

State of California
AIR RESOURCES BOARD

Staff White Paper

**SCOPING NEXT STEPS FOR EVALUATING THE POTENTIAL ROLE OF
SECTOR-BASED OFFSET CREDITS UNDER THE CALIFORNIA CAP-AND-TRADE PROGRAM,
INCLUDING FROM JURISDICTIONAL “REDUCING EMISSIONS FROM DEFORESTATION AND FOREST
DEGRADATION” PROGRAMS**

October 19, 2015

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Submitting Public Comments on White Paper

California Air Resources Board (ARB) staff will present this white paper at a public workshop on October 28, 2015. ARB staff is releasing this white paper prior to the workshop to solicit comments from interested members of the public. Following the workshop, stakeholders will have an opportunity to provide written comments during an informal comment period which will conclude at 5:00 p.m. Pacific time on Monday, November 16, 2015. As this workshop is not a formal regulatory hearing, ARB is not obligated to respond to comments; however, comments will assist staff in developing potential topics for future workshops and for regulatory proposals should the Board direct staff to do so. Staff will strive to incorporate and address comments presented on this white paper to the extent feasible during future workshops.

Comments may be submitted at: <http://www.arb.ca.gov/lispub/comm/bclist.php>

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Executive Summary

Addressing climate change requires a comprehensive assessment of the causes of greenhouse gas emissions. In adopting the Global Warming Solutions Act of 2006 (Assembly Bill 32, or AB 32), the Legislature recognized this fact and directed the California Air Resources Board (ARB) to develop measures to reduce California's greenhouse gas (GHG) emissions to 1990 levels by 2020. AB 32 also recognized the importance of California's climate leadership and engagement with other jurisdictions, and directed ARB to consult with the federal government and other nations to identify the most effective strategies and methods to reduce GHGs, manage GHG control programs, and to facilitate the development of integrated and cost-effective regional, national, and international GHG reduction programs.

ARB began assessing emerging international mitigation actions as it developed the AB 32 Scoping Plan and the California Cap-and-Trade Program. One of the most studied sectors within which mitigation actions have been proposed has been tropical forests, which serve as one of the world's most important carbon sinks. Emissions from tropical deforestation and forest degradation are estimated to account for between 11% and 14% of global GHG emissions. Initiatives for reducing emissions from deforestation and forest degradation, or REDD, are thus a critical part of addressing global climate change, including climate change in California. Mitigating tropical forest deforestation may have additional effects on California's climate and environment because research indicates a direct link between tropical deforestation and reduced California precipitation. In addition, the inclusion of REDD sector-based offset credits within the already existing quantitative usage limit for offset credits within California's Cap-and-Trade Program would contribute to cost-containment benefits under the program, demonstrate California's climate leadership, and yield benefits to biodiversity, forest-dependent community livelihoods, and other areas integral to low emissions rural development in tropical jurisdictions.

California began engaging on REDD through the creation of the Governors' Climate and Forests Task Force (GCF) in 2008. This subnational government initiative aims to exchange information and develop best practices for forest conservation, climate mitigation, community engagement and capacity building, as well as develop the technical areas necessary to design robust jurisdiction-wide REDD programs. The GCF is currently comprised of 29 different subnational jurisdictions, including states and provinces from Brazil, Indonesia, Ivory Coast, Mexico, Nigeria, Peru, Spain, and the United States (U.S.). Based in part on interactions with the GCF, ARB designed the California Cap-and-Trade Program to include specific regulatory language directing how a REDD program could be included through future, formal rulemaking. These regulatory provisions are referred to as sector-based offset crediting provisions, and could provide a small portion of the existing quantitative usage limit in place for all carbon offsets.¹ As described in Sections II and III of this paper, the sector-based

¹ A sector-based crediting program, such as a REDD program, is a jurisdiction-wide crediting mechanism in a subnational jurisdiction of a developing country, which (if approved) could issue sector-based offset credits that would be eligible for use by California covered entities to comply with a small portion of their

crediting approach for international offsets offers advantages that do not exist at the project level, such as guarding against risks of performance reversal and leakage at the jurisdiction scale.

To date, ARB has not approved any international, sector-based offset credits to be used for compliance under the Cap-and-Trade Program. ARB staff explained in the Cap-and-Trade rulemaking that further work would be needed to determine how a REDD program could fit within the rigorous AB 32 and Cap-and-Trade Program criteria. California launched a process for assessing this additional work by signing a Memorandum of Understanding (MOU) with Acre, Brazil, and Chiapas, Mexico in 2010 to further streamline the information exchange underway within the broader GCF. The MOU established the REDD Offset Working Group. This ad hoc team of technical experts developed technical and policy recommendations that were provided in final form to California, Acre, and Chiapas in July 2013.²

REDD is an important component of ongoing negotiations under the United Nations Framework Convention on Climate Change, and continues to receive backing from national jurisdictions, such as the United States and Norway, which have collectively pledged billions of dollars to support capacity building and other REDD-related activities in multiple tropical jurisdictions. These international efforts have made considerable progress on developing guidelines and lessons for the design of jurisdiction-wide REDD programs. However, economic development in many jurisdictions is still dependent on activities which drive deforestation. Work is underway to expand economic opportunities with low-emissions rural development mechanisms such as REDD-based financing in the voluntary carbon market and through overseas development financing. These actions have been important in helping test best practices, but have not yet been sufficient to overcome the economic hurdles to reducing drivers of deforestation to the extent necessary to curb emissions from tropical deforestation and forest degradation. California could play a leadership role at the subnational level by recognizing and approving robust program standards that other market programs could also take advantage of. This could increase opportunities for REDD-related financing within regulatory compliance markets (e.g., through the sale of sector-based REDD offset credits into California's Cap-and-Trade Program or other markets).

The REDD Offset Working Group Recommendations provide a framework for assessing many of the technical design elements that would be needed for a robust REDD program. These include setting reference levels, ensuring social safeguards are in place, designing crediting pathways, and ensuring effective government oversight and

Cap-and-Trade obligations. This portion is limited to 2% of an entity's total compliance obligation in the first and second compliance periods, and 4% in the third. It should be noted that because ARB staff is not proposing any regulatory amendment related to REDD or any other sector at this time, no sector-based crediting will be eligible in the first or second compliance periods.

² REDD Offset Working Group, *California, Acre and Chiapas – Partnering to Reduce Emissions from Tropical Deforestation: Recommendations to Conserve Tropical Rainforests, Protect Local Communities and Reduce State-Wide Greenhouse Gas Emissions* (2013), attached to this white paper as Appendix A.

enforcement, both in a REDD jurisdiction and in California's program. While the Recommendations demonstrate that many of these concerns can be addressed, ARB staff is seeking feedback on these Recommendations to fully vet stakeholder concerns. Additional engagement with California stakeholders, including ARB's Environmental Justice Advisory Committee, is needed to ensure ARB is able to take into account concerns which have been raised related to social safeguards, enforceability, and leakage, among others.

Before staff recommends that the Board consider a specific REDD-related regulatory amendment proposal from staff, the following steps will need to occur. First, ARB staff will conduct stakeholder workshops, starting with the one scheduled for October 28, 2015 to assess the issues and criteria that would inform the development of a staff proposal. ARB staff will also need to continue engaging with partner jurisdictions from the GCF. This engagement might include cross-jurisdictional visits, seeking advice and input from ARB's Environmental Justice Advisory Committee, contracting for assistance with California universities, and engaging with the U.S. federal government. Second, ARB would need to undergo the normal California Administrative Procedure Act requirements of a 45-day public notice and comment period on any proposed regulatory text, including an environmental review and a Board hearing. Third, in conjunction with the rulemaking process, ARB would need to request that the Governor make findings pursuant to Senate Bill 1018 regarding the equivalency of a jurisdiction's program in terms of GHG reductions and offset credit stringency, the enforceability of such a linkage, and whether the linkage creates specific liabilities for California. This type of finding was made prior to ARB concluding its linkage regulation with Québec.

If the Board decides to move forward on considering any specific REDD program, ARB staff would target regulatory amendments to allow for the use of sector-based offset credits in the third compliance period of the Cap-and-Trade Program. Based on a review of existing GCF state programs, ARB staff believes that Acre's sector-based REDD offset program is already technically capable of being considered for formal inclusion in the Cap-and-Trade Program at the beginning of the third compliance period, even while additional engagement is necessary to, among other things, ensure a clear understanding of how Acre's program may fit within any applicable Brazilian national structures. Other GCF jurisdictions may be nearing readiness in the near future. To prepare a staff proposal for Board consideration, there is a need for additional work as described in this white paper that could benefit from collaboration with California universities, public stakeholder engagement through additional technical workshops on the issues identified herein, engagement with GCF and other subnational jurisdictions, and regulatory text drafting.

Finally, ARB staff would like to highlight that proceeding down the path of working more closely with Acre will likely provide beneficial lessons and engagement with other jurisdictions, particularly those of Mexico (both in terms of engagement through the GCF and also through the California-Mexico MOU)³ and Brazil. Continued evaluation of

³ Memorandum of Understanding to Enhance Cooperation on Climate Change and the Environment between the State of California of the United States of America and the Ministry of Environment and

California Air Resources Board

REDD and other sector-based offset programs will further demonstrate California's climate leadership. Indeed, this engagement has already resulted in partnering on other mutually beneficial climate and low emissions development initiatives, such as the Subnational Global Climate Leadership MOU (also known as the Under 2 MOU), which includes participation of multiple GCF jurisdictions.⁴

This ARB staff white paper provides a summary of the work California has conducted to date on sector-based crediting programs, including REDD. It also describes collaborative efforts with the GCF, such as signing the Rio Branco Declaration. Finally, the paper includes an assessment of the REDD Offset Working Group Recommendations and identifies next steps that will be required for ARB staff to propose a REDD program to be considered by the Board in a future rulemaking action.

Natural Resources and the National Forestry Commission of the United Mexican States (July 28, 2014), available at http://gov.ca.gov/docs/7.28_Climate_MOU_Eng.pdf.

⁴ The Under 2 MOU was developed between California and the German state of Baden-Württemberg to bring together ambitious subnational jurisdictions to make commitments towards emission reductions and to galvanize action at the upcoming Conference of the Parties to the United Nations Framework Convention on Climate Change in Paris, France. Current signatories who are also GCF members include Acre (Brazil), Amazonas (Brazil), California, Catalonia (Spain), Chiapas (Mexico), Cross River State (Nigeria), Jalisco (Mexico), Rondônia (Brazil), Tocantins (Brazil), and Ucayali (Peru). More information is available at the Under 2 MOU Web site, <http://under2mou.org/> (accessed Oct. 18, 2015).

I. Introduction

When the California Legislature enacted the Global Warming Solutions Act of 2006 (Assembly Bill 32, or AB 32), it directed the California Air Resources Board (ARB or Board) to develop a Scoping Plan setting forth various mechanisms to lower statewide emissions to 1990 levels by 2020, to adopt a mandatory greenhouse gas reporting and verification regulation, and it gave ARB the authority to develop a market-based compliance mechanism. (Health & Saf. Code, §§ 38530, 38561, and 38570.) In developing these measures, ARB is required to consult with the federal government and other nations to identify the most effective strategies and methods to reduce greenhouse gases, manage greenhouse gas control programs, and to facilitate the development of integrated and cost-effective regional, national, and international greenhouse gas reduction programs. (Health & Saf. Code, §§ 38564 and 38561(c).) Since 2006, ARB has adopted numerous measures to implement AB 32, including the adoption of the California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms Regulation. (Cal. Code Regs., tit. 17, § 95801 et seq.; hereafter Cap-and-Trade Regulation or Cap-and-Trade Program.)

In order to achieve the AB 32 mandate of designing cost-effective programs, ARB included several cost-containment features in the Cap-and-Trade Regulation. These include elements such as multi-year compliance periods, an Allowance Price Containment Reserve, and the use of carbon offset credits.¹ In designing these elements, ARB staff reviewed the state of existing market-based programs,² which is evidenced by the work ARB has undertaken related to the Western Climate Initiative (WCI), including linkage of the Cap-and-Trade Programs developed by ARB and the Canadian province of Québec.³

In addition to its work with WCI, ARB has been considering jurisdiction-wide, sector-based carbon offset crediting programs. As defined in the Cap-and-Trade Regulation, a sector-based crediting program is “a GHG emissions-reduction crediting mechanism established by a country, region, or subnational jurisdiction in a developing country and covering a particular economic sector within that jurisdiction.” (Cal. Code Regs., tit. 17, § 95802(a).) These programs would focus on a single economic sector (i.e., cement, forestry, etc.) and seek to reduce emissions across the entire sector, perhaps as part of a broader low emissions development plan similar to AB 32. This means that crediting is done not by looking at a single project’s performance against its project baseline, such as under traditional project-based offset programs. Instead, crediting is “based on achievement toward an emissions reduction target for the particular sector within the boundary of the jurisdiction.” (*Id.*) This jurisdictional approach offers advantages that do not exist at the project level, such as guarding against risks of performance reversal and leakage at a broad scale.

In assessing the potential for sector-based crediting programs, ARB is interested in both industrial and biological sectors. During the development of the Cap-and-Trade Program, ARB staff had explored both the cement and forestry sectors. ARB chose to

focus first on emission reduction strategies in the forestry sector because of the ongoing focus on forestry at the international scale, the significant potential of addressing a large portion of global GHG emissions coming from deforestation, and because ARB was already pursuing a domestic U.S. Forest Projects Compliance Offset Protocol, which may be used to generate offset credits under the Cap-and-Trade Program using traditional project-based crediting.⁴ In assessing sector-based crediting for forestry, ARB has engaged in discussions with other jurisdictions that are designing broad, jurisdiction-wide forestry programs related to reducing emissions from deforestation and forest degradation, also known as “REDD” programs. ARB did not pursue a sector-based forestry offset program domestically as there are already well established programs and regulations in the United States to monitor and protect the forestry sector as a whole.

For any offset credit to be eligible under California’s Cap-and-Trade Program, whether derived through a Compliance Offset Protocol or through a jurisdiction-wide, sector-based crediting program, the credits have to meet the same statutory criteria – namely, they have to be real, permanent, quantifiable, verifiable, additional, and enforceable.⁵ (Health & Saf. Code, § 38562, subd. (d)(1)-(2).)

This white paper provides an overview of sector-based crediting, and more specifically, what REDD is and how it is contemplated by the Cap-and-Trade Program. It highlights why California, through ARB, has been interested in further exploring whether and how jurisdictional REDD offset credits fit within the Cap-and-Trade Program, and what California has done to date as part of this exploration. Next, it summarizes the recommendations submitted to the Board by the REDD Offset Working Group, which offer a policy and technical framework for ARB’s acceptance of jurisdictional REDD programs. Finally, this white paper concludes with an overview of additional work that will need to be completed before ARB staff could propose a specific sector-based REDD program for Board consideration and a timeline for such work prior to returning with recommendations for Board approval.

It is important to note that this white paper does not propose any particular regulatory action at this time. Instead, ARB staff is seeking to document its work to date on sector-based crediting, including jurisdictional REDD, and to elicit feedback from stakeholders regarding necessary next steps toward a regulatory proposal. As will be explained throughout this paper, the importance of tropical forests, and of reducing emissions from deforestation and forest degradation in tropical countries, is a critical element for tackling global climate change.

II. Overview of Sector-Based Crediting

Sector-based crediting, as defined above, is the preferred option over traditional project-based crediting when considering international offsets for California's Cap-and-Trade Program. Sector-based crediting requires the establishment of a sector performance standard (e.g., a target against which to measure GHG emission reductions or enhanced GHG sequestration). Only once that sector performance standard is achieved can any additional GHG reductions or enhanced sequestration activities be eligible for offset credits.⁶ In this international context, by engaging an entire sector to make progress towards a performance standard for GHG reductions or enhanced sequestration activities beyond what would otherwise have occurred, the overall GHG emissions benefit is greater than if just one project were to take place in the sector and receive offset credits for activities within its project boundary. In addition, addressing emissions at the sector level within a jurisdiction may assist that jurisdiction in its overall low-emissions development planning.

There are other important benefits to sector-based crediting, including the possibility that action at the sector level may spur broader emissions reduction activity throughout the jurisdiction. For instance, many countries have committed to Nationally Appropriate Mitigation Actions (NAMAs) and Intended Nationally Determined Commitments (INDCs) to reduce their GHGs within the United Nations Framework Convention on Climate Change (UNFCCC).⁷ If a country or a subnational jurisdiction within a country implemented a sector-based offset program, the GHG mitigation activities and progress towards meeting the sector performance standard could also be counted towards the country's NAMAs and INDCs. Specifically, the GHG reductions leading up to the sector performance standard would be recognized through the international commitments, and any additional sector program reductions, once the performance standard is achieved, could be recognized under a market-based program as sector-based offset credits. Under this type of program design, any reductions that account for progress towards meeting the sector performance standard would not be eligible to receive offset credits as those would not be additional. Only reductions that go beyond the sector performance standard would be considered additional and eligible for offset credits.

An effective sector-based program must include a regulatory framework that results in reductions across the entire sector and sets forth the rules for participating in the program. This participation could include state-run initiatives, community-based efforts, private actions, and combinations of these activities to meet and exceed the performance standard. Reductions which occur after the performance standard is met would be eligible for offset credits under ARB's Cap-and-Trade Program. Reductions to achieve the performance standard are sometimes called "own effort," meaning that the jurisdiction must show it has developed sufficient legal requirements and achieved sufficient participation in its sector-based program to achieve the performance standard prior to additional reductions being eligible for sector-based offset credits. This type of design will help ensure that any sector-based offset credits meet the additionality requirements of AB 32 and ARB's Cap-and-Trade Program.

The sector-based program would set legal requirements for meeting the performance standard, and requirements for reductions beyond the performance standard, as well as effective enforcement for actions which do not meet these legal requirements. Given the need for regulatory design, implementation, and enforcement, and the requirement that the performance standard be met prior to offset credits being issued, a successful sector-based crediting program is best designed under the direction of a jurisdiction with sector-wide regulatory authority over the GHG mitigation actions and entities within the sector.

With this overview of sector-based crediting programs as contemplated by ARB's Cap-and-Trade Program as a backdrop, the remainder of this white paper focuses on the forestry sector, and specifically on jurisdictional, sector-based REDD programs.

