

# THE GREENHOUSE EFFECT



PLANTING A HEALTHIER, STRONGER,  
MORE SUSTAINABLE LIFE.

**Detroit Community High School and the University of Michigan**

Change by Design

Fall 2018

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# Executive Summary

In the effort to educate young people on the power of growing one's own food, our team built a greenhouse and speculative technological elements that can revolutionize the gardening process. Our group asked the question: how might we tackle food production during the winter months? Michigan, like many states around the country, has very long and snowy winters that do not provide ideal growing conditions. To address this global issue on a local level, we needed something that our students could relate to, would add some healthy food to their lives, and would teach them about healthy eating along the way. Our product does not intend to replace the urban gardens; rather, it helps maintain them throughout the winter months.

Our product is adding one piece to the larger, existing system that Detroit has made. The people are already showing a positive effort by coming together in communities and creating all these gardens. Most designers are not afforded the chance to work alongside the recipients of their designs, but the University of Michigan and Detroit Community School students were fortunate enough to spend an hour every week for a semester to work together. We used our opportunity of working in a design group with people from mixed backgrounds and experiences to help the Detroit students be able to continue the great work their community has already started.

Our greenhouse pod can be produced in numerous sizes so that it may cater to larger urban farms, but also small family homes or apartments. The smaller sizes would be big enough to hold plants that could feed someone, but they would not be so big that they would be in the way if you have a small yard. We are going to implement a rain catcher (catches snow and waters the plants), which was Eric, one of the Detroit student's, ideas.

We began this semester thinking that the UofM team members would be the "teachers" and the Detroit team members would be the "students." However, we soon discovered that there was a lot to learn both ways. Throughout the semester, we all began to trust each other and ask genuine questions to which we

did not know the answers. The team combined our knowledge that came from our wide variety of different experiences to create something we could all be proud of.

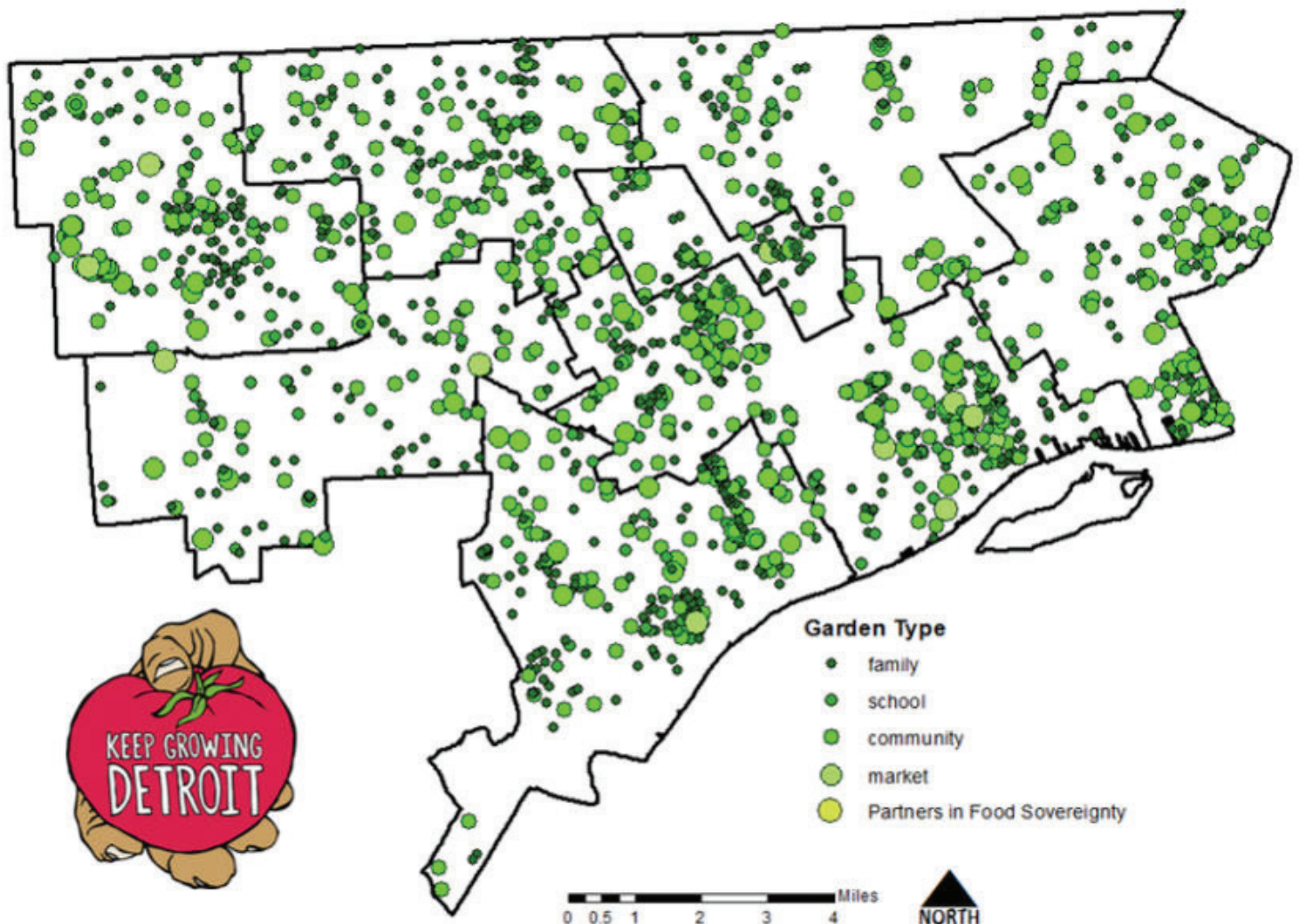
Throughout the construction of the greenhouse, we posed many questions about why a greenhouse is constructed the way it is. What is its purpose? How could it better serve this purpose? As we built the greenhouse and planted the seeds, we discussed how we could make the process of constructing, planting and caring for a greenhouse easier. In further iterations, we would look at the possibility of solar panels to create an ideal living system for the plants within the pod, regardless of weather within the area. We also researched weather balloons which, alongside the solar panels and a smart-gardening system, could open in response to sun and collect carbon dioxide from the air to add nutrients to plants. By implementing speculative elements, explained in further detail below, we connected our project to the larger system it supports. Our company name, The Greenhouse Effect, references an effect that is currently harming people and our planet because of human actions. In contrast, our effect will be bringing people together to spread health and sustainability throughout urban communities. By revolving our product around its end users, within the realm of bettering homes and communities, our product becomes more than a mere greenhouse. Rather, it is a beacon of hope that brings people together. We hope you will join us in showcasing this city's inspiring effort as we plant the way to a stronger, healthier future.



