban Forest Projects are defined as "a planned set of tree planting and maintenance activities that permanently increase carbon storage, taking into account GHG emissions

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[57] California Air Resources Board (October 2011). *Compliance Offset Protocol U.S. Forest Projects.* p,8 Available at http://www.arb.ca.gov/regact/2010/capandtrade10/copusforest.pdf.

[58] The inclusion of an international REDD program would require changes to existing regulation, such as the expansion of the offset program to countries outside of North America.

[59] California Air Resources Board, *Final Regulation Order, Subchapter 10 Climate Change, Article 5, Sections 95800 to 96023, Title 17, California Code of Regulations* § 95993

[60] California Air Resources Board (October 2011). *Compliance Offset Protocol U.S. Forest Projects.* p,7 Available at http://www.arb.ca.gov/regact/2010/capandtrade10/copusforest.pdf.

associated with planting and maintenance of project trees."[61] The protocol applies to three specific categories: i) in municipalities ii) on educational campuses, and iii) by utilities. An offset project is defined by a specific number of project tree sites, determined a priori, that will be planted and maintained within one of the above types of entities over the offset project life. Offset Project Operators or Authorized Project Designees may undertake as many tree projects as desired as long as each project meets the eligibility criteria and reporting requirements in this protocol and set forth in the regulation.

### 4.1.2 Proposed international REDD offset program

As a precursor to ARB's final cap-and-trade regulation passed in 2011, ARB's 2008 Climate Change Scoping Plan articulated California's commitment to working at the international level to reduce global GHG emissions. Affirming "the importance of establishing mechanisms that will facilitate global partnerships and sustainable financing mechanisms to support eligible forest carbon activities in the developing world," the scoping plan embraces the opportunity to "provide incentives to developing countries to help cut emissions by preserving standing forests, and to sequester additional carbon through the restoration and reforestation of degraded lands and forests and improved forest management practices."[62] This desire to support forests is reflected in the final regulations, which lists REDD as a source of sector-based offsets. Paragraph 95993, Sources for Sector-Based Offset Credits, states: "Sector-based credits may be generated from: a) Reducing Emissions from Deforestation and Forest Degradation (REDD) Plans."[63]

The GCF[64] and the ROW[65] have been working as partners with ARB to develop a framework for the inclusion of an international REDD+ offsets into the AB 32 cap and trade program. The GCF began in 2008 when then-Governor Arnold Schwarzenegger began a state-province partnership with leaders from the nine states/provinces in five countries including the United States, Brazil, Indonesia, Mexico, and Nigeria representing over 50% of the world's tropical forests. The purpose of the GCF task force was to take urgent steps to contain global climate change, and to jointly set forth a blueprint for the next global agreement on climate change solutions.[66] Today the GCF has fifteen states and provinces seeking to integrate REDD+ and other forest carbon activities into emerging GHG compliance regimes and other market and non-market opportunities. The goal is to create a common understanding of the key substantive and procedural elements of REDD+ programs, facilitate the development of interoperable REDD+ programs in the GCF states and provinces, and provide an important model for national-level linkages in the future.[67]

The ROW was developed out of the GCF in order to provide more details on how a REDD program would actually be initiated in California and host jurisdictions. An MOU was signed in November 2010 by then-Governor Schwarzenegger and the governors of Acre, Brazil and Chiapas, Mexico to explore design and implementation of an international REDD offset program. In creating the ROW, these three jurisdictions have taken incipient steps towards answering the legality of all states to generate and trade REDD offsets and developing the proposed architecture for how each state could operate a REDD program. While the ROW focuses on developing a framework for offset programs between these three particular jurisdictions, its work is designed to have broader relevance across jurisdictions involved in the GCF and beyond. More information on Acre and Chiapas is provided in Boxes 2 and 3 below.

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[61] California Air Resources Board. (October 20. 2011) *Compliance Offset Protocol: Urban Forest Projects*. Available at http://www.arb.ca.gov/regact/2010/capandtrade10/copurbanforestfin.pdf.
[62] California Air Resources Board (December 2008) *Climate Change Scoping Plan: A framework for Change*. p.115. Available at http://www.arb.ca.gov/cc/scopingplan/scopingplan.htm.
[63] California Air Resources Board, *Final Regulation Order, Subchapter 10 Climate Change, Article 5, Sections 95800 to 96023, Title 17, California Code of Regulations* § 95993 p. 257.
[64] http://www.gcftaskforce.org/
[65] http://stateredd.org/
[66] California Air Resources Board (December 2008) *Climate Change Scoping Plan: A Framework for Change*. p.114. Available at http://www.arb.ca.gov/cc/scopingplan/scopingplan.htm.
[67] Governors' Climate & Forests Task Force (August 2011). *Task 1 Report: GCF Design Recommendations for Subnational REDD Frameworks*.

## BOX 2: ACRE, BRAZIL

The State of Acre, Brazil is located on the far west of the country, entirely situated within the Amazon Basin, with 88% of its territory covered with tropical forest. Since 1998, Acre has seen more than a 200% increase in production of native latex and a 400% increase in the net value of timber products (lumber). Although the state saw 254,000 $km_2$ of forest destroyed in 2008, this reflected a 70% drop in the rate of deforestation since 2003. In 2007, Acre commissioned an assessment related to climate policy, immediately followed by an analysis of the potential for a state-level REDD program with the support of German donor organization GTZ. Government leaders view the California carbon offset market as a valuable source of revenue for a sustainable forest economy.

At the federal level, Brazil's government created a set of three working groups to debate the proposed elements of a national REDD system. The process was led by the Ministry of Environment with participation of both governmental and non-governmental institutions, including representatives of GCF's Brazilian states and stakeholders. Two key points arose out of these debates: 1) the need for a flexible approach to REDD+ is preferred, one that recognizes governmental, and non-governmental, fund and market-based options; and 2) any national system must be integrated with subnational systems (both at the regional and project levels) to ensure the integrity and consistency of the system. Commitment to these ideas amongst regulators at the national and state level is one sign of the viability of implementing a successful REDD+ program in these jurisdictions.

Additionally, the Brazilian GCF States, including Acre, have made progress in both developing and implementing REDD+ programs. In 2010, Acre passed a law establishing their "System for Environmental Services Incentives – SISA", which includes a program specific to REDD+ actions. It seeks to promote public/private initiatives on environmental services, has created a registry system to register the activities developed within its boundaries, and has established principles and criteria that activities must follow to be recognized. It also created several institutional structures to implement the program, including an two new entities; the Institute for Climate Change and the Environmental Services Development Company, which are currently developing rules governing their structures and procedures.


Source: Electric Power Research Institute, "Overview of Subnational Programs to Reduce Emissions from Deforestation and Forest Degradation (REDD) as Part of the Governors' Climate and Forest Task Force," July 2012, p. 3-14.

## BOX 3: CHIAPAS, MEXICO

Chiapas is an extremely biodiverse state in Mexico, with cloudforest, temperate forest, natural and induced pasture, humid rainforest and subhumid rainforest. Chiapas is an epicenter of international forest conservation efforts and home to more than 205 mammal species, 565 bird species, 224 reptile species, 117 amphibious species and more than 1,200 butterfly species. 62% of GHG emissions from Chiapas come from land use change, making the sector the dominant source of GHG emissions in the state.

Leaders in Chiapas have taken a number of important steps towards the protection of forests and are eager to advance these efforts by connecting them with the California compliance market. Since 2009, the Government of Chiapas began the development of the Action Program for Climate Change in Chiapas funded by the British Embassy in Mexico, and Conservation International. The REDD+ framework in Chiapas seeks to strengthen local actions as well as provide guidance to help construct a national REDD+ strategy. A statewide baseline estimating hectares of deforestation and degraded forests has been developed, and a protocol for the MRV requirements has been drafted along with criteria for compensation and restoration activities in communities in the Lacadonian jungle.

In December 2010, the Climate Change Adaptation and Mitigation Law was published. One of its objectives is to propel the Climate Change Action Program. It also establishes a State Climate Change Commission made up of 15 state government agencies. The Commission is responsible for state government coordination in the development and implementation of the climate adaptation and mitigation policies. The decisions and opinions of the Commission are legally obligatory for the state government. The Commission will participate in the development of the state's Climate Change Strategy in coordination with the state's Ministry for Environment in order to set emission targets, budget assignments, and concrete policy goals.

In August 2011, the first state-level Technical Advisory Committee for REDD+ was established. It is made up of experts from social organizations, federal and state government agencies and academic institutions, with a wide range of experiences in monitoring, reporting and verification , forestry inventories, voluntary market carbon initiatives, community territory planning, community training and sustainable land management. The Technical Advisory Committee is currently guiding and advising the State Climate Change Commission in the development of the REDD+ strategy, mechanisms and projects. Some finances have also been mobilized. In 2010 the Environmental Fund for the State of Chiapas was founded, opening with a deposit of US$4 million for the financing of environmental projects in the state.


Source: Electric Power Research Institute, "Overview of Subnational Programs to Reduce Emissions from Deforestation and Forest Degradation (REDD) as Part of the Governors' Climate and Forest Task Force," July 2012, p. 3-14.