III. What is REDD?

REDD, which stands for “reducing emissions from deforestation and forest degradation,” is a low-emissions development financing mechanism first contemplated under the UNFCCC that would incentivize activities undertaken to reduce emissions in the forestry sector in tropical developing countries from deforestation and forest degradation. In its Fifth Assessment Report, the Intergovernmental Panel on Climate Change (IPCC) estimated that greenhouse gas emissions stemming from the forestry sector account for upwards of 12 percent of global GHG emissions from 2000 to 2009.⁸ The IPCC's Fourth Assessment Report indicated that emissions from the forestry sector in 2004 alone were greater than the emissions from the entire global transportation sector; and varying estimates place emissions solely from tropical deforestation and forest degradation within a range of 11-14 percent.⁹ There are numerous causes (or drivers) of tropical deforestation and forest degradation, including commercial logging, and clearing of forest for expanded cattle ranching and commercial agriculture, including for commodities such as palm oil.¹⁰ Between 2010 and 2015, despite some successful efforts at reducing the global rate of deforestation, trends continued to show losses of upwards of 6.6 million hectares per year, mainly from loss of natural forests in the tropics.¹¹ Although it started at the international stage through the UNFCCC process, REDD has more recently been the focus of subnational jurisdiction collaboration.

a. From International to Subnational

The concept of REDD first arose as part of the UNFCCC negotiations in 2005 at the 11th Conference of the Parties (COP) to the UNFCCC.¹² The concept gained broad support because of a recognition of the need to expand country participation beyond Annex I (i.e., developed) countries in order to achieve real climate change results.¹³ At that meeting, the Parties to the UNFCCC directed the Subsidiary Body for Scientific and Technological Advice to work on scientific, technical, and methodological issues related to designing REDD projects and programs.¹⁴ Since 2005, Parties to the UNFCCC have considered further decisions regarding the development and implementation of REDD programs. For instance, in 2007, the Parties adopted the Bali Action Plan, which

included “an action point aimed at reducing emissions from forests and called for a decision to be made by the Parties...on how this would be brought about” in December 2009.¹⁵ The Plan also encouraged consideration of “the role of conservation [and the] sustainable management of forests and forest carbon stocks in developing countries.”¹⁶

In 2008, the Subsidiary Body for Scientific and Technological Advice presented a report identifying methodological issues associated with REDD at COP 14 in Poznań, Poland.¹⁷ Its report placed equal emphasis on conservation and sustainable management of forests, and enhancement of forest carbon stocks, deforestation and forest degradation.¹⁸ In the nomenclature of the UNFCCC discussions, activities to reduce emissions from deforestation and forest degradation have varied in scope as follows: 1) activities to reduce emissions from deforestation (i.e., RED); 2) activities that reduce emissions from deforestation and forest degradation (i.e., the second “D” in REDD); and 3) activities which also include the role of conservation, sustainable management of forests, and enhancement of forest carbon stocks (i.e., REDD+ or REDD-plus).¹⁹

In 2009, at COP 15 in Copenhagen, Denmark, Parties adopted the Copenhagen Accord, which “recognized the crucial role of” REDD to reduce global climate change, and developed countries committed to providing financial resources for mitigation actions in developing countries.²⁰ The Accord requested “Parties to identify the drivers of deforestation and forest degradation resulting in emissions[,] along with means to address them,” and directed Parties to use the most recent IPCC guidelines to “estimate and monitor forest-related greenhouse gas emissions and removals and changes in forest cover.”²¹ COP 15 also emphasized the need for methodological guidance, guidance on potential work that may be needed to support these activities, support for capacity-building and inclusion of local communities in monitoring and reporting, and guidance for the establishment of forest reference emission and reference levels.²²

In 2010, at COP 16 in Cancun, Mexico, Parties reaffirmed their commitment to “slow, halt, and reverse forest cover and carbon loss” in what came to be called the Cancun Agreements.²³ Parties also established a phased approach for REDD-plus implementation and agreed to support the inclusion of social and environmental safeguards when undertaking REDD activities.²⁴ COP 16 also established the Green Climate Fund as the “operating entity of the financial mechanism of the Convention,” although Parties did not identify a specific funding mechanism for REDD-plus at that time.²⁵ Parties pledged \$100 billion per year to the fund, but it has yet to be fully financed.²⁶

In 2011, at COP 17 in Durban, South Africa, Parties agreed in Decision 2/CP.17 that multiple financing options for REDD-plus would be needed, and agreed that these should include public, private, bilateral, multilateral, and market-based sources.²⁷ Decision 12/CP.17 continued the discussion on social and environmental safeguards, including the kind of information to be reported to demonstrate how safeguards are being “addressed and respected.”²⁸ Importantly, Decision 12/CP.17 also provided guidance on establishing reference levels (i.e., forest stock baselines and emissions

baselines) as a basis for a rigorous measurement, reporting, and verification scheme.²⁹ Parties decided that reference levels should be consistent with each country's greenhouse gas inventories, and should be guided by the most recent IPCC guidance and guidelines to ensure that they are keeping up with any methodological advancements.³⁰ This "Durban Platform," as the agreements from COP 17 have come to be called, also explicitly recognized a role for subnational efforts in developing REDD programs.³¹

Since the Durban Platform, the Subsidiary Body for Scientific and Technological Advice has continued its consideration of measurement, reporting, and verification methods, as well as safeguard issues. COP 18 included a request from the Parties that the Subsidiary Body for Scientific and Technological Advice continue to consider measurement, reporting, and verification methodological guidance and other technical and policy approaches to REDD.³² In November 2013, at COP 19 in Warsaw, Poland, the Parties made progress on REDD by agreeing to enforce safeguards, and to lay the groundwork for reporting, monitoring, and verifying emission reductions, as well as agreeing on broad financing mechanism language and instituting national reference levels and monitoring systems.³³ At COP 20 in Lima, Peru in 2014 numerous countries with tropical forests submitted their deforestation reference levels to the UN.³⁴ Reference levels inform baseline emissions against which reductions in emissions can be measured and potentially credited.

Finally, during the Subsidiary Body for Scientific and Technological Advice Intersessional Meeting in Bonn, Germany in June 2015, negotiators agreed on draft recommendations to resolve technical issues related to reporting of safeguards, sustainable management, and non-carbon benefits of REDD.³⁵ These draft recommendations will be presented for approval at COP 21 in Paris, France in 2015.

b. Jurisdictional vs. Project-level REDD

In addition to the different categories of activities that could comprise a UNFCCC REDD mechanism, Parties to the negotiations also contemplated different levels at which REDD activities might be undertaken and how incentives could be offered; specifically, the negotiations looked to broader, jurisdictional versus project-based approaches.³⁶

As contemplated by the Cap-and-Trade Regulation, REDD would be conducted at the subnational jurisdiction level as part of a sector-based crediting program, rather than at a project level.³⁷ These subnational programs would have to fit within applicable national legal structures, including under any submitted INDC. As explained in Section II above, sector-based offset credits refers to a crediting mechanism across an entire sector (i.e., the forest sector of a particular jurisdiction) based on the jurisdiction's sector inventory. This is different from the smaller-scale, project-based model in California's domestic offset program and from the model of many existing REDD projects.³⁸

Jurisdictional, sector-based REDD programs "are designed to operate across entire nations, states, or provinces."³⁹ The jurisdictional model defines performance targets

across the entire jurisdiction for the two main types of activities causing emissions—deforestation and forest degradation.⁴⁰ Under jurisdictional approaches to REDD, “the state or province develops policies and frameworks to reduce emissions...across the whole jurisdiction.”⁴¹ Individual REDD projects could still occur within the jurisdiction’s program, but would need to conform to these jurisdiction-wide performance targets and be accounted for against the jurisdiction-wide inventory in order to receive offset credits.⁴² If ARB were to proceed with a sector-based REDD program, ARB staff would have to propose specific regulatory provisions for Board approval to ensure any sector-based REDD offset credits eligible to be used for compliance in California’s system were of high quality, met the AB 32 requirements, and that the REDD jurisdiction provided stringent oversight and enforcement of its program. Sections V through VIII describe how ARB staff might go about developing such provisions.

The jurisdictional approach has advantages over project-level approaches in developing countries. First, it has “the potential to generate emissions reductions at [a] much larger scale and lower cost than the traditional project-based model.”⁴³ In addition, the jurisdictional approach involves a robust public process, incorporating “stakeholders from the beginning in designing and building” the program.⁴⁴ And, because jurisdiction-wide programs are administered by the subnational government, there are mechanisms in place to provide for public accountability that may not exist at the project-based level for some jurisdictions. The jurisdictional REDD approach offers other advantages, such as guarding against risks of performance reversal and leakage at a broader scale. Individual projects could be allowed, so long as they fit within the jurisdictional approach so they can be absorbed into jurisdiction-level monitoring, measurement, verification, and reporting. For instance, any increases in emissions in one location may be offset by greater emission reductions elsewhere within the jurisdiction’s forest sector.⁴⁵ Jurisdictional approaches direct attention to large-scale changes, encouraging jurisdictions to create policy models that address the underlying causes of deforestation and land conversion, resulting in more protections against reversals in carbon stocks and against shifting of forest loss in one region to another in the jurisdiction, while ensuring permanent emission reductions.

Finally, many countries have established national targets for GHG emission reductions under the international treaty regime described above. A sector-based approach provides an opportunity for the GHG benefits gained from attaining the performance target at the subnational level to also be counted towards meeting the international target for the national government within which the subnational jurisdiction lies. This opportunity could make it more likely for governments at the national level to support subnational activities focused on REDD.

c. Ongoing REDD Efforts Still Needed

While international efforts described above have made considerable progress on developing guidelines and lessons for the design of jurisdiction-wide REDD programs, delivering on the financing aspect to REDD jurisdictions has continued to prove difficult. Economic development in many jurisdictions is still dependent on activities which drive

deforestation, including commercial logging and commercial agriculture.⁴⁶ Many individuals and groups are working to expand economic opportunities with low-emissions development mechanisms such as through REDD-based financing. To date, this has been primarily in the voluntary carbon market or through overseas development financing, rather than in a regulatory compliance market.⁴⁷ With respect to overseas development financing, countries such as Norway, Germany, the United Kingdom, and the United States, and multilateral funds such as the World Bank's Forest Carbon Partnership Facility, have provided several billion dollars of financing to assist in developing capacity in REDD jurisdictions.⁴⁸ This is often termed "REDD readiness" financing, which assists recipient jurisdictions in developing institutional capacity to prepare for the initial stages of a jurisdictional program, such as forest inventories, carbon stock baselines, and begin preparations for designing mechanisms to implement programs to reduce emissions from deforestation.

All of these actions and investments have helped test best practices by the UNFCCC and other organizations, but have not yet been sufficient to overcome the economic hurdles to reduce drivers of deforestation to the extent necessary to curb emissions from tropical deforestation and forest degradation.⁴⁹ Additional action by California at the subnational level, as contemplated by California's Cap-and-Trade Program, could play a leadership role by recognizing and approving robust program standards that other market programs could also take advantage of. This could increase opportunities for REDD-related financing within regulatory compliance markets (e.g., through the sale of sector-based REDD offset credits into California's Cap-and-Trade Program or other markets). While market mechanisms are an important tool to address deforestation, additional initiatives will be needed to fully address the economic hurdles.

IV. Why is California interested in REDD?

The acceptance of REDD offset credits into California's Cap-and-Trade Program would help in meeting the goals of AB 32 by reducing greenhouse gas emissions and by lowering the cost of compliance for entities subject to the Cap-and-Trade Regulation. AB 32 recognizes that climate change is a global problem requiring international solutions and that California can be a leader in these efforts. AB 32 also stresses the need for low-cost carbon reductions. (Health & Safety Code, §§ 38501.) REDD offset credits provide a cost-effective and innovative mechanism for covered entities to comply with the Cap-and-Trade Program while engaging developing countries in low-carbon growth. Furthermore, many co-benefits associated with REDD programs have the potential to improve the lives of local populations.⁵⁰ This section of the white paper highlights specific reasons why engaging with other jurisdictions developing robust low-emissions development plans, including sector-based REDD programs, is of importance to California and California's climate efforts.

a. Reducing Emissions from Tropical Deforestation also Reduces Impacts of Global Climate Change on California

Climate change is one of the most serious environmental threats facing the world today. Global warming is already impacting the Western U.S., and particularly California, in more severe ways than the rest of the country.⁵¹ The 2010 Climate Action Team (CAT) report concluded that climate change will affect virtually every sector of the state's economy and most of California's ecosystems.⁵² Significant impacts will likely occur even under moderate scenarios of increasing global GHG emissions and associated climate change.

Compared to the rest of the country, California is particularly vulnerable to significant resource and economic impacts from at least three effects of climate change. A major vulnerability California faces is its reliance on the snowpack for water supply and storage. This resource is predicted to decrease substantially in the 21st century, and data suggests that decline has already begun. Researchers have found that lower snowpack in mountains across the western United States could not be explained by natural variability, and that it was consistent with a human-induced increase in the average temperature.⁵³ The California Department of Water Resources projects a 25-40% reduction in Sierra snowpack compared to the historical average by 2050.⁵⁴ This does not mean less precipitation, but a change in the hydrological system. More rain and less snow means state water managers will not be able to use current flood-control measures and less water will be available during summer months, when demand is highest.⁵⁵ This, in turn, will effect urban populations and agriculture production dependent on this resource. According to estimates, roughly 40% of California's freshwater goes to agriculture, while the rest is split between urban and environmental uses.⁵⁶ Cash farm receipts in California totaled \$46.4 billion in 2013, according to the California Department of Food and Agriculture.⁵⁷ A reduction in water supply would likely reduce output from that important component of California's economy and negatively impact domestic food supply.⁵⁸

At the time of release of this white paper, California is in its fourth year of drought, which is causing economic, environmental, and social impacts throughout the State.⁵⁹ The drought has resulted in lower availability of surface water supplies, which increases the amount of groundwater pumping in the State; and the drought has also resulted in lower availability of hydroelectric power, which increases reliance on other types of power (such as natural gas and renewable fuels) for water conveyance.⁶⁰ Both of these result in higher GHG emissions associated with water use, as well as impacts to the State's fish and wildlife resources, further exacerbating climate change. Excessive pumping of groundwater is resulting in the earth sinking in parts of the Central Valley.⁶¹ Farmers are leaving hundreds of thousands of acres unplanted, which means less food exports and less in-state jobs.⁶² And, for the first time in history, California regulators have curtailed senior water rights holders.⁶³

Beyond the effect of global climate change on California's water supply, a 2013 study suggests that deforestation in the Amazon could have a direct effect on Sierra Nevada

snowpack levels. As described in the *Journal of Climate*, researchers employed various high resolution climate models to analyze how complete Amazonian deforestation would change jet streams and weather patterns. They found that such deforestation would “modify the jet stream so as to divert storms away from the northwest United States,”⁶⁴ as well as the Sierra Nevada. According to their models, complete deforestation of the Amazon would result in a 50% reduction of California’s snowpack.⁶⁵ As a point of reference, NASA found that tropical forests across the globe held about 271 billion tons of carbon in the early 2000’s, with Brazil accounting for approximately 61 billion tons.⁶⁶

While complete deforestation is unlikely, the implication is that some deforestation could result in some additional reduced snowpack, in addition to reduced snowpack due to increased emissions. The presence of atmospheric rivers, bands of moisture that form across the globe, has ended about a third or more of California’s droughts since the middle of the last century.⁶⁷ Any disturbance in the jet stream impacts the location of these atmospheric rivers and where they deliver rain and snow on land. These bands of moisture are also responsible for carrying a vast amount of moisture from the tropics to other regions. The moisture contained within these rivers results from evapotranspiration from plant matter such as tropical forests. Deforestation reduces the amount of evapotranspiration and the amount of water available to recharge the atmospheric rivers.⁶⁸

Furthermore, studies suggest that without the Amazonian forests there are likely to be more El Niño-like events. El Niño is the shorter term for the “El Niño-Southern Oscillation” and refers to the situation where the eastern and central equatorial region of the Pacific Ocean increases in temperature by a few degrees Celsius and there is a see-saw shift in the surface air pressure between the eastern and western halves of the Pacific.⁶⁹ In years that El Niño events have occurred, some regions in California have experienced increased isolated flooding, abrupt and fast melting of the existing Sierra snowpack, landslides, and coastal erosion.⁷⁰ Princeton researchers state, “[t]he big point is that Amazon deforestation will not only affect the Amazon – it will not be contained. It will hit the atmosphere and the atmosphere will carry those responses.”⁷¹

In addition, climate change is already affecting California’s ocean resources. Like the atmosphere, the chemistry of the ocean appears to be changing as it absorbs more carbon dioxide (CO₂) from the air. The Monterey Bay Aquarium Research Institute found that more CO₂ absorption increases the acidity of the ocean water, and that ocean water CO₂ levels are increasing faster near the California coast than in the open ocean.⁷² Increased ocean acidification has been shown to reduce populations of shell-forming animals like bivalves and plankton.⁷³ Recent years have seen the “near total failure of developing oysters in both aquaculture facilities and natural ecosystems on the West Coast.”⁷⁴ Between 1951 and 1995, zooplankton – a pillar of the marine food web – in California coastal waters declined by 80%.⁷⁵ While researchers caution that it is too early to blame these population declines on ocean acidification, experiments suggest that it is a factor.⁷⁶ Thus, climate change appears to already be affecting California’s ocean economy, which one study suggests was worth \$21.4 billion in direct market value and provided 400,000 direct jobs in 2000.⁷⁷

California coastal waters are not only experiencing a change in chemistry; they are also rising. A 2013 Office of Environmental Health Hazard Assessment report on climate change in California notes that “sea level is increasing almost everywhere in California.”⁷⁸ While the report cautions that sea level variation is natural, the authors indicate that climate change may accelerate the rate of change as glaciers and polar ice sheets melt. This, in turn, could lead to flooding of coastal urban zones, erosion, and the loss of infrastructure and natural resources.⁷⁹

Moreover, California’s urban, suburban, and rural areas are highly impacted by wildfires in ways most of the country does not face, and climate change will increase the incidence and severity of wildfires and resulting adverse air quality and economic impacts. Using CalFire research, the Office of Environmental Health Hazard Assessment shows in their 2013 report that California’s fire season is arriving earlier and ending later, in tandem with warmer temperatures, reduced snowpack, and other climate change indicators.⁸⁰ Researchers sponsored by Cal/EPA and the California Energy Commission suggest that fire risk will increase until about the middle of this century, when dry conditions in Southern California will reduce the amount of fuel available for large wildfires. At that point, the risk will be reduced in drought regions but will be increased in more northern regions of California, which will become drier but which will still have sufficient fuel for wildfires.⁸¹ The Bureau of Land Management estimated the cost of one wildfire in the Santa Ana watershed at \$1.2 billion, not including adverse health effects, destroyed ecosystem services, lost recreational opportunities, and the loss of natural heritage.⁸² An increased number of large fires would thus mean a cost of many billions of dollars to the people of California.

According to President Obama’s Climate Action Plan, emissions associated with forest loss, agricultural expansion, and other land-use change account for one third of global carbon dioxide output.⁸³ The federal government, through the U.S. Agency for International Development and initiatives such as the Tropical Forest Alliance 2020, is partnering with countries to reduce emissions from land-use change, including forestry, and to create new models for rural development.⁸⁴

Addressing deforestation means tackling a major cause of climate change on a global scale and helping mitigate the specific risks to California. Jurisdictional REDD offset credits represent an important incentive to assist jurisdictions in the implementation of best-practice forest management and social safeguard policies to conserve tropical forests. Moreover, and as will be described below, because they are low cost, such offset credits would also offer significant cost containment opportunities for regulated parties within California.⁸⁵

b. Cost-Effectiveness for Covered Entities

AB 32 requires that ARB adopt regulations which achieve “the maximum technologically feasible and cost-effective greenhouse gas emission reductions.” Jurisdictional, sector-based REDD offset credits meet this mandate by reducing emissions at low cost. In

fact, researchers have estimated that through 2020, the per ton cost of forest emission reductions like REDD would be about one-half the cost of projected carbon prices from carbon projects in developed countries.⁸⁶ These cost-estimates include accounting for opportunity costs, implementation costs, and transaction costs.⁸⁷ The low cost of sector-based REDD offset credits stems from the low opportunity cost of reduced deforestation; there is a relatively modest return on land use and forest products in tropical regions.⁸⁸ Being low-cost does not imply low-quality emission reductions however. Any jurisdictional REDD programs that California would engage with would require rigorous measurement, monitoring, reporting, and verification systems to ensure that sector-based REDD offset credits represent real emission reductions and that they meet the offset criteria of AB 32.⁸⁹ The AB 32 criteria are discussed in further detail in Section VI of this white paper.

