[Clean Air Tech]
Carbon dioxide removal prepurchase application
Summer 2024

General Application

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

Public section

The content in this section (answers to questions 1(a) - (d)) will be made public on the Frontier GitHub repository after the conclusion of the 2024 summer purchase cycle. Include as much detail as possible but omit sensitive and proprietary information.

Company or organization name

Clean Air Tech LTD

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

United Kingdom, however, demonstration site is in Belgium

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

Dr Yougunn Prakashkumar

Brief company or organization description <20 words

Clean Air Tech has developed a novel, hybrid technology that directly captures and permanently sequesters CO_2 using waste alkaline feedstock.

1. Public summary of proposed project[1] to Frontier

a. **Description of the CDR approach:** Describe how the proposed technology removes CO_2 from the atmosphere, including how the carbon is stored for > 1,000 years. Tell us why your system is best-in-class, and how you're differentiated from any other organization working on a similar approach. If your project addresses any of the priority innovation areas identified in the RFP, tell us how. Please include figures and system schematics and be specific, but concise. 1000-1500 words

[1] We use "project" throughout this template, but the 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.

Clean Air Tech has innovated the Zero Air Pollution Carbon Capture Capsule (ZAP-C^3) and the Zero Air Pollution Microbubbler (ZAP-Microbubbler) technologies, collectively called the 'ZAP Systems'. This patented, rapidly scalable, and modular reactor system enables the aboveground capture and permanent sequestration of CO_2 from various sources, including flue gas emitting point sources, direct air capture (DAC), and air. It directly facilitates the mineralization of CO_2 by reacting it with waste alkaline feedstock. The resulting carbonated materials can be utilized as substitutes for traditional, carbon intensive materials, in concrete mix production.

The Technology:
(See video link in 2a of demo)

The ZAP-C^3 consists of three interconnected 40 ft stainless-steel containers: The Yellow ('quenching container') and Red container (*Fig 1*) and the Blue container (not shown). These containers are meticulously engineered to exhibit exceptional corrosion resistance and durability enabling long use life, featuring unique perforated and patented dynamic flooring systems. The Microbubbler is a bubbling and recirculation system connected directly to the ZAP-C^3 units.

We have deployed our first TRL 7 system at a large anaerobic digester (AD) plant in Belgium (*Fig 2*). Our system directly sources CO_2 from the flue gas emitted during the biogas combustion process. Recyclers crush construction and demolition (C&D) waste i.e. building material to produce Recycled Concrete Aggregate (RCA), an alkaline waste material. Several studies have shown its significant capacity for CO_2 sequestration (Zhu et al., 2024, Sereng et al., 2021, Qian et al., 2024). In this project, we primarily utilize locally sourced RCA and well water to produce a carbonated RCA (C-RCA). Throughout the process, the redirected flue gas flows continuously from the Yellow container to the Red container, and then to the Blue container in a unique manner. The CO_2 sequestered into the C-RCA is considered permanent with a durability of >1000 years (IPCC). Utilization of this into concrete mix also allows for permanence and is not subject to conditions that allow for leakage. The CO_2 removal process is based on the well-established principles of carbonate chemistry and consists of two parts, summarized below.

Part 1: ZAP-C^3 System

1. **Quenching in the Yellow Container:** Flue gas emitted from a combustion engine during an industrial process is typically very hot (ca. 200-400 °C). For safety, this gas is redirected to the Yellow quenching container to reduce its temperature. High-concentration CO_2 from high temperature flue gas reacts with sprayed water in a gravitational flow, forming carbonic acid solution (H_2CO_3), at ca. pH 3.5 and cooling the gas. The unique engineering improves the rate of CO_2 dissolution in water. H_2CO_3 partially dissociates into bicarbonate ions (HCO_3^-) and hydrogen ions (H^+). This solution, called 'quenchant,' at ca. 90 °C and a lower pH (ca. 3.5) is immediately pumped to the Red container.

