CarbonCure

APPLICATION FOR STRIPE 2020 NEGATIVE EMISSIONS PURCHASE

Section 1: Project Info and Core Approach

1. Project name

Carbon Mineralization in Concrete with CarbonCure

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

Unlocking 500 Megatonnes of scalable, cost-effective carbon reductions in concrete

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)*

Why CarbonCure – CarbonCure's mission is to reduce **500 megatonnes of CO_2 annually** from the development and deployment of scalable and cost-effective carbon removal technologies. CarbonCure is already the innovation and commercial leader in carbon removal technologies for the concrete sector. The concrete sector is the largest and earliest industrial carbon removal technology adopter with an expected annual $400 billion and 3 gigaton CO_2 reduction potential by 2030 (Source: Global CO_2 Initiative Report, 2016). It is also a rare carbon removal option that offers truly **permanent** reductions, which is lacking in other product applications such as fuels, plastics, biological and chemical.

Presently CarbonCure has reduced 60,000 tCO_2 since 2016, with another 60,000 tCO_2 expected to be reduced in 2020 alone. However, at this rate of organic adoption it will take us at least 15 years to reach our climate target. The Stripe Negative Emission Purchase program creates a growth inflection point by catalyzing faster adoption to surpass a tipping point in the construction market and accelerate the commercialization of our next-gen carbon removal technologies. These complementary new technologies offer enhanced CO_2 reduction and economic benefits, as well as create new circular manufacturing benefits for water and solid waste.

Stripe can also join its technology industry peers, like LinkedIn (https://cnn.it/2UhZ6kP), by directly specifying CarbonCure concrete for the construction of upcoming office buildings or data centers, such as the Kilroy development in Oyster Bay. The two-prong approach of construction specifications and offset purchasing can catalyze an industry shift with concrete producers to scale up carbon removal negative emission solutions.

Many independent organizations have already assessed the climate impact of CarbonCure. The Global CO_2 Initiative (GCI) and several other independent technology reports recognize CarbonCure as the most scalable carbon removal solution (see Figure 1). CarbonCure has been selected as one of the Cleantech Global Top 100 Companies for five straight years, is a 2019 Bloomberg New Energy Pioneer, is an NRG COSIA Carbon XPRIZE finalist, the 2019 co-winner of the ERA Grand Carbon Challenge, among the inaugural 2019 Mission Innovation Champions and was recognized as the 2020 North American Cleantech Company of the Year by the Cleantech Group. In 2018, Breakthrough Energy Ventures, a $1B clean technology investment firm chaired by Bill Gates, invested in CarbonCure (https://youtu.be/0pAH-6R5J2A) and remains the only carbon removal technology and buildings solution within its portfolio that requires a minimum potential of 500 megatons per year of CO_2 reductions. There is an outstanding opportunity to build upon this momentum and work with Stripe to urgently scale carbon negative emission reductions.

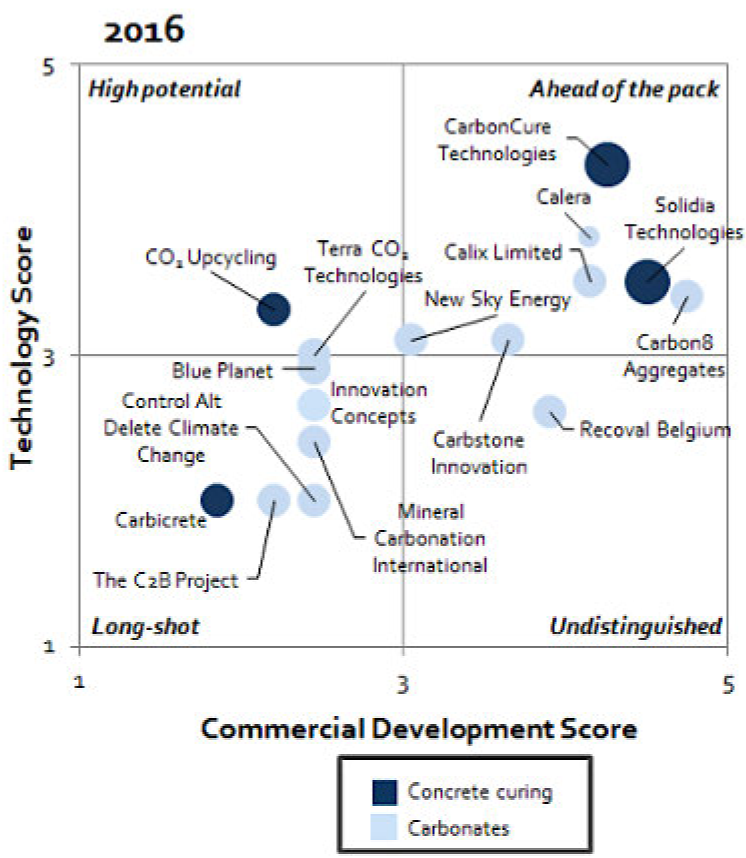

Figure 1: Ranking of carbon removal technologies for the concrete sector.

