Frontier

Clairity Technology

Carbon Dioxide Removal Purchase Application

Fall 2022

General Application - Prepurchase

(The General Application applies to everyone; all applicants should complete this)

Company or organization name

Clairity Technology Inc.

Company or organization location (we welcome applicants from anywhere in the world)

Los Angeles, CA, USA

Name(s) of primary point(s) of contact for this application

Glen Meyerowitz

Brief company or organization description

Clairity Technology develops technology for direct air capture of carbon dioxide. We create dilute CO2 streams for subsurface injection.

1. Project Overview[1]

a. Describe how the proposed technology removes CO_2 from the atmosphere, including as many details as possible. Discuss location(s) and scale. Please include figures and system schematics. Tell us why your system is best-in-class, and how you're differentiated from any other organization working on a similar technology.

Overview

Scale is the biggest challenge facing the carbon dioxide removal (CDR) industry.

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[1] We use "project" throughout this template, but note that term is not intended to denote a single facility. The "project" being proposed to Frontier could include multiple facilities/locations or potentially all the CDR activities of your company.

Clairity Technology was founded to develop scalable and cost-effective solutions to remove carbon dioxide (CO2) from the atmosphere. We are taking a first principles approach to developing scalable and low-cost technology for direct air capture of CO2. We believe that generating dilute CO2 will have myriad benefits compared with generating high purity CO2 streams.

The benefits of dilute DAC include lower capital expenses (capex) and operational expenses (opex) with dramatically reduced system complexity. We expect the output of our plant to be 10-20% CO2, with the remainder being air. This contrasts with competitor systems that generate >98% pure CO2 streams. In this way, we are unique from other companies approaching the challenges of CDR.

Energy is the main determining factor to whether a CDR solution will scale to gigaton level. Minimizing operational energy consumption and the energy required to build the plant and source materials is critical.

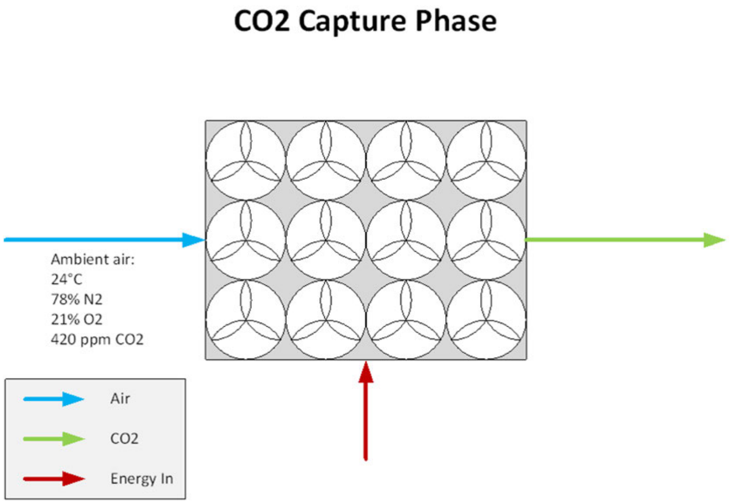
Clairity Technology generates dilute CO2 streams from our direct air capture (DAC) plant, which dramatically reduces both the capital expense to build our systems and the operational expense to operate our systems, ensuring that our solutions will scale better and faster than other approaches being developed today.

We expect our system to utilize activated carbon extruded monoliths that are impregnated with carbonates to capture CO2. These are abundant, low-cost, and safe. Our proposed regeneration involves a low-temperature, moisture aided regeneration. This is based both on literature and lab data that we have collected ourselves.

Once we capture CO2, we expect to durably sequester the CO2 via geologic injection. We are exploring various options for geologic injection, including either partnering or performing this work in-house. The value of our own well for storage would be significant, and we would be able to sell any excess capacity to other CDR companies.

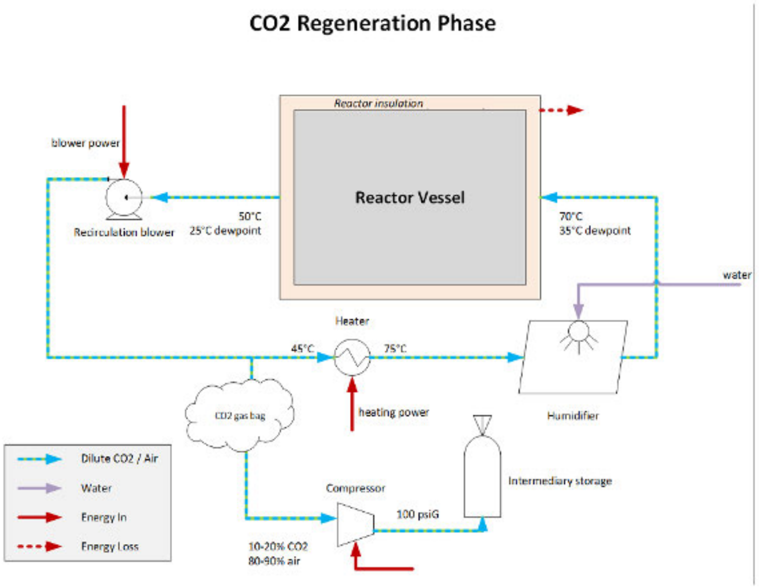
Our process

Clairity Technology approaches DAC with a two-step process: capture and regeneration. During capture, a large volume of air is moved over our contactor and the chemical media selectively adsorbs CO2 from the air stream. We move approximately 2 million m3 of air per ton of CO2 that is captured.


CO2 Capture Phase

After capture, our system enters the regeneration phase. We use a low-temperature, moisture aided regeneration to reduce the energy of regeneration. We use a small recirculation blower to move air during regeneration, and provide the heat and moisture required to desorb CO2 from the chemical media. Sensors and closed-loop automation allow us to hit specific target values for both air temperature and dewpoint to ensure optimal conditions for desorption.

Since our system is not a pressure vessel, for increased simplicity and reduced cost, we include a gas bag or bladder to hold the CO2 that is desorbed during regeneration. As CO2 is released, the total mass of fluid within the system increases. Without the inclusion of a gas bag, the system pressure would increase and result in fluid leaking from the reactor vessel. The gas bag allows pressure within the system to remain constant, near ambient, while CO2 accumulates.



CO2 Regeneration Phase

Vacuum chambers require large amounts of materials to build, specifically steel and concrete, which has a large carbon footprint. By operating our system at ambient pressure, we are able to take advantage of commonly used building equipment, like dimensional lumber and HVAC hardware.

Our system does not use vacuum and regeneration occurs at ambient pressure. This reduces the energy opex because we do not need vacuum pumps, which contributes to approximately 5% of the total energy budget in traditional DAC systems.

Selection of materials and sorbents

Our novel approach will leverage porous supports impregnated with chemical sorbents. Specifically, we expect the support to be a porous activated carbon honeycomb monolith. Honeycomb monoliths provide multiple benefits including:

1. Their broad use in automotive and industrial applications.
2. A high surface area to volume ratio serves as a great contactor for direct air capture.
3. The low pressure drop of a honeycomb structure reduces the energy required for forced airflow over the contactor surface.

We expect to use alkali carbonate sesquihydrates on activated carbon supports. The following equations govern the expected thermodynamics for capture and release of carbon dioxide in the reactor. The reliance on moisture for the regeneration of the sorbent decreases the energy and temperature that is required to desorb CO2, thus making our system more energy efficient.