2. **Carbon Mineralization in the Red Container:** The flue gas containing CO_2 in 'aspirated' form continues to flow from the Yellow into the Red container. Some of the aspirated CO_2 is captured by the sprayed quenchant in a gravitational flow, resulting in additional density driven dissolution of CO_2, to contact and react with the RCA that is loaded onto a perforated moving floor. The H^+ from the dissociated carbonic acid reacts with $Ca(OH)_2$ in RCA, producing calcium ions (Ca^{2+}) and H_2O. The bicarbonate ions (HCO_3^-) react with calcium ions (Ca^{2+}) to form calcium carbonate ($CaCO_3$), a stable, solid compound, which forms on the outer layer of the C-RCA aggregates (*Fig 4*). We continuously monitor the reaction by measuring the delta pH of the liquid quenchant as well as the leachate (bicarbonate solution) with a greater than 9 pH, collected at the bottom of the container.

3. **Updraft Reaction in the Blue Container:** The flue gas containing aspirated CO_2, flows to the Blue container, encountering in an updraft with the RCA which is loaded onto a perforated moving floor. This further optimizes conditions for CO_2 mineralization because the carbonic acid is still in an aspirated form and continuously reacts with the RCA, enabling even faster reaction rates compared to the Red container. No leachate is produced here.

Part 2: ZAP-Microbubbler

4. **Microbubbling:** A part of the cleaner flue gas with the remaining CO_2 exiting Blue container is directed to the ZAP-Microbubbler, where it reacts with high-pH leachate removed from the Red container to form precipitated calcium carbonate (PCC), which is filtered out. This neutralizes the leachate, and the solution of neutral pH is recirculated back to the Yellow container, restarting the process. This step is important for the sustainable recirculation of water, ensuring that no environmental discharge occurs, with the bonus of additional sequestration. However, we are conducting ongoing research to quantify the CO_2 sequestered and have not accounted this in our net removal.

RCA from C&D waste generally exhibits lower strength compared to natural aggregates; however, the carbonation reinforcement method can enhance the strength of RCA (Su et al., MDPI, 2023) making it an economically desirable production concrete mix. The ZAP-C^3 provides optimal conditions for required liquid-to-gas ratio and increased residence time, ensuring that all of these conditions, chemical, and kinetic reactions occur efficiently and homogeneously at atmospheric pressure. Reaction process summarized in *Fig 3*.

Figure 1: *Yellow and Red containers interconnected. Flue gas is diverted from the flue stack (arrow) and connected to the Yellow 'Quenching container' at the start of the process.*

Figure 2: We have collaborated with an anaerobic digestor plant in Belgium. Biogenic flue gas produced from their combustion our CO_2 feedstock

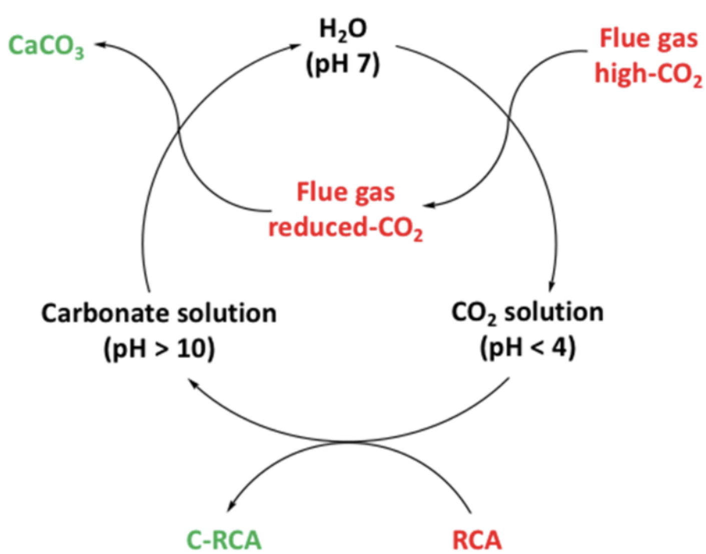

Figure 3: Schematic of the water catalyzed conversion of RCA and CO_2 into $CaCO_3$ and C-RCA