The emission reductions associated with REDD programs are not only cost-effective compared to other options for abating emissions⁹⁰ because of the low opportunity costs, but also because of the flexibility it would give covered entities in the Cap-and-Trade Program. California's Cap-and-Trade Regulation only allows sector-based offset credits to represent half of any entity's 8 percent offset usage limit in the third compliance period. (Cal. Code Regs., tit. 17, § 95854, subd. (c).) Nonetheless, a broader compliance instrument market provides more options for lower cost compliance instruments for California's covered entities. More options mean that covered entities have more emissions reduction opportunities, allowing them to determine the least-cost compliance methods. Additionally, more compliance instrument types may increase market liquidity, as trading for allowances and offsets would increase due to the price difference. Liquidity also lowers transaction costs as buyers and sellers can find each other more easily. Thus, the availability of stringent sector-based REDD offset credits would increase the functioning of the market component of the Cap-and-Trade Program, reinforcing the other cost benefits of such offsets.

c. Leadership

The environmental leadership role for California is well-recognized in academia, where the term "the California effect" is used to refer to jurisdictions whose rigorous environmental regulations and economic influence results in strengthened environmental standards within economically integrated jurisdictions, such as other states or nations.⁹¹ Whether accepting sector-based REDD offset credits would result in a "California effect" or not, it would demonstrate continued leadership in climate change policy by creating a further incentive to overcome the economic barriers of existing drivers of deforestation, as explained in Section III above. AB 32, which recognizes California's leadership role (see Health & Saf. Code, § 38501), heralded a new effort on the part of California to combat climate change. Allowing sector-based REDD offset credits from an approved jurisdictional REDD program that meets the rigorous requirements of California's Cap-and-Trade Program into the program would complement this leadership position. By carefully enacting these policies, California could set a high-standard precedent which other jurisdictions may follow as they pursue climate change policies of their own.

This leadership position would also allow California to help build a model for low-emission development that benefits communities. As described in Section II, if enacted, California's REDD policy would consist of a jurisdictional, sector-based approach, meaning that the entire jurisdiction's deforestation rate would come down, rather than the rate on just one plot of land. As will be further discussed in paragraph d. below, and in Section V, this method could help engender changes in the development model of the jurisdiction; instead of relying on inefficient resource extraction to develop, local communities would benefit from a knowledge transfer and other incentives allowing them to produce more from already cleared or degraded land. This represents one of the win-win aspects of REDD: the program improves the lives of rural communities by incentivizing improved forest management, while offering low-cost emission reductions to regulated parties. By reducing their rates of deforestation, jurisdictions in countries such as Mexico and Brazil will be actively mitigating one of the main sources of carbon emissions in the world⁹² and improving management of one of the world's most important carbon sinks.⁹³ Working with a jurisdictional REDD program to accept sector-based REDD offset credits would demonstrate California's ongoing commitment to engage with other governments in addressing climate change.⁹⁴

d. Additional Co-benefits

The monetary value of carbon sequestration is an important element to considering jurisdictional REDD programs. The value of sector-based REDD offset credits does not necessarily include externalities, however. A number of positive externalities, or co-benefits, can result from jurisdictional REDD programs.

While jurisdictional REDD programs would only credit for the programs' carbon value, co-benefits associated with avoided deforestation and improved forest management include biodiversity preservation, watershed management, cultural heritage and local livelihood benefits, and maintaining the conventional and beneficial albedo. Some have called for co-benefit values to be monetized as well, which would consist of "stacked" or "bundled" payments for various ecosystem services.⁹⁵ Accounting for all ecosystem services would increase the value that forest-dwelling communities realize from conserving tropical forests, and thereby increase their incentive to do so. While "stacking" and "bundling" are not included in the jurisdictional REDD policy contemplated by the Cap-and-Trade Regulation, the potential for these multiple, important co-benefits further underscores the importance of tropical forests to local and global populations.

One of the most valuable co-benefits is biodiversity preservation. Tropical forests harbor a vast array of species. One study found that a REDD mechanism and the resulting financial incentives could dwarf the effect of all conservation spending worldwide, resulting in far fewer extinctions of forest-dwelling species.⁹⁶ Maintaining this biodiversity is important for several reasons. First, one non-marketed resource provided by biodiversity is ecosystem resiliency. By eliminating species, we increase an ecosystem's dependence on certain organisms and increase its susceptibility to

disturbances. If drought or disease or other factors affect the remaining organisms, an ecosystem has less ability to adapt (or respond or recover) because there are fewer substitute organisms, and the severity of any impacts on the ecosystem are higher with lower species diversity.⁹⁷ Such a scenario could lead to what is sometimes called “ecosystem collapse.”⁹⁸

Second, in addition to their importance for the ecological functioning of tropical ecosystems, many species may also have value for medical research. The genetic value of biodiversity represents a kind of bank of evolution, in which millions of years of mutations are stored. Destroying the genes in this bank would deprive us of potentially valuable genetic information.⁹⁹ Jurisdictional REDD programs may help conserve these values as a byproduct of carbon sequestration.

Besides maintaining biodiversity, REDD provides tremendous co-benefits to local ecosystem services. Forests play an important role in watershed management, for example, helping to regulate flooding and drought. This can have important effects on downstream human populations, who may depend on the watershed management services. Indeed, hydrological services are “among the most valuable of the many ecosystem services from forests” because water is so important to human populations.¹⁰⁰

Valuable insights into livelihood impacts of avoided deforestation can be drawn from existing avoided deforestation and payment for ecosystem services projects, including some REDD projects.¹⁰¹ Apart from job creation,¹⁰² specific local livelihood impacts of avoided deforestation projects can include sustained economic development and additional sources of income through payments for conservation.¹⁰³ Though livelihood impacts depend on the management scheme, studies show that programs similar to REDD provide “tangible livelihood benefits” that outweigh the opportunity cost of conducting resource extractive activities on the protected land.¹⁰⁴ Intangible benefits are also generated, including the preservation of cultural identity. Forest-dependent communities rely on primary forests for traditional foods, products, and as their ancestral land. Thus, protecting these forests also means protecting forest-dependent cultures.¹⁰⁵

Deforestation also affects climate change beyond the obvious carbon it causes to be emitted. For example, reduced forest cover in tropical regions may also create a negative feedback loop to climate change because of the albedo factor. The term “albedo” refers to the amount of radiative heat reflected back into the atmosphere from a surface. A higher albedo means more radiative heat is reflected back into the atmosphere, thus causing more warming of the atmosphere. Deforested surfaces have been shown to have a higher albedo than forested surfaces and thus reflect more radiative heat into the atmosphere that is trapped by GHGs and contributes to global warming. In contrast, reduced deforestation results in a lower albedo. In addition, forest cover, particularly in tropical regions, also leads to cloud formation, and clouds reflect more sunlight because of their white color, thereby reducing the warming associated with solar radiation on tropical forests. The reflection of direct sunlight by

clouds results in less heating of the surface and subsequently, less radiative heat emitted back to the atmosphere. These clouds also result in precipitation, which allows the humid conditions necessary for tropical forests to thrive. Deforestation can reverse these effects, causing fewer clouds to form. This effect also reduces precipitation and can lead to a more savannah-like vegetation cover. Thus, reducing deforestation and forest degradation in tropical forests not only mitigates climate change through carbon sequestration, but also through the feedback effects of reduced albedo and increased cloud cover.¹⁰⁶

Finally, a jurisdictional REDD program, given its scope and focus on robust monitoring, reporting, and verification at the jurisdiction scale, could also provide useful insights into mechanisms to enhance sustainable supply chain efforts, including with respect to certain types of commodities that have historically relied on increasing deforestation (e.g., soy, cattle, palm oil, pulp and paper).¹⁰⁷ The jurisdictional framework to forest management and low emissions development is already proving useful for commodity companies seeking to eliminate deforestation from their supply chains and source materials and products in a more sustainable way.¹⁰⁸ Continuing to explore jurisdictional REDD programs may also provide useful lessons for increased sustainability measures in other California initiatives.

V. What has California done to date on REDD?

This section of the white paper summarizes the activities California has already undertaken regarding REDD, including through the AB 32 Scoping Plan and the First Update to the Scoping Plan, the development of the Cap-and-Trade Program, and in interactions with other jurisdictions.

a. Scoping Plan and Update

As part of AB 32, ARB was required to develop and publish a plan that outlines the approach which California will take to reduce greenhouse gas emissions. (Health & Saf. Code, § 38561.) This document is called the Climate Change Scoping Plan, which was first published in 2008.¹⁰⁹ Among other things, the initial Scoping Plan recognized that mechanisms to incentivize forest carbon activities around the world will be crucial to address climate change.¹¹⁰ AB 32 also requires ARB to update the Scoping Plan at least once every five years. (*Id.*) The first update to the Scoping Plan was published in 2014.¹¹¹ Like the previous iteration, this document outlines California's plan to reduce emissions over the next five years. California's participation in the Governors' Climate and Forests Task Force (GCF) and the release of the REDD Offset Working Group's recommendations are highlighted in the Scoping Plan Update.¹¹² The Plan notes that by continuing to engage with other jurisdictions on sector-based offsets, California demonstrates its commitment to climate leadership and innovation.

b. Actions During Cap-and-Trade Development

Recognizing the need for action on reducing emissions from deforestation and forest degradation in developing countries as a means to reduce global GHG emissions, ARB indicated early in the development process of the Cap-and-Trade Regulation that REDD was an area California was interested in further exploring. For instance, ARB released a Preliminary Draft Regulation (PDR) in 2009, which included a conceptual framework for sector-based crediting programs, including REDD.¹¹³ This framework was partially informed by ARB's engagement in the GCF, which is described further below.

Following the release of the PDR, ARB held a workshop in July 2010 to solicit public comments regarding some of the technical considerations first mentioned in the PDR, including reporting and verification, baselines, and sector performance targets.¹¹⁴

Based on this initial work, ARB included a regulatory signal within its Cap-and-Trade Regulation to demonstrate California's ongoing commitment to better understanding REDD. Specifically, the Regulation includes sector-based crediting provisions, which are found under California Code of Regulations, title 17, sections 95991-95995. Under these provisions, ARB has the option of approving (through additional rulemaking) a "sector-based crediting program," which is defined as "a GHG emissions-reduction crediting mechanism established by a country, region, or subnational jurisdiction in a developing country and covering a particular economic sector within that jurisdiction." (Cal. Code Regs., tit. 17, § 95802, subd. (a).) The program's performance would have to be "based on achievement toward an emissions-reduction target for the particular sector within the boundary of the jurisdiction." (*Id.*) For sector-based crediting, as opposed to other compliance offset credits, ARB would be considering, through additional rulemaking, the approval of jurisdiction-wide programs (i.e., at a subnational level). This jurisdictional approach differs from ARB's domestic compliance offset protocols, which are based on setting performance standards that individual projects must meet.¹¹⁵

In the development of the Cap-and-Trade Regulation, ARB stated in its Staff Report: Initial Statement of Reasons, that it was proposing to include REDD as the first sector for consideration because of "the important role that forests play in climate change in terms of sequestering carbon and, in particular, the role that tropical forests play in directly affecting the climate."¹¹⁶ (See Cal. Code Regs., tit. 17, § 95993, subd. (a).) In making this decision, ARB staff relied on the IPCC finding that "reduced deforestation and degradation is the forest mitigation option with the largest and most immediate carbon stock impact in the short term per hectare and per year globally."¹¹⁷ Thus, ARB found that for "California's cap-and-trade program, sector-based credits from avoided deforestation are a potentially promising opportunity for covered entities to reduce compliance costs while ensuring net reduction of GHG emissions to the atmosphere."¹¹⁸ However, given the complex scientific, technical, legal, and policy discussions, which are still ongoing at the international level, ARB has moved forward carefully with the goal of establishing a REDD model for subnational programs that is of high quality and replicable.¹¹⁹

The sector-based crediting framework within the Cap-and-Trade Regulation would require any jurisdictional REDD program to fulfill several requirements, including the need for a sector plan; a transparent system that monitors, reports, verifies, and provides for enforcement; a transparent system for ensuring sector-level performance; a public participation and consultation requirement; and the ability to ensure that any sector-based REDD offset credits meet the six AB 32 criteria mentioned above.¹²⁰ (Cal. Code Regs., tit. 17, § 95994.) Moreover, sector-based offset credits would be subject to quantitative usage limits such that they could only be used for up to two percent (2%) of an entity's compliance obligation in the first two compliance periods, and up to four percent (4%) in the third. (Cal. Code Regs., tit. 17, § 95995.) It should be noted that because ARB staff is not proposing any regulatory amendment related to REDD or any other sector at this time, no sector-based crediting will be eligible in the first or second compliance periods.

c. ARB's Consultation with Other Jurisdictions and the Federal Government

In line with the AB 32 statutory directive to consult with other jurisdictions, and with the regulatory framework for sector-based crediting programs described above, ARB staff has been engaging with the U.S. federal government and state and provincial partners in several different REDD-related initiatives. This engagement has included a continued assessment of how REDD could be fully included in the Cap-and-Trade Program through a future rulemaking action.

i. Governors' Climate and Forests Task Force

Since 2008, California has been involved in a collaborative group of states and provinces called the Governors' Climate and Forests Task Force (GCF). California has signed several non-binding Memoranda of Understanding (MOU) related to REDD with other subnational jurisdictions, including separate MOUs between California, Illinois, and Wisconsin of the United States on the one hand, and the Indonesian States of Aceh and Papua, and the Brazilian States of Acre, Amapá, Mato Grosso, and Pará on the other.¹²¹ These MOUs were structured to promote cooperation between the jurisdictions and to focus on information, capacity, and knowledge exchange related to REDD, specifically, and the forest sector, generally.

As it stands currently, the GCF is comprised of 29 different subnational jurisdictions, including states and provinces from Brazil, Indonesia, Ivory Coast, Mexico, Nigeria, Peru, Spain, and the U.S.¹²² These jurisdictions are included in the GCF because collectively, they are home to over 25 percent of the world's tropical forests, and reducing emissions from deforestation and forest degradation in any one of these jurisdictions will result in significant climate benefits, as described in Section IV above.¹²³ In addition, each jurisdiction has enacted or is in the process of enacting specific legal structures to improve the management of its forests, as they relate to climate change, and has agreed to share information about its experience with the broader GCF group. For instance, the Indonesian provinces are implementing a federal

moratorium on the logging of primary forests.¹²⁴ In Brazil, the states of Acre, Amazonas, and Mato Grosso are developing broader statutes for low emissions development and ecosystem services, including those related to REDD.¹²⁵ All of the GCF jurisdictions are working with communities living in and around the forests to assess the status of the forests and the needs of the communities.¹²⁶

Topics which have been discussed and considered by the GCF members include the following technical considerations:

- How jurisdictions set jurisdiction-wide reference levels (i.e., forest carbon stock baselines);
- Different mechanisms for determining crediting baselines;
- Assessing tools for the accounting of carbon stocks and emission reductions through monitoring, measuring, reporting, and third-party verification;
- Different mechanisms for tracking those stocks and reductions over time, including how to demonstrate that a reversal in emissions reduction or sequestration progress has occurred;
- Options for accounting for such reversals;
- How local community and environmental co-benefits can be ensured;
- How jurisdictions can ensure the reductions are permanent and enforceable; and
- Gaining a better understanding of each jurisdiction's legal structure and how it fits within the broader national legal system for each jurisdiction.¹²⁷

These topics are similar to those considered under ARB's domestic U.S. Forest Projects Compliance Offset Protocol, as well as in ARB's early development of the Cap-and-Trade Regulation and in discussions occurring pursuant to the UNFCCC as described in Section III of this white paper. Lessons learned through these discussions will likely also provide useful information for collaborative efforts beyond the REDD context.

Pursuant to the GCF MOUs, a Secretariat was approved to help facilitate annual meetings, commission studies, and work with funding sources to support these efforts. The GCF Secretariat is incorporated as a 501(c)(3) non-profit entity and has received funding from the Gordon and Betty Moore Foundation, Climateworks, and the David and Lucile Packard Foundation, as well as grants from the U.S. Department of State.¹²⁸ As stated above, the goals of the GCF are to share experiences and best practices, build capacity, and develop recommendations for ways to integrate REDD and other forest carbon activities into emerging greenhouse gas compliance systems. The GCF annual meetings provide important opportunities for exchanges between California and the GCF's tropical forest members, who are building jurisdiction-level REDD and low emission sustainable development programs and developing ways to link these programs with emerging greenhouse gas compliance systems and other market and non-market opportunities around the world. California, through the California Environmental Protection Agency and ARB, has participated in every annual meeting of the GCF since its inception.

California's engagement with the GCF has also included joining the Rio Branco Declaration, which is a GCF-initiated declaration developed in Rio Branco, Acre at the 2014 GCF Annual Meeting to signal a commitment by signatories to help achieve an 80 percent reduction in tropical deforestation if sufficient financial assistance is made available.¹²⁹ ARB's Chair Mary Nichols signed the Declaration on behalf of California on April 1, 2015.¹³⁰ Preliminary research indicates an enormous potential for emission reductions if the Rio Branco Declaration were to be fully implemented.¹³¹ ARB also participated in the 2015 GCF Annual Meeting in Barcelona, which saw increased participation of indigenous peoples organizations as well as a nearly \$25 million contribution from the Government of Norway to the Governors' Climate and Forests Fund.¹³² This fund is designed to assist GCF member jurisdictions access international climate financing to support the implementation of the Rio Branco Declaration.¹³³

ii. REDD Offset Working Group

In addition to the GCF, California was involved in a smaller collaborative group called the REDD Offset Working Group. This group arose out of a 2010 MOU on Environmental Cooperation between the State of Acre of the Federative Republic of Brazil, the State of Chiapas of the United Mexican States, and the State of California.¹³⁴ Like California, Acre and Chiapas are members of the GCF, and they have been implementing innovative strategies to address climate change. As previously mentioned, Acre has begun implementing a program which incentivizes environmental protection and reduced emissions through financial and other incentives for ecosystem services. Chiapas continues to work to implement its climate change action program, and develop regulations to implement a 2010 Law for Climate Change Adaptation and Mitigation, which includes important REDD-related efforts and other elements for the state's climate strategy.¹³⁵ Chiapas remains committed to jurisdictional REDD and to further develop an overall REDD strategy which incorporates broader social participation in the planning and execution of such a strategy.¹³⁶

The focus of the REDD Offset Working Group was to develop cooperation and "state to state sectoral REDD linkage recommendations," taking into account "the legal, technical and economic considerations in developing [REDD] sector-based credits."¹³⁷ The REDD Offset Working Group, in which California, Chiapas, and Acre participated as observers, was made up of technical experts on topics ranging from aerial mapping to on-the-ground forest management and from local community engagement to market design. These experts worked for nearly two years on developing a set of recommendations to present to ARB and its counterparts in Chiapas and Acre regarding how the states could integrate REDD into their climate programs. The final recommendations were submitted to ARB on July 18, 2013. Those recommendations are analyzed in Section VI of this white paper and are included as Appendix A. It is important to note that the focus of the REDD Offset Working Group was narrower than that of the GCF, because it assessed the technical design and implementation nuances of the programs in Acre, California, and Chiapas.

Through the REDD Offset Working Group, ARB gained insight into the REDD initiatives being developed in Acre and Chiapas, and California was able to enhance its relationship with both of these jurisdictions. Each jurisdiction has a better understanding of how regulations are drafted and adopted in the other jurisdictions, as well as the public process and length of time it takes to approve a regulation.