The ROW is currently nearing completion of a set of recommendations regarding i) legal and institutional mechanisms required to enable California to recognize international REDD-based offsets for compliance purposes; and ii) the key policy and technical elements a sectoral REDD+ program should achieve in order for REDD-based offsets to be recognized in a compliance program. The ROW is then planning to have a series of workshops in all three states to incorporate stakeholder input into the report, the final version of which will be issued by early 2013 for ARB's consideration. If ARB develops regulations to allow international REDD offsets into California, it is expected to be initially limited to offsets from Chiapas and Acre, with some potential to expand sources of supply in future years.

## 4.2 APPROACHES TO INTERNATIONAL REDD OFFSETS

Like the cap-and-trade program, crediting for REDD offsets will require clearly defined pathways and a set of responsibilities to navigate the legal and quality control issues that surround such offsets. Under any system, administrators must decide what types of projects can be considered for offset crediting. While avoided emissions from both deforestation and forest degradation are slated for inclusion in the ROW's recommendations, the ROW is currently considering whether or not to also include carbon enhancement activities (i.e. the "plus" side of REDD+). The ROW is currently in the process of evaluating possible pathways and developing recommendations for consideration by ARB. Integral to ROW's discussions is the need to specify who will issue REDD+ credits or allowances, to whom, and how these credits will be issued. Clarifying the "crediting pathways" is important because it will affect all design aspects for a REDD+ carbon offset program.

For REDD+ activities within states and provinces, there are various options for how, and to whom, REDD+ credits might be issued, including: i) direct crediting to project-level activities, perhaps as projects are integrated or "nested" within larger state or provincial accounting frameworks; ii) direct crediting to states or provinces based on reductions that result from policies or programs; and iii) recognition of credits issued under an approved state or provincial program. These options are not mutually exclusive. That is, one could envision REDD+ regulations that allowed for the possibility of multiple crediting pathways available to different states/provinces depending on particular circumstances.[68] Multiple crediting pathways enable maximum flexibility to keep the costs of compliance low for suppliers, buyers, and administrators of carbon offsets.

One of the main policy issues behind the selection of a REDD+ offset program is the question of who retains direct authority over credit *issuance* decisions (i.e., decisions about how many credits to issue, and under what circumstances). This could be done by a cap-and-trade administrator (such as ARB or the United Nations Framework Convention on Climate Change-UNFCCC) or this authority could be delegated to the government of a REDD+ host jurisdiction, such as Acre or Chiapas. In delegating to an outside authority, the administrator may not be directly involved in determining whether credits should be issued. Another option is for the administrator and REDD+ host jurisdiction is to delegate credit-issuance authority to a third-party program. Determining the crediting pathway has important implications for each jurisdiction's level of involvement in REDD+ program administration and enforcement. Currently, California's regulations (and accompanying staff report) are silent on the question of which body should be responsible for issuing international credits.

### 4.2.1 Project-based crediting

A project-based crediting approach would function much like California's U.S. Forests Offset Protocol or like existing voluntary markets, whereby ARB or an authorized registry would determine a project's eligibility in

[68] Governors' Climate & Forests Task Force (August 2011). *Task 1 Report: GCF Design Recommendations for Subnational REDD Frameworks,* p.8.

the offset program, issue the offset credit, and monitor, report, and verify sequestration effects. In this model, authorized registries or ARB itself would work directly with developers or project managers to manage offsets and ensure additionality and to protect against threats such as double-counting, leakage, and reversal. The strictly project-based approach does not necessarily require the participation of the host-jurisdiction government.

While there are some advantages to a project-based approach, especially since it is already used in many voluntary markets, project-based crediting can involve several challenges. First, REDD+ projects can have a higher risk of leakage. That is, if someone agrees not to deforest or degrade a particular site, it is harder to ensure that deforestation or degradation does not increase in a different location, as opposed to broader REDD+ activities that may cover the forest sector of an entire province or country. Second, to reduce GHG emissions at scale, efforts will need to move beyond a project-by-project approach, particularly in the forest sector that requires government action to achieve large-scale emission reductions. Third, the UNFCCC negotiations on REDD+ have moved towards REDD+ activities occurring at larger scales than projects (in part due to leakage concerns), and many developing countries are also moving in this direction. In light of these and other concerns, the ARB has indicated its interest in moving forward on sector-based and/or "nested" crediting approaches where projects are incorporated in a jurisdictional framework. These alternative approaches are described in more detail below.

### 4.2.2 Sector-based and nested crediting

The current cap-and-trade regulation expresses support for sector-based offset crediting.[69] Under this crediting scenario, the regulatory authority recognizes offset credits from REDD activities issued by an approved state/province program for sector-wide emissions reductions or nested project-level activities and based on performance relative to a specific crediting baseline determined for the entire sector or jurisdiction. Such sector-based credits would be converted to the appropriate offset currency (*e.g.*, CCO) with proper accounting to avoid double counting, before being tendered for compliance purposes in the relevant GHG compliance system. Implementation of this option would generate the largest amount of reductions, "fast-track" the move toward state/province-level systems, and better position these states and provinces to receive REDD readiness funding. One significant challenge in considering any pathway is determining what legal mechanisms and arrangements are available for forming such partnerships. The GCF may wish to explore this issue further and will certainly be coordinating with the California-Acre-Chiapas ROW Group effort.[70]

#### *Sector-based programs*

Sector-based programs would require the development of an institutional framework capable of managing the jurisdictional offset program. The ROW is currently developing recommendations to ensure that a sector-based program could reliably achieve the goals of the AB 32 offset program and minimize enforcement costs. In particular, the ROW is actively discussing institutional choices for setting baselines, developing registries, determining who issues and receives credits, avoiding interstate and intrastate leakage, developing buffer mechanisms to address reversals, mitigating against double-counting, fostering robust MRV, and incorporating social and environmental safeguards. Should ARB decide to include a sector-based international REDD or REDD+ offset program, the forthcoming ROW recommendations should provide important information about legal, environmental, social, and political implications of different institutional arrangements.

[69] California Air Resources Board. AB 32 Final Regulation Order. Article 5, Section § 95991, p. 256. Available at http://www.arb.ca.gov/cc/capandtrade/finalregorder.pdf.
[70] Governors' Climate & Forests Task Force (August 2011). *Task 1 Report: GCF Design Recommendations for Subnational REDD Frameworks*, p. 12.

### *Nested programs*

One of the most discussed REDD+ topics is the potential for a type of sectoral crediting known as nested accounting and crediting. The term "nested projects" refers to REDD+ projects whose site-specific emissions reductions are accounted for, but where credit issuance is dependent upon the overall performance of the jurisdiction in which they are located. The key feature of a nested program is an accounting system shared at the project and jurisdictional levels. Nested also can refer to how sub-national jurisdictions (state and provinces) area accounted for within a national program. Because nesting includes accounting at the jurisdictional level, it is therefore considered a type of sectoral program (i.e. the geographic boundary of the sector is the jurisdiction). Current ROW and other efforts by the Verified Carbon Standard (VCS) and American Carbon Standard (ACR) cite the importance of this jurisdictional scale reconciliation for maintaining "atmospheric integrity," i.e. to ensure that the number of credits issued to all actors (projects and jurisdiction) does not exceed the total number of emissions reductions[71] that are generated across the state.

**BOX 4: BUFFER POOLS**

Buffers are pools of REDD+ offsets used as a type of "insurance" in case emission reductions from REDD+ activities are lost after issuance from events such natural catastrophes. Buffer credits may be retired to ensure that these types of unforeseen circumstances do not change the actual level of emission reductions for a given period and/or jurisdiction. Buffers are thus additional emission reductions set aside and only "retired" under these circumstances.

Nested project accounting requires the establishment of consistent and harmonized baselines and MRV between the project agents and jurisdictional authorities. The host-state's REDD+ program (as set out in the linkage agreement with the State of California) would define how credits are allocated between projects and the jurisdiction based on emissions reduction performance, including how leakage and reversal mitigation (for example, through shared buffer pools that serve as back-up credits) will be managed and allocated.

Both GCF and ROW members have suggested that project nesting mechanisms need to be flexible and should be able to coherently integrate state activities with a future national system/strategy. Ultimately, answering the question of who *receives* credits should depend primarily on which crediting pathway(s) will be most effective at reducing deforestation and degradation within the desired time-frame and with the ability to generate robust credits that meet California's offset quality requirements. To this end, the ROW's discussions center around which option will most effectively create incentives for, and channel resources to, the required measures. For example, if targeted reductions and accompanying social and environmental objectives could be most effectively achieved and sustained through jurisdiction-wide policies and strengthening of government institutions, then it may make sense to credit only the host jurisdiction and maximize incentives for undertaking these reforms. If, on the other hand, reductions might be most effectively achieved by leveraging the resources of private project developers, then third-party involvement might be preferable. Providing states the option of having credits issued directly to both the jurisdiction itself and nested projects could represent a fruitful approach. However, to maintain atmospheric integrity at the state level, the REDD+ program would have to clearly define how baselines, MRV, accounting and crediting at the various scales would be handled, and how leakage and reversal risks and responsibilities would be shared between government and project actors.