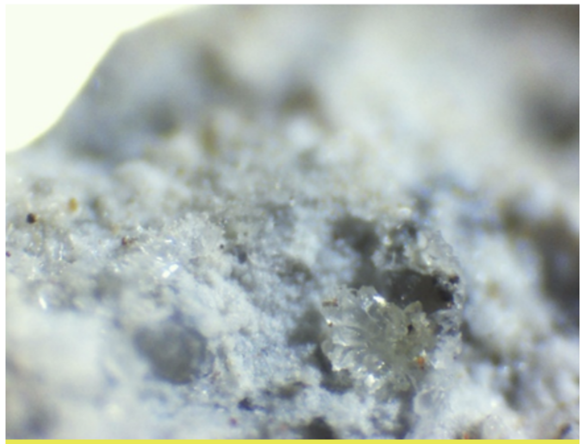

Figure 4: Microscopic image of C-RCA demonstrating successful calcite formation on surface layer

Further differentiations and addressing innovative priority areas:

1. **Use of water as a catalyst:** The improved kinetic reactions in the system allows us to effectively use water sustainably as a fully re-circulated catalyst/reagent instead of amine or other organic reactants. These benefits include:
    a. Reduction in costs and carbon-intensities associated with use of amines/solvents.
    b. Unlike amines and other organic solvents/reagents water does not degrade under any condition (conceivable in the system), allowing the direct use of hot flue gas as a CO_2 source. (Gouedard et al., 2012)
    c. Using well or fresh water eliminates petroleum-based reagents, reducing associated emissions with their manufacture and disposal.
    d. Water-based processes are not affected by NO_x or SO_x, enabling capture from a wider range of CO_2 sources.
    e. Water is non-hazardous, and even carbonic or carbonate waters used in the process are environmentally safe in case of an accident.

2. Use of a variety of waste industrial alkaline materials: We have conducted feasibility studies (Narasimhamurthy et al, 2024) utilizing a variety of industrial waste alkaline materials, such as RCA, (Basic Oxygen Steel) BOS slag, toxic fly Ash, and toxic Bottom Ash which would otherwise require cost-intensive and toxic disposal in landfills or transportation to distant sites. Our bench scale data demonstrates that we can incorporate these materials into our process, thereby reducing those challenges.

3. Minimal negative ecosystem impact: We do not discharge any waste or byproducts into land or water, minimizing the entry of toxic metals into the environment and promoting sustainable reuse of these materials.

4. All-in-one process: ZAP system can be configured to 'plug-in' with any industrial point source emitter, and capture & sequester CO_2 into materials *directly at site*. We do not depend on storage underground/into oceans or land posing risks of environmental issues and leakage. No transport or secondary systems needed to sequestrate captured CO_2 elsewhere, further reducing cost and emissions.

5. Low energy use and cost-effectiveness: In addition to above, a ZAP system is highly energy-efficient, which is attributed to several factors: materials, utilizing waste heat from flue gas, operating without additional pressure, no requirement for CO_2 separation or solvent use and more.

6. Industrial integration: *Fig 5* provides a general overview of ZAP's integrative capabilities. The ZAP System's modular design enables efficient integration of CDR into existing industrial processes. It can be rapidly scaled, interconnected, and stacked, allowing expansion to multiple projects and various industrial point source emitters using a variety of alkaline waste.

Partnering with the Energy Safety Research Institute (ESRI) in the UK, we aim to integrate our system with their technologies in a 'Decentralized Integrated Process Approach' (DIPA). For example, the valuable alkaline leachate we produce can be used to generate green hydrogen (a zero-emission fuel) and support algae farms in producing agro-biochemicals and high-value bio-chemical products, replacing petroleum sources. We can also collaborate with existing DAC technologies. Prof. A. Barron, our Chief Scientific Officer and Director of ESRI, explains this with a visual representation of the ZAP systems in this video: https://www.youtube.com/watch?v=1hM8gVsGX5M