One significant example of information which ARB learned through observing the REDD Offset Working Group relates to advancements in REDD accounting – highly advanced Light Detection and Ranging (LiDAR) and Synthetic Aperture Radar (SAR) mapping.¹³⁸ These mapping tools, in conjunction with on-the-ground field inventory plots and satellite imagery, are crucial to developing baseline maps and periodically-updated carbon stock maps for entire jurisdictions. These tools may help improve accuracy in monitoring, measuring, and verifying forest activities, while decreasing cost for those jurisdictions.¹³⁹ These maps could also be key tools to ensure compliance. Some of these same technologies are now also being used in California in relation to the ongoing drought.¹⁴⁰ Sample carbon density maps provided by the Earth Innovation Institute (formerly Amazon Environmental Research Institute)¹⁴¹ are attached to this white paper. Appendix B shows jurisdiction-wide carbon density for Acre. Appendix C shows jurisdiction-wide carbon density for Chiapas.

Through the REDD Offset Working Group, ARB also increased its understanding of various stakeholder concerns regarding environmental and social standards related to REDD. Many of those concerns were directed to the technical experts in the development of the recommendations described further in Section VI of this white paper.

iii. ARB's Consultation with the U.S. Federal Government

Throughout its engagement with the GCF and the REDD Offset Working Group, ARB has coordinated with the U.S. Department of State on issues related to REDD. The U.S. Department of State has welcomed ARB's engagement with subnational jurisdictions on REDD and has helped facilitate discussions with national governments, including those of Brazil and Mexico, upon request.¹⁴² ARB expects that this collaboration with the U.S. Department of State will continue. The U.S. Department of State kept ARB up-to-date on federal positions relating to the UNFCCC REDD+ negotiations and they will continue to coordinate on relevant topics going forward, as appropriate, to facilitate a shared understanding of relevant technical and policy issues related to REDD.

ARB has also had more limited discussions with representatives from the United States Agency for International Development (USAID) regarding REDD+ initiatives undertaken by USAID. Based on these interactions, ARB believes that the ongoing consultations with the U.S. Department of State and USAID will continue to be mutually beneficial to both California and the U.S. federal government.

iv. Other Efforts

California and Mexico committed to working together on climate change and other environmental issues last year, when Governor Brown and Mexican officials signed a Memorandum of Understanding to Enhance Cooperation on Climate Change and the Environment.¹⁴³ This agreement catalyzed a series of meetings about how California and Mexico can cooperate to reduce emissions. Working groups composed of Mexican and Californian representatives now have regular calls to exchange information on efforts related to greenhouse gas inventories, carbon pricing, clean vehicles, wildfires, and air quality. Within the climate change workgroup, one of the stated goals is to collaborate on REDD, “with a view to incentivizing forest carbon approaches.”¹⁴⁴

While working with Mexico remains a priority, California has also developed relationships with other countries and subnational jurisdictions around the world. The governments of Peru and California agreed, in the context of a Memorandum of Understanding, to cooperate to address climate change.¹⁴⁵ The country of Norway has engaged with California regarding Norway’s experience in the deforestation arena. In addition, in a broad statement of support for including forests as a tool for addressing climate change, 130 governments and other groups, including California and many fellow GCF members, signed the United Nation’s New York Declaration on Forests last year.¹⁴⁶

Many of ARB’s efforts described in this white paper were also discussed in an informational update to the Board on ARB’s overall offsets program during the July 24, 2014 Board hearing. A copy of the presentation provided to the Board is available here: <http://www.arb.ca.gov/board/books/2014/072414/14-6-6pres.pdf>.

d. California Universities Research on REDD

In addition to California state government engagement on REDD, many California universities are also studying various aspects of forest conservation, financing mechanisms, and REDD programs. The following is a representative, but non-exhaustive, list of several programs underway at various universities:

- Stanford University. The Carnegie Institution for Science’s Department of Global Ecology, located on the campus of Stanford University, has been developing cutting edge monitoring techniques to measure and map tropical deforestation and forest degradation across entire jurisdictions, including through the Carnegie Airborne Laboratory’s laser-guided imaging spectroscopy. The Institution also now offers a free online course to “assist governments, nongovernmental organizations, and academic institutions with high-resolution mapping and monitoring of forests with satellite imagery.”¹⁴⁷
- UC Santa Barbara. The Bren School of Environmental Science & Management at UC Santa Barbara completed a project analyzing U.S.-based funding streams of REDD+ projects in developing countries. The project concluded that REDD+

can “address drivers of deforestation by integration of finance with food security aid,” that the U.S. should increase funding for capacity development and carbon monitoring and mapping, and that “U.S. government agencies reporting on REDD+ expenditures should increase transparency by reporting about finance and impacts more clearly and in greater detail.”¹⁴⁸

- UCLA. The Center for Tropical Research at UCLA is partnering with Cameroonian universities to develop a REDD project to improve forest management and provide financing to help protect the Dja Reserve in Cameroon, thereby protecting gorillas, chimpanzees, forest elephants, and other endangered species in Central Africa.¹⁴⁹ Legal researchers from UCLA Law School’s Emmett Institute on Climate Change and the Environment also prepared a report on behalf of the Center for Global Development entitled *The California REDD+ Experience: The Ongoing Political History of California’s Initiative to Include Jurisdictional REDD+ Offsets within its Cap-and-Trade System*.¹⁵⁰ The report reviews the history of California’s engagement on REDD and highlights challenges and opportunities to including sector-based, jurisdictional REDD in California’s Cap-and-Trade Program.
- UC San Diego. Partnering with the Tropical Forest Group and the World Wildlife Fund, UC San Diego is offering a Specialized Certificate in Terrestrial Carbon Accounting that will help train professionals from around the world who work on REDD and other climate initiatives.¹⁵¹
- UC Davis. Partnering with the U.S. Forest Service’s International Program, UC Davis hosts an annual International Seminar on Climate Change and Natural Resources Management, which discusses carbon markets and sector-based REDD offset credits, among many other topics.¹⁵²

Universities outside of California have also been active in studying tropical forests as they relate to climate change generally, as well as with respect to REDD specifically. For instance, the GCF Secretariat is based at the University of Colorado Law School. In addition, Michigan State University’s (MSU) Global Observatory for Ecosystem Services operates a “Carbon2Markets” program aimed at establishing systems and tools to support measurement, reporting, and verification for REDD and for carbon sequestration projects that focus on reforestation and agroforestry.¹⁵³ MSU is already working with the GCF in Indonesia to improve monitoring, reporting, and verification at the provincial level.¹⁵⁴ Furthermore, the University of Maryland’s Department of Geographical Sciences has been developing global forest mapping tools in coordination with the Woods Hole Research Center and the State University of New York’s College of Environmental Science and Forestry.¹⁵⁵

This academic engagement demonstrates the scientific and policy interest in California for understanding and developing robust REDD programs, and it also highlights the fact that California students and faculty are helping lead the way in creating tools and analyses that are crucial for the implementation of these programs.

VI. Overview of REDD Offset Working Group Recommendations

Section V explained that the REDD Offset Working Group arose out of a 2010 MOU between California, Chiapas, and Acre. The purpose of the REDD Offset Working Group was to develop recommendations designed to answer the following questions to help inform the three MOU member states on the design of potential jurisdictional REDD programs:

1. What legal and institutional mechanisms are required to enable California to recognize international REDD-based emission offsets for compliance purposes;
2. What are the key policy considerations a sectoral REDD program should address to achieve the level of performance needed for California to recognize the REDD-based offsets for compliance purposes; and
3. What should be the bases for judging the performance of the states in reducing carbon removals from forests?¹⁵⁶

After much stakeholder input, deliberation, and research, the REDD Offset Working Group presented a final set of recommendations to California, Chiapas, and Acre which attempts to answer these three questions. These recommendations are the result of a multi-year process involving a group of experts who examined the legal, policy, and technical elements of jurisdictional, sector-based REDD programs. (The recommendations focus on broader REDD+ activities, in order to address the same issues under negotiation in the UNFCCC process described above in Section III; and therefore refer to this as REDD+, rather than REDD.) The development of these recommendations began in 2011 with presentations regarding the REDD Offset Working Group's activities and goals. Participants then published draft recommendations in early 2013. Finally, after holding multiple public workshops in 2013, the REDD Offset Working Group incorporated public comments into their recommendations and produced a final report entitled "*California, Acre and Chiapas – Partnering to Reduce Emissions from Tropical Deforestation: Recommendations to Conserve Tropical Rainforests, Protect Local Communities and Reduce State-Wide Greenhouse Gas Emissions.*"¹⁵⁷

The REDD Offset Working Group recommendations provide a good starting point for ARB staff's evaluation of how REDD programs could be integrated into California's Cap-and-Trade Program. However, before ARB can proceed toward considering adoption of a specific jurisdictional REDD program in a formal rulemaking action, ARB will require further stakeholder engagement and policy development. Starting with this white paper and the October 28, 2015 workshop, ARB is soliciting input from interested stakeholders on these recommendations. The overview of these recommendations included below does not necessarily indicate ARB staff's concurrence with any specific recommendation, and should be read in conjunction with ARB staff's assessment of where additional work is needed and what proposed next steps would be as outlined in Sections VII and VIII of this white paper. The final REDD Offset Working Group recommendations are summarized below.

a. California Compliance-Grade REDD Program Design Options

i. What credits should California recognize?

One of the first questions in designing a jurisdictional REDD program is: what is being measured? Which forest carbon emissions shall be counted? How should carbon uptake from forest growth be accounted for? These questions are complicated by the diverse carbon pools within tropical forests, such as above-ground biomass (i.e., tree trunks, etc.) versus below-ground carbon pools (i.e., roots and soil carbon). Whatever the forest circumstance, the REDD Offset Working Group experts widely agreed that REDD programs should have the ability to include all measurable and verifiable emission reductions.¹⁵⁸

The first step towards this greater inclusion is for partner jurisdictions to collect accurate forest carbon stock data. The experts recommend that California focus initially on only accepting compliance-grade credits derived from programs designed to reduce emissions from deforestation and forest degradation, rather than also including carbon stock enhancement (i.e., conservation, sustainable management of forests, and enhancement of forest carbon stocks activities that make up the “plus” in REDD+). This approach allows partner jurisdictions to receive credit for reductions from deforestation and degradation, which are technically simpler to measure, account for, and verify. While REDD+ would include carbon stock enhancement from practices like reforestation, the recommendations indicate that starting with REDD+ might be too complicated at the outset of the program. That said, the experts noted that partner jurisdictions could at least *measure* the changes in carbon stock from forest enhancement so that California would have the option to credit the carbon sequestration if the methodology is proven to be robust. ARB’s U.S. Forest Projects Compliance Offset Protocol includes crediting for enhanced carbon sequestration, through reforestation and improved forest management, and avoided conversion. The REDD Offset Working Group recommendation to initially focus on reduced emissions is therefore aligned with an existing project type in the California compliance offset program.

ii. Additionality

Another fundamental element which is required by AB 32 is that credits used to satisfy a compliance obligation under the Cap-and-Trade Program must be “additional.” As such, the REDD Offset Working Group experts recognized that additionality is a precondition for the creation of sector-based REDD offset credits. This means that a jurisdictional program must show that real, measurable, and long-term emission reductions would occur *in addition to* what would be Business-As-Usual (BAU) reductions.¹⁵⁹ In other words, the emission reductions must be greater than what would have happened in the absence of a REDD program. To understand the BAU scenario, the REDD Offset Working Group recommends establishing a reference level (essentially a sector-wide forest inventory baseline) from the 10-year historic average emissions due to deforestation.¹⁶⁰ For example, a jurisdiction could have a 10-year

average of 100 tons of GHG emissions (i.e., carbon dioxide equivalent (CO₂e)) per year, making the reference level 100 tons per year. The REDD Offset Working Group also recommends establishing a crediting baseline below the reference level to ensure that partner jurisdictions demonstrate their own efforts at reducing emissions.¹⁶¹ This might mean, for example, that emissions have to drop below 95 tons per year before offset credits could be created (meaning crediting would not occur for those first 5 tons of “own effort,” but could occur for reduced emissions below 95 tons).

Finally, the REDD Offset Working Group allows for the possibility of reference level adjustments if there is a valid reason, such as a new road being built which could increase annual emissions.¹⁶² Any such changes to reference levels and their potential impacts to annual emissions could be addressed through adjustments to the performance target for the sector. With an accurate reference level and potential adjustments, the REDD Offset Working Group believes that sector-based REDD offset credits would meet the additionality test. California already uses a “performance test” to determine additionality in its approved, domestic Compliance Offset Protocols. The REDD Offset Working Group recommendation to establish a reference level that is below historic emissions and then a crediting baseline below the reference level fits within the existing ARB policy for how to determine additionality. ARB staff notes that additional work would be needed to set an appropriate crediting baseline relative to the reference level and that this work might depend on specific jurisdictional circumstances.

iii. Crediting Pathway

Another issue in terms of the architecture of a jurisdictional REDD program is the crediting pathway. This refers to who issues credits and who receives them. In California’s Cap-and-Trade Program, offset credits are issued by ARB to offset project operators or other parties. The REDD Offset Working Group recommends that partner jurisdictions issue the REDD offset credits, which California could then recognize as compliance-grade credits.¹⁶³ Partner jurisdictions could decide whether individual, “nested” projects are eligible or whether only jurisdiction scale reductions would be credited. If these nested projects are credited, the partner jurisdiction would need to provide specifics as to how the individual project affects the jurisdiction-wide emissions level. With respect to international sector-based crediting, since ARB is only interested in jurisdictional programs, ensuring the involvement of a partner jurisdiction aligns well with the recommendation provided by the REDD Offset Working Group.

iv. Jurisdictional Registry

With credits being issued and received, and bought and sold, a registry is necessary to keep track of credit ownership. California’s program utilizes the Compliance Instrument Tracking System Service (CITSS) for this function. The REDD Offset Working Group recommends that partner jurisdictions maintain their own jurisdiction-specific registry, especially because they have the authority to validate the data therein.¹⁶⁴ Per the recommendations, this data should be comprehensive, including REDD policies in the jurisdiction as well as nested project information. Registries should be compatible with

national government registries, in case the REDD program expands to the national-level. If a third-party is administering the registry, then the partner jurisdiction should set the rules and procedures for the system. Finally, the REDD Offset Working Group recommends that California work with the partner jurisdiction to codify these rules and procedures to ensure the integrity of the registry.¹⁶⁵

b. Risks

i. Leakage

As explained in Section III of this white paper, one of the benefits of a jurisdictional REDD program is that it reduces the risk of leakage which might occur in a project-only scenario. Leakage is defined as an increase in emissions outside of the area of emissions reduction implementation, as a result of that implementation. While the risk is lower for programs designed at larger geographic scales, one of the challenges with jurisdictional REDD is the potential for leakage outside of that jurisdiction. This can occur when a jurisdictional REDD program lowers resource extraction or agricultural output in that jurisdiction, without slowing demand or increasing production in another jurisdiction. Market demand may simply shift deforestation to another jurisdiction without a REDD program, resulting in fewer net emission reductions overall, and affecting the ability of the program to be considered additional.

To mitigate jurisdictional leakage risk, the REDD Offset Working Group offers three recommendations. First, lowered emissions from nested projects should be compared against the jurisdiction's reference level. As stated previously, a jurisdictional REDD design offers some protection against leakage because it spreads the risk across a larger geographic area. Analogous to a diversified investment portfolio, one nested project may result in leakage and hence fewer net emission reductions, but the jurisdiction as a whole may still perform well. The second recommendation addresses interstate or international leakage caused by decreased production of a good for which demand remains constant, such as wood. To reduce this risk, partner jurisdictions could increase production of the good on already-harvested land within that jurisdiction. Continuing with the example of wood products, this could mean implementing a sustainable forest management program that increases timber yields, while instituting policies and activities elsewhere to still result in net emission reductions across the entire jurisdiction. The third recommendation is to accurately measure or estimate interstate or international leakage and to account for that within the jurisdiction's program, ensuring that only real, additional emission reductions are credited.¹⁶⁶ ARB's U.S. Forest Projects Compliance Offset Protocol already employs a form of the third recommendation.

ii. Reversals

Similar to ARB's U.S. Forest Projects Compliance Offset Protocol, the risk of reversal represents another potential threat to the integrity of a REDD program. If a fire or land-use change reverses the emission reductions generated by a partner jurisdiction, then

the emission reductions are no longer real. Much like the intrastate leakage risk, the jurisdictional REDD design reduces this risk because it diversifies the origin of emission reductions compared to project-level REDD systems. Besides the fundamental design of the program, the REDD Offset Working Group recommends that California work with partner jurisdictions to develop other reversal-risk mitigation mechanisms, such as a buffer pool or insurance products to compensate for emissions above the reference level.¹⁶⁷ Per the recommendations, these reversals should be accounted for by partner jurisdictions. However, the REDD Offset Working Group also recommends that California not penalize partner jurisdictions for natural disturbances (such as wildfires, pest infestations, disease, and windstorms) if they would have happened even in the absence of a REDD program. These natural disturbances would be considered part of the baseline emissions, rather than an emissions reduction reversal.¹⁶⁸

iii. Double Counting

Double counting of emission reductions can also threaten the integrity of a jurisdictional REDD program. This would occur if California credited emission reductions from a partner jurisdiction and the reductions were also credited by another entity within the same accounting system. One ton of CO₂e reduced can only be counted once to be real. To diminish the possibility of double counting, the REDD Offset Working Group recommends establishing clear laws regarding who owns REDD emission reductions.¹⁶⁹ Furthermore, if a national REDD program is envisioned, the REDD Offset Working Group recommends that the national government publicly acknowledge the subnational program so as to avoid double counting on that front.¹⁷⁰ Finally, the group recommends that robust accounting frameworks incorporating nested projects be created so as to differentiate between credits awarded to jurisdiction-level emission reductions and those awarded to the project-level reductions.¹⁷¹ ARB staff notes that the California program employs maximum transparency in the documentation and public accessibility of all projects that are issued offset credits. Full transparency by any offset program can help mitigate the risk that a project will be recognized and credited more than once for the same emission reductions or enhanced carbon storage.

iv. Mitigating Risk through Measurement, Monitoring, Reporting, and Verification

California's Cap-and-Trade Program requires the use of stringent measurement, monitoring, reporting, and verification systems for its offset program and for its GHG reporting program. These systems help safeguard against reversals and leakage. These systems essentially represent the auditing of a jurisdiction's greenhouse gas emissions and emission reductions from deforestation, allowing them to be credited for reductions where they are due. However, the content, uncertainty level, and measurement, monitoring, reporting, and verification standards can affect the legitimacy of a REDD program and how many emission reductions are real, additional, verifiable, and quantifiable. To deal with the uncertainty of precisely measuring emission reductions over a state, the REDD Offset Working Group recommends that California establish a sliding scale discount by which fewer reductions would be credited as the

uncertainty level of the measurements increases.¹⁷² The REDD Offset Working Group also recommends that the measurement, monitoring, reporting, and verification process should be transparent with an independent third-party verifying the methodology of the process.

c. Social Safeguards

There is widespread agreement amongst experts that in order to work, REDD programs must employ robust social safeguards. As the REDD Offset Working Group report points out, “implementing high-quality safeguards is one of the most cost-effective investments governments can make in ensuring permanence and additionality of reductions.”¹⁷³ Several issues arise relative to safeguards, including: who develops the safeguards, how do they develop them, and how are they monitored and enforced? These questions are especially pertinent for ARB, because California can play a leading role in the formation of a broader REDD program outside of the California Cap-and-Trade Program. The REDD Offset Working Group makes numerous recommendations regarding how California and partner jurisdictions could work together to protect the rights of local people and the local environment.