## 4.3 OTHER CONSIDERATIONS

In order for states like California, Chiapas and Acre, or other REDD states or provinces, to link cap-and-trade programs, there will be a number of issues to be addressed collectively and independently. Each state

[71] After making any adjustments for contributions to reversal buffers or other deductions

must deal with its own domestic political forces regarding international agreements, sharing financial benefits, demonstrating environmental integrity in emissions reduction measurement, and a host of other potential issues. Several of these areas are discussed in more detail below that are relevant in assessing risks to investing in REDD+ projects.

### 4.3.1 Monitoring, Reporting, and Verification (MRV)

Robust MRV requirements for REDD+ are important for ensuring accurate accounting of emissions and credits—the backbone of any cap-and-trade program. California discusses sector-based credits as being eligible for approval only if the "country, state, province, or program issuing the sector-based credit has implemented substantive and procedural requirements for the relevant sector that would provide equal or greater assurance of the integrity of such sector-wide GHG reductions or avoidances, or GHG sequestration as is provided by the requirements for other offset credits approved under this article." The GCF's concept note on sector-based crediting further states that "it is essential that adequate monitoring, reporting, and verification systems be in place" to ensure that no credits will be earned "until the crediting baseline is reached and surpassed."[72]

Presumably, specific MRV requirements regarding project- or jurisdictional-level performance would be spelled out in a "quantification methodology" and/or additional guidance documents rather than in the regulations themselves. For approved external credit-issuing programs, some of the MRV criteria/requirements may also be elaborated in the governing linkage agreement or other arrangement with the program (i.e., state/province or other body).

The GCF and ROW have emphasized that reporting structure should be designed in a way that does not place too great a burden on the partner jurisdictions, or on ARB. While having California design a specific program for MRV would ensure a defined level of rigor in these processes, the jurisdictions would also need to be able to tailor their processes to their specific circumstances.

### 4.3.2 Environmental and social safeguards

Environmental and social safeguards have moved in recent years from the periphery to the center of the discussion on REDD+. The increased attention to safeguards stems from the strengthening empirical case[73] that clear land rights and secure resource tenure, effective consultation processes, and the development of progress indicators relevant to local needs are necessary for the ultimate success of REDD+ programs. Developing high-quality safeguards represents an investment in long term sustainability for REDD+ projects and decreases the risk of reversals. This can create additional social and environmental benefits and provide a viable pathway to sustainable low-carbon rural development.

Safeguards, particularly those involving protection of rights and benefit sharing, are an important and sensitive area that poses particular implementation challenges. Safeguards are under development in a variety of ongoing multi-stakeholder processes in a number of GCF states and provinces (e.g. Acre, Amazonas, Mato Grosso, Brazil Social & Environmental Principles and Criteria for REDD+, and Aceh) and other fora, including the UNFCCC, Forest Carbon Partnership Facility, UN-REDD Programme, Climate, Community and Biodiversity Alliance and REDD+ Social and Environmental Standards Initiative (REDD+ SES).

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[72] Boyd, William. *Regulatory Design Options for Subnational REDD Mechanisms.* Governors Climate and Forests Task Force Options Paper., February 2010.

[73] See for example Chhatre, Ashwini, and Arun Agrawal, *Trade-Offs and Synergies between Carbon Storage and Livelihood Benefits from Forest Commons.* Proceedings of the National Academy of Sciences, 2009; available online at http://www.pnas.org/content/early/2009/10/05/0905308106.

Both Chiapas and Acre are addressing social and environmental safeguards as a core component of their jurisdictional REDD+ programs and activities. Acre, in particular, has already developed a set of comprehensive safeguards applied to a jurisdictional REDD+ program. Acre has drawn from a range of sources in developing their approach to safeguards, including national law and extensive consultations with national, state, and local civil society, the farm sector, and indigenous peoples.[74] Chiapas has recently initiated a process to engage relevant stakeholders in discussing applicable safeguards as it develops its REDD+ program. Both states also work closely with their respective national government agencies responsible for REDD+.

As the term "safeguards" itself implies, their primary function is to reduce or prevent negative social or environmental changes. But, as the ROW members have discussed, REDD+ also has the potential to bring positive change as well, and it is important that such co-benefits are incentivized through forest carbon offset activities under California's cap-and-trade program. This "enhanced benefits" approach is consistent with current UNFCCC REDD+ safeguards—as adopted by Parties to the UNFCCC in the Cancun Agreements—which include a requirement for actions to "…enhance other social and environmental benefits."[75] By ensuring that compliance credits embed such co-benefits, California would also satisfy a key interest of investors and offset buyers – who are typically attracted to the social and environmental benefits associated with REDD+ activities.[76]

Proposed safeguards in the two initial partner jurisdictions of Acre and Chiapas demonstrate a commitment of the governments in these jurisdictions to enhanced benefits, and reflect the strong positions taken by civil society in each jurisdiction with respect to prior informed consent, rights to information, and robust co-benefit mechanisms. Guidance for other jurisdictions can also be found in the "Design Recommendations" document of the GCF Task Force,[77] which calls on GCF partner jurisdictions to draw upon existing efforts to develop robust safeguard systems, as a set of recommendations to all jurisdictions regarding the future use and implementation of safeguards.

Likewise, on the demand side, advocating for the adoption of safeguards that are consistent with REDD+ in partner jurisdictions and possibly conditioning any linkage on such adoption, will help to ensure that any REDD+ credits coming into California have been generated in jurisdictions that adhere to high-quality safeguards. One option considered by ROW would be for California to stipulate *ex ante* its intent to link only with jurisdictions that have adopted safeguards that are consistent with REDD+ SES,[78] and to require independent, third-party confirmation of adoption and implementation of such safeguards before concluding any sort of linkage arrangement. In short, safeguards should be integrated into the overall MRV approach.

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[74] See http://www.ecosystemmarketplace.com/pages/dynamic/article.page.php?page_id=7887&section=home for a brief English-language overview of Bill No. 2.308 (22 October 2012), Acre's 'SISA' (Sistema de Incentivo a Serviços Ambientais) law. An unofficial translation of the Bill is found on the Governors Climate and Forests Task Force website, at http://www.gcftaskforce.org/documents/Unofficial%20English%20Translation%20of%20Acre%20State%20Law%20on%20Environmental%20Services.pdf

[75] See Annex I, UNFCCC Conference of Parties 16 Decision ("The Cancun Agreement"), Annex I, "Guidance and safeguards for policy approaches and positive incentives on issues relating to reducing emissions from deforestation and forest degradation in developing countries; and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries." The UNFCCC guidance creates no immediate legal requirements for the states. It has not been adopted in treaty form, and even if so, states' powers to regulate as subnational jurisdictions would be limited, based on national constitutional treatment of international treaties.

[76] EcoSecurities (2010), *Forest Carbon Offsetting Report 2010,* based on global survey responses from 207 organizations. At:

[77] Task 1 Report "GCF Design Recommendations for Subnational REDD Frameworks", 22 July 2010, p 22.

[78] See the REDD+ SES website for more information: http://www.redd-standards.org/the-initiative

BOX 5: REDD+ Social and Environmental Standards (REDD+ SES)

The REDD+ Social & Environmental Standards initiative aims to build support for government-led REDD+ programs that make a significant contribution to human rights, poverty alleviation and biodiversity conservation. The 2nd version of the standards were issued in September 2012 and they are currently being used by the State of Acre in Brazil, the Province of Central Kalimantan in Indonesia, Ecuador, Nepal which follow the same country-led multi-stakeholder process which involves three core elements: governance, interpretation and assessment. Other countries/provinces are starting to use REDD+ SES including Guatemala, Mexico, San Martin Region in Peru, Amazonas State in Brazil, Liberia and Tanzania.

The standards are designed to:

- Provide comprehensive support for the development of a country-led, multi-stakeholder safeguards information system;
- Provide a framework for monitoring and reporting on how safeguards are being addressed and respected throughout REDD+ implementation;
- Aim to enhance positive outcomes – respect for the rights of indigenous peoples and local communities, poverty reduction and biodiversity conservation – as well as avoid social and environmental harm;
- Support the design, implementation, and assessment of the potential social and environmental impacts of government-led REDD+ programs, enabling consistent assessment irrespective of funding source; and
- Build support at national and global levels for a more effective, equitable and sustainable approach to REDD+.

### 4.3.3 Timing

California's cap-and-trade program does not yet provide a regulatory framework for international REDD or REDD+ offsets. ROW is working diligently with a wide variety of stakeholders to develop a framework that will be open to public review and comment, and later presented to ARB who has ultimate authority for how any program will be implemented. While the exact timing remains fluid, the release of the ROW framework is anticipated in early in 2013.

