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# EMERGING COMPLIANCE MARKETS FOR REDD+: AN ASSESSMENT OF SUPPLY AND DEMAND

## SUMMARY FOR POLICYMAKERS

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

MARCH 2013

This publication was produced for review by the United States Agency for International Development.

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The US Agency for International Development (USAID) has launched the Forest Carbon, Markets and Communities (FCMC) Program to provide its missions, partner governments, local and international stakeholders with assistance in developing and implementing REDD+ initiatives. FCMC services include analysis, evaluation, tools and guidance for program design support; training materials; and meeting and workshop development and facilitation that support US Government contributions to international REDD+ architecture.

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# ACRONYMS AND ABBREVIATIONS

ARB	California Air Resources Board
CER	Certified Emissions Reduction
COP	Conference of the Parties
EU ETS	European Union Emissions Trading System
GHG	Greenhouse Gas Emissions
IPCC	Intergovernmental Panel on Climate Change
FCI	Forest Carbon Index
FCMC	Forest Carbon, Markets and Communities Program
FCPF	Forest Carbon Partnership Facility
NICFI	Norway's International Climate and Forest Initiative
REDD+	Reducing Emissions from Deforestation and Forest Degradation in Developing Countries; and the Role of Conservation, Sustainable Management of Forests and Enhancement of Forest Carbon Stocks
REM	REDD Early Movers
tCO <sub>2</sub> e	Metric Ton Carbon Dioxide Equivalent
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
VCS	Verified Carbon Standard

# EXECUTIVE SUMMARY

This document is a Summary for Policymakers of the longer report “Emerging Compliance Markets for REDD+: An Assessment of Supply and Demand”, produced by FCMC with support by Terra Global Capital.

The forest sector is a significant source of emissions contributing between 10 to 17 percent of global emissions.<sup>1</sup> Reducing emissions and sequestering carbon from forests is a cost-effective option to reduce global greenhouse gas (GHG) emissions.<sup>2</sup> The Parties to the United Nations Framework Convention on Climate Change (UNFCCC) are negotiating policy to reduce emissions from deforestation and degradation and enhance carbon stocks (REDD+). To achieve this, there needs to be predictable, long-term finance available to incentivize conservation and sustainable use of forests, the protection of biodiversity, and support local communities whose livelihoods are linked to forests. Global economic studies dedicated to estimating the costs of REDD+ find that the annual funding needs are in the tens of billions of dollars.<sup>3</sup> When these figures are considered against the finite amount of public finance available, a significant funding gap is apparent.<sup>4</sup> As a result, broad participation by the private sector has been envisioned. In 2011 at the seventeenth session of the UNFCCC Conference of the Parties (COP) in Durban, South Africa, the Parties reached the important decision that financing REDD+ could engage the private sector. The Parties agreed that “appropriate market-based approaches could be developed by the COP to support results-based actions.”<sup>5</sup> Many market-based mechanisms for REDD+ are already either developed, under development, or anticipated in the future. Private sector capital has been responsive and has started to develop REDD+ activities and generate REDD+ credits.

The report assessed the policies and early REDD+ actions that represent the current status of market and results-based finance mechanisms for REDD+ around the world. This includes:

- i) Estimates of potential demand for REDD+ credits based on current market initiatives and results-based finance mechanisms
- ii) Estimates of potential supply of REDD+ credits based on an analysis of the current pipeline of REDD+ projects and programs with growth assumptions
- iii) Synthesis of demand and supply findings to understand potential supply-demand balance and implications for REDD+ finance

The demand-side assessment reviews and analyzes potential demand from 30 multilateral, bilateral, national and sub-national initiatives including emerging emission trading schemes in Australia, Brazil, California, Canada, China, and Korea, and multilateral and bilateral initiatives such as the Forest Carbon Partnership

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<sup>1</sup> The higher estimate of 17 percent comes from the IPCC’s 2007 report and estimates emissions from the forest sector as a whole (IPCC (2007) AR4 Synthesis Report). More recent analysis by Winrock International that looked at satellite data to track deforestation finds lower absolute and relative numbers than previously reported in the literature and estimates deforestation contributed to approximately 10 percent of global emissions over 2000 – 2005 (Harris N. et al, (2012): ‘Baseline Map of Carbon Emissions from Deforestation in Tropical Regions’, *Science* 22 June 2012: Vol. 336 no. 6088 pp. 1573-1576.)

<sup>2</sup> For example, see the McKinsey Cost Curve for Greenhouse Gas Reduction, available at [http://www.epa.gov/oar/caaac/coaltech/2007\\_05\\_mckinsey.pdf](http://www.epa.gov/oar/caaac/coaltech/2007_05_mckinsey.pdf); and the Climate Works Forest and Land-use Sector Overview, available at <http://www.climateworks.org/network/sectors/forests-and-land-use>.

<sup>3</sup> IWG/IFR. Report on the Informal Working Group on Interim Finance for REDD+ (IWG/IFR). Discussion document. October 2009.

