Norad

# Template for report and accounts for organisations under the Climate and Forest Initiative funding scheme for civil society

2013-2015

## 1. .General Project Information:

1.1 Name of recipient organisation: Environmental Defense Fund, Inc.

1.2 Reporting year: 2015

1.3 Agreement Number: QZA-0464 QZA-13/0074

1.4 Name of project: Options Market and Risk-Reduction Tools for REDD+

1.5 Country and region in the(se) country if applicable: Brazil, Mexico and Indonesia (research, technical/policy workshops, business outreach, policy advocacy, capacity building, technical assistance, pilot/demonstration; Austria (research offices, technical workshops); Germany (research offices); United States and United Kingdom (research offices, workshops, business outreach, policy advocacy); Australia, EU member states, and other strategic countries with financial centers, public development agencies, and/or existing/emerging emissions trading systems (workshops, business outreach, policy advocacy)

1.6 Financial support to the project from Norad for last calendar year 2015: NOK 3,791,771

1.7 Thematic area: Creating global consensus on REDD+

## 2 Please describe the project's progress for the whole grant period

2.1 **Please repeat the project's target group(s) and the baseline for the target group at the start of the project (from the approved project document).**

The development of market-based REDD+ is stuck in a "chicken and egg" problem in which a lack of demand holds back the supply of jurisdictional (i.e., state, province or country-level) REDD+ credits, which in turn hinders growth in demand. The crucial actors who hold the key to creating a functioning market for REDD+ are:

1) *Business and financial community:*
Baseline: Few private sector actors are willing to invest in jurisdictional REDD+ programs because of uncertainty over future compliance carbon markets and the rules for REDD+ crediting. Existing private investment is focused on stand-alone projects for voluntary markets rather than jurisdictional frameworks that are more suitable for compliance markets.

2) *Policymakers and stakeholders in REDD+ countries:*
Baseline: Despite widespread expectations that forest protection would acquire market value, Brazilian and other REDD+ stakeholders have seen little tangible monetary return from their actions and are increasingly sceptical that emissions reductions from deforestation will be compensated. Low demand signal discourages governments and actors on the ground from pursuing jurisdictional REDD+ programs, and ultimately puts at risk the policies and programs responsible for the large-scale reductions of Amazon deforestation over the last decade.

3) *Academics and technical experts:*
Baseline: *Academics and technical experts* are not engaged in developing hedging tools and approaches to address underlying uncertainties that depress investment by both buyers and sellers of REDD+.

4) *Policymakers in cap-and-trade jurisdictions:*
Baseline: Policymakers in cap-and-trade jurisdictions question whether tropical jurisdictions can produce supplies at the required level of quality, slowing the policy and regulatory developments to spur demand. In the UNFCCC, discussions on REDD+ have been advancing, yet no rules authorize REDD+ use within compliance markets. Limited ambition, uncertain long-term policies, recession in Europe, and other factors have curtailed demand in existing markets generally.

2.2 **Please repeat the project's desired impact (from the approved project document).**

Rapid action to curb deforestation is critical for climate stability, to protect biodiversity, improve livelihoods and provide other environmental and socioeconomic benefits, while avoiding risks of a tipping point that could trigger large-scale die-back of Amazon forests. The project will contribute to rapidly scaling up demand and supply for REDD+ credits, and build momentum and opportunity for the creation of positive incentives for global forest protection in future carbon markets and other climate policies. The goal is to ensure that deforestation in key countries begins and/or continues to decline on a path towards zero net emissions while addressing development and poverty alleviation. Protecting tropical forests will also be a powerful cost-control mechanism for climate policies to facilitate policy agreements on more ambitious global emission reductions.

2.3 **Is the project still relevant for the desired impact?** Yes.

2.4 **Main outcome(s).**

a) **Please repeat the project's planned outcome(s) (effect on project´s target group(s), beneficiary (-ies)) (from the approved project document).**

Policymakers and REDD+ stakeholders do not have hedging tools and approaches to address uncertainties that depress private investment. The project aims to design, communicate and demonstrate REDD+ options (the right but not the obligation to buy/sell credits) and complementary risk-management tools to deliver private finance for high quality results-based REDD+ programs over near- and medium-terms during the transition period towards a future international climate regime. In this way, the project will encourage: private buyers to purchase REDD+ credits/options; public and other funders to strategically support these purchases; and policymakers in major REDD+ jurisdictions (as well as in jurisdictions designing carbon market systems) to codify the frameworks and standards for developing, transacting and accepting such credits for compliance purposes. We will produce four principal outcomes:

*1) Potential buyers of REDD+ credits, including private companies, investors and financial institutions gain confidence, show interest and invest in REDD+ options as an immediate pathway to manage their carbon price risks through an options approach.*

*2) Governments and key REDD+ stakeholders in tropical countries (Brazil, Indonesia, Mexico) gain confidence to continue developing high-quality REDD+ credits as they begin to receive funds from sales of REDD+ options and acquire other tools to reduce risks of program development.*

*3) A community of practice develops among academic and technical experts, and they become engaged in research to design and further develop a market for options on REDD+ and complementary financial and risk-management instruments to scale up REDD+ demand and supply beyond the contribution of the project team at the end of the 3-year project period.*

*4) Policymakers and regulators in developed and developing countries gain confidence and participate in the development of REDD+ crediting approaches and adopt regulations authorizing REDD+ use for compliance at the international, national and state levels based upon jurisdiction-scale approaches that ensure high environmental quality and equitable benefit allocation among stakeholders so REDD+ regimes meet environmental and development goals.*

b) **Please report on all outcomes from the project document:**

i. What changes have been achieved with reference to the baseline?
ii. Please report on the key indicators used to document that the desired change has occurred.

iii. Please reflect on whether targets that were originally set have been achieved, and what project outputs were key to achieving them. If relevant reflect on why outputs delivered as planned did not help meet the targets.

iv. If outcomes are not yet achieved, please explain why, and in addition, how the outputs will lead to the desired outcome and when.

Outcome 1, *Potential buyers of REDD+ credits, including private companies, investors and financial institutions gain confidence, show interest and invest in REDD+ options as an immediate pathway to manage their carbon price risks through an options approach.*

Over the course of the project, we have seen changes from the baseline through publicly-funded demonstration of jurisdictional REDD+ transactions and growing private interest in acquiring REDD+ credits from the growing pipeline of jurisdictional programs as a potential compliance market asset for use in existing and emerging carbon markets in California-Quebec, international civil aviation and UNFCCC. A handful of first-mover private companies have gained confidence, demonstrated interest, and begun to pursue investments using an options approach to secure jurisdictional REDD+ credits in advance of compliance market acceptance.

As detailed below, the project contributed substantially to these developments through its technical analysis on REDD+ options and risk-reduction approaches; facilitation of discussions between the state of Acre and private investors; and design and communication of a risk-sharing investment vehicle for jurisdictional REDD+ purchases, which has garnered widespread interest from companies and investors (see discussion of indicators below and Table in Annex for a numbered list of key outputs). EDF and partners analyzed, designed and began to establish private/public finance approaches to catalyze pre-compliance purchases of REDD+ credits and options. This effort has produced a shift relative to the starting baseline by providing private actors with a practical risk-hedging approach to address uncertainties that depress private investment.

Although we were ultimately unable to achieve the original goal of an actual pilot transaction (proposed output #4) by the end of 2015, we made significant progress. We also made greater than expected progress in developing a private investment vehicle ("The REDD+ Acceleration Fund"), expected to launch at the end of 2016, and which would catalyze private finance on an even broader scale. This has put private actors on the road ofdeveloping a private investment pathway for demonstrating proof-of-concept for market-based REDD+ and for providing critical "bridge" financing for tropical forest protection.

While the private market remains at an early stage in terms of jurisdictional REDD+, private demand for project-scale REDD+ credits for voluntary offsetting purposes grew during the project period. In the voluntary carbon market, avoided deforestation became the most purchased single offset category in 2013 and remained so in 2014. Credits from the forest sector overall grew to more than half the voluntary market's total transaction volume of $395 million in 2014 (Forest Trends 2015). Excluding pay-for-performance transactions under the government donor funded REDD+ Early Movers program (REM), private REDD+ voluntary transactions totaled 15 MtCO2 with a value of $39 million in 2014. While corporate social responsibility and leadership on climate remain the main motivators of voluntary offsetting generally, data from Carbon Disclosure Project (CDP) indicates that awareness of carbon price risks and anticipation of regulated markets are also correlated with companies' offsetting (Forest Trends 2015). The dominance of REDD+ in the voluntary market suggests the charismatic appeal of REDD+ and the potential to increase demand in REDD+ as a tool for climate action, but it also reveals inherent limitations of voluntary approaches to generate finance at the needed scale to address global deforestation and climate change generally.

