The challenge
The latest Intergovernmental Panel on Climate Change (IPCC) report [1] warns that we must decrease greenhouse gas pollution by 45 percent from 2010 levels by 2030 to limit global warming to a safer 1.5°C goal. Climate change needs to be addressed urgently, and a significant hurdle that must be overcome is securing financing for projects that can achieve large scale mitigation. The OECD estimates that a gap of $6.9 trillion of annual investments must be filled to meet our climate goals [2]. Carbon pricing via taxes, emission trading systems, and voluntary initiatives from the private sector, have all been a growing and cost-effective way to finance mitigation while making it increasingly costly to pollute. Both by policy design and supply and demand dynamics, the price of carbon emissions, measured in tons of CO2 (tCO2), has risen from having no value three decades ago to over $15 in California, $25 in the EU and $120 in Sweden today. It is in the best economic interest of firms in industries subject to carbon pricing regulations and of voluntary players to hedge carbon price increments. Hence, devising a mechanism for firms to hedge that risk can harness the power of finance into the fight against climate change in the present, when it is most needed.

The solution - Carbon Option+
We have structured an innovative, over-the-counter, carbon derivative: a call option, with a ton of carbon as the underlying asset, giving purchasers the right, but not the obligation, to acquire carbon credits at predetermined prices in the future. Our hedging instrument, Carbon Option+, will help regulated and voluntary carbon credit buyers reduce the risk of overpaying in the future for their emissions goals and obligations, while financing early action on urgent climate change issues. Development Finance Institutions will serve as buyers of last resort, providing a backstop if the price of carbon does not exceed the strike price defined in the option contracts. Carbon Option+ offers buyers with different risk-aversion profiles different strike prices to choose from. Revenue from the options premiums sold will be paid into a fund that will finance mitigation projects with the potential to generate a large volume of carbon credits with environmental and social co-benefits. We will start with a pilot project as proof of concept, and proceed with our vision of becoming a global marketplace for carbon derivatives.

Demand for Carbon Option+
For our pilot, we are focusing on demand for carbon credits in Colombia, which introduced a carbon tax in 2016 and has an emissions trading system under design. Both mechanisms allow regulated firms to meet their emissions obligations by purchasing verified carbon credits from agricultural and land use projects, creating a predictable, large scale and policy-backed source of demand for this type of carbon credits. Over 46 national and subnational jurisdictions are following. At the corporate level, companies like Microsoft have pledged to become carbon negative, and are increasingly looking at forestry and agricultural mitigation as a way to achieve their ambitious and large scale emission reduction goals. An additional source of demand for carbon credits will be the International Civil Aviation Organization (ICAO), which in order to fulfill its emissions goals, will create the largest voluntary source of demand for carbon credits in the world.

Global demand for carbon credits from compliance and voluntary markets

Carbon Pricing initiatives around the World

<table>
<thead>
<tr>
<th>Tons of CO2 covered</th>
<th>Proportion of global emissions</th>
<th>Estimated demand for carbon offsets to 2030 (US$Bn)</th>
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<tbody>
<tr>
<td>11.6tCO2</td>
<td>20%</td>
<td>$5.5 trillion</td>
</tr>
</tbody>
</table>

Source: World Bank and Ecosystem Marketplace

Note: Assume $5 per tCO2e

"We are very interested in strategies that allow us to proactively manage our exposure to climate change related risks. If you tell me that I can fix the price of one of the major components of our tax expense, I do not think of a reason not to do." - Henry Cubides
Founder of Colonoquias, Envia, Chairman of EasyFly, Largest commercial transportation conglomerate in Colombia

Financing mitigation at scale
For Colombia to achieve its emissions goals, the cattle sector must transition towards sustainable land use and less emissions-intensive milk and beef production. Relevant stakeholders such as the Colombian Ministry of Agriculture and Rural Development and the World Bank, among others, have pursued silvopastoral programs to reduce the area devoted to pastures in the country and restore natural forest cover. These programs have typically faced funding gaps that finance from Carbon Option+ will help fill. As a proof of concept, we will channel the revenue from the option premiums sold to finance consolidated multi-stakeholder programs that generate carbon credits at the intersection of sustainable land use and sustainable beef and milk production, while improving cattle farmers yields by building technical capacity and providing payments for ecosystem services.