<sup>4</sup> Simula, M. Analysis of REDD+ Financing Gaps and Overlaps. REDD+ Partnership. December 2010, accessed October 31, 2011 at <http://reddpluspartnership.org/25159-09eb378a8444ec149e8ab32e2f5671b11.pdf>

<sup>5</sup> United Nations Framework Convention on Climate Change. Decision 2/CP.17. Outcome of the work of the Ad Hoc Working Group on Long-term Cooperative Action under the Convention, Paragraph 66

Facility, Germany’s REDD Early Movers fund, Japanese Bilateral Offsetting Credit Mechanism, Norwegian International Climate and Forest Initiative, and the UNFCCC. Potential demand was divided into low, mid, and high range estimates, with total potential demand ranging at 42.5 million, 509.9 million, and 2,921.5 million tons respectively for the period 2013-2020. The single largest potential source of demand was from a future UNFCCC agreement that would include some form of provision for a prompt start and early crediting before 2020. With this excluded potential, demand was 42.5 million, 232.1 million and 539.6 million tons respectively. See Figures 1 and 2 for a summary including and excluding the UNFCCC.

Figure 1: Total demand with UNFCCC (thousands tCO<sub>2</sub>e)

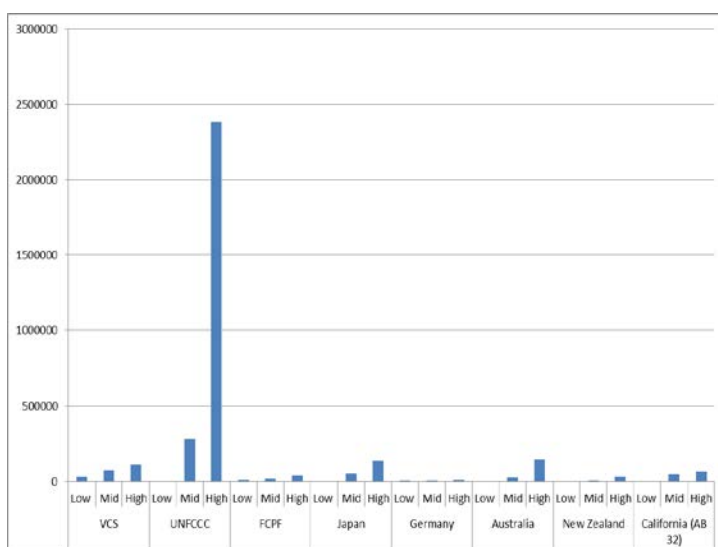
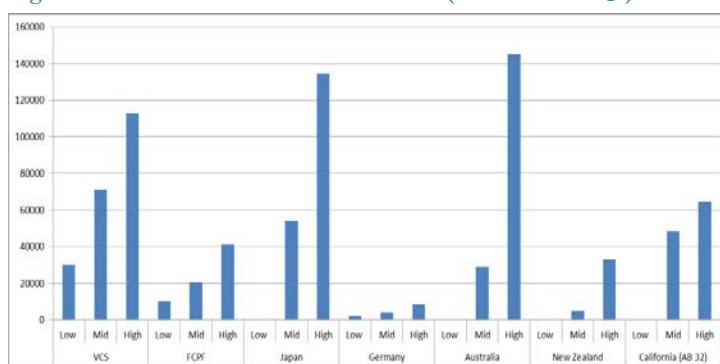


Figure 2: Total demand without UNFCCC (thousands tCO<sub>2</sub>e)



For the supply side analysis, the report used a bottom-up approach and gathered data from REDD+ activities that are expected to produce high-quality credits that may be viewed as “compliance-grade”. Potential supply from these projects and programs was used to develop a projection of the global supply for the period 2013-2020. The supply model was adjusted to take into account various delivery risks, potential to generate credits from past vintage looking back to 2008, and included an assumption as to growth in supply during 2013-2020 from new activities not yet initiated. The results indicated cumulative issuance for the period 2013-2020 will be approximately 283 million credits, with average production over this eight year period at over 35 million credits per year. Pipeline growth is difficult to estimate as it is affected by a number of factors with the most significant being level of demand. Pipeline growth needed to meet each of the demand scenarios was calculated to be 22 percent (low-end demand), 22 percent (mid-range demand) and 240 percent (high-end demand).

The very early stage of this market and the impact of the assumptions included does not allow for an easy comparison of supply and demand findings. Even so, the main findings of the analysis are clear, but not surprising. **Demand for REDD+ credits will be relatively weak compared to potential supply without an agreement under the UNFCCC, even though programs in Australia, Japan, and California could promote some demand. If the Parties reach an ambitious agreement in 2015 that does not allow for a prompt start for a REDD+ mechanism, or reach a modest agreement that does not have a meaningful role for REDD+, demand will remain weak through 2020. A lack of strong demand until after 2020 could cause financial harm to governments, local communities, civil society and the private sector already engaging in REDD+ activities. It could also cause political fallout within countries engaged in REDD+ readiness activities and looking for signs that a REDD+ market is real.** There are two ways to avoid this risk – develop new performance-based compensation vehicles for the 2013-2020 period and increase bilateral funding, and/or ensure an ambitious UNFCCC agreement is reached that includes a prominent role for REDD+ markets with prompt start provisions

# I.0 EMERGING REDD+ DEMAND

## I.1 SOURCES OF DEMAND FOR REDD+ CREDITS

Demand for REDD+ credits is created by two sources: i) regulations or policy that create obligations to purchase credits, and ii) voluntary purchases of credits. Demand for REDD+ credits driven by regulations is currently in its infancy, but has the potential to significantly outweigh voluntary demand. To share a sense for the scale of possibility, in 2011 the total market for emission reduction credits from all sources was \$176 billion, of which only \$569 million was from the voluntary market.<sup>6</sup> Already speculative “pre-compliance” demand is being observed in California: in 2011, approximately 23 percent of the forest carbon market was motivated by buyers interested in possible financial returns from the potential grandfathering of compliance-grade voluntary credits to emerging compliance markets such as California. As many of the emerging compliance programs have yet to formalize rules for inclusion of credits, this source of demand is currently a significant driver of investment in REDD+ activities.