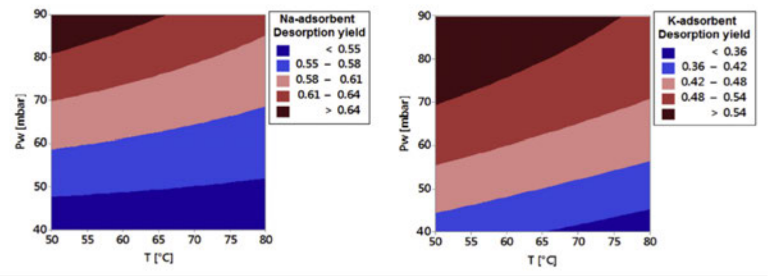
$$K_2CO_3 + 1.5H_2O_{(g)} \rightarrow K_2CO_3 \cdot 1.5H_2O \qquad \Delta H_{300K} = -101\frac{kJ}{mol}$$

$$K_2CO_3 + CO_{2(g)} + H_2O_{(g)} \rightarrow 2KHCO_3 \qquad \Delta H_{300K} = -141.7\frac{kJ}{mol}$$

$$K_2CO_3 \cdot 1.5H_2O + CO_{2(g)} \rightarrow 2KHCO_3 + 0.5H_2O_{(g)} \qquad \Delta H_{300K} = -40.7\frac{kJ}{mol}$$

To convert alkali bicarbonates back to the crystalline sesquihydrate form, the water vapor pressure in the recirculating buffer fluid must be maintained at levels between 2 - 20 kPa during desorption. Otherwise, potassium carbonate sesquihydrate will deliquesce into a potassium carbonate solution for the next round of adsorption, disrupting the crystallinity and possibly leading to sorbent degradation over time.

From literature, we understand that increasing the partial pressure of water in the airstream used for regeneration can decrease target regeneration temperature. This is a critical variable as every additional degree increases the total energy budget. We calculate that a 1°C marginal increase in regeneration temperature requires an additional 22.6 kWh / tCO2 ($1.13 / tCO2 per 1°C). The below figure shows a heat map of the desorption yield at varying temperatures and partial pressure of H2O and demonstrates that increasing the H2O partial pressure allows for higher yields at lower temperatures. We project that the cost savings of this are significant compared with other high-temperature carbonate approaches.



Vacuum systems increase systems complexity and cost

The use of a vacuum is necessary if a sorbent is not thermally stable in the presence of oxygen or if the impurities within the reactor vessel (i.e. ambient air) would impact the final purity of the CO2 stream. While the energy penalties for vacuum are relatively modest (<5% of total system energy), the operational and capital costs are significantly larger.

If the largest vacuum chamber in the world, the Space Simulation Vacuum Chamber at NASA Glenn, were converted into a reactor vessel for direct air capture, it would have an estimated capacity of 163,750 tons of CO2 (tCO2) / year. To achieve the scale of 10 Gt CO2 removed annually, it would require over 61,000 identical vacuum chambers - a tremendous undertaking with an equivalently large emissions of CO2 from the concrete, steel, and other materials that would be required to build these facilities.

Space Environments Complex (SEC) aerial view at NASA Glenn.

It is our belief that any DAC system that relies on vacuum will not scale to megaton (Mt) or gigaton (Gt) levels. While these systems are easy to implement at a lab- or sub-scale, the reliance on vacuum will prevent them from achieving their stated goals. Clairity is one of the few companies that is developing DAC technology without a reliance on vacuum, allowing our technology to scale better, faster, and cheaper.

Direct air capture as an approach to carbon dioxide removal

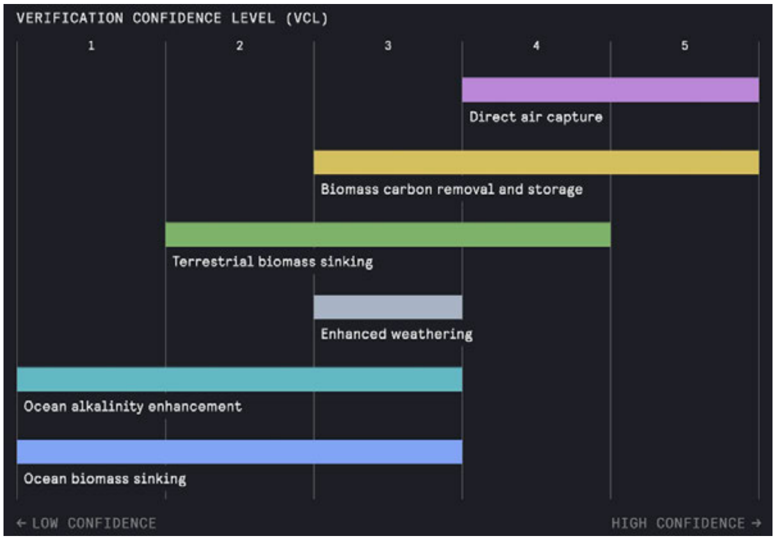
Direct air capture is not the only possible approach for carbon dioxide removal. Teams are developing both, “natural” and “engineered” solutions, along with unique approaches which combine the two. These involve planting billions of trees; ocean acidification; biomass and biochar technologies; and so much more.

A recent study showed that planting 2.2 billion acres of forest could capture about 25 Gt of CO2 at a rate of 88 million acres of forest per Gt CO2. This is approximately the land area of California. Additionally, researchers state that planting this many trees could take, “between one and two thousand years.”

While ocean-based CDR techniques are appealing due to the large surface area of the ocean and the relative low cost of implementing a solution, they carry a number of unknowns which increase the risk to ocean ecosystems. Increasing carbon sequestration in the ocean will change the pH of the water which may have an impact on organisms and ecosystems. Additionally, sequestering CO2 by sinking biomass to the bottom of the ocean may have unexpected impacts on the ecosystems which are present.

Quantifying carbon removal is an underappreciated challenge for many approaches. While there may be approximations or theories on how different CDR approaches work from lab-based studies, the real-world performance may vary significantly due to local conditions. Requirements for monitoring, reporting, verification (MRV) for other technologies are still early and not robust. Direct air capture is, essentially, an industrial process with clear inputs and outputs which makes measuring the amount of CO2 captured straightforward.

Independent analysis from CarbonPlan shows that direct air capture solutions have the highest confidence level in their ability to remove and sequester CO2. This is due to the highly engineered nature of the process and the underlying technology, compared with other approaches to carbon dioxide removal.



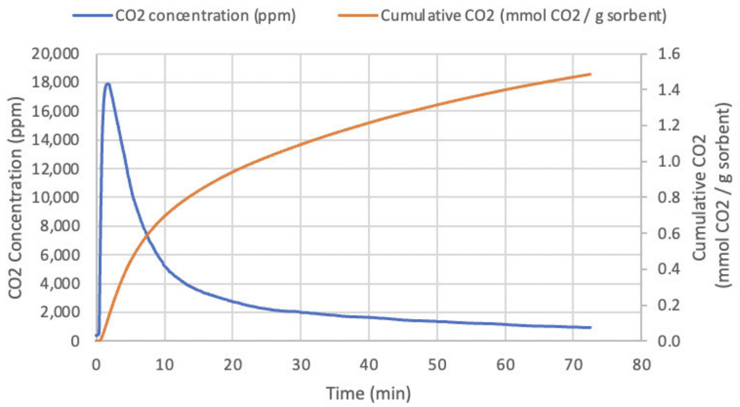
Summary

Given the urgency of the problem and the required scale of the solution, we are excited for Clairity Technology to be one of many companies that succeeds in developing systems that can collectively remove gigatons of CO2. We plan to lead the field of carbon dioxide removal with rapid scaling and deployment of our technologies!

b. What is the current technology readiness level (TRL)? Please include performance and stability data that you've already generated (including at what scale) to substantiate the status of your tech.

Our technology is currently TRL 4. We have performed lab scale tests with sorbents that are representative of our proposed technology. Additionally, we have developed and tested subscale sorbents which are representative of our proposed adsorption and desorption pathways.

We have collected lab scale data with sorbent powders using pure CO2 during capture and then heated and humidified N2 gas during regeneration. As the regeneration occurs, the N2 gas actively desorbs the CO2 which is measured as a change in CO2 concentration of the desorbed gas stream. The area under the curve of the CO2 concentration yields a cumulative CO2 value, which steadily increases over the cycle time. The below figure shows a representative plot of real-time CO2 concentration and cumulative CO2 during one regeneration cycle using activated carbon powder impregnated with carbonate.