The Challenge – Due to urbanization and population growth megatrends, cities are expected to grow by 2.6

billion people by the year 2050. The entire global building stock will double by 2060 at a rate of building a New York city every 30 days for each of the next 40 years. As the most prevalent building material, concrete demand will surge to meet this growing demand. However, the global cement industry already accounts for 5-7% of global greenhouse gas (GHG) emissions (Source: De Wolf et al, 2018. *A sustainable future for the European Cement and Concrete Industry*) and is especially hard to decarbonize since its emissions are mostly process related and minimally impacted by advancements in renewable energy. If the cement industry were a country it would be the third largest emitter, after China and the USA. Recognizing this challenge, the global cement industry GHG reduction roadmap is relying on over 50% of its GHG reductions to be attributable to CO_2 removal solutions in order to meet its Paris Agreement commitments. CO_2 capture but especially utilization components of a carbon removal solution must be scalable. Whether CO_2 is captured from the atmosphere or emission point sources, the concrete industry is best positioned to utilize CO_2 at the necessary volume, permanence, urgency and economics to scale up carbon removal solutions. The sheer enormity of the concrete industry and its exceptional compatibility with carbon removal technologies make it an ideal opportunity to lead in climate action (https://youtu.be/bKN7l3r9EWI).

What is CarbonCure – CarbonCure is a Canadian high-growth carbon removal technology company serving the concrete sector. Our expanding portfolio of technologies use CO_2 from any source to make concrete with lower carbon intensity and higher material performance (e.g. compressive strength) to create a competitive cost and green sales advantage for our customers. CarbonCure has uniquely commercialized technologies for the masonry, precast and ready mix concrete segments that are licensed directly to over 200 concrete producers spanning North America, Asia and (soon) Europe (see Figure 8). **Over 5 million yards of concrete** made with CarbonCure's technology has been supplied to hundreds of projects including airports, high rise commercial, arena, school and residential projects. CarbonCure is continuing to develop its innovation pipeline of new carbon removal solutions that offer enhanced CO_2, water and solid waste reductions using circular manufacturing solutions for the industry's waste products. Today a yard of concrete produced with CarbonCure technology will reduce on average 28 lbs of CO_2. Our upcoming technologies expand the CO_2 impact to over 100 lbs of CO_2 per yard without requiring expensive process and material changes, limitations on concrete segment applicability (e.g. non-structural precast) and lengthy regulatory reforms. Through geographic expansion and new technology commercialization, CarbonCure has future plans to reduce 500 megatonnes of CO_2 annually.

CarbonCure's retrofit technology injects a precise dose of CO_2 into concrete in a manner where it becomes chemically converted into a nano solid calcium carbonate mineral within the concrete during the normal manufacturing process. This carbon mineralization offers a permanent sequestration, so the CO_2 will never be released even if the concrete is eventually crushed. Apart from the novel scientific and engineering breakthroughs, CarbonCure is unique in that it reduces the carbon footprint and water requirements of concrete, is a retrofit that is universally integrated into any of the 125,000 global concrete plants, is compatible with existing materials, codes and standards and all concrete product segment types, and offers immediate production efficiencies to the customer. The addition of CO_2 into concrete strengthens the concrete by 10-20% (see Figure 2), which allows the producer to remove cement and thereby unlock the associated benefits of avoided CO_2 and reduced costs. Our innovative business model offers the technology to producers without any CAPEX investment and has been as important to our scalability as the technology itself. This global solution offers an attractive combination of environmental and economic benefits to the industry to meet its Paris climate targets.

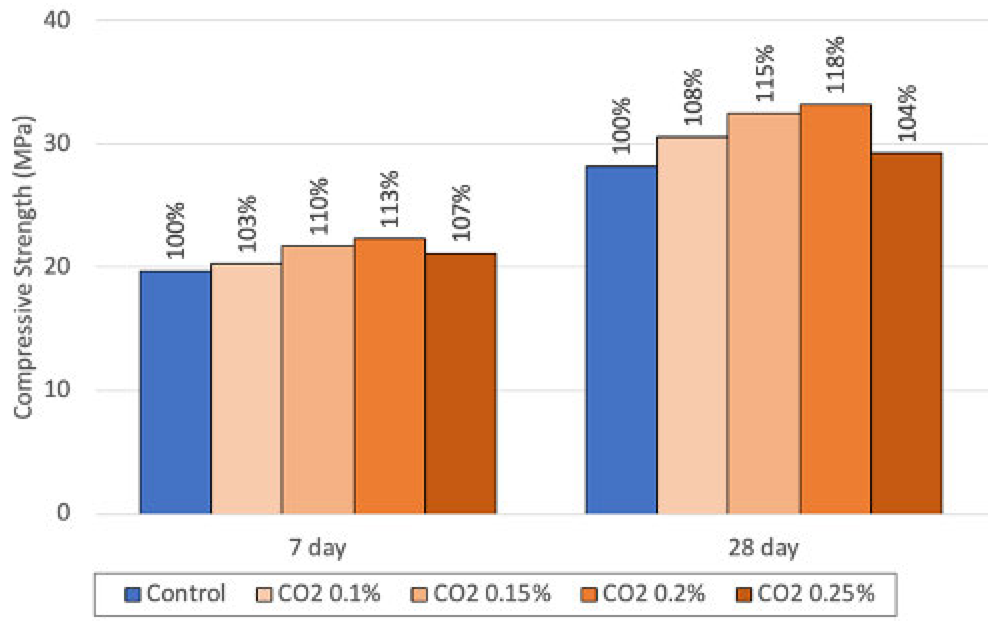

Figure 2: Demonstration of compressive strength improvements realized through CarbonCure's Ready Mixed Concrete Technology.

Use of negative emissions funds – The necessary ecosystem is beginning to be formed to urgently scale up essential carbon removal solutions. Research and development funding is rising. Commercialization is accelerating with venture capital investment and special initiatives such as the Alberta Grand Carbon Challenge and Carbon XPRIZE. Early commercial deployment is underway. Currently there are more than 200 concrete plants using CarbonCure's technology in Canada, the US and Asia. Collectively these consist of the majority of all carbon removal projects worldwide (https://www.thirdway.org/graphic/carbon-capture-projects-map). However, there is still an overwhelming number of eligible concrete plants (est. 125,000) for adoption and many other industries to serve. Carbon removal policy gaps are also beginning to be filled with important precedents being established like 45Q and with US state and municipal infrastructure procurement (https://www.carboncure.com/concrete-corner/climatepolicy). The Stripe Negative Emission Fund begins to fill an important scaling ecosystem gap by creating a targeted carbon finance mechanism that other governments and corporations may adopt themselves.