Program design features are critical to assess scale of demand for credits. Prospective demand sources were therefore analyzed based on the following factors:

- i) *Sources of demand:* A review of emissions trading mechanisms that have been enacted and either implemented or under development (and so creating demand that is referred to as “pre-compliance”). National and sub-national bilateral agreements that will generate demand for REDD+ are also assessed.
- ii) *Quantity of demand:* Projections of demand for REDD+ credits per market. Different assumptions were used to generate low-end, mid-range and high-end volume forecasts.
- iii) *Credit eligibility criteria:* The likely criteria for REDD+ credits to be included in each market, including project location, methodology and scale in accounting scheme.
- iv) *Market rules:* The key elements of market design, including rules on banking and borrowing, credits inclusion ceilings, acceptance of liability, compliance periods and qualifying vintages, and mechanisms for linking with other markets.
- v) *Additional forest carbon specific factors:* rules on additionality, non-permanence risk and liability, monitoring, reporting and verification.

The largest potential source of demand pre-2020 comes from a future UNFCCC agreement. In the shadow of the UNFCCC, a suite of national and sub-national compliance programs are emerging. Many of these compliance programs are still at very early stages in their design and implementation. Nevertheless, the design of emerging program infrastructure and evidence from pre-compliance REDD+ activities offers insight into future market development. See Table 1 for a summary of key programs and demand estimates, and Figures 2 and 3 for annual total demand estimates with and without UNFCCC demand.

The full *Emerging Compliance Markets for REDD+: An Assessment of Supply and Demand* report includes a review of compliance programs’ design components and additional details on program design features and assumptions used to estimate potential demand.

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<sup>6</sup> World Bank (2012). *State and Trends of the Carbon Market 2012*, accessed September 19, 2012 at [http://siteresources.worldbank.org/INTCARBONFINANCE/Resources/State\\_and\\_Trends\\_2012\\_Web\\_Optimized\\_19035\\_Cvr&Txt\\_LR.pdf](http://siteresources.worldbank.org/INTCARBONFINANCE/Resources/State_and_Trends_2012_Web_Optimized_19035_Cvr&Txt_LR.pdf)



## I.2 SUMMARY OF PROGRAMS AND DEMAND ESTIMATES

Table 1: Summary of Programs, Design Features for REDD+ and Potential Demand in Low- Mid- and High- Scenarios

Type	Program	REDD+ Design Features / Rules	Demand 2013-2020 (thousand tons CO <sub>2</sub> e)	
			Low-	High-
Voluntary	<b>Verified Carbon Standard (VCS)</b> is a GHG reduction and removal certification standard that dominates the voluntary market in general, and the forest market in particular.	As a voluntary standard, demand for REDD+ is largely supported by voluntary and pre-compliance purchases, which may vary over time. There are no limitations for use of REDD+ credits. Demand volume estimates follow historical trends as reported in market surveys.	Low-	30, 100
			High-	112, 800
The US <b>Climate Action Reserve</b> and the <b>American Carbon Registry</b> are also assessed in the report though today lack sufficient volume or signals to be include in the demand forecast.				
Multilateral	<b>UNFCCC demand</b> is linked to a future agreement under the UNFCCC, which may also create some demand via the Kyoto Protocol.	Assumptions for future REDD+ demand hinge on an agreement that allows a “prompt start” for REDD+ credits recognized from 2016, with Parties’ commitments that reflect the pledges made in the Copenhagen Accords and 49 percent (high) and 25 percent (mid) caps placed on the number of offsets that can be used to meet reductions, with further caps (25 percent high, 10 percent low) on the proportion that can come from REDD+.	Low-	0
			Mid-	278, 778
			High-	2,381, 944
	<b>Carbon Fund of the Forest Carbon Partnership Facility (FCPF)</b> will support demand for forest-based mitigation by compensating non-Annex I countries for verified emissions reductions.	The volume of demand for emissions reductions from the Carbon Fund is a function of the sum of funds available for purchases, and the price paid for each emissions reduction unit. The amount of funds available for purchases is assumed to be pledged money minus administration costs.	Low-	10, 250
Mid-			20, 600	
High-			41, 200	
<b>Green Climate Fund</b> was established by the Copenhagen Accord to support projects, programs, policies and other activities in developing countries related to mitigation, including REDD+. The administrative structure of the Fund is currently being organized, however investment strategy and the extent of capital deployed to REDD+ has yet to be determined.				
Bilateral	<b>Japan</b> will meet its Kyoto commitment through a combination of domestic reductions complemented by government purchase of Kyoto credits and potentially other units.	The World Bank estimates Japan will generate a demand for up to 539 MtCO <sub>2</sub> e international offsets from non-Annex I countries between 2013 and 2020. This includes demand for Kyoto credits along with demand under its proposed Bilateral Offsetting Credit Mechanism which may include REDD+.	Low-	0
			Mid-	54,000
			High-	134,750
	<b>Germany’s REDD Early Movers (REM)</b> support pioneers in the REDD sector, countries who are taking risks and acting independently towards mitigating climate change through preserving their forests.	REM modalities direct funding to national and sub-national programs in exchange for ex-ante and ex-post REDD emissions reductions. Bilateral activities such as the REM do not transact credits for compliance, yet will create demand for REDD+, therefore displacing supply of emissions reductions.	Low-	2,120
Mid-			4,200	
High-			8,480	
<b>Norway’s International Climate and Forest Initiative (NICFI)</b> funds several bilateral and multilateral efforts aimed at reducing deforestation and testing results-based payment. The initiative is not currently designed to involve transacting credits or tradable credits, and there is no indication that this will change in the immediate future.				