### 4.3.4 Support to foreign jurisdictions

In California, proposed legislation to limit the use of cap-and-trade revenues could create additional hurdles to an international REDD offset program. According to the California Legislative Analyst's Office, the auctions under the cap-and-trade program will generate anywhere from $660 million to $3 billion in revenues in the first year alone.[79] According to the state's Legislative Counsel, these revenues qualify as "mitigation fees," and therefore "must be used only to mitigate GHG emissions or the harms caused by GHG emissions." The question of where and how to spend revenues, however, has become controversial with one proposal to limit cap-and-trade revenue spending to California communities. Large scale REDD+ programs in developing countries may need California's support to become established under AB 32. If it is deemed that these revenues cannot be used to help support REDD coming into AB 32 this may limit the ability fot REDD to become a California compliant offset.

[79] http://www.lao.ca.gov/analysis/2012/resources/cap-and-trade-auction-revenues-021612.aspx

# 5.0 MATERIALITY OF AB 32 ANALYSIS

AB 32 creates the type of systemic change institutional investors should consider in their asset allocation and risk management decisions. In a cap-and-trade program, allowance allocation, combined with rules around offset usage, can have a significant effect on these entities' cash flow and valuations. In addition to the direct impact on covered entities, AB 32 creates new investment opportunities. Although the REDD market under AB 32 is not yet a reality, institutional investors can draw lessons from existing segments of the carbon market. Offsets from other AB 32-eligible project types are already trading, and the European Union Emissions Trading System (EU-ETS) and international carbon markets are well developed.

This chapter provides an overview of potential impacts to covered entities, carbon market features such as supply and demand drivers, price history, and risks, as well different routes to REDD+ market exposure.

## 5.1 EFFECTS ON EARNINGS, P/E RATIOS, AND SHARE PRICES

Cap-and-trade programs can discriminate between facilities based on their total emissions along with other public policy considerations. How emission allowances are allocated to regulated entities under AB 32 has significant cost implications. More efficient industries and companies that generate fewer emissions can be supported, while entities with higher emissions can be disadvantaged since they may need to make additional efforts to reduce emissions and purchase more allowances and offsets to minimize compliance costs. Under AB 32, 90% of allowances will initially be provided for free, though the exact amount an individual facility receives will vary, based on trade exposure of the industrial sector and efficiency of a given facility. With industrial facilities having received their allowances in early November 2012, it is now more feasible to quantify the effect AB 32 might have on cash flow, valuations and share prices of regulated entities under AB32.[80] It can be expected that specialized market data and research firms such as Bloomberg or Thomson Reuters, as well as large banks and trading houses, will perform detailed quantitative analyses of AB 32's effects on regulated firms.

An example of such analysis, while not specific to companies or facilities, is a special comment report about the effects of the California GHG regulation on the refinery industry in the state, published by the ratings agency Moody's Investors Service on March 13, 2012.[81] The Moody's report states "California's increasingly stringent environmental regulations will challenge refiners over the next decade, increasing operating costs and negatively impacting refined product demand." Moody's projects that carbon costs for the refining industry under the AB 32 cap-and-trade program could be between $325 million and $1.2 billion per year by 2020.[82] Thus, while a detailed company-by-company assessment is not yet available, the impact of allowance allocation could be substantial.

[80] Pers. Comm. with Emilie Mazzacurati, Head Carbon Analysis, Thomson Reuters, Point Carbon, August 28, 2012.
[81] As cited in http://issuu.com/carbon-tradingmagazine/docs/carbon_trading_april_2012. Report can be purchased from Moody's on www.moodys.com
[82] As cited in http://issuu.com/carbon-tradingmagazine/docs/carbon_trading_april_2012. Report can be purchased from Moody's on www.moodys.com

## 5.2 OFFSET PRICE DRIVERS

The price of allowances and offsets are affected by a number of different factors. The allowance price in the European carbon market is affected by fundamentals such as economic activity, fuel and power prices, and weather. Prices are also affected by policy decisions, such as the volume of allowances released into the market either for free or at auction and the availability of offsets. The prices for offsets will be affected by allowance prices, but can also be impacted by other factors such as supply and demand, market eligibility, cancellation risk, and offset generation risk. This section reviews specific factors affecting offset prices in California.

### 5.2.1 Supply and demand

*Supply*

ARB rules about which types of REDD carbon offsets from which nations or subnational jurisdictions it will allow for compliance in the AB 32 cap-and-trade program will greatly influence the available supply. If the supply of REDD credits were to overwhelm demand, prices for these offsets would fall dramatically, negatively impacting investments in REDD projects. Note that this would not necessarily impact the overall AB 32 market. Due to the overall limit on the number of offsets allowed for compliance, as well the specific sublimit for REDD offsets, such an oversupply of REDD credits would be isolated from the rest of the AB 32 carbon market. It is expected that ARB will carefully design the rules to maximize the cost containment function of offsets, while also avoiding a flood of REDD offsets which could threaten the REDD market under AB 32.[83]

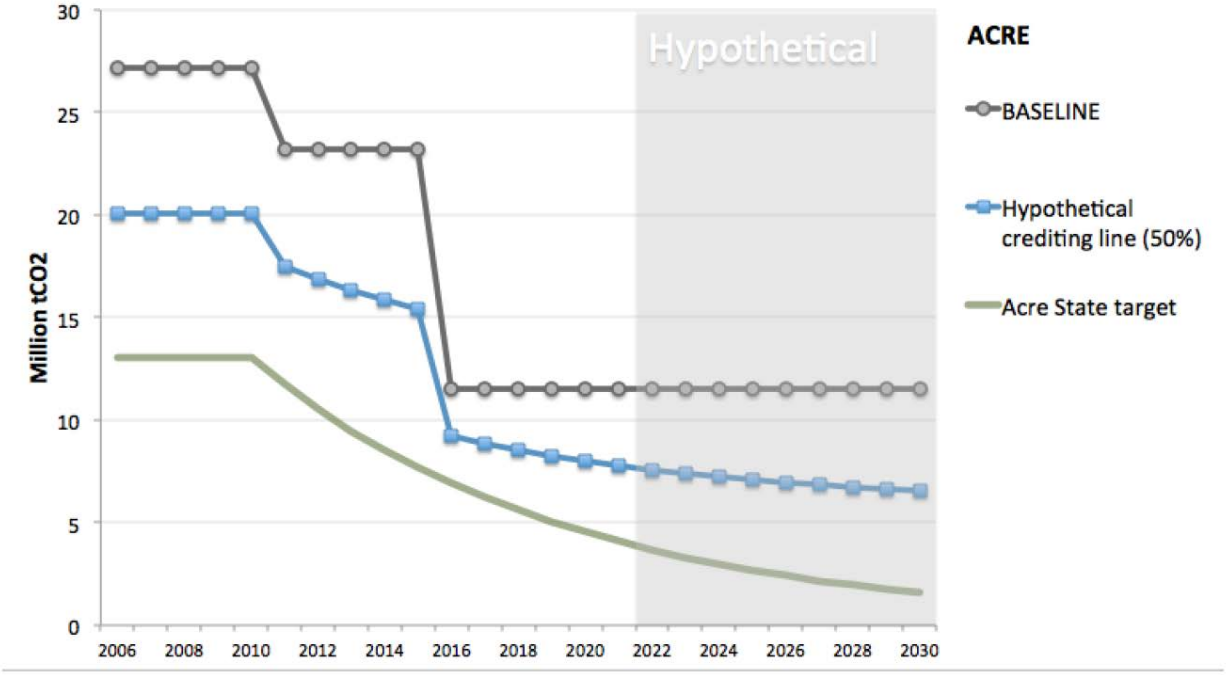
*Potential supply from the State of Acre, Brazil*

Modeling by EDF indicates that the supply of REDD offset credits from the State of Acre could meet a significant amount of the demand for REDD credits under AB 32. The modeled supply figures depend on various factors such as the scenario for crediting, whether Acre achieves or even exceeds its deforestation reduction plan, as well as the extent to which "early action" reductions will be allowed. Additionally, the potential development of an internal carbon market in Brazil, as well as other demand drivers such as the compliance market in Australia, might counteract oversupply issues.[84] Under certain crediting assumptions, Acre could supply California's AB 32 market with 36 $MMtCO_2e$ through 2020. If "early action" REDD credits from reduced deforestation emissions achieved over 2006-2012 are considered eligible for compliance in California, the potential supply from Acre alone until 2020 could be 84 $MMtCO_2e$. There are no detailed supply forecasts for Chiapas available to date.

83 Nicholas Institute for Environmental Policy Solutions (February 2011). Demand for REDD Carbon Credits: A Primer on Buyers, Markets, and Factors Impacting Prices. Accessed August 20, 2012 at http://nicholasinstitute.duke.edu/economics/naturalresources/demand-for-redd-carbon-credits

84 Pedro Piris-Cabezas and Ruben Lubowski, Environmental Defense Fund, September 27, 2012. Potential supply to California of sectoral credits from REDD+ from the State of Acre, Brazil.

