

# Droneseed

## APPLICATION FOR STRIPE 2020 NEGATIVE EMISSIONS PURCHASE

### Section 1: Project Info and Core Approach

#### 1. Project name

DroneSeed: Pioneering financial mechanisms for reforestation

#### 2. Project description. *Max 10 words*

Reforesting landscapes via heavy-lift drone swarms and science-based seed enablement

#### 3. Please describe your negative emissions solution in detail, making sure to cover the following points:

- a) Provide a technical explanation of the project, including demonstrations of success so far (preferably including data), and future development plans. Try to be as specific as possible: all relevant site locations (e.g. geographic regions), scale, timeline, etc. Feel free to include figures/diagrams if helpful. Be sure to discuss your key assumptions and constraints.
- b) If your primary role is to enable other underlying project(s) (e.g. you are a project coordinator or monitoring service), describe both the core underlying technology/approach with project-specific details (site locations, scale, timeline, etc.), and describe the function provided by your company/organization with respect to the underlying technology/approach.
- c) Please include or link to supplemental data and relevant references.

#### *Max 1,500 words (feel free to include figures)*

All climate models that result in a sustainable solution assume significant carbon sequestration in the coming decades. As Stripe has noted in its “decrement carbon strategy,” the tools to sequester GHGs at scale currently do not exist. Landscape-level reforestation is the most cost-effective method of carbon sequestration: nature itself has provided eons of proof of concept, there are no unintended consequences or significant energy requirements, and the vast physical space required to sequester millions of megatons of carbon only adds benefits (namely: beauty, property values, watershed protection, and biodiversity) rather than introducing more challenges.

The magnitude of lands now slated for reforestation worldwide is unlike anything that has ever been

attempted. The terrain is complex. Tools and techniques haven't been updated, and financial vehicles to fund slow-growing trees into the future are conspicuously lacking. This project pioneers advances on each of these fronts--and does so at scale, in real-world conditions.

Our current tools (literally: a shovel and boots) lend more to triaging forest loss than they do to adding significant quantities of new forest. With the aim of effectively scaling these efforts, DroneSeed has developed the first industrial-scale tool ever specifically designed for reforestation. Using science-based seed enablement technologies as the foundation, our heavy-lift drone swarms are able to reforest landscapes at 6x the speed of conventional hand-planting—and we're aiming for 10x. Aerial seeding creates a new paradigm of accessibility to lands that were previously deemed too massive, too difficult, or too dangerous for hand-planting crews to tackle effectively. And working with seeds critically removes the bottleneck of nursery supply chain dynamics, a logistical hurdle that often results in an 18- to 36-month lag time, allowing invasive species to take hold. Our proprietary seed enablement techniques boost seedling survival rates in degraded landscapes, allowing for a more conservative use of precious seed resources than that seen in traditional seed broadcasting with raw or coated seed. With this tool, we aim to double the planet's reforestation capacity to 16 million acres per year.

Our mission is to scale reforestation in all ecosystems critical to the functioning of the planet. First up are the conifer forests in North America that have been devastated by wildfire. In the four years since its inception, DroneSeed has worked in this system with three of the five largest timber companies, the largest non-profit forest landowner, tribal entities, and a handful of government agencies on reforestation contracts and pilots. Through targeted R&D, we have advanced through five different iterations of our custom-designed seed vessel during that time, generating successful beta tests in both hemispheres in the process (see inset figure; note that numbers represent successfully established seedlings rather than germinants). This spring, DroneSeed completed its largest contract to date, reforesting 521 acres of burned forest in north-central Washington; this is the area proposed for Stripe's negative emissions purchase. These acres are projected to sequester a total of 64,031 tCO<sub>2</sub>e during their first 100 years of growth.

#### SOLUTION

### Replicated field trial success

#### Version history

- BETA** Washington  
140 trees per  
acre  
V2
- V3** New Zealand  
96-147 trees per  
acre  
V4
- V5** WA  
Pending Fall 2020  
results



DroneSeed estimates that one fleet (two trucks, two trailers, and six drones) manned by an Ops crew of four people can reforest approximately 4,000 acres per year in the Pacific Northwest. More forgiving

climatic conditions (e.g. California) would allow for more planting time annually and a higher corresponding target of total acreage. DroneSeed’s solution scales by increasing the quantity of fleets in step with carbon sequestration demand, essentially “copy-pasting” across the globe in a modular approach guided by the strategic distribution of hangars. DroneSeed’s second fleet is currently under construction, and we are proactively exploring international prospects for expansion into British Columbia, Australia, New Zealand, and South America.