Regional	The <b>European Union Emissions Trading System (EU ETS)</b> was launched in 2005 and is the largest emission trading market in the world, though excluded forest carbon in its first two phases due to concerns as to environmental integrity and potential over supply threatening the stability of a system focused on industrial efficiency initiatives. Despite a theoretical window, it is unlikely that REDD+ will be allowed into Phase 3 of the ETS.			
National (Annex I)	<b>Australia's Clean Energy Future Program</b> includes a cap-and-trade mechanism. The legislation outlines rules for using international credits.	From July 2015 onward, international emissions units are allowable for up to 50 percent of an entity's compliance obligation. REDD+ credits are not currently included on the list of eligible international emissions units. There is scope for including REDD+ credits – particularly if an international REDD+ crediting mechanism is put in place under a UNFCCC agreement – but in order to admit REDD+ before 2020 the future UNFCCC REDD+ mechanism would need to fast-track implementation and include a “prompt start” mechanism.	Low-	0
			Mid-	29,000
			High-	145,000
	<b>New Zealand's ETS</b> commenced at the beginning of 2008 with forestry as a covered sector from the start.	New Zealand compliance entities are currently able to use unlimited international units to meet their emissions reduction liability with only qualitative restrictions. International units include Kyoto units and “approved overseas units”, which could arguably include REDD+ units issued under a future UNFCCC mechanism. As stated above, in order to admit REDD+ before 2020 the future UNFCCC REDD+ mechanism would need to fast-track implementation and include a “prompt start” mechanism.	Low-	0
			Mid-	4,688
			High-	32,813
National (Non-Annex I)	The emergence of non-Annex I domestic programs could drive demand for domestic REDD+ credits, particularly if linkage with other programs. <b>Brazil</b> has recently taken steps to create a domestic carbon market with its emissions reduction goal including the forest sector, though it remains to be seen whether a domestic trading program will allow forestry credits. <b>China</b> has an ambitious 12 <sup>th</sup> Five-Year Plan that commits to an emissions intensity target and is stimulating comprehensive climate change legislation currently. A credits component is being structured for regional and national programs, and though a forest credits program would be consistent with the country's climate change mitigation goals to increase forest cover, it is too early to forecast REDD+ inclusion and volumes. In <b>Colombia</b> , a voluntary platform is being established to trade emissions reductions and will serve at the outset to find buyers for domestic forest carbon credits issued on the voluntary market. Consideration of a credits component for the trading platform currently under development is not expected to create domestic demand on its own. <b>Korea</b> has passed domestic cap-and-trade legislation, though key design features have not yet been addressed and forest credit potential within the program is not known.			
Sub-National	<b>California's Assembly Bill (AB) 32</b> directed the California Air Resources Board (ARB) to develop and adopt regulations to establish a statewide cap-and-trade program. Regulations were formally incorporated in 2012, and will cover 85 percent of the State's GHG emissions.	The final cap-and-trade regulation under AB32 specifically recognizes REDD as a “sector-based” offset. Compliance demand for REDD requires additional rules, particularly around a sector-based crediting mechanism. The cap on sector-based credits with which REDD has been specified is set at a sub-limit within the 8 percent credit cap. Sector-based credits can be used for 2 percent of a covered entities total compliance obligation to 2017, and 4 percent to 2020. Based on the emissions allowance budget, the maximum volume of demand for sector-based credits is 70.95 million units.	Low-	0
			Mid-	48,400
			High-	64,500
<b>Total REDD+ Demand:</b>			Low-	42,470
			Mid-	509,865
			High-	2,921,487

Note that in the forecasting methodology used, a program's anticipated demand is assumed to start at the earliest date REDD+ credits are allowed. For example, the California Cap-and-Trade-Program offset allowance regulations are still under development. As such, California demand is assumed to commence in 2015. In Australia and New Zealand, REDD+ inclusion will be a function of linking with a REDD+ mechanism under the UNFCCC and so the 2015 target is considered to be the earliest date. All other demand sources are assumed to commence in 2013, with further important caveats to methodology outlined in the full assessment report.