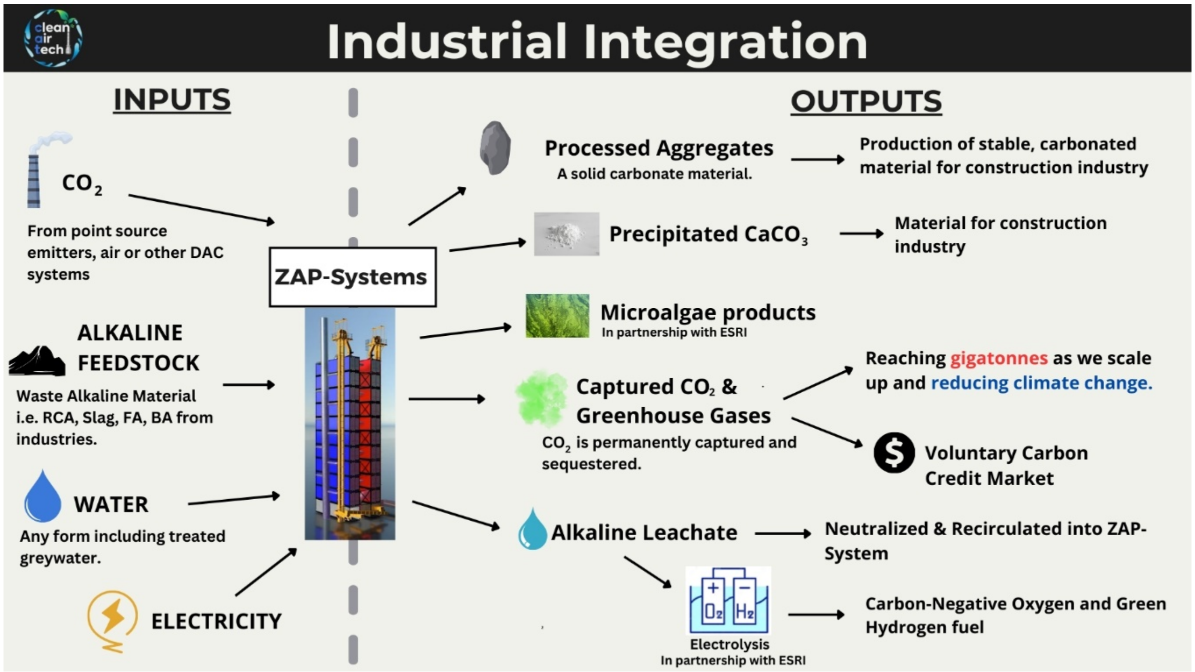

Figure 5: *Schematic representation of how the ZAP System can integrate with other industrial processes*

7. Additional Revenue Sources, Utilization of Byproducts & Economic Benefits: The C-RCA produced can substitute a percentage of Portland cement in concrete mixes, and a percentage of virgin mined/dredged sand and gravel. This offsets the construction industry's current carbon emissions and significantly reduces costs. Whilst we currently plan to sell our byproducts to local concrete manufacturers, we are planning to produce our own 'green' concrete mix using C-RCA from after TRL 9. With our overall integrative ability, comes multiple other sources of revenue, which unlocks demand beyond voluntary carbon purchasing and reduce costs to <$100/t$CO_2$.

8. Community Benefits: The Wallonia region of Belgium has a rich industrial heritage in steel and metallurgy. This history has unfortunately left a legacy of factory closures, job losses, and environmental issues. Recognizing these challenges, we have aligned our initiatives with local community to help boost employment rates in the region and achieve their environmental goals.

b. **Project objectives:** What are you trying to build? Discuss location(s) and scale. What is the current cost breakdown, and what needs to happen for your CDR solution to approach Frontier's cost and scale criteria?[2] What is your approach to quantifying the carbon removed? Please include figures and system schematics and be specific, but concise. 1000-1500 words

1. Current project objectives

The AD plant is located in the Wallonia Province, Belgium. Operating 365 days per year, the plant's engines combust all the produced biogas to generate electricity for the grid. Collectively, these engines emit ca. 12,000 tCO_2/year, which is 100% biogenic.

We have successfully installed the Yellow and Red ZAP-C[3] containers, along with the Microbubbler. The Blue container is in production expected to complete by end July. Despite its absence, our system is operational but with lower efficiency of CO_2 dissolution, because we are operating at minimum water to flue gas ratio to prevent water loss to the atmosphere. In January 2024, we conducted successful trials, capturing and sequestering ca. 1.44 tCO_2. Data from our bench-scale model with miniature containers suggests that once the Blue container is complete, the sequestration efficiency will achieve net 3494 tCO_2 annually due to higher mineralization rates, and reduced loss of aspirated CO_2 and water vapor. The aspirated carbonic acid enables faster reactions, further enhancing CO_2 capture and permanent sequestration efficiency. We anticipate beginning our CDR with complete ZAP System's by November 2024.