## Problem Identification

This is an image that everyone in Michigan can relate to. It symbolizes the long, cold winter months that make us wonder when we will next see the sun. The Greenhouse Effect began by exploring the question: how might we tackle food production during the winter months? To combat this global issue locally, we are building small greenhouse pods that communities, schools, and families in Detroit can use to sustain their local gardens throughout the rough Michigan winters.

If we look at this map of Detroit, we can see that the number of gardens- whether it be a community, school or family garden- far surpasses the number of grocery stores in the Detroit Metro area. According to Keep Growing Detroit, there are 1,500 productive urban farms and gardens that engage more than 20,000 people each year versus 111 grocery stores. In acreage, that's about 165 acres. However, if 5,000 acres were being used, residents could grow the majority of their own fruits and vegetables while ensuring social, economic and health benefits.



# 5 Levers of Social Change

## DRIVERS OF SOCIAL CHANGE

Social change happens one step at a time. But where to begin? We took a look at some of today's most successful social initiatives and identified five strategic and proactive approaches that have resulted in enduring change on society's most pressing issues.



Based on Stanford Social Innovation Review's article "Five Levers for Social Change," written by Aaron Hurst, The Greenhouse Effect looked at projects dealing with similar themes as our own to see how we fit into the drivers of social change.

### Bright Spots

When thinking about new ways to weave the knowledge of food insecurity and sustainable gardening into people's everyday lives, we could start in schools. By implementing the teachings of valuable information regarding overall health and sustainability to children and young adults, the possibilities for growth and innovation are endless and will eventually have a greater impact over time (as children also influence their parents, and vice versa).

The Greenhouse Effect fits best into the bright spots category because we are making a product that can help with a small aspect of food insecurity, and others can apply the idea to their own gardens. Hurst's Edible Schoolyard example actually applies to our project, and I like that it has a similar combination of teaching kids about healthy eating as well as the environment. Like our project, Edible Schoolyards give the kids a local source of food to combat the unhealthy eating that often comes with food insecurity.