By entering into a negative emissions purchase agreement with Stripe, CarbonCure would use the funds to incentivize the concrete industry to **accelerate technology adoption** beyond the tipping point for market wide conversion, **expand our sources of CO_2 supply** (e.g. Direct Air Capture, biological capture) and accelerate the commercialization and deployment of our **next generation of carbon removal technologies**. The historic growth rate of the technology has been roughly 100% annually. At a purchase price of \$100/tCO_2 it is expected that the pace of adoption could double in the near term, thereby accelerating the path to achieve our 500 Megatonne annual CO_2 target by 2030.

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_2. (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).

Approximately 60,000 tCO_2 of net-negative reductions have been realized to date. An additional **60,000 tCO_2** is forecasted to be achieved in 2020, with emission reductions expected to roughly double year over year.

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.

100% of the reductions are still available for purchase (~120,000 tCO_2), however we are actively negotiating with several parties to enter into long-term purchase agreements. 2,500 tCO_2 of reductions have been set aside for Stripe, however more could be made available if there is interest.

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

CarbonCure's carbon removal technology is used by 200 concrete plants across Canada, the US, and Asia. Figure 3 shows that over 60,000 tCO_2 were reduced since 2016. Another 60,000 tCO_2 is forecasted to be achieved in 2020, and a further ~110,000 tCO_2 is expected to be generated in 2021. Growth from the 2016 to 2020 period inclusive has established that emission reductions are roughly doubling year over year. The pace of carbon removal is expected to increase significantly with a negative emissions purchase agreement.

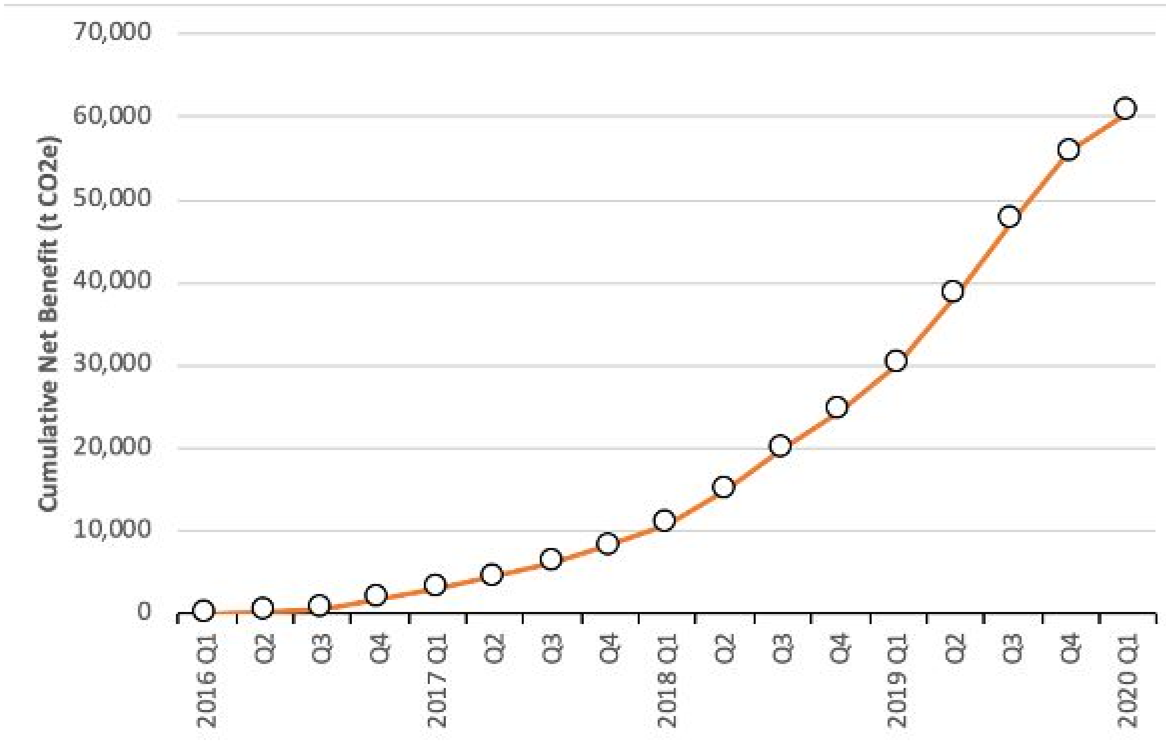

Figure 3: CarbonCure's technology is equipped with remote telemetry, which accurately measures the CO_2 emission reductions associated with the use of the technology. This data visualization shows the cumulative CO_2 emission reductions since the technology was introduced in 2016.