This N2 stream was heated and humidified to substantiate the claim that low-temperature, moisture aided regeneration is feasible. Using a hot plate, the system was heated to 65C and the N2 gas stream was humidified to a relative humidity of between 70-80%.

c. What are the key performance parameters that differentiate your technology (e.g. energy intensity, reaction kinetics, cycle time, volume per X, quality of Y output)? What is your current measured value and what value are you assuming in your nth-of-a-kind (NOAK) TEA?

Key performance parameter	**Current observed value (units)**	**Value assumed in NOAK TEA (units)**	**Why is it feasible to reach the NOAK value?**
Output stream CO2 purity	10-20%	10-20%	Typical DAC plants target high-purity CO2 output streams, >98% pure. We are targeting a dilute CO2 stream with a purity of 10-20% CO2 and the remainder air. This reduces the energy required and lowers system complexity, increasing scalability.
Regeneration temperature	150°C	60°C	Regeneration of carbonates typically occurs at elevated temperatures of approximately 150°C or higher. Literature suggests that incorporation of H2O into the regeneration gas allows for desorption of CO2 at lower temperatures, with our target value being 60°C.
Regeneration pressure	1 barA	1 barA	Our system operates at atmospheric pressure, eliminating the reliance on vacuum to reduce complexity with a lower capex and opex.
Sorption capacity	20 mmol CO2 / L of reactor volume	95 mmol CO2 / L of reactor volume	We will leverage physical and chemical properties of carbonates

			and activated carbonate supports to develop a sorbent that has not yet been used in industry or academia for their potential applicability as moisture-driven CO2 sorbents. Four major properties of our sorbent will be varied to identify optimal sorbent combinations: carbonate type, carbonate ratio, activated carbonate mesopore/micropore volume, and support surface properties. We have a roadmap to quantify each of these parameters to improve sorption capacity.

d. Who are the key people at your company who will be working on this? What experience do they have with relevant technology and project development? What skills do you not yet have on the team today that you are most urgently looking to recruit?

Glen Meyerowitz is CEO of Clairity Technology and leading R&D development efforts. He is a former SpaceX engineer with years of experience solving the most difficult engineering problems in high-stress, mission critical settings. He was part of the team that developed systems to enable the first landing of the Falcon 9 rocket and are now consistently used across all SpaceX launches. He worked to develop systems for test and launch of the Crew Dragon spacecraft, the first commercial vehicle to carry astronauts to the International Space Station. Glen has experience designing advanced fluids systems, performing thermodynamic and heat transfer analysis, designing heat exchangers, and managing multi-million dollar budgets.

Dr. Kershanthen Thevasundaram will conduct research on the capture of carbon dioxide from ambient air using biochemical and electrochemical catalysts. Dr. Thevasundaram will evaluate the theoretical productivity of biochemical catalysts for CO2 capture, design and execute laboratory experiments to develop and characterize biochemical catalysts to capture carbon dioxide from ambient air to concentrate into pure CO2 streams or convert into value-added products such as biomaterials and fuel alternatives. Dr. Thevasundaram received a Ph.D. in Molecular and Cell Biology in 2020 from the University of California-Berkeley.

We are looking to expand our team and bring on additional engineers with expertise in developing fluid and thermal systems; a material scientist with expertise in synthesis and characterization of porous materials; and a geophysicist with experience in analyzing and designing well sites for geologic injection.

e. Are there other organizations you're partnering with on this project (or need to partner with in order to be successful)? If so, list who they are, what their role in the project is, and their level of commitment (e.g., confirmed project partner, discussing potential collaboration, yet to be approached, etc.).

Partner	**Role in the Project**	**Level of Commitment**
Lawrence Berkeley National Laboratory,	Analytical equipment and lab space provider	Confirmed company partner for research & development

Molecular Foundry		
Applied Catalyst	Materials provider	Discussing potential collaboration

f. What is the total timeline of your proposal from start of development to end of CDR delivery? If you're building a facility that will be decommissioned, when will that happen?

We expect our proposed pilot plant to be operational by December 2023 with a lifetime of 20 years. We expect to complete CDR delivery within three years of starting CDR.

g. When will CDR occur (start and end dates)? If CDR does not occur uniformly over that time period, describe the distribution of CDR over time. Please include the academic publications, field trial data, or other materials you use to substantiate this distribution.

Clairity Technology expects CDR to begin in December 2023 and occur through December 2026 at an annualized rate of at least 100 ton CO2 / year. We currently expect uniform distribution of CDR over the first year, but accelerating distribution of CDR over the years of operation. Over the lifespan of our pilot plant, we expect to capture over 300 tons CO2, as the capture capacity and performance of the plant will improve as our sorbent materials improve.

h. Please estimate your gross CDR capacity over the coming years (your total capacity, not just for this proposal).

Year	**Estimated gross CDR capacity (tonnes)**
2023	0.1
2024	100
2025	1,000
2026	30,000
2027	300,000
2028	1,000,000
2029	4,000,000
2030	15,000,000

i. List and describe at least three key milestones for this project (including prior to when CDR starts), that are needed to achieve the amount of CDR over the proposed timeline.

	Milestone description	**Target completion date** (eg Q4 2024)
1	Automated subscale system for improved sorbent and materials characterization	Q4 2023
2	Subscale system to characterize systems engineering and energy input for DAC plant	Q1 2023
3	Site selection, with care towards geologic injection capabilities, for pilot plant	Q2 2023
4	Break ground for pilot plant construction	Q3 2023
5	Systems testing and activation of pilot plant	Q4 2023
6	First CDR at pilot plant	Q4 2023

j. What is your IP strategy? Please link to relevant patents, pending or granted, that are available publicly (if applicable).

A provisional patent has been filed for the underlying technology described here (US 63/369,658).

We have engaged an experienced IP team to assist with development and refinement of our IP strategy. We plan to file multiple provisional patents across mechanical and electrical technology systems, and chemical sorbent development. We plan to convert patents which are important to our process to PCT at the appropriate time. We will conduct an FTO and identify potential university IP that could be licensable and is relevant to our work.

k. How are you going to finance this project?

We expect the capital cost of this project to be approximately $750k to $1.1M. This is based on sizing estimates of our plant, from our TEA, and data from similar sized plants from competitors which are public or case studies released by DOE or other research groups.

Clairity Technology has received $3.5M in venture capital funding to date. This funding will be used to advance our technology readiness level and build towards the first pilot plant.

We are pursuing additional grant funding, including from NSF and DOE to advance the technology that is discussed in this application.

Additional support, in the form of a prepurchase from Frontier, will give us sufficient capital to finance our pilot plant, and help to cover the operational expenses of running this plant over its lifespan.

l. Do you have other CDR buyers for this project? If so, please describe the anticipated purchase volume and level of commitment (e.g., contract signed, in active discussions, to be approached, etc.).

We do not have other CDR buyers for this project.

m. What other revenue streams are you expecting from this project (if applicable)? Include the source of revenue and anticipated amount. Examples could include tax credits and co-products.

We are not expecting any other revenue streams from this project.

n. Identify risks for this project and how you will mitigate them. Include technical, project execution, ecosystem, financial, and any other risks.