We noticed that the students in our group have a passion for their city and culture. According to the National Geographic, an interesting activity for students to engage in food sustainability is looking into "Culture, Food, and Ritual"; analyzing certain historical practices/celebrations and how food is connected to these activities. Not only does this activity teach

students about history, but it also helps expand students' knowledge on food and why it is so important in our everyday lives.

If we are trying to design "bright spots" within this community, we must focus on initiating a replicable process/product. We want to encourage both community and individual winter farming in the community to increase the incorporation of fruits and vegetables in the off-season diet. The first step toward designing for the Brightmoor community is to design something that is affordable and simple to construct so that anyone can build and maintain their own greenhouse.

### Data and Insights

Data and insights keep us grounded in what is feasible for the community to construct, maintain, and use. Looking at materials that are easy to access, a bit of technology, and a size that an individual can use and construct alone, we hope that our design fits the demographic needs.

It is important to know who is food insecure in order to work towards security. Since almost 25% of Baltimore lives in food deserts, the Johns Hopkins Center for a Livable Future (CLF) created a Maryland Food System Map project that maps supermarkets, food pantries, farms, and the food insecure regions of Baltimore. The goal of this project was to gain a greater understanding of how the area as a whole relates to food, and the CLF hopes that the project will spark conversations and direct policy action.

A leading organization in improving access to food in Detroit is "Feed: Fighting Hunger in Detroit". As stated on their website, "Forgotten Harvest's mission is two-fold: to relieve hunger and to prevent nutritious food waste. Over the past 25 years, they have been doing just that in the Detroit area. What started as one donated van has since grown to 33 trucks and 71 employees. According to Forgotten Harvest, over 70 billion pounds of food is wasted every year in our country. "There is more than enough good food," they say, "Food that can be obtained absolutely free of charge for our neighbors." In the past year alone, Forgotten Harvest has rescued over 40 million pounds

of fresh healthy food.” This non-profit organization works with grocery stores, farmers, restaurants, etc. to help rescue healthy foods and deliver them to Detroit citizens who do not have access to healthier foods. I believe if more people were able to partner with them there could be a great chance for publicity and therefore a spread of valuable information. There could potentially be a partnership with the Detroit Pistons and Forgotten Harvest to reach out to local schools and work with students to educate them on the healthy foods that allow athletes to perform at their best.

### **Public Perception**

Public perception of Detroit is often a misconstrued image of a worn down city with abandoned buildings and dangerous streets. Changing this perception can be difficult, but the power to do so resides in the people on a societal level.

Referring back to the previous idea of the Detroit Pistons working with high school students, the Los Angeles Clippers have actually done some community outreach that has shed some light on the socio-cultural issues of downtown Los Angeles. Some of their community outreach functions consist of Teacher Appreciation, reading and math programs, and mentorship assistance. Not only has this increased publicity for the Los Angeles Clippers by being seen as the “city’s team,” but in a much larger picture, it has truly touched the students and local communities involved. Using a sense of celebrity to bring awareness to a certain issue can greatly change the public’s opinion on whatever preconceived notions they may have.

Changing public perception is challenging. Initiatives such as Alice Waters’ Edible Schoolyard mentioned in The “Five Levers of Social Change” were successful at changing the attitude about food, what we should be eating, and what we should be teaching our children to eat. We want to further this education of gardening by showing people that gardening can be a year-round activity, even in colder climates. We also want to change the perception that the solution to this problem is expensive and highly breakable.

Although our project is mainly about food production and insecurity, it is interesting to see how other projects also exist to combine healthy eating with environmental sustainability. These symbiotic solutions remind me of an issue I have tried to tackle in my

other work: how do we spark environmental action in people whose main concern is not sustainability? There is a company called Ducks Unlimited that is essentially an animal conservation company in disguise as a hunting company. Their idea is that by marketing to hunters by promoting the need to protect duck populations in order to have enough ducks to hunt, people who would not usually make a sustainability effort end up supporting conservation. Likewise, people who may not buy our greenhouses for the locally-sourced, sustainable food will be benefiting the Earth while also addressing their food insecurity issue.

### **Shifts in Policy**

A shift in policy may be necessary to allow our greenhouses to be placed on public property. There would not be an issue with private property, like the school and individual homes, but to expand this project to the rest of the community and other communities, we may have to make compromises. We want the communities to be on board with what we are designing, so hopefully it will not be a big issue.