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)*

LCA Boundary: The technology is a retrofit addition to concrete production. Three discrete sections form the product stage of concrete manufactured with mineralized CO_2 as shown in Figure 4. The first stage is the CO_2 supply (A1) with a segment boundary of the carbon dioxide processing operation. Carbon dioxide is captured from the air from a by-product or waste stream of an industrial process. The energy required for the processing and liquefaction is required to estimate the relevant process outputs. A generic value of 200 kWh/tonne LCO_2 is reasonable (Häring, H.-W. (Ed.), 2008. *Industrial gases processing*). The carbon dioxide is then transported (A2). In practical terms this may involve shipping a tanker load of cryogenic CO_2 to a depot before the carbon dioxide is portioned into smaller amounts for delivery to individual end users. The output emissions are attributable to the transportation mode (e.g. type of truck, full/partial load, fuel type) and transportation distance. Representative values can be obtained from US EPA guidelines. Finally, the carbon dioxide is utilized in stage A3 Manufacturing. The segment boundary is a concrete plant. The raw materials for concrete production (cement, aggregates, water, admixtures etc.) are batched and mixed in accordance with a specified mix design and quantity. The concrete is placed into a truck for delivery. The process produces waste materials which would have their own processing requirements. The boundary for the LCA calculation includes the three stages.

Inputs and Outputs: The inputs and outputs of CarbonCure's technology are shown in Figure 5. The inputs and outputs shown in **bold** are incremental with the use of the technology, and include CO_2 capture and injection, electricity, flue gas and production, transport and energy emissions. The remaining items include concrete raw materials, plant operations and generic concrete production. Items that are underlined are changed with respect to the baseline scenario (i.e. cement is reduced 5%, an optional 1% increase in fine aggregate to preserve batch volume, net reduction in transportation emissions associated with the change in material flows). Other aspects (not in bold, not underlined) are not impacted by the use of the technology; they are present in both the baseline and project scenarios, and therefore have no impact on the net GHG benefit calculations. The supplied schematic considers the generic case with concrete plant operations and material flows based upon a 4000 psi mix design as described in the NRMCA Member National and Regional Life Cycle Assessment Benchmark (Industry Average) Report – Version 3.0. These inputs are appropriate for a generic LCA of the technology but the LCA would be improved to have producer-based inputs on the proper data to use. The batching of the materials for a concrete mix is well characterized through the batching operation (e.g. weigh scales, volumetric measurements).

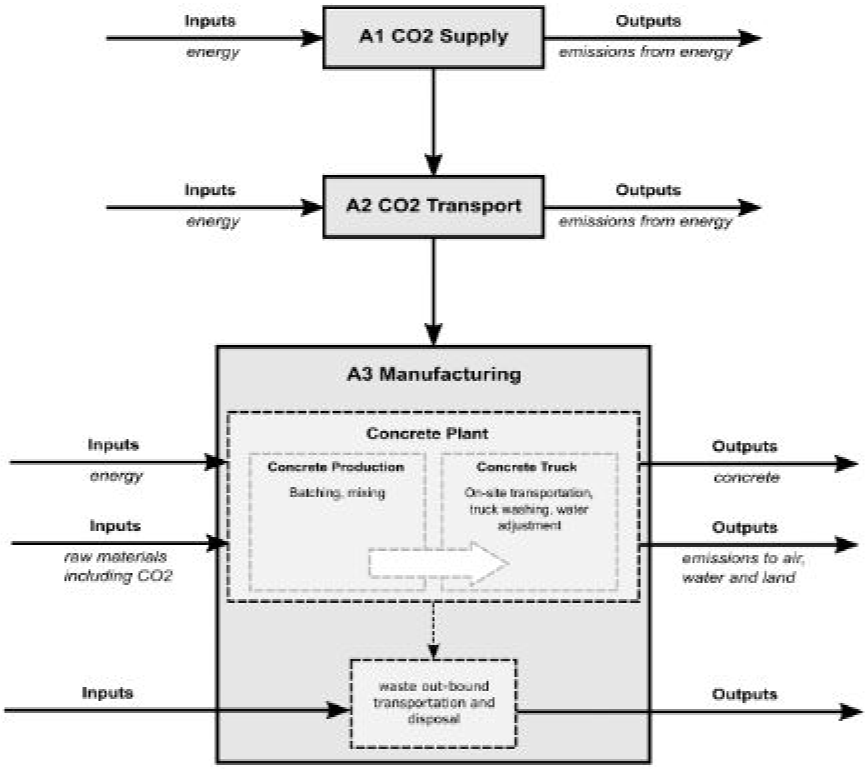

Figure 4: LCA boundary overview.

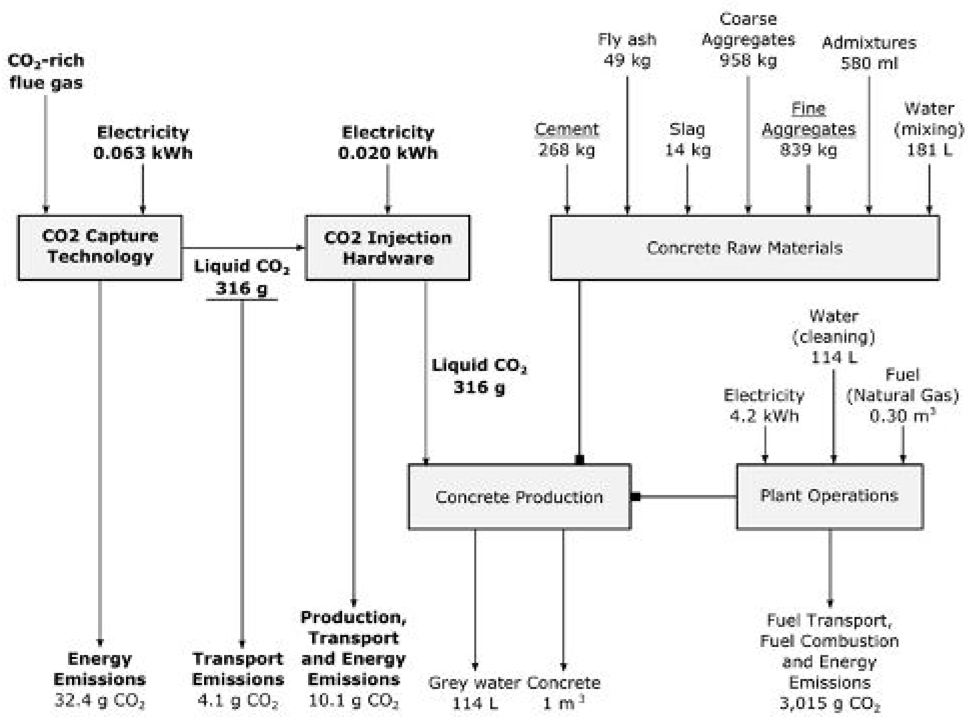

Figure 5: Detailed material flows for generic process.