**Figure 4: Acre's Baseline, Crediting and Targeted Emissions**




Source: Environmental Defense Fund

### *Demand*

While the detailed rules and/or protocols prescribing exactly how REDD sector-based credits could be used for compliance under AB 32 have not been developed, the rules do specify that the total maximum allowable sector-based credits, of which REDD is the only approved sector, is limited to around 71 $MMtCO_2e$ between 2013 and 2020, out of a total offset limit of about 200 $MMtCO_2e$. As a comparison, the offset limit in the European Union Emissions Trading System (EU-ETS) is an average limit of 106 $MMtCO_2e$ per year approximately 1.7 billion $MtCO_2e$ between 2005 and 2020, or and estimated 848 $MMtC_2e$ from 2013 to 2020.[85] While the potential value of a REDD market is difficult to predict, if REDD is admitted as a sector-based offset this could create a primary market for REDD offsets valued at approximately $900 million to $1.65 billion through to 2020, with a larger total market value if the secondary market is included.[86]

While the inclusion of REDD or REDD+ under AB 32 would represent the first global market signal for such offsets to qualify as compliance-grade under a regulated cap-and-trade system, there are several other programs at various stages. See section 5.2.4 for an overview of the role of REDD+ in voluntary and other market initiatives.

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[85] Alexandre Kossoy and Pierre Guigon, *State and Trends of the Carbon Market 2012*. A report by The World Bank. Accessed Oct. 16, 2012 at http://siteresources.worldbank.org/INTCARBONFINANCE/Resources/State_and_Trends_2012_Web_Optimized_19035_Cvr&Txt_LR.pdf

[86] This estimate contains a number of uncertainties and assumptions. It assumes no REDD offsets are used in the first compliance period and 75% of the allowable REDD offsets are recognized and used for the second and third compliance periods, and the price of credits is discounted by either 40% or 60% against Barclay's predicted allowance prices of $40 and $73 for the second and third compliance period respectively. If 100% of the allowable number of REDD credits are used, the range is $1.1 - $2.2 billion.

### 5.2.2 Compliance and invalidation risk

While offsets can be used for compliance, they are trading at different discount levels than California Carbon Allowances (CCAs) since they carry additional risks not found in CCAs. CCAs are government-issued and will not be rescinded. Their value will vary with market conditions, but they don't face the prospect of being deemed illegitimate and, consequently, being invalidated. The different types of compliance-eligible offset credits, on the other hand, carry two main risks that result in price discounts - compliance eligibility and invalidation risk.

#### *Compliance eligibility*

As outlined in section 3.4, there are four different types of offset credits potentially usable as compliance instruments under AB 32: 1) CCOs; 2) Early Action Offset Credits; 3) offsets from an Approved External GHG ETS; and 4) Sector-based Offset Credits. As the offsets are actually issued by ARB, CCOs face no risk of submission to ARB as compliance instruments. Other offsets incur varying degrees of eligibility risk. Early Action Offset Credits which were issued under one of the ARB-approved voluntary protocols carry a risk of not being converted to CCOs. If successfully reverified and issued as CCOs, these offsets are fully acceptable for use as compliance instruments under AB 32. To date, the only credits recognized as Early Action Offset Credits are CRTs, issued by the CAR, under four approved protocols. In addition to the four project types recognized by ARB, CRTs are generated under several other protocols. Any CRT not among the four project types acceptable by ARB sees its price heavily influenced by the perceived relative likelihood that ARB will accept the project type in the future. This is also the case for offsets issued by the ACR, as ARB has indicated it may also consider ACR protocols.

There are not yet any approved external GHG ETSs, and while Quebec's ETS is strongly expected to be approved, the province does not yet have an offsets program. Also, note that sector-based offset credits, such as from REDD activities, do not yet exist. Offsets potentially usable in California from an external GHG ETS or from sector-based activities can be expected to be discounted based on likelihood of compliance eligibility. For example, REDD offsets marketed to California-covered entities today would be considered in terms of location (likely Acre or Chiapas) and how well they might fit the evolving recommendations of the ROW and, by extension, the anticipated rules under AB 32.

#### *Invalidation risk*

ARB included a provision in its cap-and-trade rulemaking which allows for issued offset credits to be subsequently invalidated by ARB.[87] Under this rule, offsets can be invalidated within eight years after issuance. This period can be shortened to three years if an offset project undergoes a second verification by a different verifying body within three years of the initial issuance.[88] If an offset is invalidated, the entity that used an invalid offset is required to replace it with a valid offset or allowance within six months of being notified of the invalidation.[89] There are three instances in which offset credits can be invalidated:

1) Overestimation: in cases where an Offset Project Data Report contains errors that lead to the issuance of offset credits of more than 5% above what would be justified.
2) Illegality: if project activity and implementation was not in accordance with all local, state or national environmental, health and safety regulations during the reporting period for which the ARB offset credit was issued.

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[87] California Air Resources Board, *Final Regulation Order, Subchapter 10 Climate Change, Article 5, Sections 95800 to 96023, Title 17, California Code of Regulations*, Section 95985. Accessed August 27, 2012 at http://www.arb.ca.gov/regact/2010/capandtrade10/finalrevfro.pdf

[88] International Emissions Trading Association, IETA Summary of Final Rules for California's Cap-and-Trade Program, February 13, 2012. Accessed August 23, 2012, at http://www.ieta.org/assets/US-WG/ieta_summary_of_california_ct_regulations.pdf

[89] California Air Resources Board, *Final Regulation Order, Subchapter 10 Climate Change, Article 5, Sections 95800 to 96023, Title 17, California Code of Regulations* §95985 (h)(1)(B).

3) Double-Counting: if offset credits have been issued in other markets for the same project area during the same time period for which the project has received ARB credits.

A number of market participants interviewed for this report considered this invalidation provision that passes validity risk onto the buyer ("buyer-liability") a hindrance to the development of a functioning offset market. This is because such provisions increase transaction costs and uncertainty. Market participants argue that this creates risk that is difficult to quantify; the price of replacement CCOs or CCAs are unknowable in advance. Furthermore, there is currently no track record available for how ARB will handle and apply invalidation rules. The market implicitly applies different invalidation risk discounts to offset credits from different project types. For example, all else being equal, the market seems to perceive the invalidation risk in forestry as higher than in an ODS project. It will be important to watch if and how ARB includes invalidation provisions in the rulemaking for REDD offset credits. Without having any evidence, it can be assumed, though, that the risk of invalidation will be perceived as higher for REDD than, for example, for ODS or even for domestic forestry projects due to the location of REDD activities in "higher risk" locations. Consequently, it can be expected that REDD credits will likely trade at a higher discount to CCAs than other offset credit types. Note that domestic forest carbon reversals do not trigger invalidation but are handled under the permanence provisions of the ARB rulemaking; we can expect REDD reversals to be handled similarly (see Section 5.4.3 under "Permanence").

The following table illustrates the different price levels of offsets and allowances at the end of November 2012.

**Table 2: Indication California Carbon Market Prices per $MtCO_2e$ (November 2012)** [90]

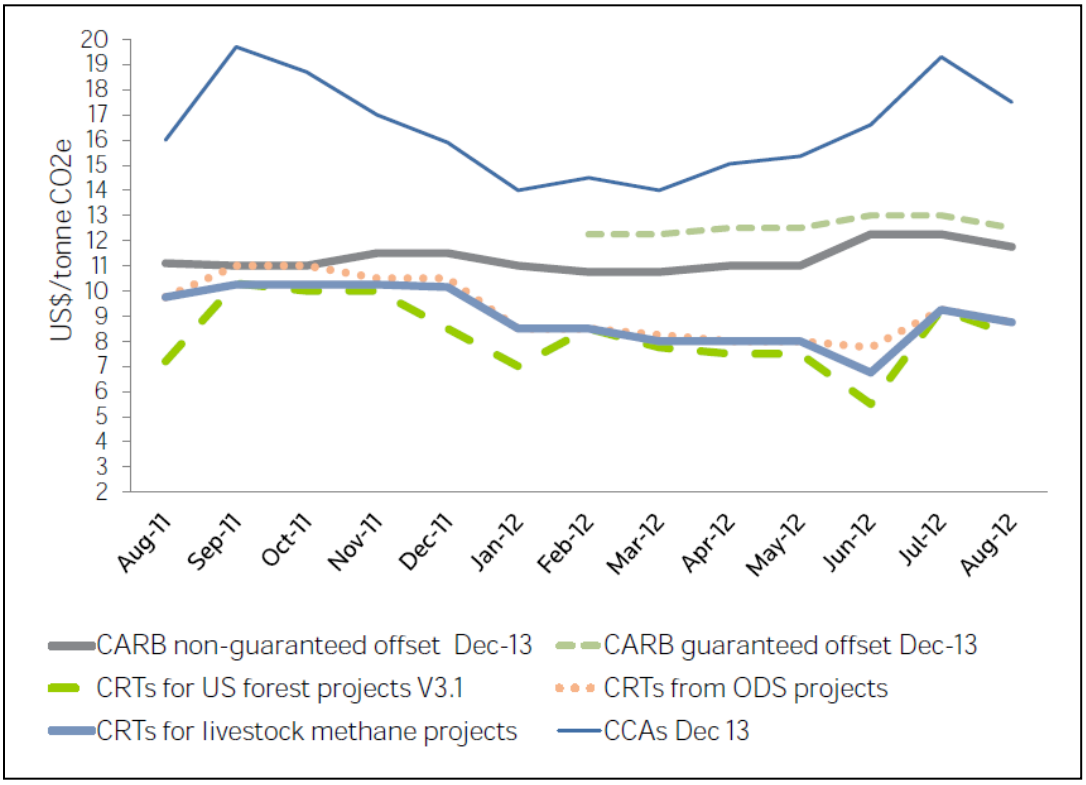
| | Vintage | Bid-Offer Midpoint | Discount to CCA |
|---|---|---|---|
| California Carbon Allowance (CCA) | 2013 | $12.20 | - |
| California Carbon Offset (CCO) | 2013 | $9.50 | 22% |
| ODS CRT | 2012 | $7.50 | 39% |
| Livestock methane CRT | 2012 | $7.50 | 39% |
| Forestry CRT | 2012 | $6.75 | 45% |
| Non-early action CRTs (various project types) | 2009 - 2011 | $1 - $4 range | 67% - 92% |