This CO_2 removal is considered additional; it was not planned by the AD plant prior to the implementation of our technology and achieves emissions reductions beyond the no-intervention baseline scenario. We envision our TRL 9 'First of A Kind' (FOAK) system to be 3 sets of fully optimized ZAP-Systems capable of utilizing the full ca. 12,000 tCO_2 emitted/year at the plant.

2. Scaling to >0.5Gt CDR/year

a. **Technology & Multiple Projects:** Being modular, the ZAP system can be manufactured and installed at any scale. Each container unit can be stacked and interconnected, enhancing CO_2 sequestration capacity (*Fig 1*). The land footprint is minimal, and if scaled for 0.5Gt tCO_2/year sequestration this equates to only ~55.5 km^2. Our system can be designed to integrate with almost any industrial site and supports a wide array of point source emitters using locally available aggregate materials, allowing for significant scale-up without major logistical constraints.

   Europe has an estimated >20,000 full-scale AD plants in operation [Kusch-Brandt, S. et al., MDPI] and an estimated 132,000 small, medium, and large-scale AD plants in operation worldwide [World Biogas Association, 2019], highlighting the large scope for global scale-up. We are in preliminary discussions to locate at other AD plants in Belgium, Germany and the UK, with plans for further global expansion. Additionally, we plan to integrate with other types of point source emitters such as solid biomass, bio-methane, biodiesel combustion electricity generation, and mixed waste incineration plants wherein, typically 50% of biogenic waste is combusted to generate electricity producing toxic

[2] We're looking for approaches that can reach climate-relevant scale (about 0.5 Gt CDR/year at $100/ton). We will consider approaches that don't quite meet this bar if they perform well against our other criteria, can enable the removal of hundreds of millions of tons, are otherwise compelling enough to be part of the global portfolio of climate solutions.

fly ash and bottom ash.

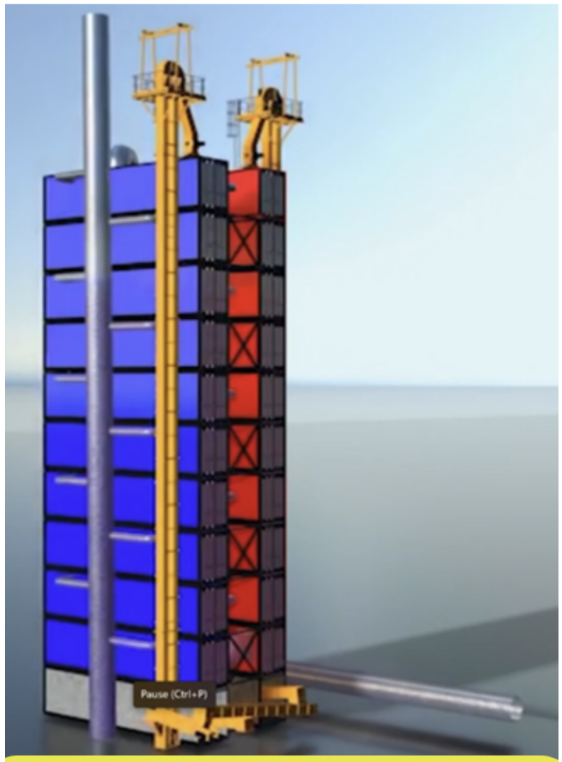

Figure 1: A conceptual rendering of our large stacked ZAP System, installed in a cluster formation, with primarily the Red and Blue containers interconnected. More containers = more sequestration, with minimal land footprint use.

b. **Waste alkaline feedstock strategies:** We are able to use a variety of feedstock types and are continuing to conduct feasibility studies on other materials. In Europe, the use of RCA is increasingly significant due to the high volume of C&D waste. Currently for RCA, the EU Commission and CEMBUREAU report that Europe generates 450-500 million tons of C&D waste annually, with at least a third being RCA. (Su et al., Publications Office of the European Union, 2023). Worldwide, approximately 4.5 billion tons of C&D waste (accounting 30-40% of total solid waste worldwide). The replacement of components such as natural aggregates, Portland cement, mined/dredged sand with RCA for use in concrete mix can significantly reduce the environmental burden associated with aggregate mining and waste disposal.