Third Party Validation - CarbonCure's technology LCA impacts have been validated by several third parties in accordance with funding programs in which CarbonCure was a recipient. Third party audits of the emission reductions and the associated methodology have been completed by Emissions Reduction Alberta's (ERA) Grand Carbon Challenge, Ontario Centers of Excellence (OCE) Target GHG Program, Sustainable Development Technology Canada (SDTC), and the NRG COSIA Carbon XPRIZE. A comprehensive LCA methodology has been validated by each of these organizations, and can be made available upon request. Furthermore, CarbonCure has engaged with third party experts to develop carbon offset protocols with the Climate Action Secretariat in British Columbia, entitled "Low Carbon Intensity Concrete Manufacture" (undergoing Stakeholder Consultation), and with the Verified Carbon Standard, entitled "Methodology for CO_2 Utilization in Concrete Production" (completing the first assessment).

Methodology - GHG reductions are realized from two sources that are both enabled by the CarbonCure technology: 1) direct mineralization of CO_2 into concrete, and 2) cement reductions in concrete, which are realized through concrete strength enhancements enabled by the addition of CO_2. The energy required for the CO_2 capture, process, transport, and hardware (operation) is accounted for in the penalty that is applied to all gross GHG calculations. This penalty of 15% is applied to all gross emissions calculations when calculating net negative emissions. The baseline condition is defined as the quantity of greenhouse gas emissions that would have occurred had the technology not been implemented at a concrete plant. Upon installing the carbon removal technology at a concrete plant, the GHG intensity of concrete is expected to be reduced from the baseline (0.263 tCO_2 / m^3 concrete; Source: NRMCA Benchmark NRMCA Member National and Regional Life Cycle Assessment Benchmark (Industry Average) Report – Version 3.0) down to 0.248 tCO_2 / m^3 concrete by the year 2022, and further reduced to 0.220 tCO_2 / m^3 concrete by the year 2050. CarbonCure's solution does not result in any non-CO_2 GHG emissions.

LCA sensitivity - For generic use of the commercialized technology, the utilization of one tonne of CO_2 will result in the process emissions of about 15% (150 kg). However, this is sensitive to the local electrical grid emissions rate, gas processing energy, transportation distance of the CO_2 and power demand of the hardware (Figure 6). The process emissions are most sensitive to the carbon impact of the required energy which can vary widely. Where industry averages might be suitable in reference to certain aspects (CO_2 emissions associated with cement production) the variation of energy grid emissions might mean that specific emissions for each installation offer a more accurate LCA assessment. This can be achieved through collecting more accurate data on CO_2 capture (e.g. reporting the energy for CO_2 capture, transportation and mode of gas delivery) and consultation of publicly available data (EPA eGrid emissions factors).