Even as the private market remains focused on REDD+ projects, rather than the jurisdictional frameworks more suited to compliance markets, the tide is starting to turn in terms of market transactions. Public donors have helped to finance a pipeline of jurisdictional REDD+ programs and have demonstrated the potential for transactions of credits from emissions reductions from reducing deforestation at the jurisdictional scale. In 2013, under REM, the German development

bank KfW and the Amazon state of Acre completed the first jurisdictional REDD+ credit transaction. This transaction was followed in late 2014 by two further announced deals under REM, funded by Norway and Germany, to purchase up 10Mt$CO_2$ for $50 million from Ecuador and Colombia. Other Amazon states, as well as more than 10 countries in the World Bank-administered Forest Carbon Partnership Facility's (FCPF) pipeline, are developing programs that could offer credits for sale in the near term (see outcome 2).

The project made significant progress in building interest and catalyzing a private transaction of jurisdictional REDD+ credits based on an options model. Over the course of 2015, a large multinational company and the state of Acre negotiated a pilot options-based deal, which was set to be announced at the UNFCCC COP in Paris. The project team directly facilitated discussions between Acre and potential investors, including through a seminar hosted in London with Acre's governor (# 3.14) as well as a presentation to ICAO stakeholders (#3.10). We also helped to develop the adopted options and risk-sharing structure in consultation with representatives from Acre and the private buyers, based on the insights gained through the project's technical analysis on options and risk-sharing structures (#1.1-1.7) and potential compliance market demand (#1.8-1.14). EDF also helped build private interest in Acre's jurisdicional program through a comprehensive research report (#2.4) on Acre state's sustainable development and deforestation reduction programs and policies, including its advanced Incentive System for Environmental Services (SISA). In the end, however, Acre postponed the pilot transaction due to political negotiations with Brazil's federal government, which has opposed international market-oriented transactions for REDD+.

In addition to these political issues, the ability to start generating private demand for Acre's credits (or options on these) was constrained throughout the project period due to slow progress on the state receiving certification of its credits under the Verified Carbon Standard's (VCS) Jurisdictional and Nested REDD+ (JNR) standard; certification was initially expected in 2013, but still has not come through as of mid 2016. In the absence of compliance market standards for REDD+, certification by VCS is important to provide credibility for private buyers compared to Acre's own proprietary carbon standard (with which it has registered credits under the Markit registry and negotiated a bilateral deal with Germany's KfW). The Forest Carbon Partnership Facility's Carbon Fund Methodological Framework provides an alternative standard for crediting, but emissions reductions under this standard will not be available until next year at the earliest.

In order to diversify the pipeline of credits beyond Acre and also establish a platform that could mobilize private finance for REDD+ on a larger scale to a broader set of programs, EDF established a partnership with Encourage Capital, a mission-oriented investment firm in New York, to develop a REDD+ Acceleration Fund (RAF) that would scale up private transactions based on an options and risk-sharing structure (#2.1). Building on the information and insights from the technical analyses, EDF and Encourage Capital jointly designed a model structure for the RAF that would layer capital from pre-compliance corporates, mission-oriented investors, philanthropies and public sector. The potential participation of the pre-compliance companies is structured as the purchase of (call) options on compliance-grade credits, giving them the right—but not the obligation—to purchase these credits at a discounted price at a future trigger date. REDD+ jurisdictions, as well as other developers of credits, would receive an upfront purchase price, as well as a share of any profits from the RAF in the future. Public and philanthropic donors would provide downside risk protection in the form of a backstop purchase guarantee (a 'put' option). EDF and Encourage developed this approach through discussions with private companies, philanthropic and public donors, and REDD+ jurisdictions and program developers over the course of 2015, including through a panel discussion to discuss investment approaches to "Accelerating REDD+ into Compliance Markets" during Climate Week in New York in September 2015 (# 3.18).

The RAF structure was made public at an investor roundtable discussion organized at the offices of Baker & McKenzie during the Paris COP (#3.19), which featured enthusiastic support and participation from Norwegian energy company Statkraft and other companies and investors (see indicators). The RAF concept (#2.1) has generated widespread support and formal expressions of interest from pre-compliance corporates, other potential investors, the World Bank, and potential public and philanthropic donors, The team's efforts to develop and promote the RAFare starting

to signal to private companies, investors, government and philantrhopic donors, and REDD+ jurisdictions that the market is moving from a voluntary to a pre-compliance basis. Two multinational companies have signed Memoranda of Understanding with Encourage Capital indicating a desire to participate in developing the RAF, with the intent of participating in the purchase of options on compliance-grade REDD+ credits in 2016. Encourage has also pursued an MOU directly with the state of Acre, which has indicated a desire to participate in the structure.

While an actual transaction was not concluded within the originally anticipated time frame of the project, the generation of interest in the broader RAF vehicle that would provide a more systemic solution with potential to deliver finance on a larger scale to a wider range of programs compared to a stand-alone pilot transaction was greater than expected result. We expect the launch of the RAF (with a target of $100 million to purchase 30-40 MtCO2e from jurisdictional REDD+ programs) will be announced at the Marrakech COP in November 2016, with an expected financial close in the first quarter of 2017.

The prospects for private investment in jurisdictional REDD+ credits and options over 2016 and 2017 are enhanced by: (1) the growing pipeline of jurisdictional REDD+ programs ready to deliver credits (see outcome 2); (2) the growing interest in private/public finance approaches (see outcome 3); and (3) the growing signals of potential compliance markets for REDD+ (see outcome 4). A new federal administration in Brazil also creates the opportunity for advancing negotiations between Amazon states and the federal ministries on REDD+ for international markets.

Key Indicators for Outcome 1, regarding potential buyers of REDD+ credits:

(i) *Communications and Engagement*

Over 2013-2015, engagement from private actors was indicated by:

- willingness of more than 50 private organizations to participate in interviews on barriers and opportunities for stimulating private sector demand for REDD+ credits/options.
- willingness of private sector actors to participate in workshops (e.g., #3.7, #3.8, #3.13, #3.14) , panels and roundtable discussions (#3.16, #3.17) on accelerating compliance markets for REDD+. The panel in New York (#3.16) featured representatives from Airlines for America (A4A) and Pacific Gas and Electric (PG&E) supporting market-based REDD+alongside representatives from Encourage Capital, the state of Acre, the World Bank Group, Bloomberg Philanthropies and Environmental Defense Fund. The investors roundtable in Paris (#3.17) featured pre-compliance corporates (Norwegian energy company Statkraft and Australian airline Qantas), institutional investors and financial institutions, Och-Ziff Capital Management Group and the European Investment Bank (EIB), providing favorable reviews and constructive comments on the design of the RAF to a packed audience of more than 40 from REDD+ jurisdictions and private REDD+ developers.
- participation of about a dozen companies, including airlines and companies active in the California market, in meetings on the REDD+ Acceleration Fund, about half of which pursued the idea further in repeat meetings.

(ii) *Commitment*

- Encourage Capital established a partnership with EDF, hosting joint events that included Baker & McKenzie (#3.16, #3.17), and joint meetings and outreach to companies, development finance institutions, and philanthropic and public donors to develop the REDD+ Acceleration Fund.
- Two multinational companies signed Memoranda of Understanding with Encourage Capital indicating their intention to participate in developing the REDD+ Acceleration Fund and make an options-based investment.
- The Carbon Markets Investor Association (CMIA), International Emissions Trading Association (IETA) and others representing 160 companies and civil society groups joined

EDF and Global Canopy Programme (GCP) in a declaration to express commitment to scale up private investment in return for clear policy signals of compliance carbon markets and interim public/private finance arrangements.

(iii) *Implementation*

- The state of Acre and a multinational company planned to announce a pilot transaction at the Paris COP, but this was postponed as discussed above. To our knowledge, the parties still remain willing to implement the transaction in the coming year.
- Encourage Capital is working with EDF and Baker & McKenzie to design the RAF with a goal of launching at the end of 2016.