The carbon offsets market is of disproportionate importance as a financial mechanism shaping global trends of tree-based carbon sequestration. Under this concept, an important distinction should be made between “avoided emissions” and active carbon sequestration. Whereas stemming further GHG emissions is fundamental—both through decarbonization as well as avoided deforestation—without the active, large-scale removal of existing GHGs from the atmosphere, ecosystems will continue to collapse. To date, financial mechanisms have funded carbon sequestration almost entirely from existing mature forests. With respect to trees, however, reforestation is the clearest path to achieving significant carbon sequestration. Until very recently, the carbon market has acted to disincentivize reforestation due to the mismatch between long wait times required for trees to grow/sequester carbon and the more immediate “paper-based” offset needs of companies.

As companies like Stripe and Microsoft look to go carbon negative, registries are now responding to the palpable need for frameworks that can facilitate these transactions, providing the long-awaited tangible incentives for reforestation projects to scale. This project as proposed is one of the first road-tests of these new financial mechanisms. DroneSeed has teamed up with Bluesource to offer Stripe a negative emissions purchase under the new Climate Forward framework of projected reductions in emissions. To be clear, what is being offered to Stripe are only tonnes of CO<sub>2</sub> actually sequestered during 2020, but we perceive great potential in the approach that Climate Forward is offering as a means to facilitate transactions between funding and implementing entities—as well as the ability to offer recurring sequestered tons annually as more carbon is sequestered.

## Section 2: 2020 Net-Negative Sequestration Volume

*See Stripe Purchase Criteria 1: The project has volume available for purchase in 2020.*

4. Based on the above, please estimate the **total net-negative sequestration volume** of your project (and/or the underlying technology) in 2020, in tons of CO<sub>2</sub>. (Note: We’re looking for the net negative amount sequestered here, net lifecycle emissions. In Section 3; you’ll discuss your lifecycle and why this number is what it is).

584 tCO<sub>2</sub>

5. Please estimate how many of those tons are still available for purchase in 2020 (i.e. how many tons not yet committed). This may or may not be the same as the number above.

400 tCO<sub>2</sub>

6. (Optional) Provide any other detail or explanation on the above numbers if it’d be helpful. **Max 100 words.**

Please note that the bulk of DroneSeed's 2020 operations (as per acreage) will take place in Q4; as such, corresponding seedlings will not yet generate measurable carbon sequestration during this calendar year. Sequestered tons are estimated only from projects already executed during late 2019 and early 2020.

## Section 3: Life Cycle Analysis

*See Stripe Purchase Criteria 2: The project has a carbon negative complete lifecycle (including energy use, etc).*

7. Provide a life cycle analysis of your negative emissions solution demonstrating its carbon negativity, as complete as possible given limited space, and making sure to cover the following points:

- a) Include a flow sheet diagram of direct ingoing and outgoing flows (GHG, energy, materials, etc) that bear on the LCA.
- b) Please be explicit about the boundary conditions of your LCA, and implications of those boundaries on your life cycle. Let us know why the conditions you've set are appropriate to analyze your project.
- c) Make sure to identify assumptions, limitations, constraints, or factors that relate to ingoing and outgoing flows, citing values and sources (for example: land and resource scarcity, limitations on a required chemical, energy requirements). Also identify key sources of uncertainty in determining these values.
- d) If your solution results in non-CO2 GHG emissions, please be sure to separately specify that (e.g. in units of GWP 20 or 100 years, ideally both).
- e) For solutions that rely on modular components (for example: incoming energy flows or outgoing CO2 streams), feel free to cite values associated with those interfaces instead of fully explaining those components. For these values, please identify the upstream and downstream life cycle emissions of the component.
- f) Explain how you would approach a more comprehensive LCA by citing references and underlying data needed for the analysis.

**Max 1,000 words** (feel free to include figures or link to an external PDF)

Reforestation and afforestation don't fit the typical mold or framework of a life cycle analysis, as there is no need to decipher complex processes of material or energy flows in order to determine impact assessments. However, life cycle assessment methods can be applied to assess the carbon footprint of such a process, and to further highlight how our innovative approach moves beyond the limitations and impacts of conventional reforestation methods.