Additionally, fly ash and BOS slag present significant opportunities for sustainable construction. BOS slag has a global annual production exceeding 300 million tons (USGS, 2021). Utilizing these materials as supplementary cementitious materials can further reduce reliance on natural resources. Given these figures, the utilization of RCA, along with fly ash and BOS slag alone have the potential to exceed an annual scale of 1 gigaton, contributing substantially to sustainable construction practices.

3. **Reducing the CDR Cost to <$100**

a. **Capital Expenditure (Capex) Reduction:** Achieving the milestone of $100/t$CO_2$ involves an initial capex of $197 t$CO_2$ (refer to TEA), which constitutes the highest proportion of our costs. However, the impact of this capex diminishes considerably over a project lifespan of 25 years at each site. Additionally, as we expand and engage in multiple projects, bulk manufacturing of standard size as well as custom built size will drive further reductions in capex, making our operations more cost-effective.

b. **Cost-Effectiveness Measures:** To enhance cost-effectiveness and reduce carbon intensities, we have implemented several innovative measures, such as the re-engineering of used stainless steel containers that have reached their end of their life, which avoids costs associated with manufacturing new containers.

c. **'All-in-One' System:** The hybrid advantages described previously also plays a crucial role in cost and carbon footprint savings. We simply 'plug-in' our modular system directly at the point source emitter and commence our process to permanently sequester CO_2. We do not require any transportation of CO_2 to other sites, thus have no associated costs.

d. **Low-Cost Feedstock Utilization:** The feedstock materials we use are all low-cost waste products, which significantly reduces our input costs. By sourcing materials locally available that are otherwise considered waste, we not only lower our expenses but also contribute to waste reduction and environmental sustainability.

e. **Additional Revenue Streams:** We generate additional revenue through various means, which helps drive down our purchase price. These revenue streams include the production of C-RCA, future in-house manufacturing of concrete mix, production of green hydrogen fuel and high value algae products through integration with technologies developed by ESRI and other companies. These activities not only provide financial benefits but also support and augment our carbon removal efforts.

f. **Energy Efficiency and Renewable Transition:** Our current electricity costs are extremely low. This is due to the meticulous design and working of our ZAP systems, which are highly energy-efficient, using only 288 MWh/year or 0.082 MWh/tCO2 sequestered. Furthermore, we plan to transition to renewable energy sources, which will further reduce our electricity costs and enhance the sustainability of our operations.

Through these combined efforts, we are confident in our ability to reach the target of $100/t$CO_2$, ensuring the economic viability and sustainability of our carbon sequestration projects.

4. Quantification:

We use precise and direct analytical methods for accurate quantification of CO_2 sequestration, involving the measurement and correlation of multiple carbonate chemistry parameters. The starting variability of the RCA carbonate content is a significant uncertainty in this field. We improve these uncertainties (thus Frontier's verification confidence levels) by characterizing carbonate content in RCA before and after carbonation in two ways: batch sampling and TGA analysis (*Fig* 2) to measure CO_2 sequestered by detecting thermal decomposition of carbonates within a specific temperature range, and quantitative X-Ray Diffraction (XRD) to quantify the formation of calcium carbonate on the surface of RCA & C-RCA aggregate particles.