Risk	**Mitigation Strategy**
Technical - systems engineering	We have developed detailed systems level designs, including block diagrams, process flow diagrams, plumbing & instrumentation diagrams, and more. These outline various system interactions and break our complex DAC plant into subcomponents which can each be developed and tested independently without presenting technical risk to the others. A strong systems engineering approach minimizes the risk that technical challenges related to one component of our system will impact the others.
Scientific - materials	We have a materials roadmap that outlines multiple approaches to creating sorbent media that performs as needed to meet our cost targets. This roadmap is informed by the expertise of our materials team and literature research from experts in the field. Given the broad background of our materials team, we are able to pivot to alternative chemical media as necessary. Our team is materials agnostic and we have the expertise to test a wide range of materials from our solution space.
Legal & regulatory	We have not yet started the process of site selection and therefore have not looked into all the aspects of the legal and regulatory requirements for both direct air capture and durable sequestration via geologic injection. We expect to hire or partner with appropriate experts in permitting and regulatory approval for these to accelerate the process of getting approval and avoid common pitfalls.
Financial	Direct air capture projects are expensive, both in the upfront capital and the operating expenses over many years. We plan to seek financial support from many different routes to ensure that we have the ability to complete this project. Our planned sources of funding include, but are not limited to: 1. Venture capital.

	2. Debt financing. 3. Prepurchase agreements with Frontier and other private organizations. 4. Government grants from DOE and NSF.
Durable sequestration	Clairity Technology plans to generate dilute CO2 streams from our direct air capture plant for geologic injection as an aqueous solution of CO2 in water. While this process of durable storage has been studied in literature and exists in practice, geologic injection of CO2 is a relatively new process. As we perform our first injections and continually monitor the injection site, it will be critical to confirm that the real-world data matches modeling and expectations. We will be prepared to make data-informed decisions and pursue alternative durable sequestration methods, if necessary.

2. Durability

a. Describe how your approach results in permanent CDR (> 1,000 years). Include citations to scientific/technical literature supporting your argument. What are the upper and lower bounds on your durability estimate?

Clairity Technology plans to perform geologic injection of aqueous CO2 streams for durable (>1,000 year) storage. Geologic injection is generally considered to be the "gold standard" for durable sequestration of CO2, with an expected durability of at least 1,000 to 10,000 years or more (Bachu and Adams, 2003; Bachu, 2008; Holloway, 2001; Oelkers and Schott, 2005; Oelkers and Cole, 2008; Van Noorden, 2010; Shaffer, 2010).

CO2 can be injected into the subsurface either as a supercritical fluid or as an aqueous solution, where the CO2 is dissolved in water. We plan to pursue a route where the CO2 stream from our DAC plant will be dissolved in an aqueous solution and then injected for durable sequestration.

Literature shows that this may not only result in the most durable storage, but also experiences less leakage than other types of geologic injection (Roberts and Stalker, 2017). Given the low leakage and durability of this approach, we are excited to pursue it for our project.

b. What durability risks does your project face? Are there physical risks (e.g. leakage, decomposition and decay, damage, etc.)? Are there socioeconomic risks (e.g. mismanagement of storage, decision to consume or combust derived products, etc.)? What fundamental uncertainties exist about the underlying technological or biological process?

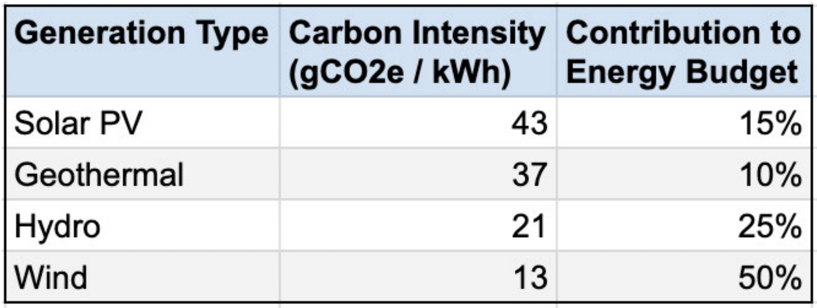
The main durability risk that we face is the same as all projects utilizing geologic injection - leakage. Literature shows that the risk of leakage from geologic injection of CO2 is significant, with many projects experiencing leakage of greater than 50% of injected CO2. The risk of leakage depends greatly on the depth of storage and the type of storage - gas, supercritical fluid, or aqueous solution.

Roberts and Stalker (2017) analyzed data from field injection tests and they found that injection sites where CO2 was dissolved in water, as we propose, experienced no leakage. Based on this research, we do not foresee leakage as a serious risk to our project. Regardless, we plan to conduct monitoring of the well site to ensure that well integrity is maintained and no or minimal leakage is observed.

We do not believe there are socioeconomic risks associated with our storage methodology. Once the aqueous CO2 solution has been injected underground, it will remain there unless the well site is destroyed by war, natural disaster, etc.

3. Gross Removal & Life Cycle Analysis (LCA)

a. How much GROSS CDR will occur over this project's timeline? All tonnage should be described in **metric tonnes** of CO_2 here and throughout the application. Tell us how you calculated this value (i.e., show your work). If you have uncertainties in the amount of gross CDR, tell us where they come from.

<table>
<tr><td>Gross tonnes of CDR over project lifetime</td><td>312 metric tons</td></tr>
<tr><td>Describe how you calculated that value</td><td>
<p>Clairity Technology has designed a pilot scale DAC plant to perform a net of 300 tons of CDR over 3 years.</p>
<p>Based on the net tonnage target, we can calculate the amount of emissions related to the project which will need to be removed to reach our net goal, and increase the gross target accordingly.</p>
<p>Data from NREL on Life Cycle Greenhouse Gas Emissions from Electricity Generation allows us to quantify the expected carbon intensity of the energy used by our pilot plant, based on the various generation types that are used by our system. The below figure shows one possible breakdown of energy sources, which results in a carbon intensity of input energy of 21.9 g CO2eq / kWh.</p>

<table>
<tr><th>Generation Type</th><th>Carbon Intensity (gCO2e / kWh)</th><th>Contribution to Energy Budget</th></tr>
<tr><td>Solar PV</td><td>43</td><td>15%</td></tr>
<tr><td>Geothermal</td><td>37</td><td>10%</td></tr>
<tr><td>Hydro</td><td>21</td><td>25%</td></tr>
<tr><td>Wind</td><td>13</td><td>50%</td></tr>
</table>
<p>This LCA is based on early modeling and design and we expect to refine it as our plant design solidifies, and pursue third party validation of our estimates.</p>
<p>Clairity Technology is committed to achieving a minimum of 300 net metric tons of CDR with this project over 3 years. As the design of the plant finalizes, we are prepared to adjust the gross ton capacity of the</p>
</td></tr>
</table>

	plant as the lifecycle emissions become more clear.

b. How many tonnes of CO_2 have you captured and stored to date? If relevant to your technology (e.g., DAC), please list captured and stored tons separately.

> We have captured approximately 10 g of CO2 in lab scale testing to date.
>
> We have stored zero CO2 to date.

c. If applicable, list any avoided emissions that result from your project. For carbon mineralization in concrete production, for example, removal would be the CO_2 utilized in concrete production and avoided emissions would be the emissions reductions associated with traditional concrete production. Do not include this number in your gross or net CDR calculations; it's just to help us understand potential co-benefits of your approach.

> We do not expect our project to result in avoided emissions.