To achieve this, a carbon footprint versus emissions sequestration model was put together to quantify specific impacts that pertain to the type of projects that DroneSeed seeks to scale. The scope and boundaries of this analysis capture the initial phases of the reforestation process, but rather than looking at conventional (nursery) seedling growth, transportation, and planting methods, a carbon footprint that is specific to the operations and transport of our drone-based aerial dispersal of seed enablement vessels has been determined. The other half of the analysis, of course, then involves looking at the net carbon balance of projects over time, providing a clearer picture of what the net emissions versus sequestration potential of such projects involves.

All projects utilizing the Climate Forward methodology employ a particular GHG Assessment Boundary, which delineates the GHG sources, sinks, and reservoirs that must be assessed by all project developers in order to determine the net change in emissions caused by a project. These include the following:

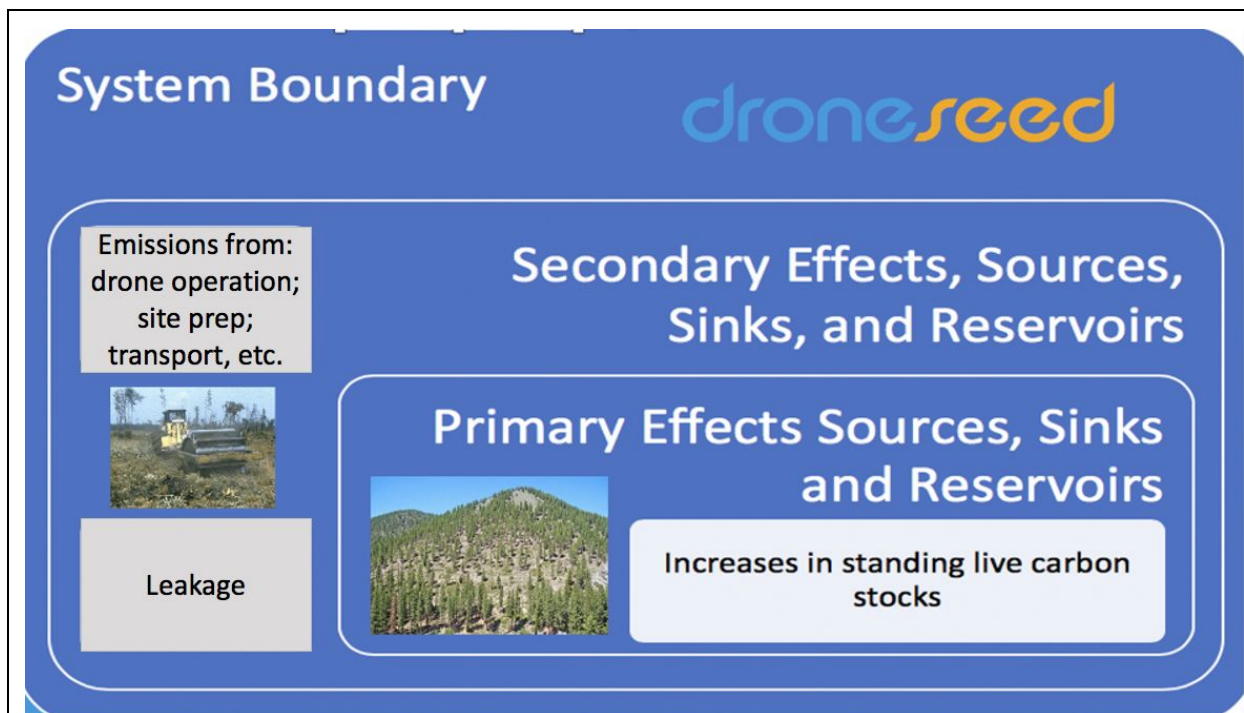
#### Primary Effect Sources, Sinks, and Reservoirs

- Standing live carbon (carbon in all portions of living trees)  
Increases in standing live carbon stocks are likely to be the largest primary effect of reforestation projects. Any pre-existing trees on the project area do not need to be considered in accounting of the live tree pool, since the site must be approved by a Professional Forester or Professional Biologist as a site that would trend toward forest cover as the result of active efforts to reforest the site.