Instrument Diagram
Option contracts sold to corporate buyers under emissions compliance obligations (1.a). Impact investors choose an investment length and each investment is paired with an options contract tranche (1.b). A range of IRRs is offered to investors 1%-12%. A management fee of 5% for every investment, contract sold, and offset sold. 95% of funds are used to finance emission mitigation projects (2). 1% IRR represents the worst case scenario when buyer of last resort buys offsets at $5/tCO2e, in other words, when the spot price for a given tranche at time t is below the contract strike price (4.b.1. and 4.b.2). 12% IRR represents a predefined limit so that for any IRR above 12%, the surplus turns into profit for the fund.

Key details

<table>
<thead>
<tr>
<th>Key Metrics</th>
<th>Target Geography</th>
<th>Fund Size</th>
<th>Minimum contract size</th>
<th>Minimum Investment</th>
<th>Size of addressable market</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Colombia, Caquetá department</td>
<td>$10 M USD</td>
<td>1 lot of 8,500 carbon offsets</td>
<td>$45,000</td>
<td>$10.4 billion</td>
</tr>
</tbody>
</table>

Target investors
Companies regulated under the Colombian carbon pricing policies. CORSIA. Voluntary buyers from all industries. Development Finance Institution or large corporate buyers places backstop by serving as buyer of last resort

Time horizon
20 years

Asset Class
Call option for a ton of CO2e

Target Class
For investors: 1%-12%

Key details

83% of pastures in Colombia are under-managed and 27% unmanaged. Very low average stocking rate of 0.86 heads/hectare [3]
26% of emissions in Colombia can be linked to the livestock sector due to cattle driven deforestation and biological emissions [3]

ISFL-Consortium with proven experience developing large scale silvopastoral projects
Key assumptions

- We have used the Black Scholes Formula to price our option premiums and our contracts follow an European option model. A lognormal distribution that reflects the upward trend of carbon prices was used.
- The Colombian carbon price of $5 tCO2e was taken as the basis for the current spot price. Various strike price options were used for the analysis.
- The average cost of Monitoring, Reporting and Verification is USD $0.10/tCO2[5]
- Sold option premiums are paid into the fund and any funds not disbursed will be invested at the at the risk-free rate annually compounding 2%. 
- All investments are paired with a tranche of the same size to guarantee enough liquidity to meet minimum IRR.

Environmental and social impact

The Initiative for Sustainable Forestry Landscapes by the World Bank's BioCarbon Fund helps farmers improve the stocking rate in selected farms (more heads of cattle per hectare). By reducing the amount of pastures necessary to raise cattle, the spared land can be used for reforestation. After 20 years rate of carbon accumulation of those forests begins to slow down and most of the carbon sequestration potential has been realized [4], making it the right time to issue carbon credits. This is the factor that explains the 20 year time horizon of our financial vehicle.

Risks and mitigation

The main risk we face would be not meeting our liabilities in terms of offsets generation or cash to meet investors expectations. We plan to mitigate this risk by including a clause in the financing contract with the buyer of last resort in which it serves as the role of catalytic first-loss, making it liable to compensate carbon option+ buyers if the project fails to generate the number of emission reduction units expected. In addition, we will only pursue projects that include a buffer, a mechanism to secure a certain level of emission reductions even in the case of partial success of the projects.

For each 1,000 ha restored, 80 permanent jobs are created, a total of 1,920, 5 times the status quo $2.97 million in payments for ecosystem services and capacity building to 3,500 households per year for 20 years

" In 2010 the Colombian government presented a national scale program to accelerate the transition to sustainable milk and meat production in Colombia. We were looking for $900 M USD, an ambitious sum but it was what we needed. We secured only a small portion of that and had to reduce our scope to only a portion of farms. "

Manuel Gomez
Chief Sustainability Officer, Colombian Livestock Farmers Association (FEDECAN)

The implementation phase of the project includes a payment for ecosystem services component. It has been shown that payments for ecosystem services to farmers in rural Latin America increases social capital in communities [6]. This is specially important in a country like Colombia, which signed in 2016 a peace treaty to end its 50 year old civil war.

References

1. IPCC, 2018. Summary for Policymakers of IPCC Special Report on Global Warming of 1.5°C approved by governments
2. OECD, 2017. Mobilising resources for sustainable development and climate action in developing countries
3. Tapasco et al., 2019. The Livestock Sector in Colombia: Toward a Program to Facilitate Large-Scale Adoption of Mitigation and Adaptation Practices
4. Requena Suarez et al., 2019. Estimating aboveground net biomass change for tropical and subtropical forests: Refinement of IPCC default rates using forest plot data
6. Alix-Garcia et al., 2018. Payments for environmental services supported social capital while increasing land management

All opinions expressed by our partners were recorded in preparatory interviews and have their full endorsement.