Outcome 2, *Governments and key REDD+ stakeholders in tropical countries (Brazil, Indonesia, Mexico) gain confidence to continue developing high-quality REDD+ credits as they begin to receive funds from sales of REDD+ options and acquire other tools to reduce risks of program development.*

Despite the lack of private market demand, international public finance has demonstrated the potential for jurisdictional REDD+ credit transactions that can provide resources to domestic actors on a payment for performance basis. Combined with domestic resources, international public donor funds have enabled progress in terms of REDD+ jurisdictional program development. We have seen a shift relative to the baseline of no jurisdictional REDD+ transactions, as Acre and other jurisdictions have started to receive funding for jurisdictional REDD+ and gained confidence to continued developing REDD+ programs and propose more ambitious reductions, contingent on adequate finance in the future. The project team helped produce this shift relative to the baseline by: (1) helping jurisdictions acquire tools to manage risks of program design and implementation as part of the VCS and FCPF Carbon Fund standards, (2) providing other analyses to inform jurisdictional program design, and (3) helping jurisdictions identify emerging private market opportunities.

Over 2013-2015, Amazon states and other REDD+ jurisdictions continued to progress in developing REDD+ programs, with 15 countries, including Brazil and Mexico, submitting REDD+ reference levels to the UNFCCC. More than 100 countries have included forestry and land use within their Intended Nationally Determined Contributions (INDCs) to the UNFCCC. Since 2013, 18 countries have progressed past the pure program readiness stage on the path to concluding transactions with the FCPF Carbon Fund, with at least two countries submitting Emissions Reduction Program Documents (ER-PDs) and the other 16 countries in the Carbon Fund pipeline submitting Emission Reduction Program Idea Notes (ER-PINs). Two additional countries have submitted ER-PINs but have not yet been formally accepted into the Carbon Fund pipeline. A pipeline of jurisdictional programs has also developed under the UN-REDD and other bilateral initiatives. Subnational forest jurisdictions with the Rio Branco declaration of August 2014 and national forest governments with the Lima Challenge of December 2014 expressed their willingness to scale up efforts to reduce deforestation with appropriate international finance. At the Paris COP, the governor of the state of Mato Grosso announced an ambitious, zero-deforestation rural development strategy, "Produce, Conserve, Include" (PCI), which depends on receiving future private investment.

Public donors have demonstrated the potential for results-based finance through the REM program's transaction with Acre for its credits registered in the Markit environmental market registry, and subsequent deals with Ecuador and Colombia. The Forest Carbon Partnership Facility's Carbon fund, totaling over $700 million largely funded with public capital, is slated to begin signing emissions reduction purchase agreements in 2016, including potentially with Mexico and Indonesia, with the flexibility to structure contracts on an options basis. At the Paris COP, Germany, Norway and UK further committed to the delivery of $5 billion in pay-for-performance financing for REDD+ through 2020. Nevertheless, there is still a disconnect between the scale of potential supply of REDD+ and actual potential demand, with the Global Canopy Programme's Interim Forest Finance project estimating that demand could be as little as 3% of supply through 2020. Private sector demand for emissions reductions to meet compliance

obligations (i.e., carbon markets) will be critical to enable forest jurisdiction to address deforestation over the medium to long term.

While engaging with technical experts (see outcome 3), the project team helped support the development of high-quality jurisdictional REDD+ programs by providing tools to enhance program effectiveness and manage risks of program performance. In particular, the project developed and provided jurisdictions with more streamlined tools to manage risks of leakage, measurement uncertainty and reversals in jurisdictional program design and implementation, thus helping jurisdictions to proceed with crediting emissions reductions under the VCS JNR standard and the FCPF Carbon Fund Methodological Framework (see outcome 3 for more discussion). The project also developed technical analyses to inform jurisdictional REDD+ incentive-system design to address uncertain agricultural prices in Mato Grosso and Acre (#1.18, #1.21), Africa (#1.22) and globally (#1.19, #1.20), and shared results with policymakers and stakeholders in Brazil (e.g.,#3.7 and various academic workshops. In further support of outcome 2, EDF also conducted complementary technical modeling and dissemination on jurisdictional REDD+ program design in Brazil, Mexico, and Indonesia, largely funded via participation in the Norad-funded project on "Promoting Deforestation-free Agricultural Commodity Supply Chains and the Link to Jurisdictional REDD+ Frameworks," led by the National Wildlife Federation (NWF).

In conjunction with outreach to private investors and policymakers (as noted under outcomes 1 and 4, respectively), the project team also worked directly with representatives of tropical forest jurisdictions to identify and engage in emerging private market opportunities. In particular, the project's modeling analyses (e.g., #1.14 on Brazil's potential advantage in a low-carbon economy) and workshops with private investors (#3.13-3.17) have helped REDD+ jurisdictions identify potential private market opportunities, as well as opportunities to proactively support policy developments in the most promising first-mover compliance carbon markets.

EDF helped facilitate coordination across and within Mexico and California to support the MOU on climate cooperation signed in July 2014 (#3.9) and ensure the important inclusion of a work plan on forests, setting a framework for collaboration on development of REDD+ programs and market-based finance. EDF supported indigenous representatives to engage with California's Air Resources Board in workshops on compliance market development (#3.2, as well as in December 2015). EDF further supported tropical forest stakeholders to engage with California policymakers through study tours organized to Mexico (#3.3) and Acre (#3.12).

Through analysis (#1.11, #1.13, #2.5), outreach and facilitation, EDF has helped forest jurisdictions identify and begin engaging in the potential private market opportunity for REDD+ as part of the global market-based measure currently under negotiation in the International Civil Aviation Organization (ICAO) to help meet the aviation sector's goal of achieving carbon neutral growth after 2020. The team supported representatives from Acre who shared experiences in a critical ICAO forum (#3.10), and convened a meeting between FCPF country representatives and U.S. airline and ICAO representatives (#3.13) (described further under outcome 4).With facilitation from EDF and project partners, representatives from the state of Acre were also active in exploring other opportunities for generating private investment. The project team worked with Acre representatives to prepare a report on Acre's program (#2.4), and to identify the potential for options-based transactions at a joint workshop in Brasilia (#3.7), and investor and public donor meetings in London (including # 3.14, with Acre's governor Tião Viana) and New York (#3.16). During the Governors Climate and Forest Task Force (GCF) meeting in August 2015, EDF briefed the governors of the Brazilian states of Mato Grosso and Pará about compliance market opportunities in California, ICAO and the REDD+ Acceleration Fund proposal.

Key Indicators for Outcome 2*, regarding governments and key REDD+ stakeholders:*

*(i) Communications and Engagement*

- Interest from jurisdictional REDD+ policymakers and stakeholders was indicated by willingness to participate in technical/policy workshops in Mexico, Brazil and Indonesia (with about 20 participants each), the dinner with airlines and ICAO representatives in

Washington, D.C. (#3.13), and workshops and study tours with California carbon market representatives (#3.2, #3.3, #3.12).

- Officials from Acre invited EDF and other NGO partners to discuss REDD+ financing possibilities, participate in presentations at the ICAO workshop in Bonn (#3.10) and meetings with potential funders in London (#3.14 with Acre's governor) and New York (3.16). Acre government and technical experts collaborated with EDF to develop the report on Acre's program (#2.4).

(ii) *Commitment*

- As part of the Governors Forest and Climate (GCF) task force of 28 subnational governments, forest jurisdictions and California signed the Rio Branco declaration of August 2014. Fourteen national forest governments joined in the Lima Challenge of December 2014.
- Twenty-eight subnational governments and eight national governments signed the New York forest declaration committing to reduce deforestation in partnership with the private sector and civil society.
- Ten of 27 GCF jurisdictions signed California's Under 2 MOU on subnational climate action, committing to major GHG reductions by 2050.
- With facilitation from EDF, Mexico committed to reduce deforestation in its climate agreement with California.
- More than 100 countries have included forestry and land use within their Intended Nationally Determined Contributions (INDCs) to the UNFCCC.
- At the Paris COP, the governor of the state of Mato Grosso announced an ambitious, zero-deforestation rural development strategy, "Produce, Conserve, Include" (PCI).