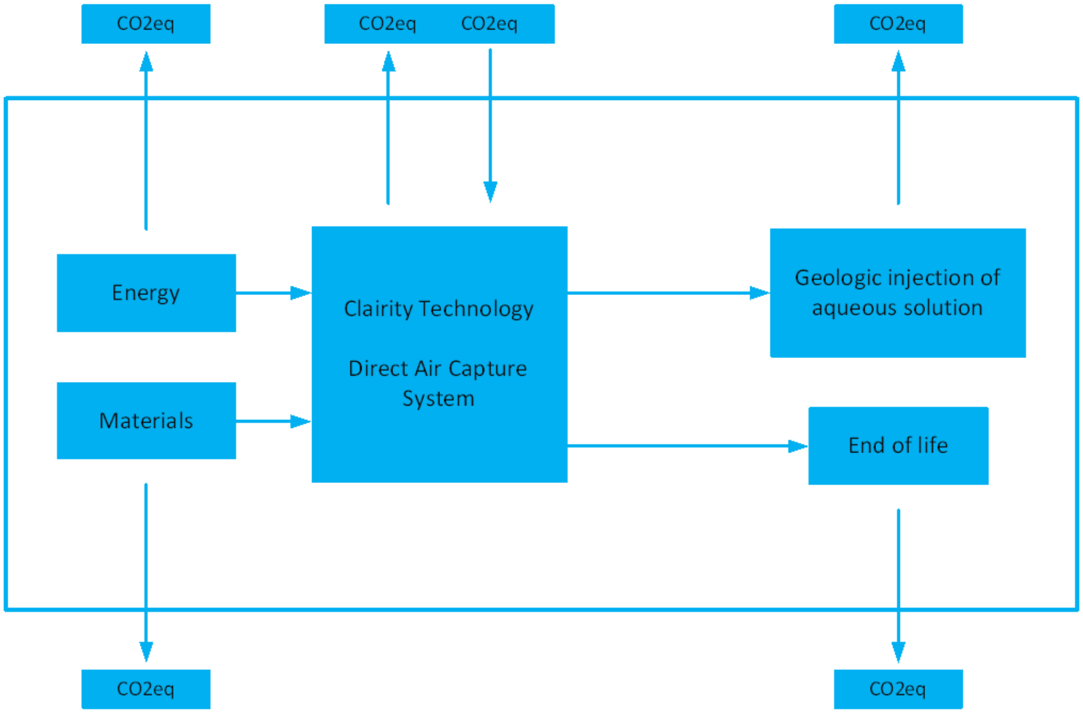
d. How many GROSS EMISSIONS will occur over the project lifetime? Divide that value by the gross CDR to get the emissions / removal ratio. Subtract it from the gross CDR to get the net CDR for this project.

Gross project emissions over the project timeline *(should correspond to the boundary conditions described below this table)*	12 tons
Emissions / removal ratio *(gross project emissions / gross CDR–must be less than one for net-negative CDR systems)*	0.038
Net CDR over the project timeline *(gross CDR - gross project emissions)*	300

e. Provide a process flow diagram (PFD) for your CDR solution, visualizing the project emissions numbers above. This diagram provides the basis for your life cycle analysis (LCA). Some notes:

- The LCA scope should be cradle-to-grave
- For each step in the PFD, include all Scope 1-3 greenhouse gas emissions on a CO_2 equivalent basis
- Do not include CDR claimed by another entity (no double counting)
- For assistance, please:
    - Review the diagram below from the CDR Primer, Charm's application from 2020 for a simple example, or CarbonCure's for a more complex example
    - See University of Michigan's Global CO_2 Initiative resource guide

- If you've had a third-party LCA performed, please link to it.

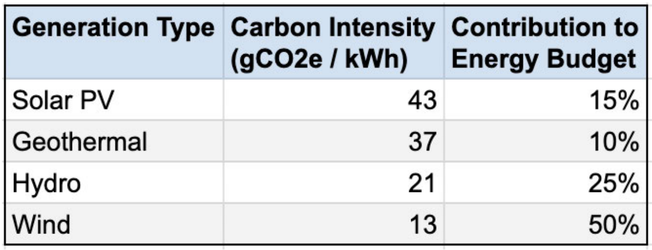


f. Please articulate and justify the boundary conditions you assumed above: why do your calculations and diagram include or exclude different components of your system?

> Our LCA currently includes energy required for capture of CO2; and estimates of the CO2 equivalent to produce the primary materials in our system, activated carbon and carbonates. We expect energy to be utilized for DAC and for geologic injection (compressors, pumps, etc.).
>
> We expect to perform additional LCA as our design matures. As appropriate, all critical values and LCA will be validated by a third-party to ensure appropriate compliance and accurate CDR.

g. Please justify all numbers used to assign emissions to each process step depicted in your diagram above. Are they solely modeled or have you measured them directly? Have they been independently measured? Your answers can include references to peer-reviewed publications, e.g. Climeworks' LCA paper.

Process Step	**CO_2(eq) emissions over the project lifetime (metric tonnes)**	**Describe how you calculated that number. Include references where appropriate.**
Energy input	4.1	Data from NREL on Life Cycle Greenhouse Gas Emissions from Electricity Generation allows us to

<table>
<tr><td></td><td></td><td>quantify the expected carbon intensity of the energy used by our pilot plant, based on the various generation types that are used by our system. The below figure shows one possible breakdown of energy sources, which results in a carbon intensity of input energy of 21.9 g CO2eq / kWh.
<table><tr><th>Generation Type</th><th>Carbon Intensity (gCO2e / kWh)</th><th>Contribution to Energy Budget</th></tr><tr><td>Solar PV</td><td>43</td><td>15%</td></tr><tr><td>Geothermal</td><td>37</td><td>10%</td></tr><tr><td>Hydro</td><td>21</td><td>25%</td></tr><tr><td>Wind</td><td>13</td><td>50%</td></tr></table></td></tr>
<tr><td>Activated carbon production</td><td>6.8</td><td>We estimate the equivalent CO2 emissions for materials based on literature values that we found averaged across similar materials classes (source).</td></tr>
<tr><td>Carbonate production</td><td>1.3</td><td>We estimate the equivalent CO2 emissions for materials based on literature values that we found averaged across similar materials classes (source).</td></tr>
</table>

4. Measurement, Reporting, and Verification (MRV)

Section 3 above captures a project's lifecycle emissions, which is one of a number of MRV considerations. In this section, we are looking for additional details on your MRV approach, with a particular focus on the ongoing quantification of carbon removal outcomes and associated uncertainties.

a. Describe your ongoing approach to quantifying the CDR of your project, including methodology, what data is measured vs modeled, monitoring frequency, and key assumptions. If you plan to use an existing protocol, please link to it. Please see Charm's bio-oil sequestration protocol for reference, though note we do not expect proposals to have a protocol at this depth at the prepurchase stage.

The direct air capture portion of our project will be straightforward to quantify the CDR. As an industrial process, we will be generating an output stream of gas and we will be able to measure the CO2 concentration in that gas stream and the flowrate of the gas stream. These values combined will give us the ability to quantify the amount of CO2 which has been captured by our system for sequestration.

We plan to perform geologic injection of our CO2 stream in an aqueous solution for durable storage. Similarly, we will be able to measure the CO2 concentration in the aqueous solution using standard industrial sensors and testing methodology. These measurements will be combined with either measuring the volume or totalized flowrate of the aqueous solution that is injected into the subsurface to measure the amount of CO2 which has been injected.

Finally, we will need to monitor the injection site to ensure that minimal leakage of CO2 occurs from the injection site. Literature suggests that the risk of leakage from injecting aqueous CO2 is low, compared with injection of supercritical CO2 (Sigfusson et al. 2015). We will monitor the well site with standard equipment to confirm that minimal leakage is occurring from the well or associated infrastructure. If leakage is observed, CDR levels will be modified to account for the change in actual sequestered CO2.

b. How will you quantify the durability of the carbon sequestered by your project discussed in 2(b)? If direct measurement is difficult or impossible, how will you rely on models or assumptions, and how will you validate those assumptions? *(E.g. monitoring of injection sites, tracking biomass state and location, estimating decay rates, etc.)*

The output stream from our DAC plant will be durably sequestered via geologic injection. We expect to partner to accomplish this task. We do not have a storage partner identified yet, but expect the ideal route will be aqueous injection of CO2 for mineralization in the subsurface.

Once the aqueous solution has been injected, it will be hundreds of meters to several kilometers below the surface, making direct measurement difficult.

We expect the injection site will be monitored by our partner to ensure that there is no, or minimal, leakage of CO2 from the well site. Since we are injection CO2 as an aqueous solution, instead of a supercritical fluid, the buoyancy of the fluid will be closer to that of water and limit the leakage, compared with direct injection of gas or supercritical CO2 into well sites.

We expect our solution to rely on standard methodologies for monitoring leakage from the well site and do not expect to require significant innovation on this front to ensure durable sequestration with minimal leakage.