First, the REDD Offset Working Group recommends that California should only accept REDD credits from and approve a REDD program with partner jurisdictions which have demonstrated safeguards consistent with United Nations standards and other standards, such as the REDD+ Social & Environmental Standards (SES).¹⁷⁴ Additionally, the REDD Offset Working Group recommends that California should ensure that the safeguards are monitored and the reporting mechanisms are transparent to stakeholders in all jurisdictions. The REDD Offset Working Group recommends that partner jurisdictions define their own performance indicators by applying the REDD+ SES.¹⁷⁵ This includes robust consultation and inclusion of local communities in the design of a REDD program before implementation of the REDD program. The REDD Offset Working Group further recommends that grievance mechanisms should be available, accessible, and transparent to stakeholders, and that partner jurisdictions submit third-party verified reports about the safeguards and grievances before any credits are issued.¹⁷⁶ Non-compliance with the safeguard provisions should prompt a suspension of the REDD program approval. Finally, the REDD Offset Working Group recommends that all nested projects within a jurisdictional program (if any) be similarly independently verified using best-practice social and environmental standards like the Climate, Community & Biodiversity Standards (CCBS).¹⁷⁷

d. Legal Framework

In order for sector-based REDD offset credits to be accepted into California’s Cap-and-Trade Program, the jurisdiction originating the credits must be approved by ARB pursuant to section 95991 of the Cap-and-Trade Regulation. Under California Government Code section 12894, this type of approval would constitute a “linking” of California’s Cap-and-Trade Program with the jurisdictional REDD program. “Linking”

means an action taken by ARB by which emission reductions from another jurisdiction will be accepted as compliance instruments in California's Cap-and-Trade Program.¹⁷⁸ Linking two subnational jurisdictions' climate policies would follow the precedent of California linking with Québec's program, which took place in 2013. California's and Québec's linkage will therefore serve as an example to further linking.

However, before such linkage could occur, Government Code section 12894 sets forth several steps which must be met. Essentially, the Governor of California must make a series of findings which ensure that California and the subnational jurisdiction have sufficiently aligned their programs if they wish to link. These steps are further outlined in Section VII of this white paper. The REDD Offset Working Group has also recommended that California and a partner jurisdiction sign a non-binding MOU.¹⁷⁹ This MOU could recognize that the partner jurisdiction's REDD program meets California regulatory requirements for sector-based offset credits. Alternatively, the REDD Offset Working Group suggests the possibility of indirect linkage through a third-party, such as the Verified Carbon Standard or the Climate Action Reserve.

California law further provides that partner jurisdictions must have enforcement capability of relevant laws. In the context of REDD, this could be a critical issue as it relates to the invalidation of credits that fail to meet program requirements. The REDD Offset Working Group recommends that partner jurisdictions follow Acre's example of developing a public-private partnership within the jurisdiction which can spread risk through an insurance or buffer mechanism.¹⁸⁰ This will enhance enforceability of liability in case of a reversal by ensuring that a mechanism exists to replace any sector-based REDD offset credit found to be invalid or which has suffered from a reversal. The REDD Offset Working Group also recognizes that California always has the ability to enforce the requirements offset credits must meet through the buyer liability provisions already in place for its domestic offset program and recommends that California use these provisions in the context of sector-based REDD offset credits as well.¹⁸¹ Additionally, the REDD Offset Working Group recommends that third-party verifiers be employed to ensure that requirements, such as social safeguards, are being met.¹⁸²

Furthermore, land rights are a fundamental and sensitive issue in any REDD program. The REDD Offset Working Group recommends that extreme care be taken with respect to this issue so as to prevent land grabbing or exclusion of local people.¹⁸³ California can aid these efforts by choosing to link only with jurisdictions that have strict social safeguard systems in place. Such safeguards can include tying emission reductions to land rights, so that those who have legal or customary title to the land where emission reductions take place receive the benefits of the sector-based REDD offset credits. In a related recommendation, the REDD Offset Working Group holds that the intent for the sharing of the revenue from sector-based REDD offset credits should be clarified in the partner jurisdiction's regulations.¹⁸⁴ Again, the REDD Offset Working Group recommends that third-party verifiers audit partner jurisdictions to confirm that these measures are in place. Finally, partner jurisdictions should clarify that liability of the REDD program remains with them and not California. The full REDD Offset Working Group recommendations are attached to this white paper as Appendix A.

VII. Additional Work Required

Although the REDD Offset Working Group recommendations, as well as ARB's ongoing engagement with jurisdictions in the GCF and with the U.S. Department of State, have greatly increased ARB's understanding of jurisdictional REDD as an option for potential future inclusion in the Cap-and-Trade Program, ARB staff believes that additional work will be required before such inclusion could be proposed as a regulatory action for Board consideration. This section describes the legal requirements that would need to be met for REDD to be included, as well as further technical work and resource requirements which will be undertaken to advance ARB staff's work on this important topic.

a. Legal Requirements

i. AB 32 Offset Criteria

As previously mentioned, AB 32 requires that offsets be "real, permanent, quantifiable, verifiable, and enforceable by the State Board."¹⁸⁵ Any reduction in emissions achieved by offsets must also be additional¹⁸⁶ and must, if applicable, occur over the same time period and be equivalent in amount to any direct emission reduction required pursuant to AB 32.¹⁸⁷ Section 95802(a) of the Cap-and-Trade Regulation also lays out definitions of the above six criteria required of any emission reduction program under AB 32.

1. Ensuring "Real" Emission Reductions from a Jurisdictional REDD Program

In the Cap-and-Trade Regulation, "real," in the context of offset projects, means that

GHG reductions or GHG enhancements result from a demonstrable action or set of actions, and are quantified using appropriate, accurate, and conservative methodologies that account for all GHG emissions sources, GHG sinks, and GHG reservoirs within the offset project boundary and account for uncertainty and the potential for activity-shifting leakage and market-shifting leakage. (Cal. Code Regs., tit. 17, § 95802(a).)

In the context of jurisdictional REDD, three main issues are raised by this definition: reference levels; monitoring, reporting, and verification; and leakage. The REDD Offset Working Group recommendations, as well as international guidance on jurisdictional REDD, address each one of them.

Ensuring that GHG emission reductions are "real" requires jurisdictions involved to develop reference levels. Reference levels are analogous to the baseline for the Cap-and-Trade Regulation, in that they establish a business-as-usual emissions forecast against which changing GHG emission reductions can be measured. The importance of accurate reference levels cannot be understated, as it benchmarks not only the emission reductions, but also payments for a REDD mechanism.¹⁸⁸ Three challenges

to establishing an accurate reference level have been identified in the literature: 1) getting reliable historical deforestation data; 2) uncertainty about variation in future deforestation levels; and 3) incentives to artificially raise the baseline in order to increase perceived emission reductions, and thus offset credits.¹⁸⁹ The REDD Offset Working Group and other researchers have developed guidance on how to establish a reference level for a REDD program based on historical data and deforestation drivers.¹⁹⁰ As part of its regulation provisions, ARB would need to define how to set reference levels. In addition, prior to any linkage with a REDD jurisdiction, ARB would need to evaluate the reference levels for conformity with established best practices.

In addition to an accurate baseline, “real” GHG emission reductions depend upon proper reporting, which requires effective monitoring, reporting, and verification.¹⁹¹ Current international guidance on these topics and jurisdiction-wide REDD programs outline how this can be done.¹⁹² To ensure that only “real” reductions are credited, ARB would only consider sector-based REDD programs with accurate and well-developed monitoring, reporting, and verification methods. Though ARB might not define specifically how jurisdictions should conduct monitoring, reporting, and verification activities, prior to accepting sector-based REDD offset credits, ARB would need to define an acceptable error range.¹⁹³ As the level of uncertainty increases, ARB could require a large “margin of safety” by, for example, decreasing the number of sector-based REDD offset credits that are accepted as compliance-grade. Beyond a certain level of uncertainty, ARB could decide to no longer recognize credits from that program. The program in Acre, Brazil appears to be currently capable of monitoring and measuring emissions from deforestation, enforcing environmental laws, and implementing incentive programs for sustainable development, which the Environmental Defense Fund found “puts [Acre] well ahead of the curve in terms of REDD readiness.”¹⁹⁴

Ensuring “real” reductions also requires that leakage be mitigated. As described in Section IV above, leakage refers to the possibility that any GHG emission reductions achieved by REDD program activities could be undermined by movement of GHG emissions to locations outside the project or jurisdictional boundaries. Leakage is most likely to happen “when the scale of intervention is smaller than the scale of the problem.”¹⁹⁵ ARB, in further specifying regulatory standards in the Cap-and-Trade Regulation, could set eligibility standards for partner jurisdictions in the way they approach leakage. For instance, ARB could insist that jurisdictions minimize leakage risk by addressing the underlying drivers of deforestation, as described in Section III above.¹⁹⁶ Similarly, ARB could set eligibility standards for agricultural production to increase on already cleared land, so as to minimize international leakage risk.¹⁹⁷ As more developing countries begin to participate in low-emissions development programs, including REDD, the international leakage risk will likely be reduced, as well. Prior to approving a jurisdictional, sector-based REDD program and the resulting REDD offset credits, ARB will have to decide which methods to account for and reduce leakage are acceptable for compliance-grade offset credits in the Cap-and-Trade Program.

By ensuring robust reference levels are set, utilizing stringent monitoring, reporting, and verification, and addressing leakage within and, to the extent feasible, outside of the jurisdiction, sector-based REDD offset credits can meet the “real” requirement of AB 32. ARB, through the design of its Cap-and-Trade Program and any specific jurisdictional REDD-related regulatory standards in the Cap-and-Trade Regulation, will coordinate with jurisdictions in how they address this requirement. As such, additional work will be needed on what levels of uncertainty risk are acceptable, and how jurisdictions might mitigate that risk.

2. Ensuring “Permanent” Emission Reductions from a Jurisdictional REDD Program

AB 32 requires that any emission reductions credited under its implementation be “permanent.”¹⁹⁸ “Permanent” means, in the context of offset projects,

either that GHG reductions and GHG removal enhancements are not reversible, or when GHG reductions and GHG removal enhancements may be reversible, that mechanisms are in place to replace any reversed GHG emission reductions and GHG removal enhancements to ensure that all credited reductions endure for at least 100 years. (Cal. Code Regs., tit. 17, § 95802(a).)

REDD activities may raise some permanence concerns due to risks associated with the lack of broad policies that address deforestation factors in developing countries, as well as natural risks associated with forests and the difficulty of controlling carbon storage and natural events.¹⁹⁹ Permanence risks may be addressed in a variety of ways. Potential solutions identified by the REDD Offset Working Group include mechanisms for compensating or managing such reversals.²⁰⁰ One mechanism “could include banking a portion of the emission reductions achieved...within an insurance buffer,”²⁰¹ similar to the existing buffer account employed for unintentional reversals under ARB’s U.S. Forest Projects Compliance Offset Protocol. With an insurance buffer, reversals of emission reductions could be replaced by offset credits from this pool. Other insurance products include contracts to provide the insured with payment in the event of loss, such as the Overseas Private Investment Corporation’s \$900,000 political risk insurance coverage for a REDD project in Cambodia.²⁰²

Emissions from natural disturbances are unpredictable, but may be managed. The REDD Offset Working Group has identified options to manage permanence concerns related to natural disturbances. One option is to “zero out” these emissions by adjusting the jurisdictional baseline or reference level; a second option is to compensate for them using buffer credits (or some other insurance mechanism).²⁰³ Partner jurisdictions could choose to develop their own mechanisms, or may rely upon an established third-party mechanism to guarantee compensation in the event of an emission reduction reversal.²⁰⁴ Either way, ARB would need to establish regulatory criteria to “assess the eligibility of any proposed reversal monitoring and compensation mechanism”²⁰⁵ to ensure that any credits from an approved sector-based REDD program meet the permanence requirement.

3. Ensuring “Quantifiable” Emission Reductions from a Jurisdictional REDD Program

AB 32 requires that any emission reductions credited under its implementation be “quantifiable.”²⁰⁶ The Cap-and-Trade Regulation states that “quantifiable” means

in the context of offset projects, the ability to accurately measure and calculate GHG reductions or GHG removal enhancements relative to a project baseline in a reliable and replicable manner for all GHG emission sources, GHG sinks, or GHG reservoirs included within the offset project boundary, while accounting for uncertainty and activity-shifting leakage and market-shifting leakage. (Cal. Code Regs., tit. 17, § 95802(a).)

The same methods described to ensure that credits are “real” help demonstrate that credits are “quantifiable.” For instance, the quantification problem requires an accurate, reliable baseline and periodic review of the accuracy of emission reductions relative to that baseline, while accounting for any leakage that may have occurred. The accuracy of this process depends upon a number of factors, such as which method is used to measure emission reductions and the acceptable uncertainty risk. REDD jurisdictions must set accurate reference levels or baselines (see discussion above). In addition, periodic review of these statistics must occur in order to ensure the accuracy of reporting data. Finally, any leakage must be reduced or reported and accounted for.

Jurisdiction-level reference levels may also better account for uncertainty, especially when developed through transparent public processes. Jurisdiction reference levels cover a greater geographical area than individual projects, thereby reducing the likelihood of uncertainties by distributing the risks. Greater access to resources further reduces the risk of uncertainty. Jurisdiction-level approaches may also encourage broader policy changes than can project-level approaches, which can lead to more accurate reporting.

While jurisdictional programs may allow for a more sophisticated way to account for emission reductions, they often include nested projects, which can complicate how reductions are quantified. For illustrative purposes, assume an example where a nested project is able to demonstrate it has reduced emissions from deforestation and degradation within the project’s boundaries, but the jurisdiction is not be able to make that demonstration as a whole throughout the jurisdiction’s boundaries. The question then becomes: How would the project’s quantified reductions be credited, if at all? Without definitively answering that question, ARB could require that partner jurisdictions explain how nested projects would be integrated into the jurisdiction-wide program, and how sector-based offsets credits would be apportioned.

Prior to linking with a jurisdiction-wide sector-based REDD program, ARB would need to assess the quantification of emission reductions, including any harmonization needed for nested projects, in that program. Much like evaluating other aspects of REDD reductions, such as whether they are “real,” this may mean examining the other

jurisdiction's methodology to ensure that it meets California's standard. ARB, through the design of the Cap-and-Trade Program, would have final say on which REDD programs were approved and which sector-based REDD offset credits would be accepted into California's system.

4. Ensuring "Verifiable" Emission Reductions from a Jurisdictional REDD Program

AB 32 requires that any emission reductions credited be "verifiable."²⁰⁷ The Cap-and-Trade Regulation, under section 95802(a), states that "[v]erifiable means that an Offset Project Data Report assertion is well documented and transparent such that it lends itself to an objective review by an accredited verification body." Verifiable information is necessary to ensure that data being reported is accurate, so that credits issued are for real emission reductions. The verifiability of data reported under a jurisdiction-wide REDD program would be governed by sector-wide terms to which the program conforms. These terms would define how many levels of surety or review are required. For instance, emissions could be verified from satellite images, or other remote-sensing technology, as well as on-the-ground reporting, by independent verifiers, or by the subnational or national government. The terms might insist that this data be triangulated through multiple data sets and metrics. ARB would define the verification terms prior to linking with any REDD program. Regardless of how "verifiability" is negotiated and defined, it would have to ensure transparency and auditability of any issued offset credits.

5. Ensuring "Enforceable" Emission Reductions from a Jurisdictional REDD Program

AB 32 requires that any emission reductions credited be "enforceable."²⁰⁸ Under section 95802(a) of the Cap-and-Trade Regulation, "[e]nforceable means the authority for ARB to hold a particular party liable and to take appropriate action if any of the provisions of this article are violated." Under ARB's domestic offsets program, ARB is ultimately able to enforce on each and every offset credit through buyer liability provisions, meaning that any offset credit issued by ARB which is found at a later time to be invalid, would need to be replaced by the entity that submits the offset credit for compliance. The REDD Offset Working Group recommended that ARB maintain this buyer liability concept for any sector-based REDD program it approved under the Cap-and-Trade Program.²⁰⁹ In addition, and because California will not have the authority or ability to enforce laws in a jurisdiction with an approved sector-based REDD program, ARB would need to partner only with those jurisdictions whose programs and enforcement abilities it understands, trusts, and can verify. Thus, prior to accepting sector-based offset credits from a REDD jurisdiction, ARB would have to review and analyze the jurisdiction's enforcement abilities to have a clear understanding of the applicable laws as written and implemented. This process could include reviewing the law, statutory and (if applicable) case law analysis, and obtaining advice from regional and international legal experts from California universities, the California Attorney General's Office, and elsewhere.

A precedent for this type of partnership already exists through California's linkage with the Cap-and-Trade Program in Québec. In fact, ARB's Linkage Readiness Report discussing coordination with Québec on program implementation such as adequate enforcement, program changes, and comprehensive, collaborative market monitoring should provide useful guidance for any sector-based REDD program approval.²¹⁰ ARB staff notes, however, that coordination with an approved jurisdictional REDD program would not require as broad an engagement as has occurred with Québec, given that the approval would only cover sector-based offset credits, rather than linking to an entire economy-wide emissions trading system (as with Québec).

6. Ensuring "Additional" Emission Reductions from a Jurisdictional REDD Program

AB 32 requires that any emission reductions credited under its implementation be "additional."²¹¹ The Cap-and-Trade Regulation states that, in the context of offset credits, "additional" means

greenhouse gas emission reductions or removals that exceed any greenhouse gas reduction or removals otherwise required by law, regulation or legally binding mandate, and that exceed any greenhouse gas reductions or removals that would otherwise occur in a conservative business-as-usual scenario. (Cal. Code Regs., tit. 17, § 95802(a).)

Thus, an emission reduction is "additional" if it would not have happened in the absence of the project or program. In the context of REDD, whether a forest "was or is actually destined for deforestation" must be assessed. This assessment ties into the reference level, as discussed above, which accurately plots the business-as-usual emissions rate. The forest areas, former and present land uses, local, national or regional legislation governing the respective forest, existing concessions, and relevant title or occupancy of the land may all need to be assessed before California can link with a REDD jurisdiction. Although jurisdictions have begun developing sector-based REDD programs, reductions from these programs are not yet eligible for use in compliance markets, and may not currently include penalties for failure to meet reduction targets; however, many of these jurisdictions "do include legally enforceable sanctions against illegal deforestation and forest degradation, and in the case of Brazil and Acre, have achieved very substantial emissions reductions while increasing agricultural production."²¹²

Jurisdiction-wide and nested REDD programs may also provide extra assurance of the additionality of any GHG emission reductions. "[A]ggregating emissions provides greater certainty that reductions achieved are 'additional,' as there is greater certainty over the trend in overall deforestation across a large region versus the likely fate of any particular piece of forest."²¹³ For further analysis on this additionality concept, see the summary of the REDD Offset Working Group recommendations in Section VI of this white paper.

ii. Formal Rulemaking Action Pursuant to Administrative Procedure Act

Any approval of a sector-based REDD program whose credits could be used for compliance with the Cap-and-Trade Regulation requires the Board to amend the Cap-and-Trade Regulation. Amendments to regulations are considered rulemaking proceedings within the meaning of the California Administrative Procedure Act (APA),²¹⁴ and are required to undergo a formal rulemaking process.²¹⁵ This process would be the same as other rulemaking actions to amend the Cap-and-Trade Regulation to date. And, as with all rulemakings, ARB staff would be required to conduct an environmental analysis of any amendments to approve a REDD program pursuant to the California Environmental Quality Act (CEQA).

iii. Government Code Section 12894 Linkage Requirements

As discussed in Section VI above, if ARB proceeds to consider a specific jurisdiction's REDD program for adoption, it would have to be incorporated into California's Cap-and-Trade Program through a formal rulemaking process and through a linking arrangement. Such an arrangement would likely take the form of a Memorandum of Understanding or related agreement, as was done with Québec.²¹⁶ Such an MOU creates additional opportunities for California to include provisions that will assure that any credits issued under the REDD Program meets AB 32's strict standards.