*(iii) Implementation*

- More than 18 countries progressed past the readiness stage on the path to concluding transactions with the FCPF Carbon Fund. Two countries in the Carbon Fund Pipeline (Costa Rica and DRC) have Emission-Reduction Program Documents (ER-PDs) submitted and publicly available on the FCPF website. The other 16 countries in the Carbon Fund Pipeline (Cote d'Ivoire, Dominican Republic, Fiji, Lao PDR, Madagascar, Mozambique, Nicaragua, Guatemala, Indonesia, Peru, Viet Nam, Chile, Republic of Congo, Ghana, Mexico and Nepal) have submitted Emission Reduction Program Idea Notes (ER-PINs). Two additional countries, Cameroon and Guyana, have also submitted ER-PINs, though they have not yet been accepted into the Carbon Fund pipeline.
- KfW and the Amazon state of Acre completed the first jurisdictional REDD+ credit transaction under the REM program in 2013. In late 2014, REM announced two additional transactions with Ecuador and Colombia.

Outcome 3, *A community of practice develops among academic and technical experts, and they become engaged in research to design and further develop a market for options on REDD+ and complementary financial and risk-management instruments to scale up REDD+ demand and supply beyond the contribution of the project team at the end of the 3-year project period.*

Since the start of the project, private sector, NGO, philanthropic and public actors have recognized that innovative interim private/public finance approaches are needed to catalyze private finance for REDD+ in advance of compliance markets. Compared to the baseline of non-engagement, a community of practice has emerged among academic and technical experts, international development institutions and private sector investors to develop risk-sharing tools and approaches to address underlying uncertainties that depress investment by both potential buyers and sellers of REDD+ credits.

EDF and technical partners underpinned these developments by building a theoretical and modeling foundation on the value of REDD+ options and other risk management tools to support private/public REDD+ transactions. The project team has produced 11 peer-reviewed journal papers (7 published, 4 currently in review) and 14 other reports or other technical analyses over 2013-2015. These analyses validate REDD+ options as a globally important climate finance strategy, and provide a comprehensive foundation for developing risk-reduction approaches to support REDD+ from the supplier and buyer perspectives. The project's analyses have generated interest as evidenced by academic publications, conference presentations and collaborations beyond the project team.

In addition to technical analyses and related presentations, project-organized workshops (#3.8, #3.14-3.17) have helped generate interest in the idea of public or philanthropic provision of a backstop price guarantee or 'put' option (an option to sell credits at a pre-determined price) combined with a private 'call' option (an option to buy credits at a pre-determined price) as a way to create a private/public finance bridge to compliance carbon markets. EDF worked with Global Canopy Programme (GCP) and associations representing over 160 companies and civil society groups to call for such private-public finance approaches in a joint declaration aimed at international policymakers in July 2014. Althelia Ecosphere and the World Bank's Pilot Auction Facility (PAF) for Methane and Climate Mitigation are implementing initial examples of public guarantee approaches in the REDD+ project market.

The project has helped build and socialize support for adapting and extending private/public approaches to the current market for jurisdictional REDD+, with our proposals featured in the IETA 2014 annual report (#2.3) and in a review report on tropical forests published by the Prince of Wales Charities' International Sustainability Unit in 2015. Similarly, EDF collaborated with GCP, Permian Global and the UNEP Finance Initiative on a white paper (#2.2) and session during the 2015 Global Landscapes Forum in London (#3.18) to present and discuss these private/public finance ideas. The collaboration with Encourage Capital has also helped coalesce a community of practice around a concrete opprortunity of the REDD+ Aceleration Fund for implementing the proposed public/private approaches. This work has engaged private companies, the World Bank Group and Forest Carbon Partnership Facility (FCPF) Secretariat, USAID, public and philanthropic donors, and REDD+ stakeholders in discussions on designing and implementing the proposed structure (e.g., #3.16-3.17). EDF and Encourage Capital have attracted interest, and we are in ongoing discussions about applying USAID's development credit loan guarantee used by Althelia and/or the World Bank's PAF put option structure to the REDD+ Acceleration Fund.

The project also collaborated with technical experts to finalize the development of jurisdictional REDD+ crediting frameworks under the Verified Carbon Standard and the FCPF Methodological Framework. EDF worked with VCS on the technical working group to develop an approach to quantify and manage the risk of "leakage" (potential shifts in emissions) under its JNR standard. EDF developed a novel, more simplified approach ("the effective area approach") that was included in the Global Commodity Leakage Module of the VCS Leakage Tool, officially approved in February 2014. The development of this tool (and the related "permanence" tool that EDF provided expert review on, which was released in October 2013) were critical steps in finalizing the JNR standard. Similarly, EDF participated as the Northern Civil Society Observer (NCSO) to the FCPF Carbon Fund's Buffer Guidelines Review Group and helped develop a revised, more streamlined approach for managing risks of uncertainty and reversals, a critical missing piece to completing the Carbon Fund methodology in 2015.

Key Indicators for Outcome 3, regarding academic and technical experts:

(i) *Communications and Engagement.*

- The project team produced 11 peer-reviewed journal papers (7 published, 4 currently in review) and 14 other reports or other technical analyses, including with the Getulio Vargas Foundation in Brazil (#1.14).
- Interest in project analysis and ideas was indicated by invitations to give and attendance at more than a dozen technical presentations on REDD+ finance at academic conferences,

workshops and UNFCCC side events, with a combined audience of over 300. This included a joint academic session by the project team at the International Union of Forest Research Organizations (IUFRO) in 2014 with about 20 participants (#3.11).

- About 30 private sector experts and practitioners attended and participated in breakout discussions in the cluster session on private/public finance approaches at the Global Landscapes Forum in London in 2015 (#3.18). There was similar attendance at each of the discussions of private/public approaches to accelerate REDD+ for compliance markets in London (#3.5, #3.14), Bonn (#3.8), New York (#3.16) and Paris (#3.17).
- The project's proposals were featured in the IETA 2014 annual report (#2.3) and in a review report on tropical forests published by the Prince of Wales Charities' International Sustainability Unit in 2015.
- EDF and Encourage Capital have had multiple discussions with USAID and with the World Bank Group on applying the development credit loan guarantee and the PAF put option structure, respectively, to the REDD+ Acceleration Fund.

(ii) *Implementation*

- The VCS JNR adopted the leakage risk management tool developed under the project, and the FCPF Carbon Fund adopted the buffer guidelines developed with project input.

Outcome 4, *Policymakers and regulators in developed and developing countries gain confidence and participate in the development of REDD+ crediting approaches and adopt regulations authorizing REDD+ use for compliance at the international, national and state levels based upon jurisdiction- scale approaches that ensure high environmental quality and equitable benefit allocation among stakeholders so REDD+ regimes meet environmental and development goals.*

Existing compliance carbon markets remain closed to REDD+ credits, and there are no jurisdiction-scale credits currently validated by a recognized standard. Nevertheless, since 2013, there has been a significant shift relative to the baseline as policymakers have gained sufficient confidence in jurisdictional REDD+ to move towards incorporating high-quality REDD+ credits within compliance carbon markets in California, under the UNFCCC and international civil aviation. In particular, there has been major progress in the UNFCCC in adopting a framework for jurisdictional REDD+, inclusive of market finance, under the Warsaw Framework of 2013 and the Paris Agreement of 2015. Furthermore, while overall demand for carbon credits remains low, there have been important increases in ambition in California and the international civil aviation sector under ICAO, as well as at the international level under the UNFCCC. The Paris Agreement marked a potentially game-changing development that could spur a dynamic of increasing adoption of carbon markets domestically and internationally and increasing ambition of climate policies to achieve long term goals, increasing demand for REDD+ and other emissions reductions over time. The policy analysis and outreach by EDF and project partners helped build support for the inclusion of REDD+ within carbon markets in California, ICAO and in the UNFCCC.

In California, in April 2015, Governor Brown issued an executive order calling for an ambitious 40% cut in California's emissions by 2030, on track to an 80% cut by 2050, relative to 1990 levels. This establishes a need for international trading for cost containment purposes, and we have briefed ARB on our modeling analysis of this issue (#1.12). Furthermore, California's Air Resources Board (ARB) initiated a regulatory process to accept international sector-based offsets credits into its carbon market with a technical workshop in December 2015 (and three more technical workshops to date in 2016), with the stated goal of including REDD+ offsets in its next compliance period from 2018-2020. The project helped build support for the inclusion of REDD+ in California's carbon market and increase collaboration on developing high quality REDD+ programs for the California market together with REDD+ stakeholders in Acre and Mexico.