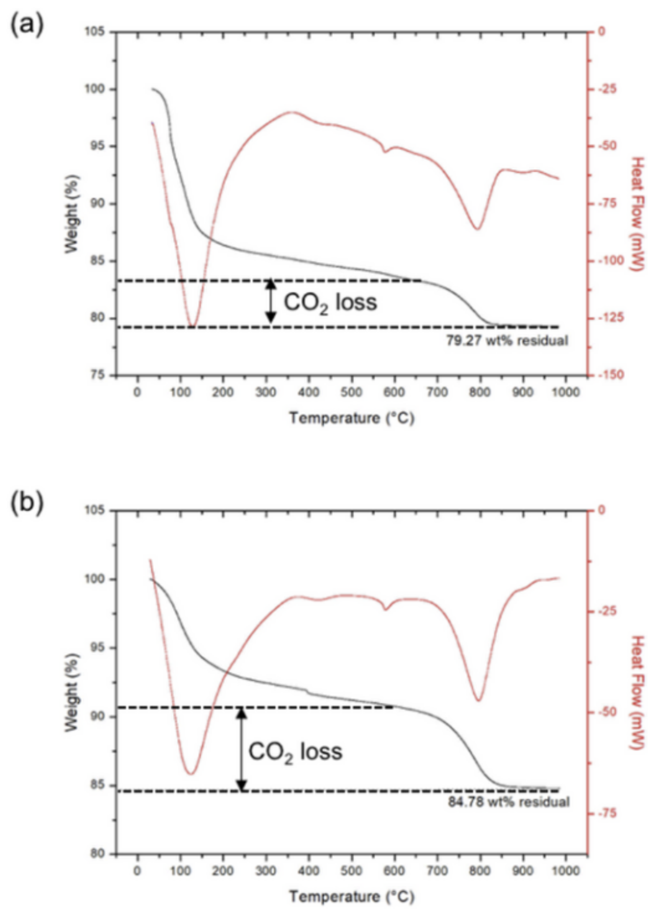

Figure 2: *Representative TGA analysis for RCA (a) before carbonation and (b) after carbonation, demonstrating mass differences.*

Additionally, the pH of the leachate is *continually* monitored as a check on the TGA sampling, enabling efficient on-site process control. Total Inorganic Carbon (TIC) serves as a corroborative indicator. Finally, we correlate these results with the CO_2 PPM content of the flue gas at the start and end points of the ZAP System, providing quantification that is quick and less dependent on predictive modelling.

While many efforts remain at the lab scale, a significant challenge in this field is scaling up from prototype to a demonstrative model. Our system has successfully achieved this large-scale implementation, demonstrating its practical viability beyond the laboratory. We are also registered with Puro.Earth and aim to certify our independently audit our carbon removal activity. Referring to Puro's 'Carbonated Materials' protocol, we can quantify the net CO_2 removed as:

$$net\ CO_2\ removed = E_{stored} - E_{production} - E_{baseline}$$

a. **Risks:** What are the biggest risks and how will you mitigate those? Include technical, project execution, measurement, reporting and verification (MRV), ecosystem, financial, and any other risks. 500-1000 words

Technical risks:

1) **Optimization of the ZAP system *(low-medium)*:** The optimization of the process in ZAP system can be done after commissioning of the Blue container. Although our demonstration in January 2024 conducted without the Blue container successfully sequestered a minimum of 1.44 tCO_2 at very low liquid to gas ratio, full optimization is essential. Achieving a net sequestration of approximately 3494 tons of CO_2/year, without the loss of aspirated CO_2 and water vapor, requires the implementation of the Blue container. This is based on bench scale data showing a 75% reduction of CO_2 capacity. Replicating similar rate of dissolution of CO_2 in water in Yellow, Red and Blue containers is a time consuming and costly process.

   To mitigate these risks, we have taken several steps: 1) Learning from the current trials in Yellow and Red containers (operating at very low liquid to gas ratio) which cuts short the process optimisation risks, time, and costs after commissioning the Blue container. 2) We periodically review to assess the effectiveness of our mitigation strategies and make necessary adjustments in response to emerging challenges. 3) We conduct routine risk management meetings with our partnered manufacturer to actively monitor progress and potential risk factors associated with the Blue container's completion.

2) **CO_2 supply limitations (*low*):** Changes in the AD plant's operations or efficiency, such as variations in biogas production, can impact our CO_2 supply. We plan to:

   - Monitor biogas production regularly, so we can accommodate for changes in our ZAP Systems
   - Maintain consistent communication with the plant's management.
   - Identify alternative biogas sources and diversify partnerships with other energy generation plants

3) **Water & energy related risks (*low*):** Dependence on water and electricity poses a risk to our process in the event of supply shortages. The availability of water resources, currently supplied by bore wells and municipal sources, will affect our operations. The AD plants, which depend more heavily on water resources than our process, take precautions to ensure water availability for their operations. The plant relies on grid electricity and also produces its own electricity; thus, this risk is minimal unless there is a variation in biogas production, which has been stable for 15 years. We plan to discuss strategies with the AD plant to incorporate our energy and water needs into their overall water management plan. There is currently an abundance of RCA, and we will continue to conduct feasibility studies on further alkaline materials. We have identified multiple RCA suppliers in the region and plan to form additional partnerships to ensure an adequate supply.