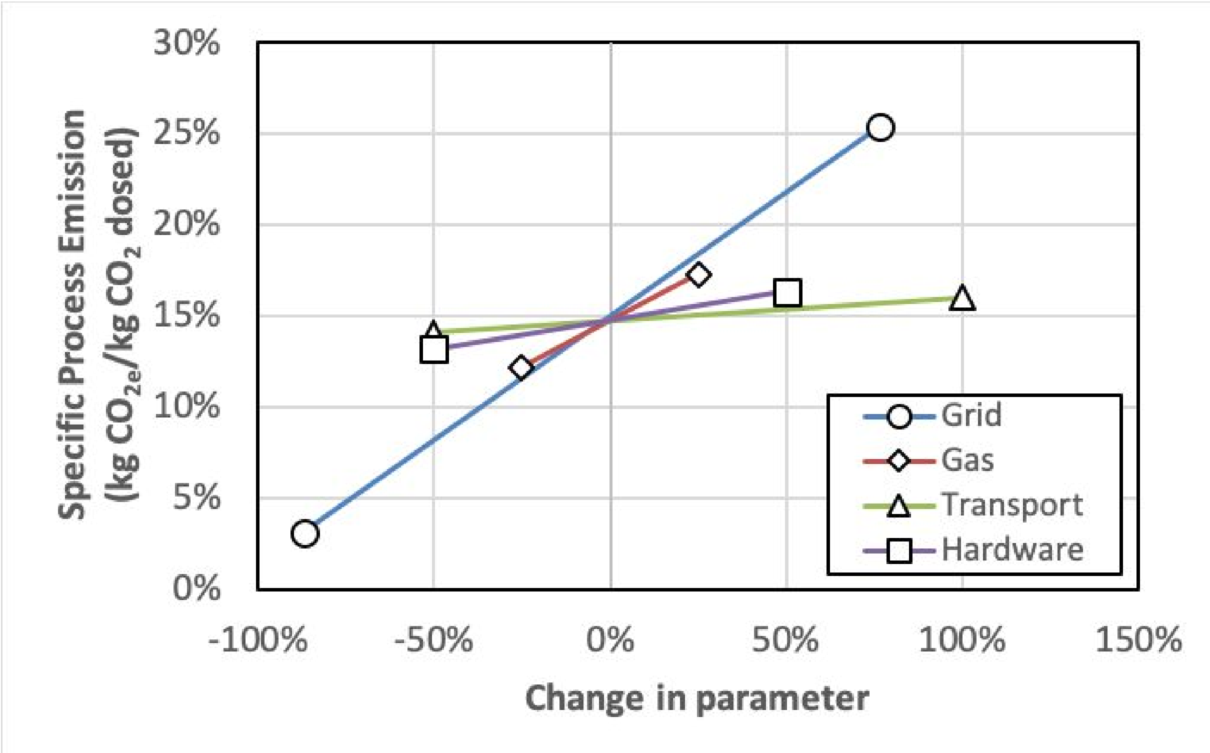

Figure 6: Sensitivity analysis of process emissions as a function of the electric grid CO_2 emissions factor (Grid), the energy required to process and liquefy the captured CO_2 (Gas), the transportation distance of the CO_2 (Transport) and the operation energy of the CO_2 injection equipment (Hardware).

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.

The ratio of emissions produced per tonne of carbon removal is 0.0033 or 0.33%.

For every 1 tonne of carbon utilized, about 850 kg is mineralized while 150 kg of CO_2 is emitted (15% process emission). Production data has shown that each tonne of CO_2 utilized has achieved an estimated 45.3 tonnes of net CO_2 reductions (inclusive of the mineralized, avoided and emitted CO_2). Thus, for an emission of 150 kg there is 45,300 kg of benefit for a ratio of 0.0033.

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:

Lower limit = 1000 years
Upper limit = millennia, geologic timescales
The CO_2 is mineralized as calcium carbonate, a thermodynamically stable mineral that is abundant in nature (e.g. limestone, coral reefs).

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.
Max 500 words

Carbon mineralization is the most efficient and permanent form of carbon conversion (Source: Al-Mamoori, et al, Energy Technol. 2017). Carbon mineralization involves reacting carbon dioxide with an alkali-rich feedstock to form solid calcium carbonate ($CaCO_3$). Not only is this a permanent conversion (lowest energy state for carbon), but the reaction is exothermic, which means the process does not require any energy. Mineralization is favourable over other chemical carbon conversion processes which require significant energy to break C-O2 bonds, and are often plainly temporary forms of carbon storage (e.g. creation of fuels, which are soon after combusted and thereby re-release the CO_2). Mineralization is one of the most efficient and permanent methodologies to convert CO_2, since it is thermodynamically favorable (see Figure 7). Other methods, such as the conversion of CO_2 to fuel, biological matter, polymers and organic chemicals, require more energy than they produce and theoretically generate more CO_2. CO_2 mineralization can store CO_2 in a more stable form for thousands of years via reaction with alkaline earth oxides to form carbonates.