Figure 3: Annual anticipated demand - including UNFCCC (thousands of tCO<sub>2</sub>e)

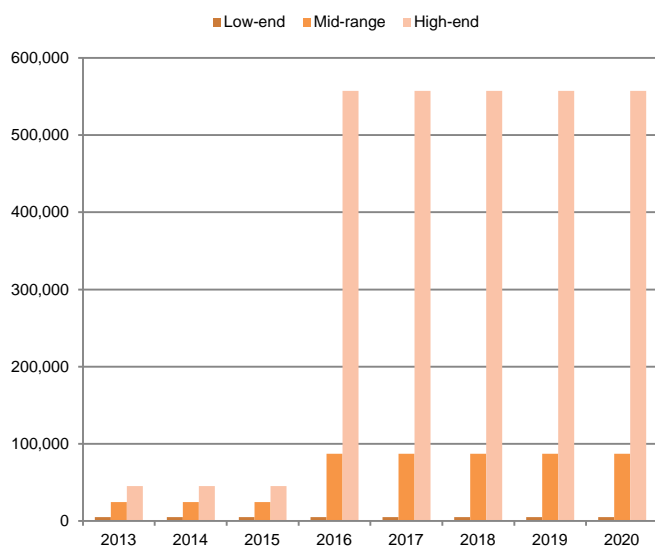
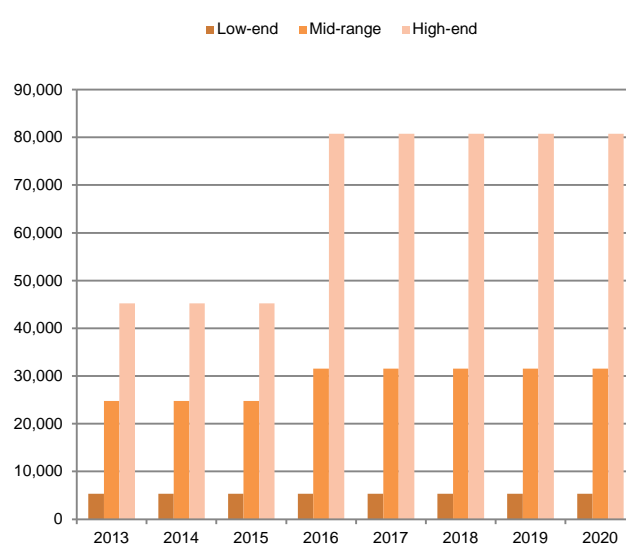


Figure 4: Annual anticipated demand - excluding UNFCCC demand (thousands of tCO<sub>2</sub>e)



## 2.0 REDD+ CREDIT SUPPLY

To date, studies aimed at predicting future REDD+ emission reduction potential and credit supply have been built on “top-down” global economic modeling approaches used to simulate markets for forest and agriculture commodities. The general approach using global economic models to predict emissions reductions rests on determining the biophysical potential for emission reductions in forest areas where the economic case will justify a switch from forest use (conversion) to forest protection. From this, deductions can be layered on to discount for a range of factors such as technical and political feasibility, and different price points for REDD+ credits. Such models are useful in providing a glimpse of the “full potential” of GHG emission reductions in forests, derived from opportunity cost and credit price assumptions. But there are limitations in coarse underlying data, price assumptions and often simplistic accounting approaches. Many “top-down” models do not incorporate important practical issues that will affect the actual supply of REDD+ credits.

The supply analysis of the report therefore seeks to improve on the limitations of such “top-down” models, through developing a “bottom-up” analysis of potential 2013-2020 supply for REDD+ credits. The results generated offer the market its first accurate short- to medium-term view of supply that reflects certain political, finance and implementation issues that are not always reflected in top-down models.

### 2.1 A BOTTOM-UP EMPIRICAL SUPPLY MODEL

The empirical model is constructed from high quality, site-specific emissions reductions data that is publicly available for early REDD+ activities currently in operation, or in late stages of project development prior to first issuance. Only projects or programs that are considered to be of high enough quality for use in emerging compliance programs are included (so referred to as “compliance-grade”). The analysis includes project activities, but also those implemented at a program scale (referred to as “sub-national” in a UNFCCC context and “jurisdictional” under the VCS).

Activities that have already met criteria to produce compliance-grade credits were categorized as Level I (seven activities in the dataset), while projects or programs still preparing to meet such criteria were categorized as Level II (73 activities in the dataset, of which three were jurisdictional programs<sup>7</sup> and the rest projects). This means that only those activities which focused resources and calculated emission reduction potential for a defined area qualified for a dataset, a threshold selected on the basis of current rules in compliance-grade standards.

An empirical approach to projecting supply was designed for each level, which, when aggregated, generates a probable scenario for the REDD+ credit pipeline for 2013-2020. Data was verified with operators of REDD+ activities where possible, and discount factors were applied to adjust the output for uncertainties in a project or program’s size, timing and probability of issuance (fully detailed in Appendix II of the report).

Modeled supply was then adjusted for a further two variables that may influence future scenarios: i) whether credits from actions undertaken in past years qualify in compliance demand sources ii) growth of new supply in a growing market. Given that the model’s scope is limited to the pipeline of activities already planned or operating, this approach risks understating supply in the scenario where greater than expected compliance demand is created.

The combined estimate of Level I and II data sets shows total credit volumes of approximately 283 million credits up to 2020, with average annual production just over 32 million credits per year (for the years following the over-stated first issuance which includes “retro-credits” [or “back-dating”] for vintages as far back as 2008).