In California, EDF played a central role in developing the REDD+ Offset Working (ROW) recommendations in 2013, including coordinating a stakeholder workshop on safeguards at the Univeristy of California at Davis (#3.2). The ROW recommendations formed the starting point for the Air Resources Board technical considerations on inclusion of jurisdictional REDD+ in 2015, in

which EDF further helped facilitate the participation of indigenous representatives from the Amazon. EDF also contributed to opening and maintaining the political appetite for REDD+ through our facilitation of a legislator study tour on REDD+ to Mexico (#3.3); the signing of California's climate cooperation agreement with Mexico, including forests (#3.9); and a trip by leading California regulators (including one of Governor Brown's principal policy advisors) to the state of Acre (#3.12). EDF also helped facilitate the participation of tropical forest indigenous representatives in the California Air Resources Board's first workshop to consider the inclusion of international sector-based offsets from REDD+, which was held in Sacramento in December 2015. EDF analyses (including research report #2.4) were highlighted in the Air Resources Board's white paper prepared as background for the workshop.

The UNFCCC has provided an important stamp of approval towards REDD+ market acceptance. The comprehensive package of decisions on REDD+ at the UNFCCC Warsaw COP in December 2013 was an important development in establishing REDD+ as an approved UNFCCC compliance mechanism, eligible for both market and non-market financing. These decisions were further validated in the Paris Agreement of November 2015, including Article 5 highlighting the role that tropical forests play in stabilizing climate and the role of payment-for-performance approaches. The Paris Agreement's Article 6 on international collaboration on mitigation across both developed and developing countries also broadens opportunities for market-based REDD+, subject to rigorous rules for accounting, transparency and environmental integrity. The Paris Agreement also sets a very ambitious global goal of reducing emissions to constrain temperature increases to well below 2 degrees Centigrade, as well as to balance anthropogenic emissions and sinks from the land sector. The recognition of REDD+ and ambitious global climate goals increases the likelihood of inclusion of REDD+ in future carbon market systems.

More generally, while Australia repealed its carbon pricing system in 2014, closing one potential market for REDD+ during the project period, there is growing interest in carbon pricing policies, with more than 50 jurisdictions currently implementing carbon pricing policies. Ninety countries have indicated interest in using market systems to support their Intended Nationally Determined Contributions (INDCs) submitted under the Paris Agreement. This creates an important potential source of demand and supply for REDD+ globally over the coming years, including for countries like South Korea, which has an opening for international credits in its carbon market after 2020, as well as an explicit goal of using international credit purchases to achive its INDC. Within the UNFCCC, EDF and partners also played a central role in championing market-based REDD+ under the Warsaw Framework and the inclusion of REDD+ and markets in the Paris Agreement. For example, EDF contributed to 3 UNFCCC Subsidiary Body for Scientific and Technological Advice (SBSTA) submissions that discussed the need for market finance for REDD+ and wrote blogs discussing the importance of all sources of finance for REDD+. EDF also conducted media outreach on the importance of financing for REDD+, and made direct interventions during parties' UNFCCC deliberations on the importance of markets for REDD+.

Since 2013, the international civil aviation sector has emerged as the largest potential source of compliance market demand for REDD+ in the near- to medium-term. At its triennial assembly in October 2013, ICAO agreed to develop a global market-based measure (MBM) to cap emissions at 2020 levels, which would allow air carriers to use credits for verified reductions from other sectors (possibly including REDD+) to offset their emissions. The resulting MBM is scheduled to be considered for adoption at the next ICAO assembly in September 2016. Linking high-quality carbon credits for REDD+ to compliance carbon markets would play a central role in combating tropical deforestation by unlocking hundreds of millions (perhaps billions) of dollars of private capital to protect the world's tropical forests.

As a founding member of the International Coalition for Sustainable Aviation (ICSA), which is the accredited observer organization representing civil society in the ICAO Committee on Aviation Environmental Protection (CAEP), EDF engaged deeply engage in CAEP's technical experts groups, building awareness of jurisdictional REDD+ and helping to ensure the emissions unit criteria maintains the potential for jurisdictional REDD+. EDF also prepared analyses on the ICAO market, and opportunity for REDD+ (#1.11, #1.13, #2.5) and organized key meetings to spur consideration of jurisdictional REDD+ within ICAO.

EDF facilitated a formal set of presentations on REDD+ as part of an ICAO CAEP meeting in July 2014 in Bonn (#3.10), the first such event to educate ICAO representatives about REDD+ and the first time any "outside experts" presented to this ICAO technical experts group. Two Brazilian experts and EDF's Director of Tropical Forest Policy Stephan Schwartzman presented on the development of the jurisdictional REDD+ program in the state of Acre, and representatives from private investor Althelia Ecosphere presented their work in Peru on behalf of IETA. In May 2015, EDF organized a dinner and presentations on the margins of the FCPF participants meeting in Washington, D.C. to introduce FCPF country representatives and U.S. aviation sector representatives to the potentially mutually beneficial opportunity from linking forests and flights under ICAO's market-based-measure (#3.13); EDF presented analysis of the match between potential REDD+ supply and ICAO demand. This meeting helped increase recognition of the pipeline of jurisdictional REDD+ programs and the demand opportunity under ICAO for REDD+ countries. Collectively, these events helped raise awareness of the potential market opportunity for REDD+ under an ICAO MBM and catalyzed the beginning of a deeper discussion on REDD+ in the ICAO forums.

Key Indicators for Outcome 4*, regarding policy-makers and regulators*

(i) *Communications and Engagement.*

- Senior California legislators and policymakers participated in study tours to Mexico (#3.3) and Acre (#3.12), respectively, to learn about jurisdictional REDD+.
- ICAO's CAEP convened an experts meeting on REDD+ in Bonn in July 2014 (#3.10).

(ii) *Commitment*

- In October 2013, ICAO agreed to develop a global market-based measure (MBM) to cap emissions at 2020 levels, which would allow air carriers to use credits for verified reductions from other sectors (possibly including REDD+) to offset their emissions.
- California joined the Rio Branco declaration in 2014 and made a commitment to work with Mexico to reduce deforestation in their climate cooperation agreement.

(iii) *Implementation*

- California's ARB started a formal regulatory process, with a workshop in December 2015 (and three more technical workshops in 2016), on the inclusion of international sector-based offsets within its carbon market, and modalities for linking with Acre and other tropical forest jurisdictions, with the stated goal of including REDD+ offsets in its next compliance period from 2018-2020.
- The UNFCCC adoped a comprehensive package of decisions on REDD+, including results-based finance, at the UNFCCC Warsaw COP in December 2013. The Paris Agreement of November 2015 reinforced these decisions in its Article 5 on the role of forests and provided further opportunities for REDD+ markets through Article 6 on international collaboration on mitigation.

v. Are the outcomes expected to be sustainable?

Yes, we expect the outcomes to replace the "chicken and egg" problem with jurisdictional REDD+ demand and supply with a self-reinforcing cycle of private investment and compliance market development that creates durable economic incentives for REDD+ policy implementation.

Progress in particular compliance markets and REDD+ jurisdictions could ebb and flow with political and economic developments. Nevertheless, once there is proof-of-concept of jurisdictional REDD+ for compliance markets, the overall trend towards growing private compliance makets for REDD+, internationally as well as potentially within tropical countries, is likely to be sustainable. In particular, the Paris Agreement has established an ambitious global goal and a process for tightening the ambition of mitigation commitments over time. It has also affirmed the importance of REDD+ and the use of market mechanisms, improving the prospects

for the sustained inclusion of jurisdictions REDD+ in existing and emerging compliance carbon markets.

Uncertain near- and medium-term policy developments create uncertainties and point to the ongoing relevance of the private/public and bridge finance approaches developed under the project to manage risks for private investors and REDD+ jurisdictions and developers. We are optimistic about the prospects for launching the REDD+ Acceleration Fund over the coming year. There is a risk that the REDD+ Acceleration Fund could not attract enough private investment to offer attractive terms for REDD+ credits due to the significant uncertainty associated with the future compliance value of these credits. However, the overall proposed structure of the RAF and the consultative approach pursued to date in developing the structure are precisely designed to address these risks. There is still a particular risk that discussions with public and/or philanthropic participants in the structure over a backstop purchase guarantee (to limit the potential losses from investments in credits should a robust compliance market fail to develop) may not be completed quickly enough to capitalize on the growing interest from private investors. This risk will be mitigated by pursuing multiple risk-hedging structures with a range of potential partners.

2.5 **Are there any internal and/ or external factors that have affected the project in any significant way?**

a) Please specify deviations from plans.