The USDA’s “Team Nutrition” is an excellent example of supporting child nutrition programs. They constantly reevaluate what should be changed based on the needs of the people and adapt to fit modern society; some of their efforts include “training and technical assistance for food service, nutrition education for children and their caregivers, and school and community support for healthy eating and physical activity.”

A company that has used the CLF map (referenced in the “Data and Insights” section) to enact change is B’More Fresh: Baltimore’s Food Desert Retail Strategy. They are also working on a dual issue of reducing the number of people living in food deserts and growing the economy by: expanding and retaining supermarkets, improving non-traditional grocery retail options, improving healthy food availability in the public market setting, expanding homegrown Baltimore to serve food desert neighborhoods, and transportation strategy. I like how B’More Fresh is approaching the issue of food insecurity from multiple policy angles, and their additional motive of expanding the economy is a good way to support their points and get these policy changes passed.

Another example is the “Healthy, Hunger-Free Kids

Act of 2010” implemented under the Obama administration. The bill states, “Beginning in the 2011-2012 school year, schools will be required to involve stakeholders in the development, implementation and review of these policies, as well as inform and update the public about the content and implementation of local wellness policies.” The policy itself is nationwide by focusing on the broader issues of childhood food insecurities and obesity, but the focus is entirely local, which is extremely important as life differs from place to place. The bill set a new standard for schools, and \$4.5 Billion was given to help implement the policy.

### **Development of New Technologies**

According to ITU News, “Disruptive technologies could help distribute food, wealth and data, reduce hunger and waste, and empower farmers to produce more valuable, climate-resilient, and nutritious foods for their clients.” Due to the rising popularity of social media sites, information spreads faster than it ever has before - and the world is still constantly changing. Specifically in the food system, technology is considered a ‘game-changer’ because it reduces the cost of matching buyers and sellers in markets.

For example, the Chinese tech, e-commerce, and artificial intelligence company Alibaba is “reportedly reducing poverty in remote villages. A future in which rural communities are fairly rewarded for cultivating and conserving local resources would be a welcome development indeed, upending decades of rural to urban migration.” In addition, “Winnow is a start-up zeroing in on food waste in commercial kitchens by connecting scales and data analytics. Protix is betting that it makes more sense to feed insects, raised locally on food waste, to Dutch poultry, than to use Peruvian anchovies, shipped halfway across the world then ground into fishmeal.”

There is an app used in Copenhagen called “Too Good to Go,” which also combines food insecurity with environmental sustainability. It strives to reduce food waste and to give people a way to get cheap, restaurant-quality food. Restaurants and grocery stores can post their food surpluses at the end of each day, and people can go there and buy the food for a very low price. You do need a smartphone to know who is posting these offers, but I think it’s a great idea to get companies and people to work together and to both get something out of the relationship.

We are creating a technology that aims to disrupt the current perceptions of winter gardening. We are trying to encourage both community and individual winter farming in the Detroit area to show the rest of the world that it is quite possible. Our idea is to build a greenhouse with a warming system to melt and utilize snow as a water source. This way it will be simple to care for and harvest from. We are hoping this idea will spread through our tumblr page and through the children passing along the instructions to future generations and neighboring communities with similar problems. This project will further the discussion of how we can solve seasonal local fresh food scarcity, part of the solution to food insecurity.



# Related Projects

Currently, large-scaled urban farmers are using a form of greenhouse called Hoop Houses, otherwise known as Polytunnels. These greenhouses are in the shape of a tunnel and are typically made from steel and polythene. The interior heats up because incoming solar radiation from the sun warms plants, soil, and other things inside the building faster than heat can escape the structure. Air warmed by the heat from hot interior surfaces is retained in the building by the roof and wall. Temperature, humidity, and ventilation can be controlled by equipment fixed in the polytunnel or by manual opening and closing of vents.

Although Hoop Houses have been around since the 1940s, they have undergone new updates and have become increasingly more cost-efficient, movable, and use lighter construction methods. In addition, the advantages of mobile hoophouses include greater return on investment and more flexibility on crop rotation without ever having to bother to dig the soil out of a stationary house.

Also since 2009, the US Department of Agriculture program is helping farmers install polytunnels. Locally, Keep Growing Detroit has helped local gardeners build 70 hoop houses through training builds, tours, and workshops that help the growers use and maintain the structures.