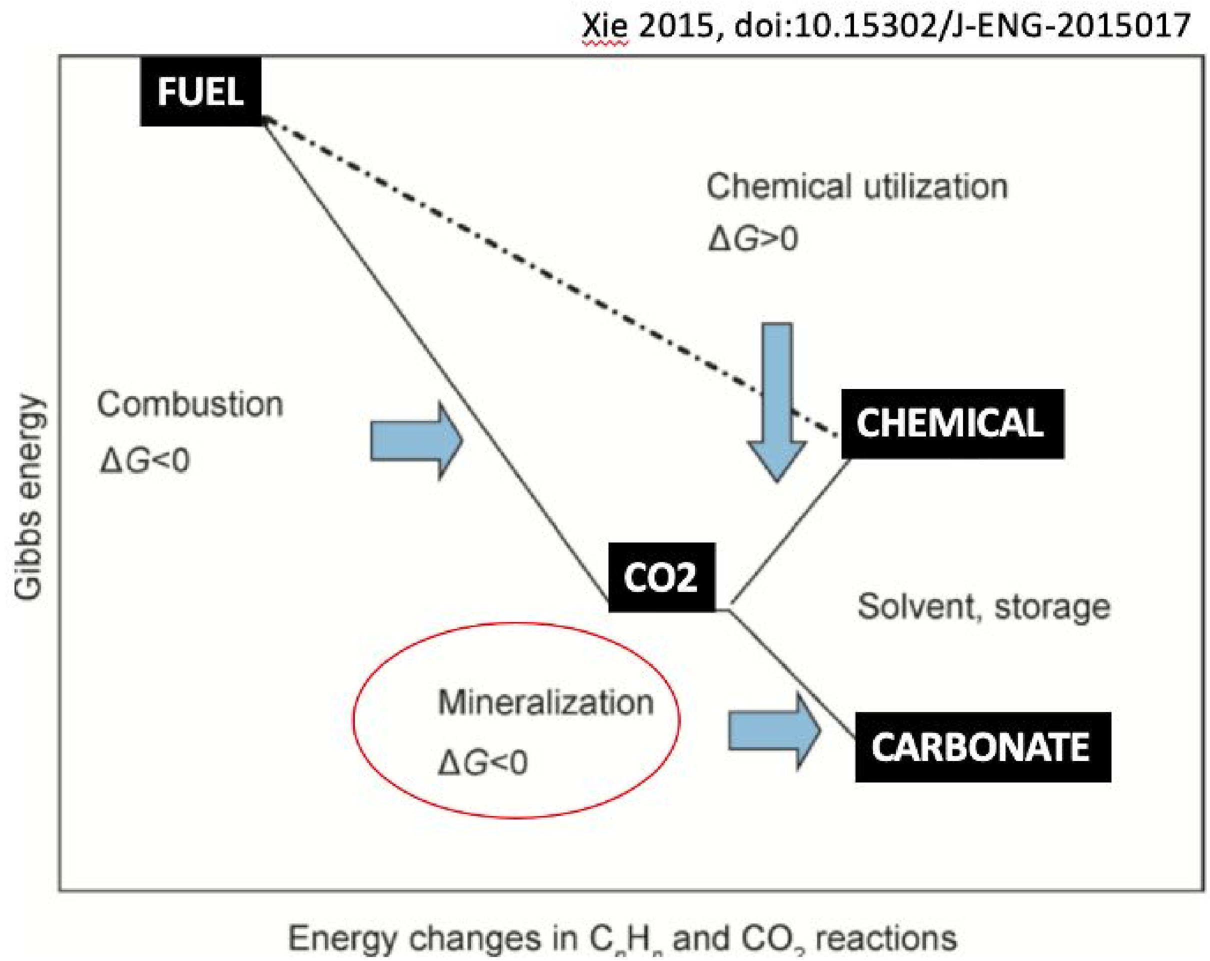

Figure 7: Diagram illustrating that carbon mineralization is the most favourable way to convert CO_2 from an energy and permanence standpoint, compared to carbon conversion to chemicals or fuels, which require significant energy inputs and are often not permanent forms of carbon storage.

Carbon mineralization offers little risk to permanence. The directly mineralized CO_2 will remain as a carbonate mineral even after the concrete reaches the end of its service life when the structure is eventually demolished and returned to the geosphere. To release the CO_2 back into the atmosphere from a carbon mineral, one would require the use of a strong acid or very high heat (>700 °C) which are two influences that are never accidentally applied to concrete nor part of any processing at the end of service life. The second aspect of the carbon benefit, the avoided CO_2 associated with the reduced cement usage, is inherently permanent since the composition of a concrete mix is determined at its time of manufacture.

As described, the form of storage (mineralization) and the associated timelines for sequestration (permanent, 1000+ years) are not significant risks for this project. No other risks are expected to impact the project such as climate variability, monitoring difficulty, etc.

Monitoring and quantification. The environmental benefit can be estimated in real time due to the operation of the CO_2 injection system. Facility-based assumptions (e.g. average cement loading, average load size, average cement reduction) can be used to convert CO_2 usage data into carbon savings conclusions. The facility-based assumptions are appropriate for a global conclusion that considers a broad time frame where a regression towards the mean can occur. However, more granular data (e.g. specific mix designs and batch actuals for concrete on a given project) would improve the strength of the quantification. The technology is evolving from the global view towards the more granular data view with the underlying intention that the environmental quantification becomes more accurate. See below for additional detail on how monitoring risks would be minimized.

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

Measurement and verification - CarbonCure's negative emissions will be measured and verified with the protocol that is currently being developed through the Verified Carbon Standard (VCS), entitled "Methodology for CO_2 Utilization in Concrete Production". The draft protocol has been developed by an expert consultant (Seth Baruch at Carbonomics), assessed by Ruby Canyon Engineering, and is expected to be published in the May/June 2020 timeframe. Any modifications to the protocol occurring between now (March 2020) and the final publication date (May/June 2020) are expected to be minor, and wouldn't significantly impact the verified volumes of reductions. CarbonCure has worked with several well respected verifiers in the past on related projects (Southern Research, 350 Solutions, PwC, Ruby Canyon Engineering, KPMG, SNC - Lavalin Environnement Inc., Stantec Consulting Ltd, etc), and can make arrangements with verifiers directly to verify the negative emissions. If Stripe has a preferred verifier, CarbonCure is open to working with any third party verifier.

Reporting – If Stripe wishes to use the VCS registry as a transaction platform, once verified with the VCS protocol, the negative emission credits will be issued on the VCS registry under CarbonCure's account. At this point, the volume of credits that Stripe wishes to purchase would be transferred from CarbonCure's account in to Stripe's account on VCS (may need to be created if Stripe doesn't already have an account). Any residual credits that Stripe doesn't wish to purchase would be transferred to another buyer. Alternatively, if Stripe has an alternate method for transferring ownership outside of the VCS framework, CarbonCure can work with Stripe to determine the best way to execute the transaction.

Key sources of uncertainty – CarbonCure's technology measures the resulting CO_2 reductions through its remote telemetry equipment, and the CO_2 reduction information is available remotely on an internal database in real-time. For verification, it is not realistic to measure the amount of CO_2 that has been sequestered in every yard of concrete that is produced with the technology (there have been more than 5 million cubic yards produced to date), so samples must be tested to determine the conversion efficiency (amount of CO_2 that is injected versus sequestered). The conversion efficiency is measured through a proxy test using standard materials, processes and CO_2 injection equipment. These tests have shown the average conversion efficiency is more than 90%. This also allows for us to account for CO_2 emissions associated with CO_2 capture and liquefaction, transportation, and the generic electrical grid emissions associated with electrical energy inputs (CO_2 process, CO_2 injection hardware operation).

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

Ownership - CarbonCure retains all environmental attributes (including emission reductions) associated with the use of its technology in its license agreements with concrete producers. In each agreement, it clearly states that the producer waives all rights to the emission reductions, and that CarbonCure will aggregate the emission reductions associated with the use of the technology for all of its customers, sell the credits to buyers, and then share any profits with the producers. Since no other party is making an investment in the technology, no other parties would have a reasonable claim to credit ownership.

Double counting – Emission reductions are generated in two ways through the use of CabronCure's technology. 1) Direct conversion of CO_2 into calcium carbonate, and 2) upstream reduction of cement emissions. For the direct conversion, CarbonCure's equipment has built-in telemetry which monitors the amount of CO_2 injected in real-time. For the upstream cement emissions, producer batching data is provided to CarbonCure to measure the baseline and project scenarios to accurately measure the cement CO_2 reductions. Since both reduction processes directly relate to activities occurring at the concrete plant, and the ownership of which has been transferred over to CarbonCure, there are no risks of double counting.