Project execution risks:

1) **Secured Land at AD Plant (low):** The availability of secured land at AD plant for hosting our ZAP-system for long-term (>10 years) operation is uncertain. Although we are ready to operate, this is dependent on a purchase order e.g. purchase of CDR. We will engage in discussions with the

AD plant management to explore long-term lease or purchase options and identify alternative adjacent sites as contingency plans. However, as an example, a Frontier pre-purchase contract will positively impact on securing long-term lease. We are also in discussion with other plants as part of both a scaling and risk mitigation strategy.

2) **Transportation risks (low):** Future restrictions on transportation imposed by regulatory authorities could affect the quantity of RCA and C-RCA transported to and from the site, impacting our operations. We will engage with local regulatory bodies to understand any future potential restrictions and develop alternative transportation strategies.

MRV risks (low):

The risks associated with MRV are very low for our project. We address and mitigate these risks through several measures:

1) **Registration and Compliance:**

We are also registered with Puro.Earth and aim to certify our carbon removal activity. This protocol involves rigorous auditing and third-party verification, enhancing the robustness and credibility of our MRV process.

2) **Laboratory Validation:**

- **Current Practices**: We employ external laboratories and teams for validation. For example, we have a strong contractual partnership with ESRI, which verifies and analyzes our materials, providing quantification of our CO_2 sequestration.

Ecosystem risks (low):

The risk to the ecosystem from our technology is minimal. One of the core advantages of our technology is its ability to enhance the existing ecosystem, which significantly reduces potential risks associated with our project. Our approach includes several key strategies:

1) **Community Engagement and Support**: We have proactively sought and secured engagement and support from local communities. This involvement ensures that our project aligns with the community's environmental and social values, reducing resistance and encouraging collaboration.

2) **Environmental and Health Safety**: Our technology operates without generating environmental hazards, waste, or health risks.

3) **Regulatory Compliance**: Currently, there are no laws mandating stricter emissions controls that would impact our operations. However, our technology already operates with low emissions, as demonstrated in our Life Cycle Assessment. This proactive approach positions us favourably should future regulations become more stringent.

4) **Scalability and Impact Assessment**: As we scale our operations, we will continue to use a community-focused approach to identify and mitigate impacts in other regions and amongst different point source emitters. This ensures that our expansion remains environmentally responsible and community-centric.

Financial risks (medium):

1) **Insufficient Financing for Scaling**:

- **Anticipated Funding**: We plan to secure project funding through a combination of debt, equity and revenue, particularly to achieve our First-of-a-Kind (FOAK) goals for this site. This diversified approach will help ensure we have the necessary capital for initial operations.
- **Advance Prepurchase Orders**: Securing advance prepurchase orders will provide an immediate incentive to speed up production and generate our first revenue. This initial revenue stream is crucial for demonstrating viability and attracting further investment.
- **Additional Revenue Streams**: We have developed strategies to create additional revenue streams, which will help reduce overall funding requirements as we scale. These strategies include exploring new markets through the Decentralized Integrated Process Approach (DIPA).
- **Exploration of Funding Sources**: Our finance and marketing teams are also actively exploring multiple avenues to secure various sources of funding, especially green debt/green bond funding, including grants and partnerships.

b. **Proposed offer to Frontier:** Please list proposed CDR volume, delivery timeline and price below. If you are selected for a Frontier prepurchase, this table will form the basis of contract discussions.

Proposed CDR over the project lifetime (tons) *(should be net volume after taking into account the uncertainty discount proposed in 5c)*	**1,453 tCO_2** *(after application of 10% uncertainty discount)*
Delivery window *(at what point should Frontier consider your contract complete? Should match 2f)*	**November 2024 – November 2025** *for Frontier's first tons*
Levelized cost ($/ton CO_2) *(This is the cost per ton for the project tonnage described above, and should match 6d)*	**$255**
Levelized price ($/ton CO_2)[3] *(This is the price per ton of your offer to us for the tonnage described above)*	**$344** *(includes 20% indirect & 15% for net margin costs)*

[3] 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 and reflect reductions from co-product revenue if applicable).