Before entering into an MOU to link²¹⁷ California's Cap-and-Trade Program with the program of any other jurisdiction, ARB would be required to submit a proposal to the Governor for review.²¹⁸ The Governor would have to make the following findings within forty-five days of receiving a notice of such linkage proposal, taking into account any advice of the Attorney General on the topic pursuant to the law's requirements:

- (1) The jurisdiction with which the state agency proposes to link has adopted program requirements for greenhouse gas reductions, including, but not limited to, requirements for offsets, that are equivalent to or stricter than those required by Division 25.5 (commencing with Section 38500) of the Health and Safety Code.
- (2) Under the proposed linkage, the State of California is able to enforce Division 25.5 (commencing with Section 38500) of the Health and Safety Code and related statutes, against any entity subject to regulation under those statutes, and against any entity located within the linking jurisdiction to the maximum extent permitted under the United States and California Constitutions.
- (3) The proposed linkage provides for enforcement of applicable laws by the state agency or by the linking jurisdiction of program requirements that are equivalent to or stricter than those required by Division 25.5 (commencing with Section 38500) of the Health and Safety Code.
- (4) The proposed linkage and any related participation of the State of California in Western Climate Initiative, Incorporated, shall not impose

any significant liability on the state or any state agency for any failure associated with the linkage.²¹⁹

The Governor must then submit his findings to the Legislature.²²⁰ These steps would have to take place before California may link its Cap-and-Trade Program with another jurisdiction for purposes of issuing credits under a REDD program. This is the same process as was conducted when California linked its program with Québec.²²¹ However, whereas California's linkage with Québec involved a bilateral linkage between two full emissions trading systems, a REDD program linkage would only involve a one-way transfer of one type of compliance instrument into California's program (i.e., a sector-based REDD offset credit from an approved REDD program).

b. Further Stakeholder Engagement

During the rulemaking process to consider the adoption of the Cap-and-Trade Regulation, stakeholders were engaged in numerous public meetings, workshops, and Board hearings.²²² As part of this public stakeholder engagement process, stakeholders provided comments and requested additional information on various areas of the Cap-and-Trade Regulation, including potential sector-based crediting and the REDD mechanism.²²³ In addition to ARB staff's responses to stakeholder comments during the rulemaking,²²⁴ other efforts, including those described in this white paper, have been underway to address concerns and to help inform the design of robust REDD programs.²²⁵

The topics raised by stakeholders during the past rulemaking process, ARB staff responses to formal comments, and items for future stakeholder engagement are summarized below. As ARB continues to explore the inclusion of jurisdictional, sector-based REDD offset credits, stakeholder engagement starting at the October 28, 2015 workshop and in future workshops and other pre-regulatory meetings will be critical for soliciting comments and obtaining feedback on staff proposals and addressing outstanding concerns. ARB staff will also seek input and advice from ARB's Environmental Justice Advisory Committee (EJAC) on the topics and concerns raised throughout this process.

As noted, some of the areas highlighted by stakeholders were addressed in the REDD Offset Working Group's recommendations. To fully explore some of the recommendations, ARB staff is soliciting input on the following specific areas:

i. Safeguards

During the ARB Cap-and-Trade rulemaking process, the topic of safeguards was raised by stakeholders and proposed to be embedded in a framework for the design of any future subnational REDD programs.²²⁶ The inclusion of safeguards limits the likelihood of unintended outcomes and provides reassurance about the robustness of the REDD program. The recommendations provided by the REDD Offset Working Group emphasize the need for safeguards to protect the land and cultural rights of indigenous

peoples and other forest-dependent communities. These include access to information, engagement with various members within communities, and other public protections.²²⁷ ARB staff believes that California universities, non-governmental organizations, and other stakeholders can help contribute to design principles for robust safeguards or recommend existing standards, as was done by the REDD Offset Working Group in its recommendations. Furthermore, and similar to the decisions on REDD at COP 19,²²⁸ ARB could require proof that social safeguards, such as those recommended by the REDD Offset Working Group, are in place for a REDD program being proposed for inclusion in the Cap-and-Trade Program.

ii. Reversals

As proposed by some stakeholders, the unintentional reversal of carbon benefits from REDD programs due to fire, pest infestations, disease, or other causes could be mitigated through an insurance mechanism. This mechanism could include a concept similar to the already-established ARB Forest Buffer Account, which provides insurance against reversals of GHG reductions and GHG removal enhancements due to unintentional causes in U.S. forest offset projects, in addition to continued monitoring activities of the number of offset credits in the buffer account.²²⁹ Similar to offset projects already eligible under the California Cap-and-Trade Program, if sector-based REDD offset credits are deemed to be intentionally reversed, the purchaser of the offsets could be deemed liable and responsible for compensation through the retirement of other compliance instruments. This approach would be an example of the application of the buyer liability provisions already in effect for ARB's domestic offset program. The intention of a buyer liability requirement is to protect the environmental integrity of the program in cases of intentional reversals and to ensure ARB is able to enforce against such a reversal.²³⁰ ARB would need to establish the parameters regarding intentional reversals prior to approving a jurisdiction-wide REDD program whose sector-based REDD offset credits could be used for compliance.

iii. Conflict of Interest

Conflicts of interest may exist when an individual's or organization's involvement in an activity is unduly influenced by an ulterior motive. Parties to offset projects in the Cap-and-Trade Program and potentially in REDD programs, which can include project operators, project verification bodies, and others parties, may be subject to conflicts of interest. These conflicts manifest through falsification of information and incorrect verification of emission reductions or carbon sequestered. Provisions requiring strict conflict of interest evaluations and ongoing monitoring for such conflicts are critical to mitigating the risk of conflicts of interest and to deterring fraudulent and manipulative behavior in the Cap-and-Trade Program. ARB's program already includes strict conflict of interest provisions for the verification of offset projects, including in section 95979 of the Cap-and-Trade Regulation. For sector-based crediting programs such as REDD, conflict of interest requirements similar to those in the existing Cap-and-Trade Regulation for offset verification bodies and offset project developers could be adopted

by the REDD jurisdiction. The requirements should include methods for monitoring and enforcing conflict of interest provisions, such as independent third-party verification.

iv. Social Benefits

Some stakeholders have raised concerns about the potential adverse impacts of the REDD mechanism on the rights of indigenous peoples and local communities, including land-grabbing and displacement of communities, and the risk of any benefits of the REDD program being realized by government or project developers instead of local communities.²³¹ Some of these concerns stem from examples based on projects that could not meet AB 32 and Cap-and-Trade Program requirements, and would not qualify under a sector-based REDD program as described in this paper. Moreover, ARB staff notes that there are many examples of local communities, including indigenous peoples, who are either interested in exploring or even actively engaged and benefitting from REDD activities, and believes these examples may demonstrate practices that address some of the concerns mentioned.²³² Important recent examples of this include actions by the Mesoamerican Alliance of Peoples and Forests (AMPB), a network of indigenous groups from Central America which promotes community participation in jurisdictional REDD programs, and the Coordinator of Indigenous Organizations of the Amazon River Basin (COICA), which organizes Amazonian indigenous groups across nine countries to advocate for self-determination at the national and international level.²³³ Both of these groups issued statements of support for the GCF at the 2015 Annual Meeting,²³⁴ and both have declared their interest in and support of REDD mechanisms that respect the rights of traditional forest-dwelling people, and have partnered with research and environmental organizations in assessing GCF member inclusion of rights recognition, participatory processes, benefits sharing, territorial security, and governance.²³⁵

In its report, the REDD Offset Working Group provided safeguard recommendations, including basing REDD requirements on existing standards such as those developed by the Climate, Community, and Biodiversity Alliance to ensure local communities share in the benefits. This is another area where ARB staff believes California universities and non-governmental organizations could provide expertise and engagement with local community groups to provide further recommendations on development of regulatory provisions. The agreement on the inclusion of safeguards at COP 19, as described in Section III above, ensures that the UNFCCC has continued working on this issue.²³⁶ ARB could evaluate the social benefit approaches suggested by the UNFCCC, academia, and the REDD Offset Working Group in determining what would be required for California's program. ARB is committed to ensuring any potential regulatory provisions include robust safeguard standards.

v. Offset Concerns

Stakeholder concerns about perceived negative impacts of a REDD program on the integrity of the environmental objectives of AB 32 include the idea that a REDD program will diminish the responsibility of polluters to reduce emissions.²³⁷ However, polluters' obligations to reduce emissions will not be diminished by the potential inclusion of a

REDD program, and the REDD program would enable greater aggregate emission reductions by preventing the destruction of carbon sinks. The Cap-and-Trade Program already includes the use of Board-approved offset credits to meet a limited portion of an entity's compliance obligation. As explained previously, sector-based crediting would fit within that existing limit, not expand it. Another concern raised by stakeholders is that REDD forest offsets are easy to fabricate and their inclusion in the Cap-and-Trade Program may jeopardize the environmental integrity of the California program.²³⁸ ARB staff recognizes the necessity of a rigorous standard to quantify sector-based REDD offset credits, ensure legitimacy of those credits, and confirm that they meet the offset criteria of AB 32 and of the Cap-and-Trade Program.

As described throughout this section of the white paper, achieving these objectives will require continued stakeholder engagement on the topics of reference levels, additionality, the principle of "own effort," and robust monitoring, reporting, and verification processes to ensure that program requirements and environmental objectives are met. Many of these areas have been addressed at great length by the REDD Offset Working Group. Some of the technical work related to evaluating reference levels, leakage assessment, and sector-wide monitoring could be accomplished through engagement with California universities that are already actively doing this work. Additionally, current efforts at the international level, including at the UNFCCC, will inform California's efforts to help establish best practices for jurisdictional REDD programs. Finally, as mentioned above, ARB staff will seek input and advice from the EJAC. ARB staff will also discuss these matters with Board members, including new Board members who have environmental justice expertise as required by Assembly Bill 1288 (Atkins, Chapter 586, Statutes of 2015).

vi. Market Impacts

Some stakeholders have commented that the exclusion of sector-based REDD offset credits from the California Cap-and-Trade Program could create a shortage of offset supply in California and lead to higher costs of compliance.²³⁹ The consideration of offset supply and cost containment, while ensuring net reduction of GHG emissions in the atmosphere, will continue to be an important area of ARB staff engagement as part of existing Cap-and-Trade regulatory modifications and in considering the potential for approving any REDD program. ARB staff will need to conduct an analysis of market effects before proposing a linkage to a REDD program.

vii. Jurisdiction

Some stakeholders have cited concerns over California's ability to enforce potential REDD programs outside of California's jurisdiction.²⁴⁰ Although California would not have authority to enforce a REDD regulation outside of its jurisdiction, California does have the authority to reject sector-based REDD offset credits that do not comply with California law and to ensure the environmental integrity of the Cap-and-Trade Program through its existing buyer liability provisions. ARB staff notes that similar to ARB's engagement with Québec, ARB would need to conduct a thorough assessment of a

potential partner jurisdiction so that we understand that jurisdiction’s REDD program and underlying legal and policy system, prior to proposing any potential linking arrangement. This assessment would be necessary for the Governor’s linkage findings discussed previously and in more detail below, and to ensure any action met the requirements of AB 32. As ARB staff collaborates with potential partner jurisdictions, and if it were to begin drafting REDD policy and program requirements for the Board to consider as part of a future rulemaking, stakeholder input will be necessary to help shape the design of additional regulatory provisions for the potential inclusion of sector-based REDD within the California Cap-and-Trade Program. While the REDD Offset Working Group recommendations may address many of these concerns, further engagement with stakeholders will be important.

c. Summary of additional work needed

The REDD Offset Working Group recommendations contributed to examining how California could link with a partner jurisdiction’s sector-based REDD program, including which next steps could be taken. The following table outlines additional work ARB would need to conduct in order to further flesh out the design of such a linkage which could be presented to the Board as a formal rulemaking proposal for future consideration. By learning from the REDD Offset Working Group recommendations and through further robust stakeholder involvement, ARB staff is confident that the following topics can be addressed. Most of the issues outlined in this table would need to be proposed as regulatory amendments to ensure Cap-and-Trade Program requirements are clear. Some of these issues would also need to be described in any linkage MOU.

Issue	Additional Work	Reason
Reference Level of Emissions	Evaluate how partner jurisdiction established reference levels	Accurate reference levels determine number of emission reductions, offset credits, and additionality of the program
Uncertainty level of emission reductions	Define level of acceptable uncertainty so as to guide development of mechanisms to address incorrect emissions levels	More accurate emissions measurements result in a more robust and trustworthy program
Emissions leakage	Decide which mechanisms are acceptable to address leakage	Leakage reduces the effectiveness of emission reductions from REDD and should be limited as much as possible
Management of reversals	Determine acceptable mechanisms for monitoring and compensating for reversals, both natural and man-made	Reversals of emission reductions undermine validity of sector-based REDD offsets
Quantification of reductions	Determine satisfactory methodology for measuring emission reductions from REDD program and nested projects	In conjunction with reference levels, quantifying reductions is necessary to generate accurate numbers of sector-based REDD offsets

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Verification of emissions statistics	Outline adequate verification terms and bodies	Auditing of reported reductions increases accuracy
Enforcement of liability provisions	Analyze enforcement abilities of partner jurisdictions and California in case offset credits are invalidated	Invalidated offsets must be compensated for, through enforcement if necessary
Additionality of program	Assess how jurisdictions measure the additionality of their emissions	Additionality is an essential element of real reductions
Registry	California should evaluate the standards utilized by REDD registries	Assessing existing registries is needed to ensure equivalent stringency and alignment with California's existing offset requirements and market program
Crediting pathways	ARB staff will need to specify who would need to issue sector-based offset credits in order to be eligible to be used as compliance instruments	This helps determine who receives funds from the credited emission reductions
Social safeguards	ARB staff must examine and propose for Board adoption minimum standards for social safeguards of forest-dependent communities. Ensure the continuation of these safeguards with a monitoring, reporting, and verification system. Require existence of a grievance mechanism for partner jurisdiction stakeholders	Without helping local people, REDD programs will not work. California will not link with REDD programs which have not demonstrated that robust social standards are in place
CEQA Analysis	ARB staff must conduct environmental analysis of Regulation amendments	Regulatory amendments require formal rulemaking process, which entails a CEQA assessment
Stakeholder engagement	Involve stakeholders to develop approaches to the issues mentioned above	Stakeholder engagement ensures transparency and good governance
Governor's approval	If ARB decides to proceed, draft proposal regarding REDD linkage for Governor to review and approve	By law, Governor has to approve linkage

d. Programs most ready for crediting

As each forest is unique, so is each jurisdictional REDD program. In fact, the status of REDD programs within the GCF membership jurisdictions varies widely, from newly planned (Cross River State, Nigeria and Campeche, Mexico) to advanced (Acre, Brazil). An ongoing study conducted by Winrock International of nineteen GCF jurisdictions will aid in assessing monitoring and measurement capacity within the jurisdictions once

released.²⁴¹ While not many states or provinces are ready to start issuing California compliance-grade credits, at least one jurisdiction has demonstrated significant progress and technical capability in the effort to begin crediting. As described in Section II of this whitepaper, any subnational program must of course fit within the construct of the applicable national legal structure, including any submitted INDC.

Acre, Brazil is a leader in jurisdiction-level REDD program development, having “invested in creating a sustainable forest-based economy for over a decade,” and thus has one of the most advanced REDD programs in the world.²⁴² With the passage of the State System of Incentives for Environmental Services law (SISA), Acre established itself as the first jurisdiction with an operational legal and institutional framework for jurisdictional REDD.²⁴³ Several institutions furthering REDD regulations have been created thanks to SISA, and social safeguards have already been put in place.²⁴⁴ These social safeguards include the protection of indigenous rights to resource use in their traditional lands and public participation by indigenous and other local community members.²⁴⁵ Crucially, it is ARB’s understanding that Acre’s regulation links those who conserve ecosystem services with the associated offset, rather than just the landowner being linked to the offset.²⁴⁶ This approach means that forest-dependent communities will be the beneficiaries of carbon revenue from emissions reduction activities, regardless of land tenure. Moreover, Acre has enacted a series of successful policies “to stimulate sustainable use of forest resources” such as Brazil nuts and rubber by forest-dependent communities, which reduces pressure to clear forest for agriculture and cattle ranching while still ensuring livelihoods for the communities.²⁴⁷

Furthermore, Acre has established a reference level of deforestation and a target level of reduced emissions which are consistent with the national reference level.²⁴⁸ Finally, Acre has engaged with a contractor to set up a state-wide carbon registry electronic platform. Such is the confidence in Acre’s REDD program that the German development bank, KfW, has provided bridge financing worth €16 million to the state.²⁴⁹ Acre qualified for the financing through the REDD Early Movers (REM) program which rewards national and subnational jurisdictions for advanced REDD preparation.²⁵⁰

After the advanced program of Acre, other jurisdictional REDD programs in Brazil that have made significant advances in developing their programs include the state of Mato Grosso, the programs in Amazonas and Pará and, to a lesser extent, Amapá and Tocantins. Some of these jurisdictions have developed legal structures similar to the one in Acre, as well as reference levels of deforestation, an essential element of REDD programs. Not all states have full capacity to implement jurisdictional REDD programs or laws yet, but they are in the process of developing these.²⁵¹ With respect to Mexico, ARB continues to engage with Chiapas, as well as Campeche, Jalisco, Quintana Roo, and Tabasco through the GCF and through the California-Mexico MOU. Through the work under this California-Mexico MOU described in Section V of this white paper, ARB understands that the federal government of Mexico is assisting the Mexican states to develop and advance on forestry and climate planning in tandem with the national strategy.

There are other subnational jurisdictions which, while part of the GCF, appear to be in the earlier stages of developing jurisdictional REDD programs. The Indonesian states of Papua, West Papua, Aceh, and East, West, and Central Kalimantan have great potential for REDD due to their high rates of deforestation, but they have not formally established reference levels, REDD governance institutions and laws, or registries – all elements that would need to be in place before California could consider those programs. The same is true of the Peruvian regions of Amazonas, Madre de Dios, Loreto, San Martin, and Ucayali, Nigeria's Cross River State, and the Béliér and Cavally regions of Ivory Coast. All of these jurisdictions have begun to ready themselves for REDD and are on a path towards developing robust jurisdiction-wide REDD programs. California's engagement with these GCF jurisdictions has helped expand best practices, and the learning curve for these jurisdictions may be less steep because they can adopt some of the models from more advanced REDD states like Acre and Mato Grosso. The next few years may see robust, high quality, subnational jurisdictional REDD programs from all over the globe.

VIII. ARB Staff's Next Steps

a. Present Staff Thinking

Given the importance of addressing tropical deforestation, the benefits described in this white paper to California and California's program, and the current status of GCF partner jurisdiction efforts, ARB staff believes there is value in developing proposed regulatory amendments and pursuing a sector-based REDD linkage in time for the third compliance period of the Cap-and-Trade Program. Based on a review of existing GCF state programs, ARB staff believes that Acre's sector-based REDD offset program is already technically capable of being considered for formal inclusion in the Cap-and-Trade Program at the beginning of the third compliance period, even while additional engagement is necessary to, among other things, ensure a clear understanding of how Acre's program may fit within any applicable Brazilian national structures. Working more closely with Acre on potential linkage will provide beneficial lessons and engagement with other jurisdictions, particularly those of Mexico and Brazil, and could result in partnering on other mutually beneficial climate and low emissions development initiatives.

i. Additional Work

Section VII of this white paper highlights a few areas where staff has identified the need for targeted analysis to support a robust sector-based REDD offset program. To continue making progress, staff would need to develop a comprehensive analysis of outstanding issues, options for addressing those issues, and stakeholder engagement to provide the best recommendation. These areas include, but are not limited to, reference level setting, crediting baseline setting, best approaches to address leakage, and mechanisms for permanence. Embedded in developing recommendations for each of these areas is the need to ensure the use of the latest scientific methodologies and proactive stakeholder engagement. This work commences with the release of this white

paper, and could continue with additional workshops and technical meetings leading toward the development of proposed regulatory amendments.