Figure 5: Annual Credit Issuance – Issuance Delay and Backdating to 2008 (tCO2e)

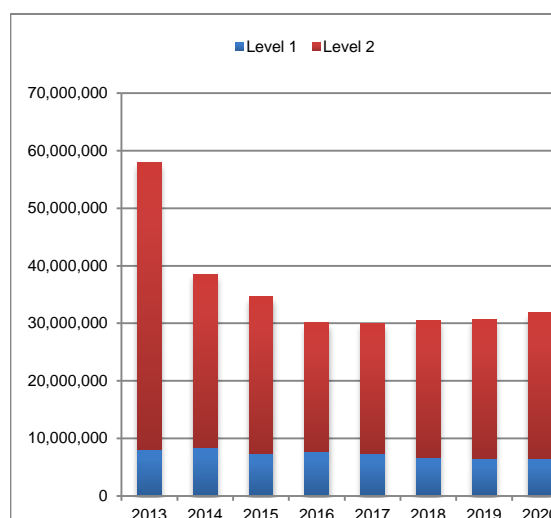
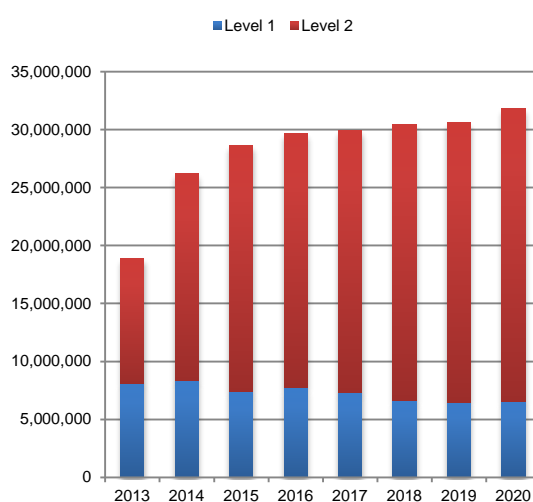


Figure 6: Annual Credit Issuance – Issuance Delay and No Backdating (tCO2e)



Note that this effect proved important: removing such back-dating lowers supply estimates by 25 percent. While there is a precedent for allowing retro-credits in emerging compliance markets like California, rules for REDD+ crediting have yet to be finalized in any markets.

<sup>7</sup> The District of Berau in Indonesia, the State of Acre in Brazil, and the Cotriguaçu pilot in the state of Mato Grosso in Brazil. Many jurisdictional approaches to REDD+ are currently focused on governance aspects of REDD+, addressing forest security, land-tenure and property rights issues, while also raising capacity in government institutions to manage and protect forests that may be brought under REDD+. To date only a handful of these programs have regulatory and institutional frameworks to support REDD+ in place. For this reason, estimating future crediting from these efforts is difficult.

The REDD+ activities within the data reveal that credit generation is likely to come from 23 different countries. Indonesia will likely produce a significant share of REDD+ credits, as its carbon-rich peat forests allow for very high number of credits produced per hectare.

As this empirical model relies on the existence of site specific REDD+ activities, an expansion of the pipeline’s growth from new projects was overlaid. This is difficult to estimate given its sensitivity to future demand. Pipeline growth needed to meet each of the demand scenarios was calculated to be -22 percent (low-end demand), 22 percent (mid-range demand) and 240 percent (high-end demand). The average annual growth of certified emissions reduction (CER) issuance from the last three years was also used as a benchmark to estimate future growth. This growth rate of 46 percent to 2020 was applied to the Level I and Level II projections, resulting in an additional 819 million credits being issued to 2020. This scenario is only likely if demand forces purchases of emission reductions at production cost or higher.

**Table 2: Total Supply Estimate Including Conservative Growth Factor**

Issuance Date	2013	2014	2015	2016	2017	2018	2019	2020	Total Volume 2013-2020
Combined Level I and II	57,912	73,234	92,422	102,876	116,932	118,846	131,287	125,759	819,269

## 2.2 COMPARATIVE REVIEW OF “TOP DOWN” REDD+ SUPPLY MODELS

As a comparative “sense check,” the report considers the results of its empirical model summarized above against existing top-down analyses that draw on biomass data to forecast emission reduction potential in likely REDD+ areas. A selection of emission reduction volume estimates derived from global economic models was gathered from scientific and policy literature and found a very wide ranging emission reduction potential for the years 2013-2020: 59 million to 23 billion tCO<sub>2</sub>e (the high-end representing biophysical potential rather than feasible supply). Of the different models considered, the Forest Carbon Index (FCI)<sup>8</sup> model adjusted to try and account for various risks<sup>9</sup> yields the closest estimates to the pipeline volumes of this report’s empirical model. Assuming a \$10 credit price, the FCI model estimates 812 million tCO<sub>2</sub>e will be produced over the period 2013-2020, compared with this report’s estimate of 833 million tCO<sub>2</sub>e when a growth factor is applied.

## 2.3 IMPLICATIONS OF SUPPLY FORECASTS

Two key determinants to the development of a supply pipeline for REDD+ credits are identified as: i) operator capacity to implement, and ii) availability of primary (to finance) and secondary (to support returns to financing) capital. Academic literature and policy discussion papers often focus on the importance of primary capital and potential credit volumes from REDD+. As with infrastructure and agricultural projects, REDD+ activities are characterized by limited control over the schedule of future production because REDD+ operators are unable to easily lower subsequent years’ credit generation (and production costs) in response to low credit prices. Scaling down credit issuance volume from a particular area in response to low demand and low prices is therefore difficult without compromising the project or program’s ongoing success. Because most REDD+ activities are limited in their ability to manage credit production in response to price,

<sup>8</sup> The Forest Carbon Index is a GISbased model developed by Resources for the Future and Climate Advisers that calculates the global potential to generate emission reductions from stopping or slowing deforestation. More information can be found at: <http://www.forestcarbonindex.org>

<sup>9</sup> Coren, M., Streck , C., Madeira, E. 'Estimated supply of RED credits 2011–2035', Climate Policy, 11:6, 1272-1288.

there is high potential for the REDD+ credit market to encounter sustained periods of over-supply or under-supply. From an investor's point of view, the future supply pipeline of credits is a critical starting point for REDD+ market analysis, and will be a subject of intense scrutiny in the near term as markets develop.