#### Secondary Effect Sources, Sinks, and Reservoirs

- Mobile combustion emissions from site preparation activities  
Project developers are therefore required to quantify emissions for the areas where mechanical equipment, i.e., brush raking or mastication, was used for the removal of competing vegetation site preparation. These mobile combustion emissions must then be added to secondary effect emissions for the project.
- Activity Shifting Leakage
  - o Likewise, developers will also need to ensure that the shifting of cropland or grazing activities to forestland outside the project area (which may be both a market and/or physical response to the project activity) is accounted for over the life of the project. To do this, developers must determine the appropriate “leakage” risk percentage for the project following a decision tree found within the methodology itself, which in turn produces a percentage that must be applied to the projected tonne-year value for the project to determine the secondary effects due to shifting of cropland or grazing activities.

A visual interpretation of these system boundaries could be interpreted as follows:



Conventional reforestation typically involves tree seedling nurseries to provide all of the propagules that are required for a project area, which in turn then need to be transported to project sites in order for them to be hand planted (manually transported from truck to planting point). Conventional seedling propagation environments rely on nursery infrastructure (greenhouse, HVAC, supplemental lights) and/or outdoor nursery beds (fertilizer, herbicides) compounded over time to produce a mature seedling (1-3 years). Our model omits the nursery process by employing seed enablement vessels. This allows us to skip the input-intensive nursery system and take the seed to a project site with beneficial amendments instead. Thus, our model only identifies the fuel emissions that are to be expected from a drone fleet transport system, coupled with the emissions with the operation of the actual drones. The input parameters, emission factors used, and relevant results for the GHG accounting of both drone fleet transport systems and project operations can be found in the [attached pdf](#). Please note that the model's calculations correspond to the 521 acres proposed here for Stripe's 2020 negative emissions purchase.

The net carbon balance model of the project over time was performed utilizing the Climate Forward Reforestation Forecast Methodology Version 1.0. This methodology provides growth estimates for reforestation in different regions in the United States. This analysis used the Ponderosa Pine Forest Type in the Pacific Northwest, East (PPE), which is based on [Smith et al 2006](#); Methods for Calculating Forest Ecosystem and Harvested Carbon with Standard Estimates for Forest Types of the United States. There are only two possible forest types for Climate Forward reforestation in the PPE ecoregion – Ponderosa Pine or Douglas fir ecosystems. Since Douglas fir is a minor component of the planting, and Western Larch is part of the Ponderosa Pine ecosystem, the entire project area would be classified as Ponderosa Pine under Climate Forward. For quantification purposes under the



methodology, baseline live tree carbon stocks are assumed to be zero. Any pre-existing seedlings that may be present prior to the reforestation activities are assumed to be *de minimis* since a determination is required at project submission that the project area is understocked and in need of reforestation to achieve stocking levels that would restore the area to full forest cover.

The boundaries of this analysis were confined to the availability and accuracy of data currently available. A more comprehensive approach to the technology and the processes could have included a detailed assessment of fixed and modular emissions generated during the actual manufacturing of the hardware components that comprise our drone fleet, but this type of data would require significant lead time and tight coordination with a long list of manufacturing source companies.

8. Based on the above, for your project, what is the ratio of emissions produced as any part of your project life cycle to CO2 removal from the atmosphere? For true negative emissions solutions, we'd expect this ratio to be less than 1.

0.0218

## Section 4: Permanence and Durability

*See Stripe Purchase Criteria 3: The project provides durable, long-term storage of carbon.*

9. Provide an upper and lower bound on the likely durability / permanence of sequestered carbon provided by your project, in years:

For the carbon associated with Stripe's negative emissions purchase, 51 years is the baseline commitment to forest permanence as per the Climate Forward framework (specific periods are contingent on forest type and location; classified here as Ponderosa pine/PPE). It should be noted that there are several additional economic incentives in place that make extension to 100 years, 151 years, or in perpetuity another likely outcome (either via a 100-yr easement under Climate Forward, participation in a subsequent *ex post* offsets program, or a permanent easement under Climate Forward, respectively).

10. Please provide a justification for your estimates, and describe sources of uncertainty related to: the form of storage, effects of environmental or climatic variability, difficulty in monitoring or quantification, etc. Specifically, discuss the risks to permanence for your project, the estimated severity/frequency of those risks (e.g. 10% of the acres of forest in this forest type are burned by fire over a 100 year period), and the time-horizon of permanence given those risks.