This white paper provides an overview of some of the work being conducted by California universities on REDD. These entities are in a unique position to provide valuable support to any effort to further explore REDD programs for inclusion in the California Cap-and-Trade Program. ARB staff welcomes input from universities on these specific issues.

ii. Stakeholder Input

As noted previously, the prospect of including jurisdictional, sector-based REDD offset credits in the Cap-and-Trade Program has garnered much attention over the years. ARB staff believes that a transparent and deliberate approach to considering sector-based REDD offset credits necessitates ongoing public engagement, including seeking input and advice from ARB's EJAC. The October 28, 2015 workshop marks the first of several technical and individual meetings to walk through technical and policy issues with stakeholders. These meetings could include experts and contractors, as well as GCF jurisdictions, donor countries such as Norway, and community leaders. As with other public workshops, ARB will make the public workshops available to all interested participants with webcasting and comment periods.

iii. Coordination with REDD Jurisdictions

As mentioned in section VII, ARB staff believes that continued coordination with partner jurisdictions, like Acre, will be necessary before any program can be proposed for Board approval. As in the case of Québec, this would include continued technical discussions on program elements such as coordination on implementation of tracking systems, more detailed exchanges on how enforcement of the program would occur and how market monitoring efforts can be coordinated, and visits between California and the potential partner jurisdiction by ARB staff and/or contractors such as California university researchers to ensure both California and the REDD jurisdiction fully understand program requirements and expectations.²⁵² As an initial step, ARB staff notes that this type of coordination has already begun with the Brazilian and Mexican state members of the GCF.

iv. Coordination with Linked Partners

Any additional review or proposals to include a sector-based REDD offset program within California's Cap-and-Trade Program will require coordination with Québec. A material change, such as new sources of offsets, in one program will have impacts on the linked jurisdiction's program. While Québec itself does not need to adopt a regulation for the recognition of a sector-based REDD offset program, California's recognition of such offsets could potentially make available additional domestic offsets and allowances for entities to use for compliance in Québec.

California and Québec have each adopted and implemented cap-and-trade programs that are based on the Western Climate Initiative program design recommendations. In December 2010 ARB adopted the Cap-and-Trade Regulation.²⁵³ On April 8, 2013, Governor Brown found that the Québec program met the SB 1018 requirements for linking with the California program,²⁵⁴ and later that month, the Board adopted a regulation linking the California program with the Québec program starting on January 1, 2014.²⁵⁵ On November 1, 2013, ARB provided a linkage readiness report to the Governor recommending that linkage occur as scheduled beginning on January 1, 2014.²⁵⁶ Since November 2014, California and Québec conduct joint auctions on a quarterly basis.

Both jurisdictions recognize the need for ongoing collaboration as the joint program is implemented. The overall framework for this collaboration is formalized in an agreement between the two jurisdictions, titled: “Agreement Between the California Air Resources Board and the Gouvernement du Québec Concerning the Harmonization and Integration of Cap-and-Trade Programs for Reducing Greenhouse Gas Emissions,” also referred to as the “Linking Agreement.”²⁵⁷ The agreement objectives are defined in Article 1 as follows:

“The objective of this Agreement is for the Parties to work jointly and collaboratively toward the harmonization and integration of the Parties’ mandatory greenhouse gas emissions reporting programs and Cap-and-Trade Programs for reducing greenhouse gas emissions.”

To this end, ARB will provide Québec with periodic updates and timelines of staff review and consideration of any sector-based REDD offset programs.

b. Rulemaking & Governor Linkage Findings

As briefly discussed in Section VII above, if staff opts to propose the inclusion of a sector-based REDD offset program in the beginning of the third compliance period, there are requirements under the California Administrative Procedure Act (APA) and SB 1018 that will have to occur prior to Board consideration of a rulemaking in mid-2016. Each of these steps is to ensure public engagement and notification prior to the Board taking any action to approve any rulemaking. These steps are listed below:

- Preliminary activities would include technical policy meetings, including the first workshop on October 28, 2015. In some cases, staff may share draft regulatory text for informal comment. All public presentations would also be posted on the ARB website. When possible, such meetings are webcast for broad public participation.
- Issuance of a notice initiates the APA rulemaking process. ARB would issue a notice of proposed rulemaking, which is included in the California Regulatory Notice Register. This notice would include the Board hearing date when staff would present the rulemaking for Board consideration. This notice would be posted at least 45 days prior to the applicable Board hearing.

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- As part of the rulemaking, and prior to final Board adoption, ARB would need to request that the Governor make findings pursuant to SB 1018, as described in Section VII above.
- At least 45 days prior to the Board hearing, ARB would also make available proposed regulatory text and a staff report that explains why certain proposals were made in the development of the rulemaking and any relevant analyses or studies to support the proposed rulemaking. These supporting documents would include a staff analysis of the jurisdiction's sector-based program to support linkage and an environmental analysis as required by CEQA. ARB would post the proposed text and the staff report on its rulemaking website with the 45-day notice. Current ARB practice is to notify the public of the availability of these documents through the relevant electronic listservs.
- ARB would provide at least 45 days for the public to review the proposed regulatory text and provide written comments to ARB.
- ARB staff would then present the proposed regulatory text to include the sector-based REDD offset program, along with other proposed amendments to the Cap-and-Trade Regulation, to the Board for its consideration in mid-2016. This process usually includes a staff presentation at a regularly scheduled Board hearing. The dates and agendas for each hearing are posted on the rulemaking website. Stakeholders can provide oral testimony to the Board before the Board takes any action on the proposed regulatory text. If Governor findings under SB 1018 have been made, the Board may then choose to adopt the proposed regulatory text as written or could direct staff to make changes and put out the new material for one or more 15-day formal comment periods. ARB would consider all public and oral comments on its proposed regulatory text.

Endnotes

¹ Cost containment mechanisms include: three year compliance periods, allowance banking, offsets, and an allowance reserve account. California Air Resources Board, Proposed Regulation to Implement the California Cap-and-Trade Program, Staff Report: Initial Statement of Reasons (Oct. 28, 2010) page ES-4, available at <http://www.arb.ca.gov/regact/2010/capandtrade10/capisor.pdf> [hereinafter Staff Report]. As defined in the cap-and-trade regulation, an “offset credit” is “a tradable compliance instrument issued or approved by ARB that represents a [greenhouse gas (GHG)] reduction or GHG removal enhancement of one metric ton of [carbon dioxide (CO₂e)]. The GHG reduction or removal enhancement must be real, additional, quantifiable, permanent, verifiable, and enforceable.” Cal. Code Regs., tit. 17, § 95802, subd. (a), available at http://www.arb.ca.gov/cc/capandtrade/capandtrade/unofficial_c&t_012015.pdf.

² See, e.g., Staff Report, *supra* note 1, at page II-36 (noting review of the Regional Greenhouse Gas Initiative’s auction design and Western Climate Initiative (WCI) design recommendations). See also *id.*, at page II-25 (noting staff review of the European Union Emissions Trading Scheme in the design of ARB’s Allowance Price Containment Reserve).

³ See California Air Resources Board, Proposed Amendments to the California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms to Allow for the Use of Compliance Instruments Issued by Linked Jurisdictions, Staff Report: Initial Statement of Reasons (May 9, 2012) pages 13-15, available at <http://www.arb.ca.gov/regact/2012/capandtrade12/isormainfinal.pdf>. On May 10, 2013, ARB filed a final approved regulation order with the Office of Administrative Law approving linkage between the California Cap-and-Trade Program and the emission trading system in Québec, Canada. This regulatory action went into effect on January 1, 2014.

⁴ California Air Resources Board, Compliance Offset Protocol U.S. Forest Projects (Oct. 20, 2011), available at <http://www.arb.ca.gov/regact/2010/capandtrade10/copusforest.pdf>.

⁵ Health and Safety Code section 38562(d)(1) requires all “greenhouse gas emission reductions” to be “real, permanent, quantifiable, verifiable, and enforceable by the state board.” Paragraph (d)(2) requires each reduction to be “in addition to any greenhouse gas emission reduction otherwise required by law or regulation, or any other greenhouse gas emission reduction that otherwise would occur.”

⁶ A sector performance standard would already include any existing legal requirements for GHG emission reductions or enhanced GHG sequestration. As such, offset credits could only come from GHG reductions or removal enhancements that are additional to the sector performance standard and its embedded existing legal requirements.

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⁸ The Intergovernmental Panel on Climate Change’s (IPCC) Working Group III found that emissions from the forestry sector accounted for an estimated 12% of global emissions from 2000-2009, and about a third of anthropogenic CO₂ emissions from 1750-2011. See IPCC, 2014: Agriculture, Forestry and Other Land Use (AFOLU), in *Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press 2014) at page 825, available at https://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_chapter11.pdf.

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http://www.ipcc.ch/pdf/assessment-report/ar4/wg3/ar4_wg3_full_report.pdf. The United Nations Environment Program (UNEP) estimates that 11% of global emissions in 2008 were from tropical deforestation alone. UNEP, *The Emissions Gap Report 2012* (United Nations Environment Program 2012) page 41, available at <http://www.unep.org/pdf/2012gapreport.pdf>. Other researchers found an upwards range of closer to 14% of global greenhouse gas emissions coming from tropical deforestation between 2000 and 2005. See Nancy L. Harris, et al., *Baseline Map of Carbon Emissions from Deforestation in Tropical Regions* (2012) *Science*, Vol. 336, Iss. 6088, pages 1573-1576, doi: 10.1126/science.1217962, available at <http://www.sciencemag.org/content/336/6088/1573.full>.

¹⁰ See Hosonuma, N., et al., *An assessment of deforestation and forest degradation drivers in developing countries* (2012) at page 8, *Environmental Research Letters* 7 044009, available at http://iopscience.iop.org/1748-9326/7/4/044009/pdf/1748-9326_7_4_044009.pdf.

¹¹ See Food and Agriculture Organization of the United Nations, *Global Forest Resources Assessment 2015: How are the world's forests change?* (FAO 2015) at page 3. According to the FAO, “[f]rom 2010 to 2015, natural forest decreased by a net 6.6 million [hectares (ha)] per year (8.8 million ha of loss and 2.2 million ha of natural forest gain). This is a reduction in net annual natural forest loss from 8.5 million ha per year (1990 to 2000) to 6.6 million ha per year (2010 to 2015). While the Global Forest Resources Assessment (FRA) does not report deforestation directly due to the complexity of collecting deforestation statistics, the area of natural forest loss is a very good proxy.” *Id.* The previous Global FRA found that between 2000 and 2010, roughly 13 million hectares of forests were converted to other uses annually, down from 16 million hectares per year in the 1990s. Most of this deforestation was due to “the conversion of tropical forest to agricultural land.” FAO, *Global Forest Resources Assessment 2010* (FAO Forestry Paper 163, 2010) at page xiii, available at <http://www.fao.org/docrep/013/i1757e/i1757e.pdf> [hereinafter FAO 2010].

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<http://unfccc.int/resource/docs/2010/cop16/eng/07a01.pdf>.

²⁴ *Id.*, at ¶ 73. The phases are “i) the development of a national strategy or action plan; ii) development of a national forest reference emission level and/or forest reference level; iii) development of a robust and transparent national forest monitoring system for REDD+ activities; and iv) a system for providing information on how REDD+ safeguards (to avoid negative social and environmental outcomes) are being addressed and adhered to.” Decision 1/CP.16 also requested Parties to address the drivers of deforestation and forest degradation when developing their national action plans or strategies under phase 1. *See also id.*, at Appendix I, para. 2.

²⁵ *Id.*, at ¶ 102.

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¹¹⁵ This sector-based approach provides multiple benefits. For instance, “[s]ectoral approaches allow jurisdictions to focus on those economic sectors that have contributed the most significant GHG emissions within their jurisdiction or that have the potential for significant future emissions.” Staff Report, *supra* note 1, at page III-23. “By moving [away] from a project-by-project approach, a sector-based crediting program can cover a larger geographical area or market and reduce the risk of emissions leakage within the jurisdiction. By crediting a sector based on some target level of reductions, competitiveness concerns among trade-exposed sectors can also be alleviated.” *Id.*

¹¹⁶ *Id.*, at page III-26.

¹¹⁷ Nabuurs, G.J. et al., 2007: Forestry, in Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (B. Metz, O.R. Davidson, P.R. Bosch, R. Dave, L.A. Meyer eds., Cambridge University Press 2007), *available at* http://www.ipcc.ch/publications_and_data/ar4/wg3/en/ch9.html.

¹¹⁸ Staff Report, *supra* note 1, at page III-26.

¹¹⁹ *Id.*, at page III-27.

¹²⁰ ARB has further limited the future use of sector-based credits under the quantitative usage limit in section 95854 of the cap-and-trade regulation. (Cal. Code Regs., tit. 17, § 95995.) Currently, offset credits may only be used for up to 8% of a regulated entity’s compliance obligation. Sector-based credits, including any future REDD offsets, would be limited further to 2% of an entity’s compliance obligation in the first two compliance periods, and 4% in the third compliance period. (*Id.*, at § 95854.)

¹²¹ See, e.g., Memorandum of Understanding on Environmental Cooperation between the Province of Aceh of the Republic of Indonesia, and the States of California, Illinois and Wisconsin of the United States of America, entered into on Nov. 18, 2008, *available at* http://www.gcftaskforce.org/documents/2008_summit_mou/MOU.Aceh-Indonesia_Signed_111808.pdf. All other MOUs referenced with this footnote are available at the Governors’ Climate and Forests Taskforce Web site, GCF Documents, http://www.gcftaskforce.org/about/background_documents/ (accessed Oct. 18, 2015).

¹²² Current GCF members include: Aceh (Indonesia), Acre (Brazil), Amapá (Brazil), Amazonas (Brazil), Amazonas (Peru), Bélier (Ivory Coast), California (U.S.), Campeche (Mexico), Catalonia (Spain), Cavally (Ivory Coast), Central Kalimantan (Indonesia), Chiapas (Mexico), Cross River State (Nigeria), East Kalimantan (Indonesia), Illinois (U.S.), Jalisco (Mexico), Loreto (Peru), Madre de Dios (Peru), Mato Grosso (Brazil), Papua (Indonesia), Pará (Brazil), Quintana Roo (Mexico), Rondônia (Brazil), San Martin (Peru), Tabasco (Mexico), Tocantins (Brazil), Ucayali (Peru), West Kalimantan (Indonesia), and West Papua (Indonesia). Governors’ Climate and Forests Task Force Web site, About GCF, <http://www.gcftaskforce.org/about> (accessed Oct. 18, 2015) [hereinafter GCF Web site].

¹²³ *Id.* See also GCF REDD+ Knowledge Database Web site, <http://www.gcftaskforce-database.org/> (accessed Oct. 18, 2015) [hereinafter GCF Knowledge Database].

¹²⁴ See Suspension of the Issuance of New Permits and Improvement to Primary Natural Forest and Peatland Governance: Unofficial English Translation, *available at* http://www.gcftaskforce.org/documents/Indonesia_forest_moratorium_201105_EN.pdf. This suspension order was to last between 2011 and 2013. On May 16, 2013, the Indonesian President issued a Presidential Decree extending the moratorium another two years. *Logging the Good News*, The Economist, May 25, 2013, *available at* <http://www.economist.com/news/asia/21578441-president-has-helped-transform-debate-about-forest-conservation-logging-good-news>.

¹²⁵ See Governo do Estado do Acre, Law No. 2.308/010, Acre State Law on Environmental Services: Unofficial English Translation, *available at* <http://www.gcftaskforce.org/documents/Unofficial%20English%20Translation%20of%20Acre%20State%20Law%20on%20Environmental%20Services.pdf>; see also Alencar, A.D. et al., *Acre’s Progress Towards Jurisdictional REDD* (IPAM 2012) at pages 7-8, *available at* <http://earthinnovation.org/wp->

Environment, Vol. 115, Iss. 12, at pages 3770-3774, available at <http://dx.doi.org/10.1016/j.rse.2011.07.019>; and Scott J. Goetz et al., *Mapping and monitoring carbon stocks with satellite observations: a comparison of methods* (Mar. 25, 2009) Carbon Balance and Management, Vol. 4, No. 2, available at <http://www.cbmjournals.com/content/pdf/1750-0680-4-2.pdf>. See also *Pan-Tropical National Level Carbon Stock Dataset*, Woods Hole Research Center Web site, <http://whrc.org/publications-data/datasets/pantropical-national-level-carbon-stock/> (accessed Oct. 18, 2015). See also A. Baccini, et al., *Estimated carbon dioxide emissions from tropical deforestation improved by carbon-density maps* (Mar. 2012) Nature Climate Change, Vol. 2, at pages 182-185, available at <http://www.nature.com/nclimate/journal/v2/n3/pdf/nclimate1354.pdf>. See also Dirk Pflugmacher et al., *Using Landsat-derived disturbance and recovery history and lidar to map forest biomass dynamics* (August 2014) Remote Sensing of Environment, Vol. 151, at pages 124-137, available at <http://www.sciencedirect.com/science/article/pii/S0034425713003489>.

¹³⁹ See generally Asner, *supra* note 138.

¹⁴⁰ See Carnegie Airborne Observatory, California Forests-in-Drought Web site (August 6, 2015), <https://cao.carnegiescience.edu/california-forests-in-drought> (accessed Oct. 18, 2015). According to the Carnegie Airborne Observatory, the California Forests-in-Drought “maps can be used by State, Federal and local organizations to undertake tactical forest interventions via ground-based responses on a geographically explicit basis. Doing so will greatly increase the power and value of field work to mitigate the effects of climate change on California’s forest ecosystems and watersheds.” (*Id.*)

¹⁴¹ These maps were provided by the California office of the Brazilian Amazon Environmental Research Institute. The California office is now the Earth Innovation Institute. See Earth Innovation Institute Web site, <http://earthinnovation.org/> (accessed Oct. 18, 2015).

¹⁴² In fact, the U.S. Department of State invited ARB to send a representative to participate in a REDD+ Partnership workshop in July 2012 to highlight California’s action on domestic forest offsets and ARB’s engagement on REDD. The U.S. Department of State helped facilitate discussions between ARB and various national negotiators present at the workshop, including representatives from Brazil and Australia.

¹⁴³ See Press Release, Governor Brown Signs Agreement with Mexico to Reduce Dangerous Greenhouse Gases (July 28, 2014), <http://gov.ca.gov/news.php?id=18622>; see also Memorandum of Understanding to Enhance Cooperation on Climate Change and the Environment between the State of California of the United States of America and the Ministry of Environment and Natural Resources and the National Forestry Commission of the United Mexican States (July 28, 2014), available at http://gov.ca.gov/docs/7.28_Climate_MOU_Eng.pdf.

¹⁴⁴ See California-Mexico MOU: Climate Change & Environment, Work Plan, available at <http://www.calepa.ca.gov/Border/Publications/2015/JActionPlan.pdf>.

¹⁴⁵ Press Release, California and Peru Sign Agreement to Strengthen Economic, Environmental Ties (Feb. 26, 2014), <http://gov.ca.gov/news.php?id=18423>.