Clairity Technology may look to perform these tasks ourselves if we cannot identify an appropriate sequestration partner, due to the unique nature of our dilute CO2 stream.

c. This tool diagrams components that we anticipate should be measured or modeled to quantify CDR and durability outcomes, along with high-level characterizations of the uncertainty type and magnitude for each element. We are asking the net CDR volume to be discounted in order to account for uncertainty and reflect the actual net CDR as accurately as possible. Please complete the table below. Some notes:

- In the first column, list the quantification components from the Quantification Tool relevant to your project (e.g., risk of secondary mineral formation for enhanced weathering, uncertainty in the mass of kelp grown, variability in air-sea gas exchange efficiency for ocean alkalinity enhancement, etc.).
- In the second column, please discuss the magnitude of this uncertainty related to your project and what percentage of the net CDR should be discounted to appropriately reflect these uncertainties. Your estimates should be based on field measurements, modeling, or scientific literature. The magnitude for some of these factors relies on your operational choices (i.e., methodology, deployment site), while others stem from broader field questions, and in some cases, may not be well constrained. We are not looking for precise figures at this stage, but rather to understand how your project is thinking about these questions.
- See this post for details on Frontier's MRV approach and a sample uncertainty discount calculation and this Supplier Measurement & Verification Q&A document for additional guidance.

Quantification component Include each component from the Quantification Tool relevant to your project	**Discuss the uncertainty impact related to your project** Estimate the impact of this component as a percentage of net CDR. Include assumptions and scientific references if possible.
Storage	We will use precision equipment to measure the CO2 concentration and flow rates to ensure that we have high confidence in the mass of CO2 that is being sequestered. We expect the impact of this to be negligible.
Leakage	Leakage of CO2 from geologic injection is a known problem in literature. As discussed in 4(d), we do not believe that will be a significant uncertainty for our approach. We expect the impact of this to be negligible.
Materials	We will perform an extensive LCA when our system design is finalized which will take into account the CO2 emissions associated with all materials in our plant, from materials of construction to the chemicals themselves. We expect the impact of this to be negligible.
Energy	If the source of power for our system changes, that may impact the LCA. Therefore, we will do our best to monitor the carbon intensity of the energy that is being provided to our facility, and work to source energy from renewable sources whenever possible. We expect the impact of this to be negligible.
Storage monitoring & maintenance	There are myriad technology and systems that exist in industry to monitor injection wells for leakage and quantify well health. We plan to utilize existing technologies with high TRL in our project to ensure that our storage site is performing as expected. We expect the impact of this to be negligible.

d. Based on your responses to 4(c), what percentage of the net CDR do you think should be discounted for each of these factors above and in aggregate to appropriately reflect these uncertainties?

> Roberts and Stalker (2017) analyzed data from field injection tests. Injections with CO2 dissolved in water, as we propose, experienced no leakage. Thus, we do not plan to apply any discount factor to our CDR. Active monitoring of the well site will ensure that the reported CDR remains accurate.

e. Will this project help advance quantification approaches or reduce uncertainty for this CDR pathway? If yes, describe what new tools, models or approaches you are developing, what new data will be generated, etc.?

Yes, we expect this project to help advance quantification approaches and reduce uncertainty for direct air capture and geologic injection of aqueous solutions of CO2. The proposed methodology for durable sequestration and quantification has been studied in research, and implemented in limited settings. Our approach to this methodology will provide additional data points on the durability of this method of sequestration and help to develop new sensors and tooling to ensure that reported CDR quantities are accurate.

Given the early stage development of this project, we have not finalized what these methods or approaches will be at this time.

f. Describe your intended plan and partners for verifying delivery and registering credits, if known. If a protocol doesn't yet exist for your technology, who will develop it? Will there be a third party auditor to verify delivery against that protocol or the protocol discussed in 4(a)?

Clairity Technology does not currently have a plan or partners for verifying delivery and registering credits. We expect to use standard practices, similar to what exists in the DAC space and for geologic injection of CO2.

We will look to implement a plan with similar rigor to the recent announcement by Climeworks:

"Climeworks, Carbfix, and DNV have partnered to develop the world's first full-chain certification methodology dedicated to CDR via direct air capture (DAC) and underground mineralization storage. The methodology has been validated in line with ISO 14064-2 and verifies the integrity of Climeworks' CDR, thus enabling the delivery of certified CDR, and leading industry action with high environmental integrity." (Source: https://climeworks.com/news/certification-methodology-for-permanent-carbon-removal)

5. Cost

We are open to purchasing high-cost CDR today with the expectation the cost per tonne will rapidly decline over time. The questions below are meant to capture some of the key numbers and assumptions that you are entering into the separate techno-economic analysis (TEA) spreadsheet (see step 4 in Applicant Instructions). There are no right or wrong answers, but we would prefer high and conservative estimates to low and optimistic. If we select you for purchase, we'll work with you to understand your milestones and their verification in more depth.

a. What is the levelized price per net metric tonne of CO_2 removed for the project you're proposing Frontier purchase from? This does not need to exactly match the cost calculated for "This Project" in the TEA spreadsheet (e.g., it's expected to include a margin), but we will be using the data in that spreadsheet to consider your offer. Please specify whether the price per tonne below includes the uncertainty discount in the net removal volume proposed in response to question 4(d).

$1,850 / tonne CO_2

Our proposed price is lower than the calculated cost in the TEA provided. We believe that our process and project contingencies are significantly lower than what is presented using the methodology of the TEA spreadsheet. The simplified systems approach that our dilute DAC allows for will reduce overall cost compared with alternative systems, and we are confident that we can provide an amortized capital expense below what is calculated in the TEA spreadsheet.

We do not apply any uncertainty discount. As we note in 4(d), we believe this to be negligible due to our process for geologic injection.

b. Please break out the components of this levelized price per metric tonne.

Component	Levelized price of net CDR for this project ($/tonne)
Capex	$840
Opex (excluding measurement)	$990
Quantification of net removal (field measurements, modeling, etc.)[2]	$20
Third party verification and registry fees (if applicable)	$0
Total	$1,850 / tonne CO_2

c. Describe the parameters that have the greatest sensitivity to cost (e.g., manufacturing efficiencies, material cost, material lifetime, etc.). For each parameter you identify, tell us what the current value is, and what value you are assuming for your NOAK commercial-scale TEA. If this includes parameters you already identified in 1(c), please repeat them here (if applicable). Broadly, what would need to be true for your approach to achieve a cost of $100/tonne?

Parameter with high impact on cost	Current value (units)	Value assumed in NOAK TEA (units)	Why is it feasible to reach the NOAK value?
Cycle duration	12 hours	6 hours	System optimization based on understanding margin impact of unit of time/energy on overall TEA
Regeneration temperature	150°C	60°C	Addition of moisture into the regeneration cycle will decrease target temperature of regeneration
Sorption capacity	13 mmol CO2 / L	95 mmol CO2 / L	Improved loading of sorbent into the pores of our support
Sorbent lifespan	1 year	5 years	Improved materials testing and adhesion of the sorbent into the support

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[2] This and the following line item is not included in the TEA spreadsheet because we want to consider MRV and registry costs separately from traditional capex and opex.

Sorbent manufacturing cost	$680 / ton	$200 / ton	Increase scale of manufacturing, improve efficiency based on key parameters of sorbent and support

d. What aspects of your cost analysis are you least confident in?

The greatest area of uncertainty is the sorption capacity of our proposed materials using our capture and regeneration methodology. We have lab scale data from our own testing which lines up well with literature data, that indicates adequate sorption capacity to build a pilot plant and provides our team line-of-sight to achieve $100 / tCO2 at scale. However, we have not yet tested our materials in real-world conditions which may impact the sorption capacity. We have engaged in early conversations with Citrine Informatics (https://citrine.io/), to use their AI platform to predict material properties and reduce development timeline and cost.

e. How do the CDR costs calculated in the TEA spreadsheet compare with your own models? If there are large differences, please describe why that might be (e.g., you're assuming different learning rates, different multipliers to get from Bare Erected Cost to Total Overnight Cost, favorable contract terms, etc.).