As with any reforestation ventures, there exist a series of risks that could threaten the permanence of the project. These are most commonly presented using risk categories and examples of each, as follows:

- Financial
  - o i.e. Financial failure leading to bankruptcy
- Management
  - o Illegal harvesting
  - o Conversion to non-forest
- Social
  - o Changing government policies, regulations, and general economic conditions
- Natural Disturbances
  - o Wildfires
  - o Disease/Insects
  - o Other Episodic Catastrophic Events such as extreme weather events

Climate Forward's Reforestation Forecast Methodology has built-in mechanisms to ensure the permanence of *ex ante* credits issued resulting from reforestation activities. These include tonne-year accounting; an optional conservation easement or public ownership where management objectives can be demonstrated as being consistent with long-term maintenance of projected increases in carbon stocks; and conservative estimates in their carbon projections.

Tonne-year accounting is applied to reforestation projects with non-perpetual conservation easements. The timeframe for assessing the tonne-year values and the resulting amount of credits to be issued is the term of the easement, up to a maximum of 100 years from project start date.

Methodology [section 3.8.3](#) highlights the various design measures that have been included in the methodology to ensure elements of conservatism in their crediting procedures, thereby also helping to ensure permanence.

Sequestered carbon estimates were arrived at utilizing the methodology requirements, which rely on the results of projected regenerated forest stands from credible sources, with the assumption that a seedling stocking rate of 70 percent or greater at the time of confirmation is sufficient to achieve the increases in carbon stocks forecasted for the project area. Data projections are presented in the "Reforestation Communities Data File," which is an associated document to the primary methodology available on the Climate Forward website.

This Reforestation Communities Data File is utilized to determine the precise forest types that correspond to the project's geography and species composition. Project stocks are then based on the projected values for each forest type and sometimes species within the forest type, as they relate to the seedlings planted by the project, and assume adequate seedling stocking at the time of project



confirmation. The project stocks are discounted for conservative accounting as a measure against project failure and, in cases where conservation easements are used, to address management for resiliency.

The carbon projections used in this Reforestation Methodology are expected to perform as predicted without decline. According to the methodology, climate change may be a factor in future carbon sequestration, but whether the effect will be negative, as in prolonged droughts, or positive, as with CO2 fertilization, lacks certainty and does not therefore merit any modifications to the published growth projections. Nevertheless, to ensure a conservative accounting approach (across the suite of projects) against the unlikely event of project site conversion and/or performance decline, a discount of 2 percent is applied to account for the potential abandonment of projects that do not have a conservation easement or are on government (non-secured) lands.

## Section 5: Verification and Accounting

*See Stripe Purchase Criteria 4: The project uses scientifically rigorous and transparent methods to verify that they're storing the carbon that they claim, over the period of time they claim to.*

11. Provide detailed plans for how you will measure, report, and verify the negative emissions you are offering. Describe key sources of uncertainty associated with your monitoring, and how you plan to overcome them.

### Max 500 words

Climate Forward's Reforestation Forecast Methodology has built in mechanisms that will ensure an effective Monitoring, Reporting, and Verification regime. It provides requirements as well as guidance on reporting rules and procedures, as well as performance-monitoring instructions, to facilitate consistent and transparent information disclosure. For all reforestation projects, Climate Forward requires that a Project Implementation Report (PIR) be established for any implementation and reporting activities associated with the project. This PIR, and its associated documents (Reforestation Project Goals Form and Reforestation Communities Data File), will serve as the basis to communicate project attributes to the public, and will serve as the basis for a confirmation body's review of project data to confirm compliance with the methodology. Each Project Implementation Report will also need to receive an independent confirmation by an approved third party selected by the project developers.