## 3.0 MARKET OUTLOOK AND CONCLUSION

Potential market outcomes are noted in order to understand the prospect for large-scale capital flows needed to finance REDD+. The key determinant to future market dynamics is the development of demand resulting from a UNFCCC agreement on REDD+. Given the significant demand that a future UNFCCC agreement may generate, and the uncertainty around both the timing and the rules of such an agreement, it is illustrative to show analysis with and without this source of demand.

While a simple comparison of aggregate supply against aggregate demand is a key objective, important limitations to this are noted:

- i) Eligibility of projects and programs categorized as “compliance-grade” across the different demand sources presented is uncertain – no compliance program has yet developed rules or criteria for recognizing REDD+ credit. It is therefore impossible to say how many (if any) of the activities in the supply side analysis may in fact be eligible for use in any of the programs identified in the analysis of demand. Given different eligibility rules, a fragmented market may persist if REDD+ credits are not fungible across all market segments, with some markets oversupplied and others undersupplied.
- ii) It is important to caveat that supply-demand analysis at such an early stage of market development is highly speculative.

These caveats make a direct comparison of demand and supply estimates problematic. However, the potential to generate credits under a compliance-grade voluntary standard is a useful indicator of the potential to also generate credits under any similarly rigorous compliance standard. The cumulative credit supply from the empirical study is charted alongside cumulative anticipated demand levels in Figures 7 and 8 below.

With assumptions used in the report's modeling of REDD+ credit supply and demand, including an ambitious UNFCCC agreement allowing a prompt start for REDD+, demand could be generated that significantly exceeds estimated credit supply.

If UNFCCC demand is moderate or absent, oversupply is almost certain based on our projections of supply growth. Only with no growth in today's pipeline supply and demand dynamics will this scenario have the potential to balance.

Figure 7: Cumulative Supply and Demand - excluding UNFCCC demand (thousands of credits)

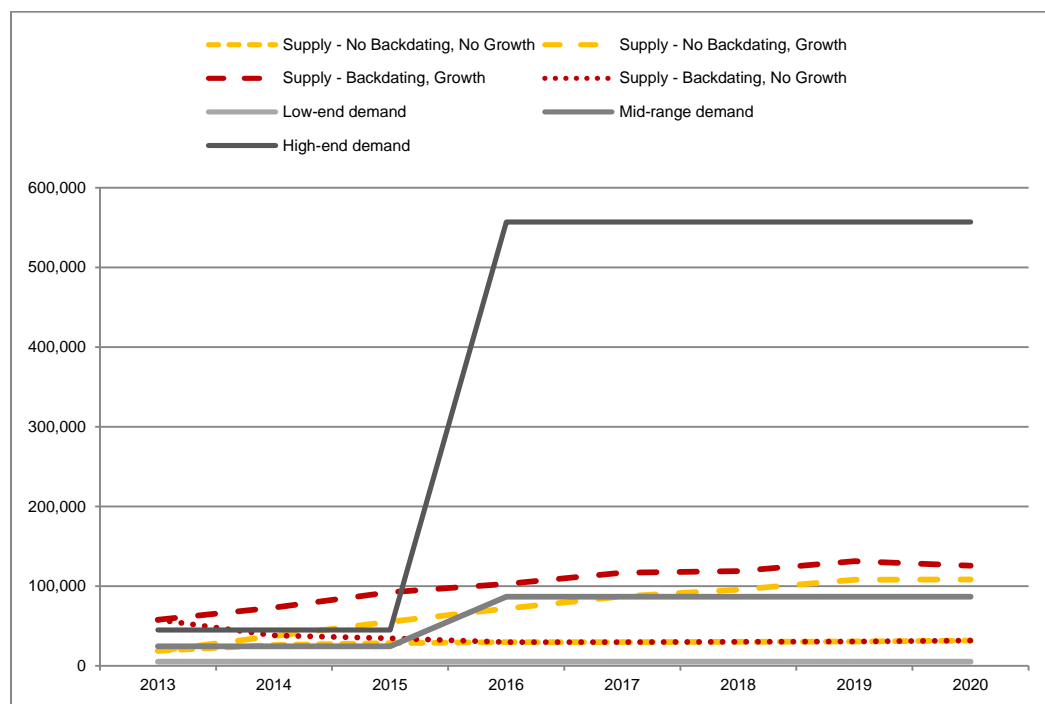
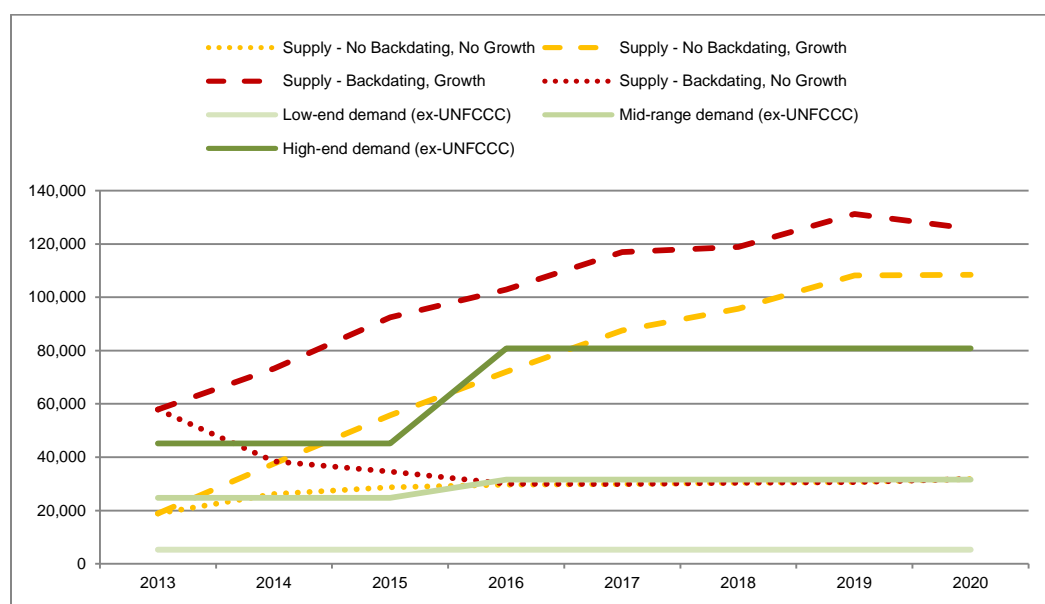