¹⁴⁶ See <http://www.un.org/climatechange/summit/wp-content/uploads/sites/2/2014/07/New-York-Declaration-on-Forest-%E2%80%93-Action-Statement-and-Action-Plan.pdf>.

¹⁴⁷ See Carnegie Airborne Laboratory Web site, <https://cao.carnegiescience.edu/> (accessed Oct. 18, 2015) and CLASlite User Friendly Forest Monitoring Technology Web site, <http://claslite.ciw.edu/en/index.html> (accessed Oct. 18, 2015). See also Asner, *supra* note 138.

¹⁴⁸ See REDD+ Finance and Impacts, An analysis of U.S. based funding of sustainable forestry projects Web site, <http://www2.bren.ucsb.edu/~redd/index.php> (accessed Oct. 18, 2015). See Final Report Mitigating Climate Change through Tropical Forests: An Analysis of U.S. Bilateral REDD+ Finance (2013) at pages 30-31, available at <http://www2.bren.ucsb.edu/~redd/docs/REDD%20GP%20Final%20Report.pdf>.

¹⁴⁹ See UCLA Institute for Environment and Sustainability, Center for Tropical Research, News & Updates, <http://www.environment.ucla.edu/ctr/news/article.asp?parentid=19021> (accessed Oct. 18, 2015).

¹⁵⁰ Jesse Lueders, Cara Horowitz, Ann Carlson, Sean B. Hecht, and Edward A. Parson, *The California REDD+ Experience: The Ongoing Political History of California’s Initiative to Include Jurisdictional REDD+ Offsets within Its Cap-and-Trade System* (CGD Working Paper 386. Washington, DC: Center for Global Development 2014), available at <http://www.cgdev.org/sites/default/files/CGD-Climate-Forest-Paper-Series-13-Lueders-Horowitz-et-al-California-REDD.pdf>.

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- ¹⁵² UC Davis, Information Center for the Environment, US Forest Service International Seminar on Climate Change and Natural Resources Management, http://ice.ucdavis.edu/project/us_forest_service_international_seminar_climate_change_and_natural_resource_management (accessed Oct. 18, 2015).
- ¹⁵³ See Michigan State University, Carbon2Markets Web site, <http://www.carbon2markets.org/content.cfm?m=33&id=33&startRow=1&mm=0> (accessed Oct. 18, 2015).
- ¹⁵⁴ See GCF Fund, Project Description, Empowering communities to improve provincial MRV systems, http://www.gcffund.org/wp-content/uploads/2014/01/gcf_fund_indonesia_online.pdf (accessed Oct. 18, 2015).
- ¹⁵⁵ See UMD Right Now, *UMD, National Researchers Publish Definitive Tropical Forest Emissions Study* (July 23, 2015), <http://www.umdrightnow.umd.edu/news/umd-national-researchers-publish-definitive-tropical-forest-emissions-study> (accessed Oct. 18, 2015); see also A. Tyukavina *et al.*, *Aboveground carbon loss in natural and managed tropical forests from 2000 to 2012*, *Environmental Research Letters*, Vol. 10, No. 7 (2015), available at <http://iopscience.iop.org/1748-9326/10/7/074002/email-alert/1144746303>.
- ¹⁵⁶ Final ROW Recommendations, *supra* note 38.
- ¹⁵⁷ *Id.*
- ¹⁵⁸ *Id.*, at page 22.
- ¹⁵⁹ Angelsen, *supra* note 36, at page 19.
- ¹⁶⁰ Final ROW Recommendations, *supra* note 38, at page 27.
- ¹⁶¹ *Id.*
- ¹⁶² *Id.*
- ¹⁶³ *Id.*, at page 30.
- ¹⁶⁴ *Id.*, at page 33.
- ¹⁶⁵ *Id.*
- ¹⁶⁶ *Id.*, at page 36.
- ¹⁶⁷ *Id.*, at page 40.
- ¹⁶⁸ *Id.*
- ¹⁶⁹ *Id.*, at page 42.
- ¹⁷⁰ *Id.*
- ¹⁷¹ *Id.*
- ¹⁷² *Id.*, at page 46.
- ¹⁷³ *Id.*
- ¹⁷⁴ See CARE Climate Change Information Centre, REDD+ Social and Environmental Standards, <http://careclimatechange.org/publications/redd-social-environmental-standards/> (accessed Oct. 18, 2015).
- ¹⁷⁵ Final ROW Recommendations, *supra* note 38, at page 52.
- ¹⁷⁶ *Id.*, at page 53.
- ¹⁷⁷ See The Climate, Community & Biodiversity Alliance, CCB Standards, <http://www.climate-standards.org/> (accessed Oct. 18, 2015).
- ¹⁷⁸ See Cal. Gov. Code, § 12894.
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- ¹⁸⁰ *Id.*, at pages 56-57.
- ¹⁸¹ *Id.*, at page 59.
- ¹⁸² *Id.*, at page 58.
- ¹⁸³ *Id.*, at page 57.
- ¹⁸⁴ *Id.*, at pages 57-58.
- ¹⁸⁵ Cal. Health & Saf. Code, § 38562(d)(1).
- ¹⁸⁶ Cal. Health & Saf. Code, § 38562(d)(2) (any emissions reduction must be “in addition to any greenhouse gas emission reduction otherwise required by law or regulation, and any other greenhouse gas emission reduction that otherwise would occur.” This is known as the additionality requirement.).
- ¹⁸⁷ Cal. Health & Saf. Code, § 38562(d)(3).

- ¹⁸⁸ Herold, M., et al., *A stepwise framework for developing REDD+ reference levels*, in *Analysing REDD: Challenges and Choices* (eds. Arild Angelsen, et al.) (2010) at pages 279-280, available at http://www.cifor.org/publications/pdf_files/Books/BAngelsen120116.pdf.
- ¹⁸⁹ *Id.*
- ¹⁹⁰ *Id.*, at page 291. See also Final ROW Recommendations, *supra* note 38, at page 24.
- ¹⁹¹ See, e.g., The Terrestrial Carbon Group Project. *Measuring and Monitoring Terrestrial Carbon as part of "REDD+" MRV Systems Policy Brief 5* (2009), available at http://www.goes.msu.edu/sumernet/docs/TCG_Policy_Brief_MRV.pdf.
- ¹⁹² *Id.*, at page 11. "[Monitoring, reporting, and verification] cost estimates...have found considerable heterogeneity among countries with regard to the level of funding required to implement national scale accounting..."
- ¹⁹³ Final ROW Recommendations, *supra* note 38, at page 46.
- ¹⁹⁴ Environmental Defense Fund, *Ready for REDD: Acre's State Programs for Sustainable Development and Deforestation Control* (2011) at page 5, available at http://www.edf.org/sites/default/files/Acre_Ready_for_REDD_EDF.pdf [hereinafter EDF 2011]; see also Final ROW Recommendations, *supra* note 38, at page 13. In coordination with multiple research, environmental, and indigenous organizations, the Earth Innovation Institute released an assessment of twelve different subnational jurisdictions' REDD and low emissions development programs and how they incorporate indigenous peoples. According to the metrics of this report, Acre is considered the "most advanced" jurisdictional program. See Earth Innovation Institute, *Indigenous Peoples & Low-Emissions Rural Development* (June 2015), available at http://earthinnovation.org/wp-content/uploads/2015/06/LED-R-IP_REDD.pdf [hereinafter EII 2015].
- ¹⁹⁵ Henders, S., *Accounting for Carbon Leakage from REDD+ are Current Quantification Methods Suitable?* (Focali Brief 2012), at page 1, available at http://www.focali.se/filer/2012_Brief_No1_carbon%20leakage_tema1_final.pdf.
- ¹⁹⁶ *Id.*
- ¹⁹⁷ Final ROW Recommendations, *supra* note 38, at page 36.
- ¹⁹⁸ Cal. Health & Safety Code §38562(d)(1).
- ¹⁹⁹ See for example Angelsen, *supra* note 36, at page 79 (Chapter 8: How Do We Ensure Permanence and Assign Liability? These risks include the following: 1) Natural/ecological risk; 2) climate change-related risk; 3) demand-side risk; 4) failure of project partners; and 5) political risk).
- ²⁰⁰ Final ROW Recommendations, *supra* note 38, at page 37.
- ²⁰¹ *Id.*
- ²⁰² See Press Release, OPIC/Terra Global REDD Insurance Project in Cambodia Wins Sustainable Forestry Award (July 19, 2012), available at <http://www.opic.gov/press-releases/2012/opicterra-global-redd-insurance-project-cambodia-wins-sustainable-forestry-award> (accessed Oct. 18, 2015).
- ²⁰³ Final ROW Recommendations, *supra* note 38, at page 38.
- ²⁰⁴ *Id.*
- ²⁰⁵ *Id.*, at page 40.
- ²⁰⁶ Cal. Health & Safety Code, § 38562(d)(1).
- ²⁰⁷ *Id.*
- ²⁰⁸ *Id.*
- ²⁰⁹ Final ROW Recommendations, *supra* note 38, at page 9.
- ²¹⁰ California Air Resources Board, *Linkage Readiness Report* (Nov. 1, 2013) at pages 9-17 and 25-27, available at http://www.arb.ca.gov/cc/capandtrade/linkage/arb_linkage_readiness_report.pdf [hereinafter Linkage Readiness Report].
- ²¹¹ Cal. Health & Safety Code, § 38562(d)(1).
- ²¹² Final ROW Recommendations, *supra* note 38, at page 23.
- ²¹³ *Id.*, at page 24.
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- ²¹⁵ See Cal. Gov. Code, § 11340 et. seq.
- ²¹⁶ See Agreement between the California Air Resources Board and the *Gouvernement du Québec* Concerning the Harmonization and Integration of Cap-and-Trade Programs for Reducing Greenhouse Gas Emissions, signed on September 27, 2013, available at

http://www.arb.ca.gov/cc/capandtrade/linkage/ca_quebec_linking_agreement_english.pdf [hereinafter ARB-Québec Linkage Agreement].

²¹⁷ Cal. Gov. Code, § 12894(e) (“For purposes of this section, “link,” “linkage,” or “linking” means an action taken by the State Air Resources Board or any other state agency that will result in acceptance by the State of California of compliance instruments issued by any other governmental agency, including any state, province, or country, for purposes of demonstrating compliance with the market-based compliance mechanism established pursuant to Division 25.5 (commencing with Section 38500) of the Health and Safety Code and specified in Sections 95801 to 96022, inclusive, of Title 17 of the California Code of Regulations.”).

²¹⁸ Cal. Gov. Code, § 12894(e)&(f).

²¹⁹ Cal. Gov. Code, § 12894(f).

²²⁰ *Id.*

²²¹ See Office of Governor Edmund G. Brown Jr., Newsroom, SB 1018 Request for Cap-and-Trade Program Equivalency Findings Website, <http://gov.ca.gov/news.php?id=17933> (accessed Oct. 18, 2015) [hereinafter Governor’s Linkage Findings Web site].

²²² See for example, California Air Resources Board, Climate Change Programs, Cap-and-Trade Program, Public Meetings and Board Hearings Web sites:

<http://www.arb.ca.gov/cc/capandtrade/meetings/meetings.htm> and <http://www.arb.ca.gov/board/board.htm>.

²²³ See California Air Resources Board, Workshop Comment Log for Cap-and-Trade Public Meeting GCF Sector-Based Crediting (July 30, 2010) Web site,

<http://www.arb.ca.gov/lispub/comm2/bccommlog.php?listname=sector-based-ws>.

²²⁴ California Air Resources Board, California’s Cap-and-Trade Program, Final Statement of Reasons (October 2011) at pages 477, 825, 831, 965, 966, 969, 970, 971, 973, 974, 975, 1712, 1713, and 1887, available at <http://www.arb.ca.gov/regact/2010/capandtrade10/fsor.pdf> [hereinafter 2011 FSOR].

²²⁵ See GCF Web site, *supra* note 122; and Earth Innovation Institute Web site, *supra* note 141.

²²⁶ Staff Report, *supra* note 1, at pages III--26 to III-29. See also Transcript of Meeting of State of California Air Resources Board, October 18, 2012, pages 142-143, and 153, available at <http://www.arb.ca.gov/board/mt/2012/mt101812.pdf> [hereinafter 2012 Transcript].

²²⁷ Final ROW Recommendations, *supra* note 38, at pages 46-53.

²²⁸ Stecker, *supra* note 33.

²²⁹ Final ROW Recommendations, *supra* note 38, at pages 2, 5, and 37.

²³⁰ See California Air Resources Board, Compliance Offset Protocol U.S. Forest Projects, available at <http://www.arb.ca.gov/regact/2010/capandtrade10/copusforest.pdf>.

²³¹ See for example, 2011 FSOR, *supra* note 224, at pages 477, 825, 831, 965, 966, 969, 970, 971, 973, 974, 975, 1712, 1713, and 1887.

²³² See for example several articles describing local and indigenous communities engaged in REDD projects. As a reminder, ARB would contemplate jurisdictional, sector-based REDD programs, but these articles indicate that at least some communities are already engaged and benefiting from REDD activities, or contemplating how to engage. *Brazilian Cosmetics Giant Buys First Indigenous REDD Credits*, Ecosystem Marketplace, Sept. 10, 2013, available at

http://www.ecosystemmarketplace.com/pages/dynamic/article.page.php?page_id=9932 (describing a REDD project with the Paiter Surui people of the Amazon); see also Jeremy Hance, *Indigenous people of Honduras granted one million hectares of rainforest*, Mongabay.com, Sept. 12, 2013, available at

<http://www.wilderutopia.com/international/earth/honduras-miskitu-facing-dams-and-deforestation-granted-land-rights/> (describing how the Miskito tribe of Honduras may want to engage in REDD activities and benefits); see also Steve Zwick, *Indigenous Groups, NGOs, and Major Corporates Line Up Behind REDD+ in Cali*, Ecosystem Marketplace, July 18, 2013, available at

http://www.ecosystemmarketplace.com/pages/dynamic/article.page.php?page_id=9843§ion=news_articles&eod=1 (describing letter of support for jurisdictional REDD, with signatories including Chief Almir Surui of the Paiter Surui in Brazil and Chief Pascal Kizaka of the Kasigua Corridor in Kenya, whose community has been engaged in REDD for several years); see also Ciro Calderon, *Indigenous Leaders Stand Up For Active Role in REDD*, Ecosystem Marketplace, Nov. 14, 2013, available at

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²³³ See Alianza Mesoamericana de Pueblos y Bosques Web site, <http://www.alianzamesoamericana.org/> (accessed Oct. 18, 2015) and Coordinadora de las Organizaciones Indigenas de la Cuenca Amazonica Web site, <http://www.coica.org.ec/> (accessed Oct. 18, 2015). See also Press Release, COICA y AMPB *defininen hoja de ruta común hacia la COP 21 de Paris* (July 13, 2015), available at <http://www.alianzamesoamericana.org/coica-y-ampb-definen-hoja-de-ruta-comun-hacia-la-cop21-de-paris/>.

²³⁴ Press Release, Subnational Climate Partnerships Announced Today: Norway, Rainforest States, Indigenous Leaders and California Strengthen Key Agreements (June 18, 2015), available at http://www.gcftaskforce.org/documents/2015/annual_meeting/Barcelona_Outcomes_Release_FINAL.pdf.

²³⁵ See EII 2015, *supra* note 194.

²³⁶ Stecker, *supra* note 33.

²³⁷ 2012 Transcript, *supra* note 226, at pages 142-143 and 153.

²³⁸ *Id.*

²³⁹ See for example, 2011 FSOR, *supra* note 224, at pages 831, and 966-969,

²⁴⁰ Transcript of Meeting of State of California Air Resources Board, August 24, 2011, pages 172-173, available at <http://www.arb.ca.gov/board/mt/2011/mt082411.pdf>.

²⁴¹ GCF Fund, *Towards better forest monitoring and measurement capacities* (2014), http://www.gcffund.org/wp-content/uploads/2014/01/gcf_fund_all_online.pdf.

²⁴² EDF 2011, *supra* note 194, at page 3; see also Final ROW Recommendations, *supra* note 38, at page 20. See also Climate Focus, *Acre, Brazil: Subnational Leader in REDD+* (2013), available at http://www.climatefocus.com/sites/default/files/acre_brazil.pdf.

²⁴³ Korhonen-Kurki, K., et al., *Multiple levels and multiple challenges for measurement, reporting and verification of REDD+* (Aug. 2013) International Journal of the Commons, available at <http://www.thecommonsjournal.org/index.php/ijc/article/view/372/348>. See also WWF, *Environmental Service Incentives System in the State of Acre, Brazil: Lessons for policies, programmes and strategies for jurisdiction-wide REDD+* (2013) at page 23 (“Acre now has a broad set of public policies designed to promote forest conservation, valuation and restoration...”), available at http://awsassets.panda.org/downloads/590001_sisa_report_english_a4_final_2.pdf [hereinafter WWF Acre Report].

²⁴⁴ GCF Knowledge Database, *supra* note 123.

²⁴⁵ EII 2015, *supra* note 194, at page 3.

²⁴⁶ See Governo do Estado do Acre, Law No. 2.308/010, Section III, Art. 4 (2010), Acre State Law on Environmental Services: Unofficial English Translation, available at <http://www.gcftaskforce.org/documents/Unofficial%20English%20Translation%20of%20Acre%20State%20Law%20on%20Environmental%20Services.pdf>. See also Steve Schwartzman, *Acre: Low-emissions, high-growth sustainable development in the Amazon* (EDF 2015) at page 12, available at https://www.edf.org/sites/default/files/acre_sustainable_development_amazon_2015.pdf.

²⁴⁷ WWF Acre Report, *supra* note 243, at page 25-27.

²⁴⁸ Alencar et al., *supra* note 125, at page 53.

²⁴⁹ See Press Release, KfW Group, KfW Rewards Successful Forest Conservation (Feb. 5, 2013), available at https://www.kfw-entwicklungsbank.de/International-financing/KfW-Entwicklungsbank/About-us/News/News-Details_20353.html. See also GCF, *Acre’s Payment for Performance* (2013) GCF e-newsletter, available at http://www.gcftaskforce.org/newsletter/index_en.php#sec2art1, and WWF, *Brazil’s Acre state and German development bank agree to performance-based payments linked to REDD+* (January 11, 2013), available at <http://wwf.panda.org/?207235/Brazils-Acre-state-and-German-development-bank-agree-to-performance-based-payments-linked-to-REDD>.

²⁵⁰ See Federal Ministry for Economic Cooperation and Development, *Cooperation in action, REDD Early Movers in Brazil: Rewarding pioneers in forest conservation* Web site, https://www.bmz.de/en/what_we_do/issues/klimaschutz/forests-and-climate/cooperation-in-action/REDD-in-Brazil-reward-for-pioneers/index.html (accessed Oct. 18, 2015).

²⁵¹ GCF Knowledge Database, *supra* note 123.

²⁵² See generally Linkage Readiness Report, *supra* note 210.

²⁵³ Rulemaking documents for the California Cap-and-Trade Program are available at <http://www.arb.ca.gov/regact/2010/capandtrade10/capandtrade10.htm>.

²⁵⁴ See Governor's Linkage Findings Web site, *supra* note 221.

²⁵⁵ Rulemaking documents for linking the California Cap-and-Trade program to the Québec program are available at <http://www.arb.ca.gov/regact/2012/capandtrade12/capandtrade12.htm>.

²⁵⁶ See Linkage Readiness Report, *supra* note 210.

²⁵⁷ ARB-Québec Linkage Agreement, *supra* note 216.