For purposes of independent confirmation and historical documentation, project developers and confirmation bodies are required to keep all information outlined in the methodology for a period equal to either the project crediting period or seven years after the information is generated (whichever is less). Examples of information the project developers must report on and retain includes:

- All data inputs for the calculation of the project carbon enhancements, including all required sampled data, which will be included in a Project Implementation Report (PIR)
- Copies of all project-related permits, formal notices of regulatory violations, and any

relevant administrative or legal consent orders dating back at least 3 years prior to the implementation of the project

- Executed Attestation of Title, Attestation of Regulatory Compliance, and Attestation of Legal Additionality forms
- Results of emission removal calculations, which will be included within the PIR
- Confirmation records and results
- All evidence relating to continued implementation
- Project Implementation Reports
- Project developers' Sinks, Sources, or Reservoirs (SSR) and/or project activity data as well as evidence cited
- List of Findings
- Confirmation Statement

Confirmation bodies must confirm that all project activities and related documentation are in conformance with this document and with any related documents, such as the Reforestation Communities Data File<sup>1</sup>, and that the estimated emission removals have been calculated accurately. The confirmation process incorporates both a desktop documentation review and a site visit assessment of the mitigation project. At later stages of project implementation, project developers can also opt to transition the project into the Climate Action Reserve's carbon offset program under the Reforestation Protocol anytime and commit to further, well established, and ongoing monitoring, reporting, and verification requirements for *ex post* crediting.

Beyond the MRV provision dictated by the Climate Forward methodology, DroneSeed also requires in customer contracts that it be granted access to sites for up to five years for monitoring and reporting purposes. As a company both the customer and DroneSeed independently utilize fixed radius plots of 0.2 plots per acre throughout large acreages to monitor establishment and growth. The sampling method is blind as fixed radius plots used by the customer are unknown to DroneSeed.

12. Explain your precise claim to ownership of the negative emissions that you are offering. In particular, explain your ownership claim: 1) in cases in which your solution indirectly enables the direct negative emissions technology and 2) when, based on the LCA above, your solution relies on an additional upstream or downstream activity before resulting in negative emissions. Please address the notion of "double counting" if applicable to your project, and how you'll prevent it.

**Max 200 words**

The 521 acres' worth of CO2 sequestration presented here for Stripe's 2020 negative emissions purchase correspond to contracts that DroneSeed executed for a single client during Q4 2019 and Q1 2020. This particular client has previously engaged in carbon offset programs at a significant scale, and in the wake of recent wildfires has proactively collaborated with DroneSeed toward the development of alternative funding mechanisms to sponsor the cost of additional reforested acres. The combination of Stripe's negative emissions purchase and the Climate Forward framework respond ideally to

<sup>1</sup> <https://climateforward.org/program/methodologies/reforestation/>

facilitating that aim. To be clear: all funds from Stripe’s purchase of sequestered carbon would fund additional reforestation for the client.

With regards to the prevention of “double-counting” under the Climate Forward methodology, project developers must also submit a signed Attestation of Title form indicating that the project proponent has exclusive ownership rights to the emission reductions and removals resulting from the mitigation project and that the project is not being submitted for emission reduction credits under any other carbon crediting program, worldwide. Furthermore, evidence of transfer of rights of all GHG emission reductions to the project proponent is required and must also be confirmed by the confirmation body.

## Section 6: Potential Risks

*This section aims to capture Stripe Purchase Criteria 5: The project is globally responsible, considering possible risks and negative externalities.*

13. Describe any risks or externalities, any uncertainties associated with them, and how you plan to mitigate them. Consider economic externalities, regulatory constraints, environmental risk, social and political risk. For example: does your project rely on a banned or regulated chemical/process/product? What’s the social attitude towards your project in the region(s) it’s deployed, and what’s the risk of negative public opinion or regulatory reaction?

### **Max 300 words**

As was discussed previously in section 4, there exist a series of risks that could threaten the permanence and implementation of the project. These are most commonly presented using risk categories and examples of each, as presented below:

- Financial
  - o i.e. Financial failure leading to bankruptcy
- Management
  - o Illegal harvesting
  - o Conversion to non-forest
- Social
  - o Changing government policies, regulations, and general economic conditions
- Natural Disturbances
  - o Wildfires
  - o Disease/Insects
  - o Other Episodic Catastrophic Events such as extreme weather events

However, while Stripe’s purchased tonnes would be unlikely to be affected in the short term, the Climate Action Reserve’s Reforestation Forecast Methodology has built in mechanisms to ensure the permanence of ex ante credits issued resulting from sequestered carbon from reforestation activities. These include tonne-year accounting; an optional conservation easement or public ownership where

management objectives can be demonstrated as being consistent with long-term maintenance of projected increases in carbon stocks; and conservative estimates in their carbon projections.