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

CarbonCure's carbon removal technology is applied during concrete production. If the demand for concrete decreased globally, then in theory the carbon removal potential would decrease. However, given that concrete is the most abundant man-made material on earth, and is a necessary building material for nearly all construction projects, there is minimal risk that the technology would not be able to produce negative emissions. In times of economic recession, concrete producers would be actively looking to improve their thin margins, so arguably the use of CarbonCure's technology would increase.

The use of CarbonCure's technology does not require any banned or regulated chemicals, processes or products. The only *incremental* inputs required to generate negative emissions are CO_2 and electricity (Figure 5); all other inputs are present in the baseline scenario, and are not impacted by the introduction of the technology.

The social attitudes towards the project are extremely favourable. While installing the technology at 200+ concrete plants, there have been no known negative side effects, but rather there's been a constant flow of positive media attention about CarbonCure, our customers and partners. Governments are passing policies to support the growth of this technology and many awards have recognized our positive societal impacts. There are no regulatory constraints on the use of the technology in Canada or the US. In some international markets outside of North America, minor regulatory barriers must be overcome such as supplying concrete on a sample project, or to present technical information to local regulatory bodies. These regulatory processes are relatively straightforward, and are not expected to impact global emission reduction potential. 100% of the emission

reductions that would be sold to Stripe would be generated in the US and Canada. There are no known other risks or externalities which could limit the technology's global potential.

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 $)	$100	$100	$100
Est. Net-negative volume (in tons of CO2)	60,000 tCO_2	5 Megatonnes	500 Megatonnes

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

One of the main reasons that CarbonCure's technology is so scalable, is that the technology economics are favourable without a price on carbon**.** The economics of the technology today offer the customer (concrete producer) a net savings when adopting the technology (i.e. the savings the technology provides exceeds the cost of the technology). However, the customer currently pays between $250 - $800/tonne to remove CO_2 from the atmosphere, depending on the region and the size of the plant. The closer the offset purchase price gets to the price of CO_2 that the customers are paying, the more favourable the technology economics become. At higher offset purchase prices, the customer is incentivized to sequester greater volumes of CO_2 into their concrete, thereby aggressive driving down their CO_2 emissions. If a buyer were to pay a higher price, then we could potentially offer the market **significantly more emission reductions.**

This would be the first deal where CarbonCure sold the carbon reductions resulting from the use of its technology. CarbonCure is proposing a deal to sell **2,500 tCO_2 to Stripe for $100/tonne** ($250,000 deal size). Stripe's motivations for accelerating the negative emissions technology industry aligns very well with CarbonCure's. We feel a purchase price of $100/t would satisfy the needs of our customers, and encourage them to adopt the technology at more plants while providing good value below market price for technology derived carbon removal offset reductions.

In terms of how the optimal price would track over time, we feel the price would be set at $100/t until a price on carbon came into place; after which point the price on carbon would be the default price.

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

Not applicable. CarbonCure's technology is a retrofit for existing concrete plants; no additional land use is required to generate the negative emissions.

A live map of CarbonCure's customer locations can be found here: https://www.carboncure.com/producers. A snapshot of the deployment in March 2020 is shown in Figure 8.

Figure 8: Users of CarbonCure's Ready Mixed Concrete Technology as of March 2020.

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

Not applicable. CarbonCure's technology is installed within the footprint of existing concrete plants.

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

Not applicable.

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

The only significant non-CO_2 impact of the project is that the technology also provides freshwater reductions. The technology usage results in net water savings as a result of reductions in cement, which avoids the use of freshwater required to produce cement (upstream), and a reduction in freshwater usage at the concrete plant due to wastewater recycling (downstream). The project water savings calculations are based on readily available industry average water footprint data for both cement and concrete. Since less cement is required to make the same amount of concrete, fresh water requirements are reduced when considering the overall material flow. The net reduction in water due to CarbonCure's process is 0.0303 m3 water / m3 concrete. On a relative basis, since it takes 2,590 m3 concrete to convert one tonne of CO_2, the incremental water footprint required to embody 1 tonne of CO_2 is -78.5 m3 water / t CO_2 converted (note this number is negative since it is a net savings in water).

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

Apart from a higher price CO_2 reductions and a long term guaranteed purchase agreement; another supercharging option are procurement policies. Government and private concrete consumers are driving demand for concrete producers to adopt carbon removal technologies. Climate and infrastructure procurement policies are being integrated to set effective and cost-neutral market forces. Examples of these government policies can be found at: https://www.carboncure.com/concrete-corner/climatepolicy. Private sector is doing its part by specifying the use of CO_2 mineralized concrete for private construction projects. The Kilroy Oyster Bay development for the Stripe HQ would be an ideal example. Other examples and info at: https://www.carboncure.com/specifiers.

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

Max 500 words

Time value of carbon - CarbonCure is scalable today. To meet the global 10 year, let alone 2050 climate targets we need to prioritize the deployment of scalable solutions like CarbonCure. Furthermore, climate solutions for large hard to decarbonize industries like cement and steel should be prioritized since they lack viable alternatives and are not benefiting from energy decarbonization. CarbonCure has the necessary technology

capability, business model, partners, investors and track record to meet the urgent demand of scalable GHG emission reductions. Stripe has demonstrated leadership by filling the missing carbon pricing gap for carbon removal technologies to scale. We welcome the opportunity to partner with Stripe.

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**.*

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.