Invalidation risk (and associated buyer liability) are reflected in the discount of CCOs to CCA. Additional compliance eligibility risk (based on CRT-to-CCO reverification risk) and reverification costs are reflected in the discounts seen in prices of ODS, livestock methane, and forestry CRTs. Finally, various other CRT's see substantially steeper discounts, based on perceptions of potential compliance eligibility, as well as voluntary market supply and demand.

For an illustration of how the prices for these various categories of carbon offsets develop over time, see Figure 5 below.

[90] CCA, CCO, and non-early action CRT prices from Evolution Markets "Western US Environmental Markets Report 11-30-12"; ODS, livestock methane, and forestry CRT prices from Amerex Brokers "North American Carbon Markets Update 11/30/12"

**Figure 5: Historical California Carbon Market Prices**[91]




Source: Thomson Reuters Point Carbon [92]

### 5.2.3 Primary and secondary market

The market for offsets can be divided into the primary and secondary market. The primary market in emission trading terminology refers to the segment that deals with purchasing offsets directly from the projects that produce them. This market has traditionally been dominated by forward contracts where buyers commit to purchasing credits before they have been generated. Primary market prices can vary significantly based on contractual terms and the stage of project development at which the credits are sold (i.e. projects at very early stages of development face higher risks so tend to contract credits at lower prices compared to operational and registered projects).

The secondary market refers to buying and selling already issued offsets. Because the credits have already been issued, the price of credits is typically higher than the primary market. However, this is subject to the allowance price and contractual terms of primary market transactions. There are many examples of primary market contracts negotiated at fixed or floating prices with a floor where the price has become higher than the secondary market prices when allowance prices collapsed.[93]

### 5.2.4 Competing demand from alternative markets (voluntary or other compliance)

While AB 32 can be an important component of the demand for REDD offsets, it is not the only source of demand. REDD offsets sold into the California market may also be sold in other markets currently in operation or under development. If the supply of REDD credits into California is restricted to a few specific

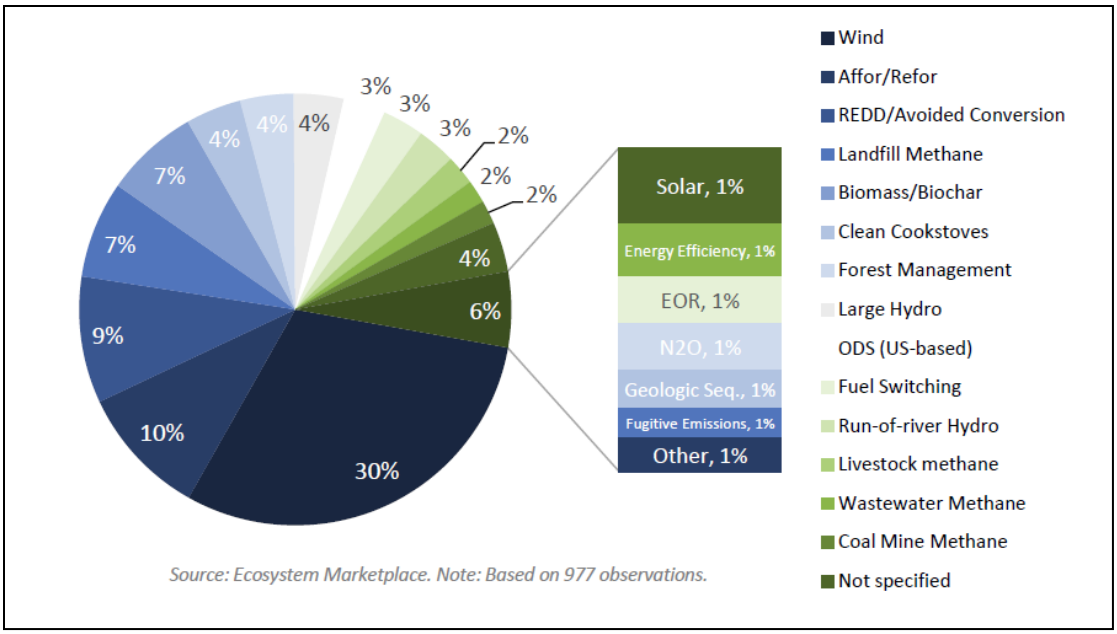
[91] Thomson Reuters Point Carbon, The WCI in numbers: Quebec & California. Slide presentation, Olga Chistyakova, June 4, 2012.
[92] Thomson Reuters Point Carbon, graph provided by Olga Chistyakova, September 27, 2012.
[93] This is the case at the moment for many companies operating in the EU ETS that entered into long-term forward purchase contracts for CERs.

jurisdictions (initially expected to be Chiapas and Acre), and credits from these jurisdictions can be sold into other markets, competing demand from the other markets may affect supply and price in California. Below we briefly explore potential alternative routes to market for REDD+ offsets, aside from the AB 32 program.

### *Voluntary carbon market*

Any REDD credits sold into a Californian market could also be sold in the voluntary market. The volumes in voluntary markets are steadily growing. In 2011, the total market volume was 95 $MMtCO_2e$, of which REDD represented 7.3 $MMtCO_2e$) and afforestation and reforestation credits (arguably part of the full acronym of REDD+) an additional 7.6 $MMtCO_2e$.

**Figure 6: Market Share by Project Type**

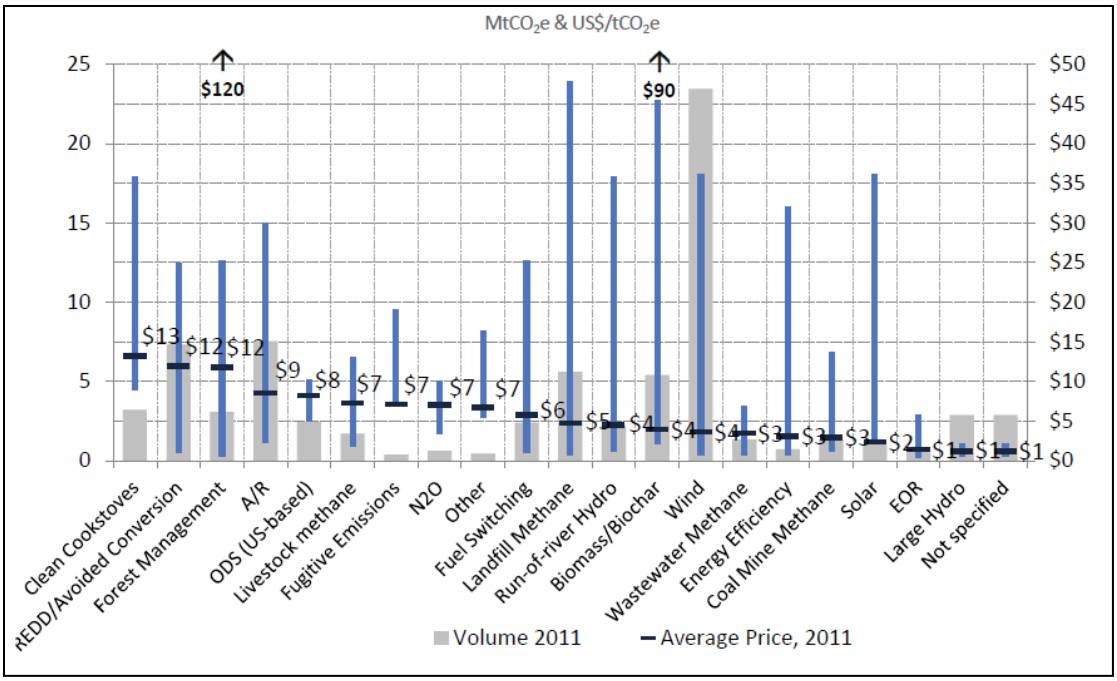



Although the volume of transacted REDD offsets in the voluntary market decreased from 2010 to 2011, the notional value stayed the same due to significant price increases. Voluntary REDD credits transacted at a price of $12/MtCO2e on average in 2011 for a total market value of $87 million out of a notional voluntary market of $576 million.[94] Given that the potential maximum volume for REDD under AB 32 between 2013 and 2020 would be around 71 $MMtCO_2e$, or roughly 9 $MMtCO_2e$ per year on average, we can see the significant role the voluntary market currently plays for REDD demand.