In addition to the mechanisms enacted in order to mitigate against these risks, the methodology employed also accounts for any significant secondary effects that may arise from reforestation projects, mainly the combustions emissions associated with machinery use in site preparation and activity-shifting leakage.

Lastly, the methodology also gives considerations and strict requirements to guarantee the enactment of environmental and social safeguards for all of its projects, demanding assurances that the project will not materially undermine progress on environmental and social issues such as air and water quality, endangered species and natural resource protection, and environmental justice. Furthermore, the methodology also puts in place mechanisms to ensure that projects also comply with all levels of regulatory compliance in their respective jurisdictions for the entire lifespan of the project.

## Section 7: Potential to Scale

*This section aims to capture Stripe Purchase Criteria 6: The project has the potential to scale to high net-negative volume and low cost (subject to the other criteria).*

14. Help us understand how the cost and net-negative volume of your solution will change over time. Note that we aren't looking for perfect estimates. Instead, we're trying to understand what the long-term potential is and what the general cost curve to get there looks like. (Note: by "cost" here we mean the amount Stripe or any other customer would pay for your solution):

	Today	In ~5 years	In ~20 years
Est. Cost per net-negative ton (in \$)	\$500.20 per tCO <sub>2</sub>	\$123.89 per tCO <sub>2</sub>	\$4.45 per tCO <sub>2</sub>
Est. Net-negative volume (in tons of CO <sub>2</sub> )	574 tCO <sub>2</sub> *  *Please note that this figure corresponds only to acres that were reforested in late 2019 and early 2020; the bulk of our 7,000-acre projection for the year 2020 will be executed in Q4.	2,421,411 tCO <sub>2</sub>	359,746,308 tCO <sub>2</sub>

15. What are the drivers of cost? Which aspects of your costs could come down over the next 5 years, and by how much? Do you think your eventual scale potential is limited by cost or by volume? Why? Refer to any relevant constraints from question #7, like land or materials scarcity, and specify the boundary conditions for which you consider those constraints.

**Max 300 words**

We've provided a model where DroneSeed achieves the capacity to plant 8M acres per year in 20 years (see above). We believe it can be greater than this. We understand it has taken the biggest forestry companies in the world 3 decades to plant 1B trees. Our targets are audacious, but this is the type of thinking required to make a meaningful dent in atmospheric carbon. The climate crisis calls for step changes--not incremental advances. We believe that our aims reflect the core spirit of Stripe's decrement carbon program by pushing the envelope on these future industries and the financial mechanisms that drive them.

Seed vessel production is DroneSeed's number one cost, driven by economies of scale and the amount of automation used in production. Strategically, it makes sense for several aspects of seed vessel production to be performed manually at this stage due to DroneSeed's rapidly evolving R&D. Over the next five years, an increasing project pipeline and sufficient data thresholds will trigger automation of production processes, dramatically driving down cost. Drone payload and flight time are currently limited by battery life, and also impact the cost of our operations. Reductions in seed vessel weight, and the exploration of alternative fuel sources may additionally offer significant prospects for driving down this component of DroneSeed's COGS.

Our eventual scale potential is limited by volume. Land for reforestation will not be a limiting factor in the foreseeable future: 7 million acres now burn annually in the US alone, and wildfire extent and severity is increasing globally. Our volume will become a question of logistics; ability to access all of the areas burned will drive DroneSeed's scale potential. To facilitate this, we will begin licensing fleets to third parties, in conjunction with provision of seed vessels and technical support.

## Section 8: Only for projects with significant land usage

*See Stripe's Purchase Criteria 2: The project has a net cooling effect on the climate (e.g. carbon negative complete life cycle, albedo impact, etc.)* **This section is only for projects with significant land usage requirements: Forest, Soil, and BECCS/Biochar/Biomass sequestration projects.**

16. Location: Please provide baseline information about the geographic location(s) of your project; and link shapefile(s) of project area(s).

**Max 100 words**

The 521 acres targeted for Stripe's 2020 negative emissions purchase are located on tribal land in north-central Washington state. Due to the need to preserve client confidentiality, we are unable to provide shape files until Stripe's negative emissions purchase has been confirmed.

17. Land ownership: Please describe the current (and historical as relevant) land ownership and management for the area(s) provided in (16). If your project is not the landowner, describe your relationship to the landowner.

**Max 150 words**

This land is owned by a tribal entity/one of DroneSeed's largest clients. Land use includes a combination of sustainable forest management practices and recreational activities (e.g. hiking, hunting, and fishing).