The project focused on the Brazilian state of Acre (with which EDF has a Memorandum of Understanding) as the best near-term opportunity on which to base a pilot transaction for certified credits from a jurisdictionalREDD+ program. However, our ability to start generating private demand for Acre's credits (or options on these) was constrained throughout the project period due to ongoing delays in the state receiving certification of its credits under the Verified Carbon Standard's (VCS) Jurisdictional and Nested REDD+ (JNR) standard; these were initially expected to be completed in 2013 and has progressively been delayed. In the absence of compliance market standards for REDD+, certification by VCS is important to provide credibility for private buyers compared to Acre's own proprietary carbon standard (for which it has registered credits under the Markit registry and negotiated a bilateral deal with Germany's KfW). In addition, progress and ability to complete the pilot transaction were delayed by political opposition to market REDD+ at the federal level in Brazil.

To diversify the pipeline of supply, as well as attempt to develop a more catalytic and systemic model, we decided to pursue the creation of a broader finance vehicle (RAF) through the collaboration with Encourage Capital. This marked a change of strategy relative to the idea of pursuing a single transaction alone. In addition, given the extent of market uncertainties, we realized that it was important to create a blended vehicle, drawing on corporate, mission-oriented, public and philantrhopic capital, rather than focusing simply on a private transaction as had been originally envisioned. Also, while Australia repealed its carbon pricing system in 2014, closing one anticipated compliance market opportunity for REDD+ during the project period, the ICAO opportunity emerged as a principal focus of analysis and outreach during the project.

b) Please provide a short assessment of the risks occurred

While the project was premised on jumpstarting private demand for jurisdictional REDD+, the shortfall of an immediately market-ready supply of credits proved to be the major near-term bottleneck. The delay in Acre's completion of the VCS certification, the opposition to REDD+ at the federal level in Brazil, and the fact that programs under the FCPF Carbon Fund are still at least a year away from generating creditable emissions reductions point to a risk that vehicles such as the RAF and emerging compliance markets could invest in REDD+ credits before the supply of compliance grade REDD+ credits i s ready to come to market. This is largely a timing issue, as supply is likely to ramp up quickly with demand. But it does create a potential risk that could undermine confidence in the potential viability of jurisdictional REDD+ for compliance carbon markets, perpetuating the current chicken-and-egg problem whereby lack of demand hinders supply which hinders demand.

The state-federal divide on market REDD+ within Brazil also emerged as an obstacle to progress on a private market transaction during the project period. The Paris Agreement, combined with a new administration in Brazil that could be more open to market-based approaches, create great potential opportunities. Nevertheless, there is a risk that ongoing political turmoil in Brazil could lead to indecision and backsliding on climate policy and forest protection in the country, eroding its historic progress in reducing deforestation, as well as hampering progress on market-based REDD+ with California and other potential carbn market jurisdictions. This creates greater urgency to keep reducing deforestation and keep REDD+ markets front and center on the agenda for Amazon stakeholders.

The continuation of low demand for emissions reductions in the EU and, to a lesser extent, California, as well as the repeal of the emissions trading system in Australia, reduced the need for cost-containment tools such as REDD+ and contributed to slow progress on developing REDD+ protocols for the major carbon markets. This situation started to change with the setting of new 2030 emissions goals in California, as noted above. Global demand for emissions reductions from REDD+ and other sectors could remain low given relatively weak ambition indicated by most countries under the INDCs. In the near- to mid-term, private sector demand for emissions reductions from deforestation may also be limited by an international economic crisis. Nevertheless, the fact that climate change impacts are becoming increasingly evident and that projections are increasingly pointing to more – rather than less – severe impact tends to mitigate this risk. The mechanism in the Paris Agreement for taking stock of global progress and ratcheting up ambition of mitigation commitments over time also provides a way to address the challenge of insufficient ambition, particularly if REDD+ markets and other market-based approaches can demonstrate cost-effective reductions that increase confidence in the viability of achieving more ambitious goals.

2.6 **Cross cutting concerns.** Please report on whether the project has had any effect (positive or negative) on
   a) Corruption
   b) Gender equality
   c) Respect for human rights

At this stage of beginning to implement actual transactions, the work has not contributed to reduction of corruption or promotion of gender equality and human rights, though these are end goals of at-scale REDD+ deployment. Through a focus on high-quality REDD+ programs, consistent with UNFCCC and World Bank Group social and environmental safeguards, programs being supported will be examples of best-practice approaches for jurisdictional REDD+ that ensure environmental integrity, as well as equitable benefit distribution, stakeholder participation and safeguards – all of which will contribute to successful REDD+ implementation. The project directly helped build support for strong social and environmental safeguards in a potential market for REDD+ in California through a workshop organized at University of California at Davis in 2013 (#3.2), as well as facilitation of indigenous peoples' participation in the ARB workshop in December 2015.

2.9 **Lessons learned.** For final report, please summarize lessons learned for the whole agreement period. Both internal and external factors are relevant. What could have been done differently? How can lessons learned be incorporated in future plans? We are interested in learning based on positive and negative experiences.

Our research and stakeholder engagement has validated that policy uncertainty provides a major barrier to carbon market investment; that an options-based structure can provide an early "bridge" for companies to invest in the right, but not the obligation, to secure credits in the future at a pre-determined price; and that additional de-risking from public or philanthropic capital is needed to enable greater volumes of purchases and more attractive up-front prices for REDD+ jurisdictions and other developers. From a theoretical perspective, our technical analyses have quantified significant climate policy risks facing private actors and significant benefits to hedging these risks with REDD+ options. For example, from the perspective of society and climate change, we find that the option value on REDD+ in 2020 is on the order of $12 per ton of $CO_2$ based on

eventual adoption of weak to moderate global climate policies. Given that such options could perhaps be available for as little as $1/ton, this provides significant scope for risk-adjusted returns for investors and profit sharing with REDD+ jurisdictions and other providers.

We made significant progress towards developing a viable finance structure and catalyzing a pilot transaction in 2015, but success was slowed by the delayed certification of jurisdictional credits from first-mover jurisdictions under the Verified Carbon Standards' Jurisdictional and Nested REDD+ program, as well as political debates over the role of market transactions for REDD+. This underscores the need to jointly develop financing approaches and policy engagement strategies. We learned the potentially hightly catalytic role of mission-oriented investors combined with public and philanthropic donors alongside traditional corporate and other private investors. We have also learned that technical research can provide valuable ideas that work in the real world, but it takes time to align all the necessary actors for a multi-layer finance strategy with interrelated components. It is also critical to develop partnerships with private sector implementers, and more attractive up-front prices for REDD+ jurisdictions and other developers.

In retrospect, we could have diversified to work with a broader set of forest jurisdictions and striven to work with a private partner to develop an investment vehicle like the RAF sooner in the process. This would have been difficult, however, given limited resources, the need to understand the market, the delayed timing of policy signals on REDD+ from compliance markets that helped spur private investment, and the need to find the right private partner to jointly develop the approach.

## 3 Case/success story

3.1 **Please see separate document for case story.**

## 4 Project's accounts for last year:

**4.1 The accounts must relate to the approved budget for the year in question. All deviations (positive and/ or negative) must be clearly shown and explained.**

Attachment: Audited accounts and completed form from the accountant for last year's accounts.

Only after a contract expires should unspent funds be returned to Norad.

Date 7 June, 2016

Signature 

## APPENDIX: Key Outputs

The table below summarizes the key outputs associated with each outcome which are detailed in the narrative above.