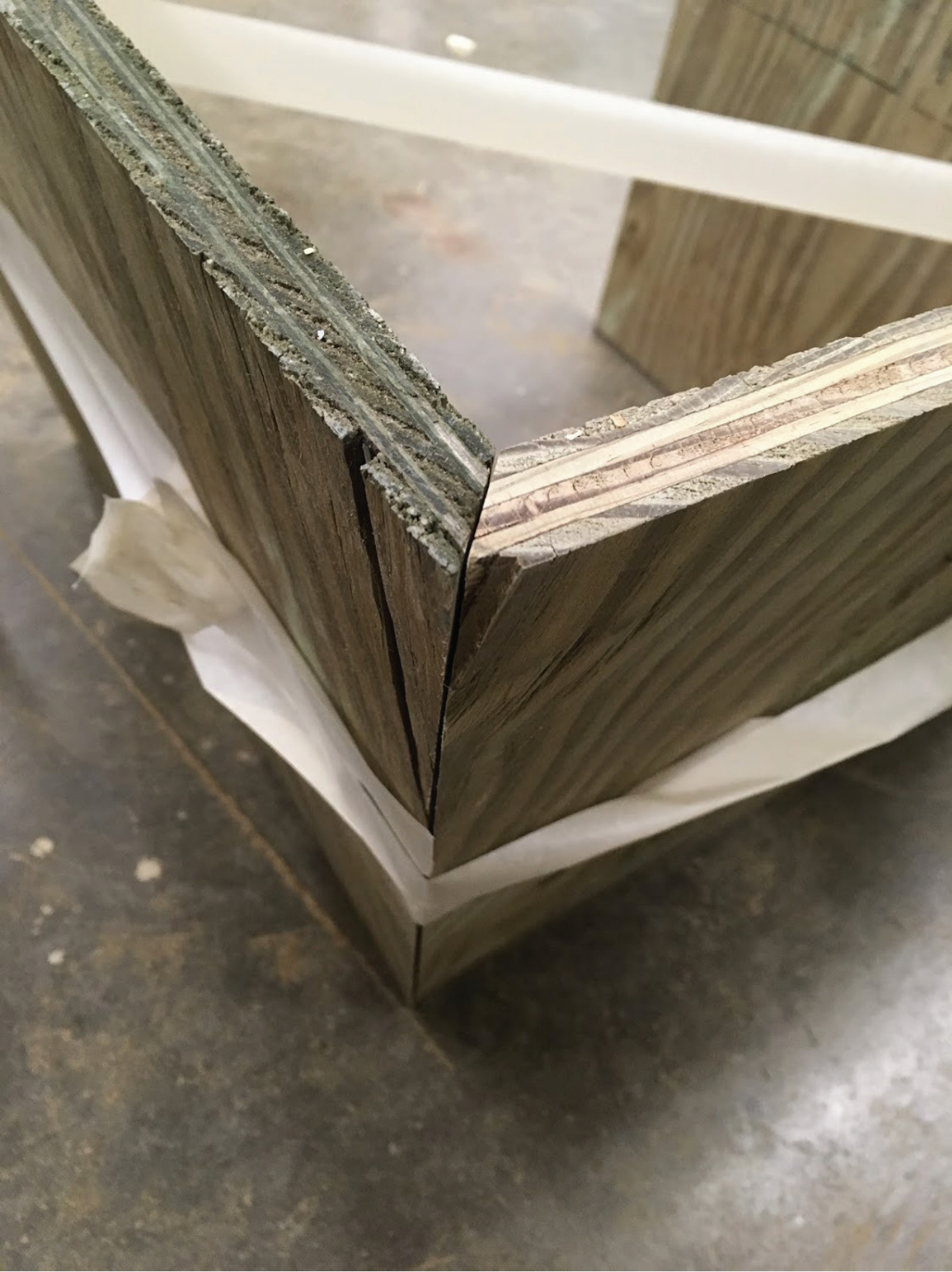


Hoop House in Detroit, Michigan



## Documentation of Process

We began with a small prototype of a diamond-shaped greenhouse that would open down on all 4 sides like a flower blooming. The shape allows for the snow to run off the top half into the middle, where it will catch, melt, and drip the water onto the plants.



We bought treated wood that is able to withstand weather; we cut all the corners to 45 degrees angle and the bottoms at an angle to be able to rest flat on the base.

The UofM and Detroit students learned from each other about working with wood, screws, and plastic.





We attached steel corners so that it would not burst under the pressure of the soil.



We added feet to elevate the structure off the ground and drilled holes in the bottom for drainage.

We also used treated wood for the top half of the structure, which was lighter and easier to attach to the wood base than the metal we had originally planned to implement.