18. Land use: For forest projects, please provide details on forest composition as well as forest age and basal crop area/density. For soil projects, please provide details on land use and crop type (if agricultural), soil organic carbon baselines, and regenerative methodology. For BECCS, biochar, or wooden building materials projects, please provide details on biomass crop type and methodology as applicable.

**Max 500 words**

Forest in the project area is mountainous (1800-2400 ft. elevation) temperate dryland Ponderosa pine, with intermittent Douglas fir and sparsely distributed Western larch. Native stand density is relatively low at approximately 150-300 trees per acre, and all native species are fire-adapted. All acres proposed here for negative emissions purchase are recently reforested in the wake of severe wildfires via drone-based aerial seeding methods; as such, they were devoid of tree cover prior to reforestation.

19. Net effect on climate: Please discuss the non-CO2 impacts of your project that may not be covered in your LCA, such as your impact on albedo.

**Max 150 words**

In addition to reducing carbon dioxide by acting as a natural sink, reforestation efforts can also provide benefits beyond those of simple CO2 sequestration. Unchecked deforestation is known to cause extreme levels of soil erosion, which in turn can negatively affect agriculture and in some cases incite landslides and flash floods. Reforestation effectively prevents runoff of the top layers of soil, thereby helping to preserve soil fertility and revive watersheds, critical aspects of environmental well-being. With flora, fauna, and now even human life beginning to face the ill effects of the global environmental crisis, reforestation also has the potential to preserve endangered species by aiding in the restoration of critical habitats and important corridors of biodiversity. In short, restoring forests provides countless benefits that range across the chemical, social and biological levels of entire ecosystems.

## Section 9: Other

20. What one thing would allow you to supercharge your project's progress? This could be anything (offtakes/guaranteed annual demand, policy, press, etc.).

**Max 100 words**

Guaranteed annual demand would allow for the most efficient scaling of DroneSeed's solution. Linking this demand to a projections-based framework such as Climate Forward creates a financial mechanism in which recently reforested acres sponsor the cost of new acres, and so on, effectively creating a positive feedback loop of reforestation. We share Stripe's concern for ensuring that the purchase of emissions translates into discrete improvements in the composition of the atmosphere, and believe that



the current lack of financial incentives to sponsor reforestation is a major hurdle to that aim. The solution proposed here deserves to be road-tested.

21. (Optional) Is there anything else we should know about your project?

**Max 500 words**

We recognize that DroneSeed's 2020 total sequestration volume is low, but want to stress that the technology's potential to scale is significant--and that Stripe's annual emissions purchase offers the prospect of creating a scalable funding mechanism to propel this solution forward. DroneSeed's public-facing development will provide a textbook, real-time example of how economies of scale can drive down cost, in this case for global benefit. This program basically pioneers a financial vehicle (futures) to facilitate carbon sequestration through new forests.

## Section 10: Submission details

*This section **will not** be made public.*

22. Please insert below the name and title of the person submitting this application on behalf of your company (or, if you are submitting this application on your own behalf, your own details). By submitting this application, you confirm that you have read and accept the Project Overview ([available HERE](#)), as well as the further conditions set out below. As a reminder, all submitted applications will be made public upon Stripe's announcement. *Once you've read and completed this section, submit your application by March 20th by clicking the blue "Share" button in the upper right, and share the document with [nets-review-2020@stripe.com](mailto:nets-review-2020@stripe.com).*

**Name of company or person submitting this application**

[REDACTED]

**Name and title of person submitting this application (may be same as above)**

[REDACTED]

**Date on which application is submitted**

[REDACTED]

We intend to make the selection process as informal as possible. However, we do expect that (a) the content of your application is, to the best of your knowledge, complete and correct; (b) you do not include any content in your application that breaches any third party's rights, or discloses any third party's confidential information; (c) you understand that we will publicly publish your application, in full, at the conclusion of the selection process. You also understand that Stripe is not obliged to explain how it decided to fund the projects that are ultimately funded, and - although extremely unlikely - it is possible that Stripe may decide to not proceed, or only partially proceed, with the negative emissions purchase project. Finally, if you are selected as a recipient for funding, Stripe will not be under any obligation to provide you with funding until such time as you and Stripe sign a formal written agreement containing the funding commitment.