| # | Select 2013-2015 Outputs | Output type | Main outcome(s) contributing to | Description (lead institution(s)) |
|---|---|---|---|---|
| | *Output 1. Research paper and analytical modeling tools* | | | |
| | *Overall modeling architecture* | | | |
| 1.1 | Fuss, S., J. Wehnkamp, W. Heinrich Reuter. 2014. "REDD+ Markets: A Review of Mechanisms for Private Sector Risk Mitigation." Manuscript. International Institute for Applied Systems Analysis (IIASA), Laxemburg, Austria. | Working paper | 1, 3 | Framing and review paper on REDD+ market and private risk mitigation tools (MCC, IIASA, EDF) |
| 1.2 | Golub, A., R. Lubowski, and P. Piris-Cabezas. 2015. "Balancing Risks of Climate Policy Uncertainty: The Role of Options and Reducing Emissions from Tropical Deforestation and Forest Degradation (REDD+)." *Ecological Economics* (under review). | Peer-reviewed paper (in review) | 1, 2, 3, 4 | "Hybrid" model of risk-adjusted demand and supply of REDD+ and market value of options (EDF) |
| | *Micro-level demand analyses* | | | |
| 1.3 | Krasovskii A, Khabarov N, Obersteiner M. 2015. "Fair pricing of REDD-based emission offsets under risk preferences and benefit sharing." *Energy Systems Journal* (under review), Available as IIASA Interim Report IR-15-019 at: http://pure.iiasa.ac.at/11670 | Peer-reviewed paper (in review) | 1, 2, 3 | Microeconomic modeling of role of risk in REDD+ demand and supply and novel benefit-sharing arrangement to ensure equity and scale up market (IIASA). |
| 1.4 | Krasovskii, A., Khabarov, N. and Obersteiner, M. 2015 "Modeling financial instruments supporting REDD." In: Proceedings, International Conference on Systems Dynamics and Control Processes (SDCP 2014). Ural Federal University, Ekaterinburg, Russia, pp. 42-49. ISBN 978-5-8295-0364-2 Abstract available at http://pure.iiasa.ac.at/11925 | Conference proceedings paper | 1, 2, 3, 4 | Microeconomic modeling of role of REDD+ options in hedging risks for electricity sector during transition to clean energy technologies (IIASA). |
| 1.5 | Krasovskii, A.A., N.V, Khabarov, and M. Obersteiner. 2014. "Impacts of the Fairly Priced REDD-Based $CO_2$ Offset Options on the Electricity Producers and Consumers." *Economy of Region* 3: 273-288. | Peer-reviewed paper | 1, 2, 3, 4 | Microeconomic model ofrole of REDD+ offsets in electricity sector market (IIASA). |
| 1.6 | Szolgayová, J., A. Golub, and S. Fuss. 2014. "Innovation and risk-averse firms: Options on carbon allowances as a hedging tool." *Energy Policy* 70: 227-235 | Peer-reviewed paper | 1, 2, 3, 4 | Microeconomic modeling of the value of REDD+ options for firms hedging both policy and technology uncertainties (MCC, EDF). |
| 1.7 | Krasovskii A, Khabarov N, Obersteiner M. 2015. "$CO_2$-intensive power generation and REDD-based emission offsets with a benefit sharing mechanism," *Energy Policy* (forthcoming). Available as IIASA Interim Report IR-15-018 (November 2015) at: http://pure.iiasa.ac.at/11671 | Peer-reviewed paper | 1, 2, 3 | Expanded analysis of role of risk in REDD+ demand and supply and novel benefit-sharing arrangement to ensure equity and scale up market (IIASA). |

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| | *Macro-level demand analyses* | | | |
| 1.8 | Koch, N., Grosjean, G., Fuss, S., and Edenhofer, O. 2016. "Politics Matters: Regulatory Events as Catalysts for Price Formation under Cap-and-Trade." *Journal of Environmental Economics and Management*. Extended working paper (2015) available at SSRN: http://dx.doi.org/10.2139/ssrn.2603115 | Peer-reviewed paper | 1, 3, 4 | Empirical study of role of policy uncertainties in driving demand in compliance carbon markets, motivating the need for options and risk hedging tools (MCC) |
| 1.9 | Koch, N., Reuter W.H., Fuss, S., Grosjean, G. 2015. "Permits vs. Offsets under Investment Uncertainty"). Available at SSRN: http://ssrn.com/abstract=2711321 | Working paper | 1, 3, 4 | Modeling analysis of policy options for including REDD+ credits and options in a compliance carbon market (MCC, IIASA). |
| 1.10 | Koch, N., S.Fuss, G. Grosjean, and O. Edenhofer. 2014. "Causes of the EU ETS price drop: Recession, CDM, renewable policies or a bit of everything? – New evidence." *Energy Policy* 73: 676-685 | Peer-reviewed paper | 1, 3, 4 | Analysis of role of policy uncertainty in EU ETS market (MCC) |
| 1.11 | Petsonk, A. and G. Turner. 2013. "Achieving Carbon Neutral Growth from 2020." *ICAO Environment Report.* International Civil Aviation Organization (ICAO). Montreal, Canada. Available at: http://cfapp.icao.int/Environmental-Report-2013/ | Invited book chapter | 1, 2, 4 | Analysis of potential international aviation market demand for offsets and supply from REDD+ and other srouces (EDF, Bloomberg New Energy Finance) |
| 1.12 | Piris-Cabezas, P., E. Morehouse, S. Brooks, and R. Lubowski. 2014. "California's Cap-and-Trade System: The Role of a Mid-Term 2030 Target." Manuscript. Environmental Defense Fund. Washington, DC. | Working paper | 1,3,4 | Analysis of California carbon market and cost- containment role of REDD+ (EDF) |
| 1.13 | Piris-Cabezas, P., A. Golub, and R. Lubowski. 2014. "Achieving Carbon Neutral Growth from 2020: A Global Market Mechanism using REDD+ Options to Stabilize Aviation Emissions and Save the World's Tropical Forests." Manuscript. Environmental Defense Fund, Washington, DC. | Analysis executive summary | 1, 3, 4 | Analysis of potential international aviation carbon market and cost/risk reduction role of REDD+ credits and options (EDF) |
| 1.14 | Piris-Cabezas, P., R. Lubowski, and A. Golub. 2014. "Managing Risks and Returns of Carbon Market Strategies for REDD+ and Other Emissions Reductions in Brazil." Technical paper (Annex 6) in: *Brasil – Potência Econômica e Ambiental No Século 21: Foco na Economia de Baixo Carbono.* Center of Sustainability Studies, Getulio Vargas Foundation (GVces/FGV-EAESP). Saô Paulo, Brazil. Available at: http://www.edf.org/sites/default/files/brasil-potencia-economica-e-ambiental.pdf | Technical paper in report | 1, 2, 3, 4 | Modeling of costs and benefits of REDD+ credits/options within potential carbon market scenarios in Brazil (EDF). |
| | *Market research* | | | |
| 1.15 | Hiller, J. "Forest Offset Market Assessment" Manuscript. Environmental Defense Fund. Boston, MA. | Working paper | 1,2 | REDD+ market assessment based on interviews of US corporate actors (EDF) |
| 1.16 | Laing, T., L. Taschini, C. Palmer, J. Wehkamp, S. Fuss, and W. Heinrich Reuter. 2015. "Understanding the demand for REDD+ credits." Centre for Climate Change Economics and Policy Working Paper No. 218. London School of Economics. Available at: http://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2015/05/Working-Paper-193-Laing-et-al1.pdf | Working paper (peer-reviewed) | 1, 2 | REDD+ market assessment report based on EU interviews and surveys (LSE, MCC) |

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| 1.17 | Laing, T., Taschini, L, and C. Palmer. (2015. "Understanding the demand for REDD+ credits." Revise and resubmit for thematic Issue on Forest Ecosystem Services, *Environmental Conservation*. | Peer-reviewed paper (in review) | 1, 2 | Academic version of REDD+ market assessment based on EU interviews and surveys (LSE). |
| | ***Micro- and macro- level supply analyses*** | | | |
| 1.18 | Engel, S., C. Palmer, L. Taschini, and S. Urech. 2015. "Conservation Payments under Uncertainty." *Land Economics* 91(1): 36-56 http://le.uwpress.org/content/91/1/36.abstract | Peer-reviewed paper/modeling tool | 2, 3 | Analysis of conservation payment design under uncertainty to mitigate landowner risks (LSE) |
| 1.19 | Gusti, M., N. Khabarov, and N. Forsell, 2015. "Sensitivity of marginal abatement cost curves to variation of G4M parameter." *Proceedings of the 4th International Workshop on Uncertainty in Atmospheric Emissions*, Kraków, Poland. (Publisher: Systems Research Institute, Polish Academy of Sciences, Warszawa, Poland 2015; ISBN 83-894-7557-X, pages 152-158). | Conference proceedings paper | 2, 3 | Global modeling analysis identifying major uncertainties affecting projections of REDD+ costs (IIASA) |
| 1.20 | Gusti, M, N. Forsell, P. Havlik, N. Khabarov, F. Kraxner, M. Obersteiner. 2015. "Sensitivity of costs of REDD to future socioeconomic drivers and its implications for mitigation policy design." Manuscript. International Institute for Applied Systems Analysis. Laxemburg, Austria. | Working paper | 2, 3 | Expanded modeling analysis of major uncertainties affecting projections of REDD+ costs and implications for policy design (IIASA) |
| 1.21 | Palmer, C., L. Taschini, T. Laing. 2016. "Targeting REDD+ Payments when Land-Use Returns are Uncertain: The Case of Acre State, Brazil. Manuscript. Grantham Research Institute on Climate Change and the Environment, London, UK. | Working paper (peer-reviewed) | 2, 3 | Modeling paper on design and targeting of REDD+ incentives within Acre given uncertain costs of conservation (LSE) |
| 1.22 | Wehnkamp, J., A. Aquino, S. Fuss, and E. Reed. 2015. "Analyzing the Perception of Deforestation Drivers by African Policymakers in the Perspective of Possible REDD+ Policy Responses." *Forest Policy and Economics.* 59: 7–18. | Peer-reviewed paper | 2, 3 | Analysis of institutional drivers of deforestation of concern to policy makers (MCC) |
| 1.23 | Wehkamp, J., Fuss S. 2015. "Do weak institutions drive deforestation? Identifying relevant governance indicators for global forest modeling." Conference Paper XIV World Forestry Congress, Durban, South Africa, 7-11 September 2015. | Working paper | 2, 3 | Empirical paper identifying role of institutional quality in driving deforestation (MCC) |
| 1.24 | Wehkamp J., Pietsch S. A., Fuss S., Reuter W. H., Kraxner F., Gusti M., Koch N., Kindermann G.2015. "Global land use modelling and institutions – accounting for environmental institutional quality." *Ecological Modelling* (under review). | Peer-reviewed paper (in review) | 2, 3 | Global modeling of role of instittuional fractors to reduce undertainty in deforestation projections and support REDD+ program design (MCC, IIASA) |

