



**COOL-OSE**

A cool way to make sugar!

Group 1

## Overview

Cool-ose is a B2B company that sells and provides a solution for Carbon Capture and Storage. Cool-ose offers a whole process with specific machinery which transforms carbon produced within the manufacturing process into D-glucose and then sugar. The sugar can be later commercialized, sold, or used as a raw material for further production. Our solution of turning carbon into sugar provides a greener and more profitable method of CCS.

## Problem Summary

Ever since the industrial age, there has been a significant increase in CO<sub>2</sub> emissions leading to excess CO<sub>2</sub> in the atmosphere. CO<sub>2</sub> has a longer atmospheric lifetime when compared to other greenhouse gases. Cumulative emissions of CO<sub>2</sub> will have a lasting impact on global average temperatures, being a leading cause to global warming. Dr. Raymond Pierrehumber of Oxford University along with other climate scientists believe that if we do not address global warming now, we will not stabilize global temperatures for another 100+ years. Efforts have been made to reduce the amount of CO<sub>2</sub> such as planting more trees; however, this method has been proven to be insufficient. Other methods are capturing the CO<sub>2</sub> and storing but this is where that process ends[1][2]. Regulations and legislation are slowly being put in place to reduce companies carbon footprint and grants are being offered in relation to carbon capture[3].

## Solution Summary

The idea behind CCS is to capture the CO<sub>2</sub> generated by burning fossil fuels before it is released to the atmosphere. Capture generally takes place at large stationary sources of CO<sub>2</sub>, like power plants or industrial plants that make cement, steel, and chemicals [4].

Inspired by the natural photosynthetic process in plants we thought of making sugar out of captured carbon. Plants make sugar, for instance in fruit. The idea is to fix carbon at a ratio of 6:1 meaning that for every sugar molecule made 6 captured carbon dioxide molecules are used. Sugar could be used to make useful products – anything from plastics, adhesives, and fuels to food and medicine. Providing access to the sugar market would make CCS more economical and therefore viable. It would also help reduce the environmental impact of current sugar production,

such as using land to cultivate sugar cane.

To do it, excess carbon is captured from the atmosphere then combined with hydrogen to produce methanol. Afterwards, hydrogen is taken out of methanol to produce formaldehyde. D-glucose is produced from formaldehyde and combined with fructose to make table sugar. Finally, the sugar is packaged and shipped to customers [5].

## **Market Analysis**

Our target market focuses on high carbon emitters such as companies and manufacturers, and our major business model would be Business to Business (B2B). Our product is geared towards those who practice sustainability and have a strong focus on reducing carbon emissions. We also market towards corporations who own food and beverage processing plants such as Coca-Cola and Hershey's where companies need a large amount of sugar to manufacture products.

Firms are showing interest in carbon capturing. For example, Coca-Cola Europacific Partners (CCEP), the world's largest Coca-Cola bottler, has announced a collaboration, through its innovation investment platform CCEP Ventures, with the University of California, Berkeley (UCB) to develop scalable methods of converting captured CO<sub>2</sub> into sugar [6].

Carbon capture market has been expanding throughout the years and the demand forecast has been positive for this industry. According to Forbes Business Insights, "The global carbon capture and sequestration market is projected to grow from \$2.01 billion in 2021 to \$7.00 billion in 2028 at a CAGR of 19.5%, The global carbon capture and sequestration market is projected to grow from \$2.01 billion in 2021 to \$7.00 billion in 2028 at a CAGR of 19.5% [7].

## **MVP**

The MVP for this case is the set of basic carbon-capturing and sugar-producing processing equipment and services. The plan considers a device that can be installed directly onto the existing producing line. However, for the MVP, the carbon-capturing device focuses on capturing emitted carbon from the air. The equipment includes machines for carbon-capturing, chemical reactions to produce sugar, and rough processing of the sugar. The MVP works on a smaller scale than the final product will in the capability of processing the carbon. As a part of the service, technical support is provided for up to 12 months. During this period, there is no consulting fee or lower maintenance fee. After 12 months, the clients can upgrade the plan to the standard service. The client can also extend the existing MVP version until the formal plan is produced if it is still being prepared.

## **Finances**

To estimate costs, we first looked at the average amount of carbon emissions in metric tons an average sugar factory produces per year [9] and the cost of carbon capture equipment per metric

ton [10]. Multiplying the two together would then give us an estimate of the cost of carbon capture for a factory, approximately \$761,000. So, the costs of a year would be calculated by the number of customers multiplied by the cost of carbon capture for a factory, with an additional fixed cost of \$50,000 dedicated to research. At the current moment, because we are within the prototyping stage, no revenue will be made until the end of Year 1. By Year 1, the finalized product will be ready to be incorporated into our first customer's factory. By Year 2, it is projected the company will break-even.

As mentioned above, Cool-ose has recently entered the prototyping phase. With the seed capital Cool-ose will accomplish the first prototype to test our company's product within a sugar factory. The prototype would be one step closer towards the finalized product. The money raised would also go towards hiring a Director of Research and two supporting researchers. By hiring these three team members the research would strengthen the science behind our product, and potentially widen profit margins by finding a more economical evolution of carbon capture. Approximately \$30,000 would also be contributed to marketing. A part of our marketing plan is to gain potential partnerships that can be found at sustainability and sugar conventions.

### **Go-To-Market Plan**

Cool-ose will use a direct sales approach in which we are selling intellectual property. Our starting marketing strategy is to directly approach companies. We will also partake in science, business, and technology conventions in order to further our marketing plan. Another approach Cool-ose will take to increase client traction will be speaking and marketing directly to companies who are high CO2 emitters.

### **Team**

Our team is a diverse collection of dedicated individuals passionate about tackling the climate crisis. We come from a variety of backgrounds ranging from physics and bioengineering to psychology and business. We value an inclusive and supportive work environment where everyone of one the seven cofounders contributes and is heard. We are committed to creating a sustainable future with hard work, ingenuity and honest teamwork.

### **Next Key Steps**

In the next 6 months, we will work on our prototype and apply for grants and fundings from the government to support our product development and future operations. By the end of 12 months, we will finalize our product and seek FDA approval, while expanding our network within the industry and connecting with manufacturers and suppliers. By the end of 18 months, we will approach our potential customers and promote our product. After 24 months, we will gain our first customer and deliver our product. By the end of 30 months, we will increase our potential customer base through various marketing channels. Finally, by the end of 36 months, we will achieve our goal of selling to at least five customers.

## References

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