The CDR costs calculated in the TEA spreadsheet line up well with our own models. Particularly, the operational expenditures, both fixed and variable, are close to our own estimates, within approximately 5%.

The capital expenses estimated in the TEA spreadsheet are slightly higher than our internal projections, due to different values assumed for EPC services, contingencies, owner's costs, and start-up costs. In particular, the impacts of the uncertainty due to process and project contingency (low TRL and low capital cost estimate class) have a significant impact on the amortized capex cost of our system. We are confident in our ability to provide a DAC solution at a lower price than what the TEA spreadsheet outputs, including uncertainties.

f. What is one thing that doesn't exist today that would make it easier for you to commercialize your technology? (e.g., improved sensing technologies, increased access to X, etc.)

High temperature heat pumps would be an impactful technology that would reduce the operational expenditure of our DAC systems. Standard commercial and industrial are very efficient tools to provide heat up to 25-30°C. Our system operates at 60-70°C, and an efficient way of generating heat would reduce the energy budget.

6. Public Engagement

In alignment with Frontier's Safety & Legality criteria, Frontier requires projects to consider and address potential social, political, and ecosystem risks associated with their deployments. Projects with effective public engagement tend to:

- Identify key stakeholders in the area they'll be deploying

- Have mechanisms in place to engage and gather opinions from those stakeholders, take those opinions seriously, and develop active partnerships, iterating the project as necessary

The following questions help us gain an understanding of your public engagement strategy and how your project is working to follow best practices for responsible CDR project development. We recognize that, for early projects, this work may be quite nascent, but we are looking to understand your early approach.

a. Who have you identified as relevant external stakeholders, where are they located, and what process did you use to identify them? Please include discussion of the communities potentially engaging in or impacted by your project's deployment.

> We have not yet identified a target site for our project. As such, we have not identified relevant external stakeholders. This will be a top priority and consideration for our project as we move towards site selection in 2023.

b. If applicable, how have you engaged with these stakeholders and communities? Has this work been performed in-house, with external consultants, or with independent advisors? If you do have any reports on public engagement that your team has prepared, please provide. *See Project Vesta's community engagement and governance approach as an example and Arnestein's Ladder of Citizen Participation for a framework on community input.*

> We have not yet engaged with stakeholders and communities.

c. If applicable, what have you learned from these engagements? What modifications have you already made to your project based on this feedback, if any?

> We have not yet engaged with stakeholders and communities.

d. Going forward, do you have changes to your processes for (a) and (b) planned that you have not yet implemented? How do you envision your public engagement strategy at the megaton or gigaton scale?

> We plan to have significant involvement from relevant external stakeholders as we select a location for this project and as we reach gigaton scale. The impacts of the CDR industry will be tremendous on local communities and it is critical that individuals and communities have a voice in the process to ensure that their needs are heard and met. Clairity Technology is focused on ensuring that public engagement is done in a way that provides all relevant stakeholders with a voice to help guide the project and maximize its positive impact and success.

7. Environmental Justice[3]

As a part of Frontier's Safety & Legality criteria, Frontier seeks projects that proactively integrate environmental and social justice considerations into their deployment strategy and decision-making on an ongoing basis.

a. What are the potential environmental justice considerations, if any, that you have identified associated with your project? Who are the key stakeholders? Consider supply chain impacts, worker compensation and safety, plant siting, distribution of impacts, restorative justice/activities, job creation in marginalized communities, etc.

Clairity Technology is aware of the potential environmental justice considerations for large infrastructure projects, such as the project we propose. We are committed to ensuring that appropriate steps are taken, including involving input from key stakeholders on important decisions, so that our project has a positive impact not just from a CDR perspective but also from a community perspective.

We have not yet begun to analyze specific environmental justice concerns. When we begin the process of site selection for this project in 2023, environmental justice considerations will be key inputs to our process.

b. How do you intend to address any identified environmental justice concerns and / or take advantage of opportunities for positive impact?

Clairity Technology plans to work closely with the communities where our projects will be located to identify environmental justice concerns and ensure our project has a positive impact on the local communities. This includes the opportunities for job creation and reducing negative environmental impacts of pollution in the communities we partner with.

8. Legal and Regulatory Compliance

a. What legal opinions, if any, have you received regarding deployment of your solution?

We have not received any legal opinions regarding deployment of our solution.

b. What permits or other forms of formal permission do you require, if any, to engage in the research or deployment of your project? What else might be required in the future as you scale? Please clearly differentiate between what you have already obtained, what you are currently in the process of obtaining, and what you know you'll need to obtain in the future but have not yet begun the process to do so.

Clairity Technology has not yet obtained any permits or formal permissions for our project. We will work on acquiring these in 2023 as we begin site selection for our pilot plant and work towards breaking ground at the site.

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[3] For helpful content regarding environmental justice and CDR, please see these resources: C180 and XPRIZE's Environmental Justice Reading Materials, AirMiners Environmental and Social Justice Resource Repository, and the Foundation for Climate Restoration's Resource Database

We expect to need permitting to build our DAC plant based on local regulations.

We expect to need permitting for geologic injection. This may involve either seeking permitting for a Class VI well that we develop ourselves or partnering with an existing group that is developing a Class VI well.

c. Is your solution potentially subject to regulation under any international legal regimes? If yes, please specify. Have you engaged with these regimes to date?

No, we do not expect our solution to be subject to regulation under any international legal regimes. Our project will take place entirely in the United States.

d. In what areas are you uncertain about the legal or regulatory frameworks you'll need to comply with? This could include anything from local governance to international treaties. For some types of projects, we recognize that clear regulatory guidance may not yet exist.

There is no significant uncertainty about the legal or regulatory framework that we will need to comply with. As we work on site selection in 2023, ensuring compliance with local and state regulations will be a top priority for us.

e. Do you intend to receive any tax credits during the proposed delivery window for Frontier's purchase? If so, please explain how you will avoid double counting.

No, Clairity Technology does not expect to receive any tax credits during the proposed delivery window. This project does not meet the size requirements to capture sufficient CO2 per year to be eligible for enhanced 45Q tax credits.

9. Offer to Frontier

This table constitutes your **offer to Frontier**, and will form the basis of contract discussions if you are selected for purchase.

Proposed CDR over the project lifetime (tonnes) *(should be net volume after taking into account the uncertainty discount proposed in 4(c))*	300
Delivery window *(at what point should Frontier consider your contract complete? Should match 1(f))*	December 2026
Levelized Price ($/metric tonne CO_2) *(This is the price per tonne of your offer to us for the tonnage described above)*	$1,850

Application Supplement: DAC

(Only fill out this supplement if it applies to you)

Note: these questions are with regards only to air capture: e.g. your air contactors, sorbents or solvents, etc. Separately, there exist Geologic Injection and CO_2 Utilization supplements. We anticipate that most companies filling out this DAC supplement should ALSO fill out one of those supplements to describe their use of the CO_2 stream that's an output of the capture system detailed here.

Physical Footprint

1. What is the physical land footprint of this project, and how do you anticipate this will change over the next few years? This should include your entire physical footprint, i.e., how much land is not available for other use because your project exists. Also, what is the estimated footprint if this approach was removing 100 million tons of CO_2 per year?

Land footprint of this project (km^2)	107 m2 [1.07e-4 km2]
Land footprint of this tech if scaled to 100 million tons of CO_2 removed per year (km^2)	11.5 km2

Capture Materials and Processes

1. What material(s) is/are you using to remove CO_2?

Clairity Technology is using activated carbon honeycomb monolith supports impregnated with carbonates to remove CO2. We are still exploring the materials space to identify the ideal activated carbon support and ratio of various carbonates to optimize our process.