As Figure 7 below demonstrates, REDD credits are one of the offset categories in the voluntary markets with the highest average price. This can be attributed to the high social and environmental co-benefits well-designed and executed REDD projects provide. It will be interesting to see if REDD credits within a compliance market will be able to attract similar price premiums as in the voluntary market, or if compliance buyers simply value and pay for the pure compliance value of REDD offset credits.

[94] Molly Peters-Stanley and Katherine Hamilton, *Developing Dimensions: State of the Voluntary Carbon Markets 2012*. A report by Ecosystem Marketplace and Bloomberg New Energy Finance. Accessed August 15, 2012, at http://www.forest-trends.org/documents/files/doc_3164.pdf

**Figure 7: Voluntary Market Prices by Sector**




Source: Ecosystem Marketplace

Whether or not the voluntary market competes with the California market will depend on the pricing of REDD offsets in California; if there is a perceived high invalidation risk and a consequentially high discount applied, voluntary market prices may exceed Californian prices. This is the case in the market for afforestation and reforestation credits generated through the Kyoto Protocol's Clean Development Mechanism – higher buyer liability risk and a limited demand for these credits has resulted in much lower prices than the voluntary market prices for afforestation and reforestation credits. However, if CCA prices are high a steep discount may see REDD offsets attracting higher prices in California compared to the voluntary market.

### *Other pre-compliance markets and capacity building initiatives*

California is the first jurisdiction which sent a compliance signal to the REDD offset market by indicating the possibility of accepting REDD offsets in the state's cap-and-trade program. However, other programs could potentially provide alternative markets for REDD credits recognized in California. The emissions trading schemes in Australia and New Zealand may be a source of demand for REDD+ credits generated under a future UNFCCC agreement, as may bilateral initiatives from Germany, Japan and Norway. FCMC is currently completing a report on emerging compliance markets.

## 5.3 ROUTES TO INVESTMENT IN FOREST AND LAND-USE CARBON

The development of a new tradable asset type and environmental market offers opportunities for early entrant investors that have developed an understanding of fundamental drivers as the market forms. There are different ways investors can gain exposure in the emerging REDD+ market. Not all of these investment routes are appropriate for each type of investor. Each differs in risk-return profile and the strengths and interests of the investor.

### 5.3.1 Project-level financing

The first mode of investment is to directly fund project development. Such financing could be structured as an advance payment for credits (as equity) or to reduce risk (as a loan). Loan repayment could be in cash, offsets, or a combination thereof. This approach requires detailed project due diligence and close monitoring of project development and performance. The financing party is largely exposed to the risks incurred by the project developer. Payment milestones can also reduce risk. Returns can be attractive if the effective cost per credit is low relative to market prices at the time of generation.

## 5.4 OFFTAKE AGREEMENTS

REDD+ offsets can be purchased from a project developer either via long-term forward purchase agreements or spot transactions. Contracting for credits directly from a project is known as an "offtake agreement" and such transactions compose the "primary" offset market. Depending on the creditworthiness of the offset buyer, an offtake agreement in an early phase of project development can be used to help secure additional project finance as the agreement can enable the project developer to obtain loans or other sources of financing, much like many power plants are being financed by lending against the power purchase agreements.

### 5.4.1 Funds and project development companies

Investing in a fund or specialized project development company that has a well-diversified portfolio of projects exposes investors to REDD+ projects with less risk than investing directly in individual projects. Returns can be monetary, offsets, or some combination thereof. Investing in a portfolio provides a means of diversifying REDD+ investments by geography, project stage, carbon market standards and methodologies, end markets, and many other aspects. There are several REDD+ funds actively soliciting investment globally.

### 5.4.2 Secondary market credits

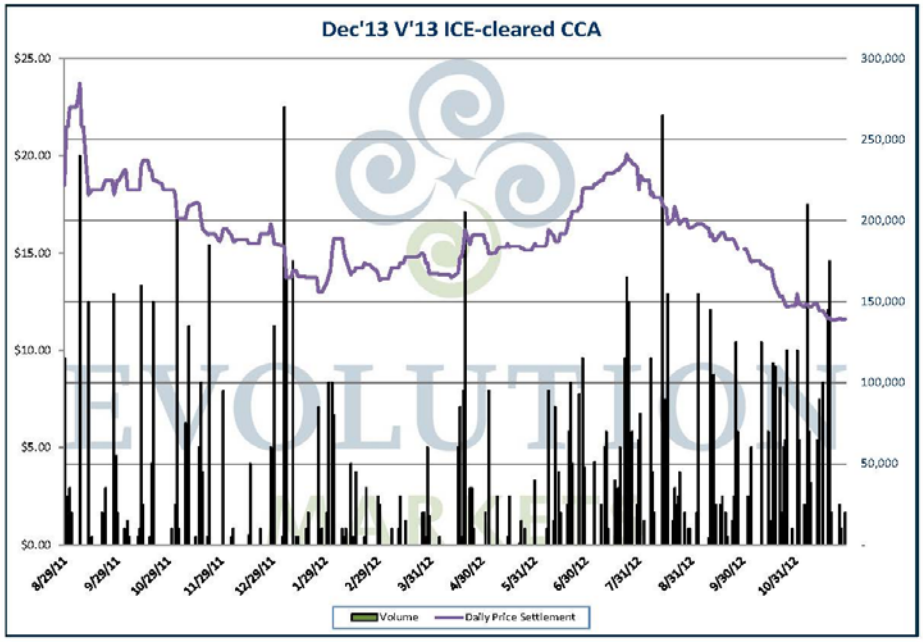
Those interested in REDD+ exposure could trade credits, either directly or through a hedge fund, which will in time offer opportunities as market liquidity and fundamental price drivers develop. Carbon markets exhibit a wide spectrum of liquidity and price transparency. On these parameters, the most developed market is for EU Allowances. The secondary market for REDD+ offsets, in contrast, is extremely limited. Liquidity and price discovery present challenges. Incorporation of REDD into the AB 32 program can be expected to improve the market for eligible REDD offsets.

Early investments in projects under the Kyoto Protocol (generating exchange-traded offsets—certified emission reductions (CERs) often yielded above average returns as a deep secondary market developed and provided ample opportunities for the primary investors to exit. Experiences from other carbon markets give clear indications of what is needed to make REDD+ a viable investment class: reliable and predictable regulation; open information by the regulating entity about critical market parameters, such as baselines, allocations, caps, and banking and borrowing provisions, and transaction, accounting and registry rules. Since the start of emissions trading under the UN system almost 10 years ago, exchange trading has developed within the EU cap-and-trade system, and specialist hedge funds have raised capital and earned returns with little correlation to the market (as best proven through the financial crisis of 2008).

The market for AB 32 allowances, as well as offset credits, is in its very early stages. AB 32-eligible offsets are still traded entirely over-the-counter, with transactions brokered or agreed directly. Allowance trading provides an indication of where the market is headed. Two exchanges clear CCA futures and options, the Intercontinental Exchange and the New York Mercantile Exchange. Both launched CCA contracts in August

2011, at which point transaction volume increased dramatically (as did prices).[95] The Intercontinental Exchange quickly became the dominant platform. Brokered transactions still occur, but even these are typically cleared through the Intercontinental Exchange. A robust secondary market of CERs exists in Europe's carbon market. Such a development in the California market would no doubt boost liquidity of offsets.

**Figure 8: California Carbon Allowances Prices**




Source: Evolution Markets "Western US Environmental Markets Report 11-30-12," based on data from the Intercontinental Exchange

### 5.4.3 Structured products

Investors can soon expect to see structured products such as a REDD+ bond, which are new and yet-to-be-issued instruments. Some instruments may incorporate REDD+ offsets within a basket that includes thematically associated investments, such as ecotourism or sustainable timber harvesting. [96]

[95] Contracts now listed on NYMEX were originally listed on a NYMEX-affiliated exchange called GreenX.
[96] Gilbert, Katie. *Better REDD than Dead.* Institutional Investor. Pp. 28-29. Accessed Oct. 24, 2012 at http://www.nxtbook.com/nxtbooks/ii/iv0976/index.php?startid=28#/30

BOX 6: EMISSIONS REDUCTION PURCHASE AGREEMENTS

In the carbon market lexicon, an offtake agreement in both primary and secondary markets is formally known as an Emissions Reduction Purchase Agreement (or "ERPA"). There are, however, some differences. For example, a secondary market ERPA typically does not allow for unit contingent delivery structures or include force majeure provisions, as may be found in primary market ERPAs. Although terms are generally similar, no standard ERPA exists for CRT transactions. For CCO transactions, parties typically use the California Offset Forward Trade Agreement or a modified version of this. The template for this agreement was developed by Barclays Capital.