Figure 8: Cumulative Supply and Demand - excluding UNFCCC demand (thousands of credits)



The key findings of the analysis are clear, but not surprising. The low-end estimates of demand will result in significant oversupply of the current pipeline from 2013-2020, the mid-range demand estimates predict oversupply from 2013-2015, and high-end demand estimate predicts oversupply in 2013 and potentially 2014, depending on growth. The scale of the market imbalance in the low-end scenario would pose dire consequences for current REDD+ operators seeking to generate revenues or exit investments through credit sales in the end-market. Insufficient demand in the end-market would translate to a deflated price of REDD+ credits through the period of oversupply.

### 3.1 CONCLUSION

The low-end estimates of demand will result in significant oversupply of the current pipeline from 2013-2020, the mid-range demand estimates predict oversupply from 2013-2015, and high-end demand estimate predicts oversupply in 2013 and potentially 2014, depending on growth. The scale of the market imbalance in the low-end scenario would pose dire consequences for current REDD+ operators seeking to generate revenues or exit investments through credit sales in the end-market. Insufficient demand in the end-market would translate to a deflated price of REDD+ credits through the period of oversupply. Given the long-term cash-flow structure of REDD+ activities, an illiquid secondary market and deflated prices means that revenues from credits sales may not cover activity operating (production) costs. This places the project or program at risk of insolvency and heightens the risk to the primary capital investment. Prolonged periods of negative cash flows may push many REDD+ stakeholders to turn to other means of revenue creation – in cases of forest use or extraction of forest products this may equate to the abandonment of REDD+ in favor of converting previously protected forests to other land uses. Clearly, such oversupply would be counter-productive in the eyes of regulators responsible for market design: the resulting low carbon price would fail to stimulate low carbon investment.

Another gloomy consequence if the REDD+ credit market were to be oversupplied is the heightened risk to the sector of not being able to produce a risk-adjusted return that would lead to the unavailability of the primary capital needed to fund REDD+ startup costs. When investors do not have a means to recoup primary capital investments through credit sales, there will be no willingness to lend/invest and limited opportunities to pre-sell credits. In this case, the means for primary capital procurement would be through conservation-based grants and other forms of public finance. To sustain REDD+ activities during periods of oversupply, increases to bilateral funding and development of additional performance-based compensation vehicles may be relied upon to absorb excess supply and buoy the market for REDD+ credits.

On the bright side, progress in the design of a future UNFCCC REDD+ mechanism and certainty surrounding a market-based approach would spark demand and likely enable the market to sustain periods of oversupply. A positively sloping price curve, where demand is expected to outpace supply in the future, sends a signal to the market that prices will be higher in the future, and therefore incentivizes purchases at today's lower levels. Under compliance programs where banking is allowed this strategy enables entities to build a supply of credits for use in the future when prices are attractive. Data and assumptions used in the analysis also indicate an ambitious agreement is warranted. The Copenhagen Accord pledges were used to calculate potential UNFCCC demand, and the pledges are known to be insufficient to mitigate a high risk of 2°C warming. The pledges represent anywhere between a 5,000 -9,000 million tCO<sub>2e</sub> emissions gap between what is pledged and what is needed by 2020. Given this gap an ambitious UNFCCC agreement that generates additional emission reductions is warranted, which should provide ample scope for a robust market mechanism for REDD+.

**Demand for REDD+ credits will be relatively weak compared to potential supply without an agreement under the UNFCCC, although programs in Australia, Japan, and California could promote some demand. If the Parties reach an ambitious agreement in 2015 that does not allow for a prompt start for a REDD+ mechanism, or reaches a modest agreement that does not have a meaningful role for REDD+, demand will remain weak through 2020. A lack of strong demand until after 2020 could cause financial harm to governments, local communities, civil society and the private sector already engaging in REDD+ activities. It could also cause political fallout within countries engaged in REDD+ readiness activities and looking for signs that a REDD+ market is real. There are two ways to avoid this risk – develop new performance-based compensation vehicles for the 2013-2020 period and increase bilateral funding, and/or ensure an ambitious UNFCCC agreement is reached that includes a prominent role for REDD+ markets with prompt start provisions.**