2. How do you source your material(s)? Discuss how this sourcing strategy might change as your solution scales. Note any externalities associated with the sourcing or manufacture of it (e.g., hazardous wastes, mining, etc.). You should have already included the associated carbon intensities in your LCA in Section 3.

We are currently working with Applied Catalysts (https://appliedcatalysts.com) to source our materials. They are a large provider of various types of extruded activated carbon monoliths for industrial and automotive applications, with significant capacity to support our work.

As our solution scales, we will need to find alternative manufacturers of activated carbon materials and carbonates. Given the large capacity of Applied Catalysts to support our work, we believe that is several years away. We will look into either bringing manufacturing at scale for this in-house or find appropriate vendors that we can contract with to produce large quantities of materials that meets our quality requirements.

There are no known significant externalities associated with sourcing or manufacturing of our materials. Both activated carbon and carbonates are known to be safe and have no hazardous effects.

They are produced in large quantities and widely available. The reliance on activated carbon and carbonates provides many benefits over amines, which are a common sorbent used in DAC. Amines are organic materials which often involve significant cost associated with end of life disposal. Additionally, amines degrade rapidly at elevated temperatures and are expensive to produce. These combine to make carbonates an ideal option for scalable DAC.

3. How much energy is required for your process to remove 1 net tonne of CO_2 right now (in GJ/tonne)? Break that down into thermal and electrical energy, if applicable. What energy intensity are you assuming for your NOAK TEA?

Our current process requires approximately 40.1 GJ / ton CO2.

Our future NOAK process will require approximately 4.9 GJ / ton CO2.

All the energy utilized by our system will be electrical energy, not thermal energy. Our system operates on a low-temperature, moisture aided regeneration cycle. Due to the relative low temperature of regeneration in our NOAK system, which we expect to be between 60-70C, all heat will be generated using electrical systems, and not the burning of natural gas.

4. What is your proposed source of energy for this project? What is its assumed carbon intensity? How will this change over the duration of your project? (You should have already included the associated carbon intensities in your LCA in Section 3).

The proposed source of energy for this project will be electrical, from the local grid. The carbon intensity of the energy source will depend on the location of the plant and the specific split of energy sources used to provide power to the grid.

Given that there are no thermal requirements for our plant, our system could be fully powered by renewables and batteries, depending on site location characteristics.

5. Besides energy, what other resources do you require (if any, such as water)? Where and how are you sourcing these resources, and what happens to them after they pass through your system? (You should have already included the associated carbon intensities in your LCA in Section 3).

Clairity Technology will require water in our system as that aids in the regeneration at low temperatures. We expect to utilize 18 tons of H2O for every 100 tons of CO2 that we capture, at a cost of approximately $0.61 per tCO2. We expect future plants to consume at least an order of magnitude less H2O as we implement processes for recovering water from exhaust gas. Water will be locally sourced near the site.

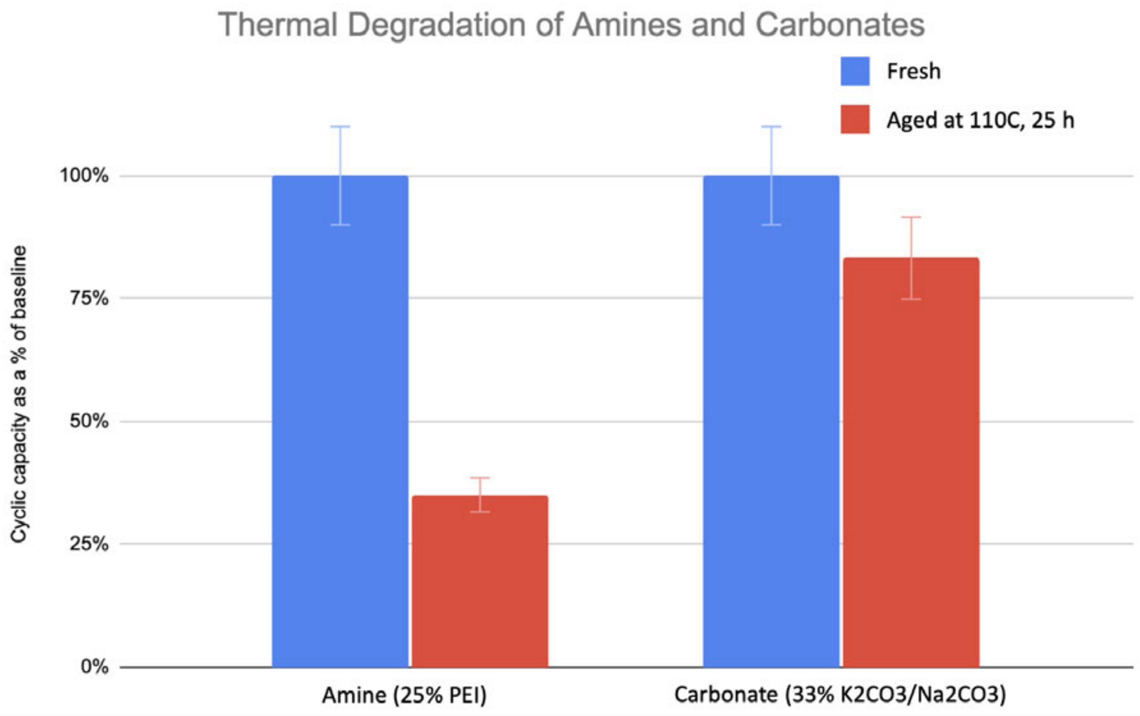
The water will be vaporized. It will be mixed with an aqueous solution for geologic injection.

No other resources are expected to be required.

6. Do you have experimental data describing how your system's CDR performance changes over time? If so, please include that data here and specify whether it's based on the number of cycles or calendar life.

We have collected data showing that our approach is thermally stable during accelerated lifecycle testing. We compare performance of carbonates with amines to highlight our reasons for selecting carbonates as low cost and thermally stable. Data show the cyclic degradation for amines and carbonates, comparing a fresh sample with one that has been aged at 110°C for 25 hours.

We demonstrate stability by showing that the carbonates maintain 83% of their cyclic capacity for CO2 adsorption, compared with only 35% of the cyclic capacity of amines, after equivalent aging. These data support that carbonates are thermally stable to 1σ confidence.



7. What happens to your capture medium at end-of-life? Please note if it is hazardous or requires some special disposal, and how you ensure end-of-life safety.

Our capture media consists of two parts: (1) an activated carbon support and (2) impregnated carbonates. These materials are not hazardous and can easily be disposed of using standard methods without any risk to safety. We are pursuing options that will allow us to remove the degraded carbonates from the support and re-use the same support, thus decreasing overall waste of our system.

8. Several direct air technologies are currently being deployed around the world. Why does your DAC technology have a better chance to scale and reach low cost than the state of the art?

Scale is the driving factor behind all technical and scientific decisions that Clairity Technology makes. We understand the criticality of reaching gigaton scale and ensure that our approach is designed from the ground up to do so.

One of the key advantages we have is that the output stream from our DAC system is a dilute CO2 stream, with concentration of 10-20% CO2 and balance air. This is in contrast to competitors who produce high-purity CO2 streams, >98% purity. The focus on high-purity streams, which mimics what is available from industrial gas suppliers, will hinder development and scale.

Primarily, the energy required to get to >98% purity is greater than to generate a dilute CO2 stream.

Additionally, high-purity systems have higher capex and opex. These systems rely on vacuum to remove impurities/air. Large vacuum systems are expensive and are made from steel and concrete, which increases the life-cycle emissions. If the largest vacuum chamber in the world, the Space Simulation Vacuum Chamber at NASA Glenn, were used for DAC, approximately 60,000 identical sized chambers would be needed to reach gigaton scale!

Clairity Technology proposes a simple approach that will be scalable and lower cost than our competitors systems.