The following is an outline of the main sections and provisions of an ERPA:

- Seller and buyer: names of each party with further identifying information, such as business address
- Product: type of underlying commodity, e.g. CRTs or CCOs
- Project: project name and/or project number
- Protocol: specification of protocol version used in underlying project
- Vintage: year in which emission reduction underlying an offset took place
- Contract quantity/volume: amount of product transacted, usually in units each representing one $MtCO_2e$, or in standardized contract sizes (clip size).
- Unit price: price per unit transacted
- Contract price: notional value of transaction (volume x price)
- Delivery: describes when offsets must be delivered, to which account, and when title to offsets transfers from buyer to seller (usually upon receipt of units in buyers registry account)
- Payment terms: specification of how many days after delivery and invoice payment is due, with seller bank account details or reference to invoice for such details.

Above are the main points specific to a given transaction. In addition, an ERPA contains a section with general, not transaction-specific, terms and conditions, such as definitions, representations and warranties, taxes and fees, events of default, confidentiality, indemnities, etc.

## 5.5 PROJECT RISK FACTORS AND RISK MANAGEMENT

Each of the investment options outlined in Section 5.3 involve engaging in offset-generating projects – either through direct investment, offtake contracts, or investing in aggregating entities such as a fund or project development company. As with any project, REDD+ projects contain risks that will affect the ability to generate a return on investment. Many of these risks are similar to other sectors – e.g. project performance risk, price volatility, and change of law. Some of these, such as offset generation risk, contain additional risks specific to REDD+ projects. There are other risks, such as reversal risk, that are peculiar to REDD+ offset projects. This section briefly reviews these risks.

### 5.5.1 Delivery/volume risk

The number of expected emission reduction credits in any carbon offset project, not just REDD+, is based on detailed analysis of data which are outlined in a project specific methodology and project documents. Based on these calculations, each project comes up with an *ex ante* estimate of expected emission reductions or removals, i.e. how many offsets the project will generate and when. The estimated volume is rarely the same as the amount calculated through *ex post* monitoring of actual project performance. Over (or under) delivery depends on various factors specific to each project type.

After a decade of active carbon markets, extensive data exists for the main emission reduction technologies, giving investors a narrower range and associated probabilities for the carbon volumes. However, the track

record for the REDD+ sector is much too short and thin to come up with similar risk-adjusted expected volumes.

One risk management approach to address this uncertainty is payment on delivery contracts where the seller does not guarantee the delivery volume and the buyer only purchases what is generated. These contracts garner a lower price than contracts with guaranteed delivery. FCMC is currently supporting the U.S. Development Credit Authority to develop a delivery guarantee product for REDD+ projects.

### 5.5.2 Price risk

The prices for REDD+ offsets will likely change between the time a project is initiated and the time the project delivers credits. Any forward contract for REDD+ offsets, therefore, presents price risks both for the seller and the buyer. As in other financial and commodity markets, there are a number of ways to approach volatility and price risk.

A seller who is very bullish on the future development of REDD+ offset prices might sell credits forward linked to some price index such as CCAs, fully paid at delivery with no upfront payment. Alternatively, a seller might simply wait for the project activities to be implemented and validated, with the REDD+ credits verified and issued, and then sell them on the spot market. Such pricing structures would not provide the seller with any downside protection in case prices are very low (or zero) at time of delivery. A fixed-price contract, on the other hand, gives the seller a guaranteed price. The seller would fail to benefit from an upswing in the market but would be protected from a price slump.

With a fixed-price contract, it might seem that the scenario of a market price decrease would be the only downside for the buyer; however, a major price increase can also pose challenges. While the buyer can profit from a potentially large spread, a very low fixed-price contract may incentivize sellers to default so that they may instead deliver to higher-paying buyers. Such a situation is not merely theoretical—it materialized several years ago when sellers with very low, fixed-price contracts for CERs (a project-based type of carbon offset under the Kyoto Protocol) defaulted on those contracts in order to sell to alternative buyers in the European Union's then very high emissions trading market. Transacting across international borders, as would also be case with REDD+ projects, made contract enforcement difficult. Consequently, pricing structures which combine a guaranteed floor price with a revenue share provision tied to a relevant market index at time of delivery, and potentially also partial upfront payment provisions, have proven to be attractive to many sellers and buyers.

### 5.5.3 Regulatory and other project-specific risk

#### *Changes in regulation*

Close tracking of regulation is necessary to manage risk and, potentially, to profit from event-driven trading strategies. Developments and decisions related to the shape of the cap-and-trade program and offset inclusion have significantly affected prices of credits. Unlike the voluntary portion of the carbon market, a mandated carbon market is inherently dependent on regulation. Thus changes in regulation pose significant risks to carbon market participants. Many levels of government and other authorities regulate carbon markets: the UNFCCC, the EU, individual countries such as Australia or South Korea, or subnational jurisdictions such as the State of Acre in Brazil or the State of California in the U.S. ARB has engaged stakeholders and provided early, inclusive information about planned actions, being open about the scope of the coming carbon program. ARB's website and public meetings, as well as carbon market publications and law firm bulletins, are means of following regulatory developments.

#### *Land and carbon rights, other political risks*

Clearly determining land and carbon rights and managing possible changes of rights and rightsholders pose additional risks for investors. Such issues are being considered by the ROW (see Section 4.1.2). The Overseas Private Investment Corporation in the U.S., as well as the World Bank's Multilateral Investment Guarantee

Agency, offers political risk insurance.[97] In 2011, political risk insurance was first applied to a REDD+ project.[98]

### *Permanence*

Aside from being invalidated by the ARB (as discussed in section 5.2.2), REDD+ credits can also be "lost" due to events, such as fires or pest infestations, that cause the sequestered carbon to be released back into the atmosphere. This issue is referred to as non-permanence. Unlike offset credits from many other project types, forest-based offsets can be reversed, so special provisions are necessary to ensure atmospheric integrity. There are inherent challenges around this topic because, for obvious reasons, no one can guarantee that a single piece of forest will still be there in several decades or even centuries. However, portfolio diversification and other risk management tools, such as insurance and buffer pools (see text box in section 4.2.2), can be used to address forest carbon's risk of reversal. For domestic forestry offsets, ARB has stipulated the use of buffer pools. Likewise, ARB is expected to design efficient and pragmatic solutions to address the non-permanence issue in international REDD forest carbon. The ROW is currently evaluating appropriate measures for REDD+ offsets.

### *Social and environmental safeguards*

Social and environmental safeguards have become central to successful REDD+ activities. Regulations will require certain safeguards, and reputational risks exist for parties associated with REDD+ activities that fail to consider such issues. Beyond this, incorporation of social and environmental aspects enhances the success and long-term sustainability of REDD+ activities. See section 4.3.2 for further discussion of this topic.

[97] Global Association of Risk Professionals, Risk Management Trends in Forest Carbon, 2012 http://www.garp.org/risk-news-and-resources/2012/august/risk-management-trends-in-forest-carbon.aspx

[98] Terra Global Capital, press release, June 30, 2011. http://www.terraglobalcapital.com/press/Terra%20Global%20Capital%20Signs%20OPIC%20REDD%20Insurnace%20Contract%20Press%20Release%20June%2030%202011.pdf

# 6.0 SUMMARY

AB 32 alters the business landscape in California. Capping GHG emissions may impact the value of regulated entities as a function of their energy consumption mix, response to emission reduction options (including offsetting), and allowance and offset prices that develop. A number of sectors including oil and gas, cement, refineries, and mining will be impacted. Ultimately, AB 32 will also affect consumer prices for gasoline and products that require high GHG-emitting manufacturing. The implementation of cap-and-trade via the allocation of allowances will boost prospects of some companies and disadvantage others.

New opportunities will emerge from the development of international forest carbon offset projects that have a high sustainable development impact, and have been developed by experienced project developers under appropriate market standards. Such projects may provide opportunity for long-term institutional investors, particularly frontier investors with an appetite for new asset-class risk, investors already familiar with the forestry sector through timber portfolios, and investors motivated by sustainable development and socially responsible investing. AB 32 is the first compliance program globally that may include REDD activities outside of the U.S. as an offset type. The inclusion of REDD in AB 32 could be a significant driver of demand for REDD credits of up to 71 $MMtCO_2e$, which could create a primary market for REDD offsets valued at up to $900 million – $1.65 billion through to 2020,[99] with a larger total market value from the secondary market. This would send an important signal to actors in the carbon market, including investors, that REDD might develop into a viable investment class.

In summary, AB 32 is an important development for the State of California and for investors with exposure to the California economy. The regulations as they currently stand will influence investment decisions and create a new market for tradable allowances and offsets. An additional market for REDD offsets valued at up to $1.65 billion[100] may also be created, opening up further investment opportunities that will support forest protection and sustainable development in developing countries.

[99] This estimate contains a number of uncertainties and assumptions. It assumes no REDD offsets are used in the first compliance period and 75% of the allowable REDD offsets are recognized and used for the second and third compliance periods, and the price of credits is discounted by either 40% or 60% against Barclay's predicted allowance prices of $40 and $73 for the second and third compliance period respectively. If 100% of the allowable number of REDD credits are used, the range is $1.1 - $2.2 billion.

[100] Primary market only. Secondary market would add additional total value. See note 23 above for assumptions

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