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| | ***Output 2. Communications and policy advocacy documents*** | | | |
| 2.1 | Environmental Defense Fund and Encourage Capital, "REDD+ Acceleration Fund: A Financial Bridge to End Deforestation." September, 2015. | Concept note | 1, 2, 4 | Concept note describing objectives and private/public risk-sharing structure of REDD+ Acceleration Fund vehicle (EDF, Encourage Capital) |
| 2.2 | Global Canopy Programme, United Nations Environment Programme, Environmental Defense Fund, and Permian Global. 2015. "Leveraging private sector finance for REDD+ Implementation: Financing Mechanisms and investible entities." White Paper. Global Landscapes Forum. Available at: http://www.landscapes.org/wp-content/uploads/docs/London-white-papers/GLF_WhitePaper_REDD.pdf | White paper | 1, 2, 4 | White paper on options and other private/public approaches to scale finance for forests protection and sustainable production (EDF, with GCP, UNEP-FI, and Permian Global). |
| 2.3 | Lubowski, R., A. Golub, R. Parkhouse, and L. Taschini. November 2014. "Bridging the REDD+ Finance Gap." In *Markets Matter: Greenhouse Gas Market Report.* International Emissions Trading Association. Geneva, Switzerland, 36-37. Available at: http://www.ieta.org/resources/Resources/GHG_Report/2014/ieta%202014%20ghg%20report.pdf | Article | 1, 2 | Proposal for pre-compliance finance bridge for REDD+ based on an options approach (EDF, LSE) |
| 2.4 | Schwartzman, S. 2014. "Acre: low-emissions, high-growth sustainable development in the Amazon." Environmental Defense Fund. New York, NY. Available at: https://www.edf.org/sites/default/files/acre_sustainable_development_amazon_2015.pdf | Report | 1, 2, 3 | Report on state's advanced jurisdictional REDD+ program for potential investors and donor-country policy makers (EDF) |
| 2.5 | Environmental Defense Fund. 2015. "Forests and Flight: REDD+ and Aviation's Market-Based Measure." | Powerpoint summary of analysis | 1, 2, 3, 4 | Summary of analysis indicating match between potential aviation sector demand and potential supply from jurisdictional REDD+ (EDF) |
| | ***Output 3. Workshops, meetings and information exchanges*** | | | |
| 3.1 | Project Partner Technical Meeting, February, 2013. | Workshop at IIASA, Laxemburg, Austria | 3 | Research partner meeting to exchange and plan analyses (MCC, EDF, IIASA, LSE) |
| 3.2 | REDD+ Offsets Working Group (ROW) Workshop on Safeguards, University of California at Davis, March 26, 2013 | Workshop at UC-Davis, California | 1, 2, 4 | Workshop to provide stakeholder input on REDD+ for California market (EDF) |

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| 3.3 | California legislators' delegation study tour on REDD+ to Mexico, December, 2013. | Study tour, Mexico City and Quintana Roo | 4 | Study tour for California legislators to Mexico on REDD+ (EDF) |
| 3.4 | Project Partner Technical Meeting. February 17-18, 2014. | Workshop at MCC-Berlin | 3 | Research partner meeting to exchange and plan analyses (MCC, EDF, IIASA, LSE) |
| 3.5 | "Developing an Options Market and Complementary Financial Structures to Mobilize Private Capital for REDD+. "April 3, 2014. | Workshop in London | 1 | Workshop on market actor views on REDD+ market barriers and opportunities (LSE, CMIA, IETA) |
| 3.6 | "Creating Appropriate private sector incentives to scale up private sector investment in REDD+ from 2015 – 2020." May 15, 2014. | Workshop in London | 1 | Workshop on REDD+ interim finance ideas, including options (GCP, IETA, CMIA, EDF) |
| 3.7 | Acre-SISA Workshop on "Financial Mechanisms for Sustainability". May 21, 2014. | Workshop in Brasilia, Brazil. | 2 | Workshop of Acre partners to coordinate on financing proposals (EDF, IPAM, GCP) |
| 3.8 | Side Event on REDD+ Interim Finance Solutions. June, 2014. | UNFCCC side event in Bonn | 1, 4 | Event on REDD+ interim finance ideas, including options (MCC, EDF, GCP) |
| 3.9 | Signing event of California-Mexico MOU on Climate Cooperation. July 2014. | Event in Mexico City | 2, 4 | Signing event of MOU including reducing deforestation (EDF) |
| 3.10 | Session on REDD+ at Meeting of Global Market Based Measure Task Force (GMTF), Committee on Aviation Environmental Protection (CAEP) of ICAO, June 2014. | Session at ICAO meeting in Bonn | 1, 4 | Meeting to introduce REDD+ to ICAO negotiators (EDF) |
| 3.11 | Session on "REDD+ and BECCs Nexus" at the International Union of Forest Research Organizations (IUFRO) World Congress (October 10, 2014). | Academic session, Salt Lake City | 3 | Academic session on long-term role of REDD+ in climate stabilization (IIASA, MCC, EDF) |
| 3.12 | California policy-maker delegation study tour on REDD+ in Acre, Brazil , May 2015 | Study tour, Acre, Brazil | 4 | Study tour of California policymakers to Acre on REDD+ (EDF with Acre state government) |
| 3.13 | Forests and flights: REDD+ and Aviation's Market-Based Measure, May 19, 2015 | Dinner convening, Washington, DC. | 1, 2, 4 | Dinner and presentations on linking aviation sector representatives and jurisdictional REDD+ (EDF) |
| 3.14 | Seminar on "The Role of Options and Forward Contracts Bridging Carbon and Financial Markets" including Governor Tião Viana of Acre, June 19, 2015 | Seminar, PwC, London | 1, 2 | Seminar with private companies and NGOs on potential finance opportunities for Acre (EDF, LSE, PricewaterhouseCoopers and Acre state government) |

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| 3.15 | Expert Cluster session: “Leveraging private sector finance for REDD+ implementation: financing mechanisms and investible entities”, Global Landscapes Forum: The Investment Case, June 10, 2015 | Session at Global Landscapes Forum in London | 1, 4 | Presentation and discussion on innovative finance approaches to REDD+ with experts and investors (EDF, Permian Global, Global Canopy Programme, UNEP-Finance Initiative, and the Government of Peru) |
| 3.16 | “Accelerating REDD+ into Compliance Markets”, Climate Week Panel Discussion, September 23, 2015 | Climate Week Panel Event, New York, NY | 1, 2, 3, 4 | Panel discussion and event to discuss accelerating compliance market REDD+ (EDF, Encourage Capital and Baker & McKenzie) |
| 3.17 | “Investor Roundtable Discussion on Compliance REDD+”, December 5, 2015, Baker & McKenzie, Paris | Roundtable discussion, Paris | 1, 2, 3, 4 | Panel discussion and convening to discuss REDD+ Acceleration Fund (EDF, Encourage Capital and Baker & McKenzie) |