We added a liner to the inside of the structure to keep the soil off the wood and to help with insulation.







We planted spinach, lettuce, and kale seeds because our interview with the head of UofM's Campus Farm said that those are the most common plants grown in greenhouses in the winter.

We used thick plastic (often used for greenhouses) for the top covering after we realized that acrylic would not work as well as we had originally thought. A Velcro door on one of the panels makes the plants easily accessible to the gardeners.

This photo shows our final Greenhouse next to the school's inactive gardens. We left it there for Mr. Gavin and his students to use!





THE GREENHOUSE EFFECT 😊



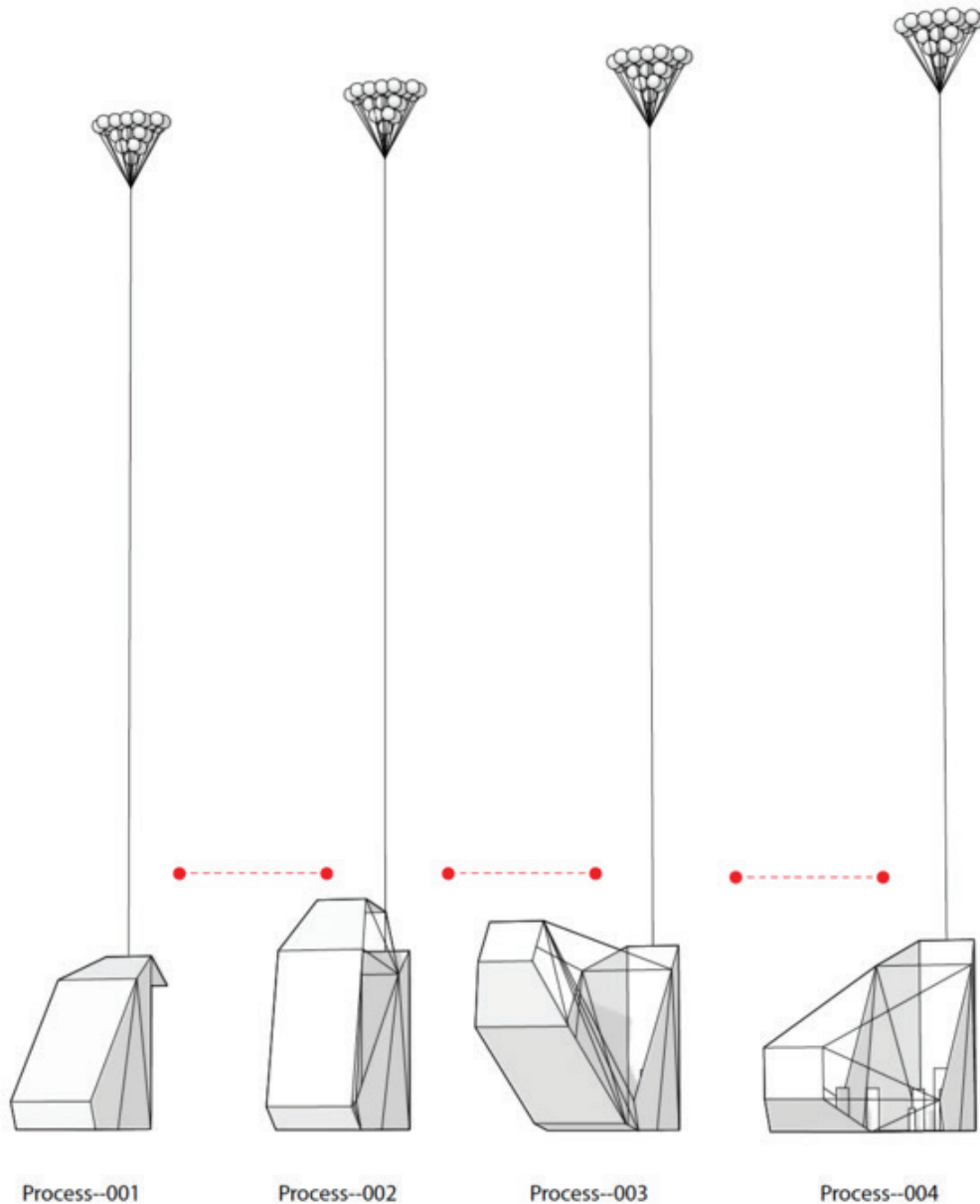


## Speculative Design and Future Company Initiatives

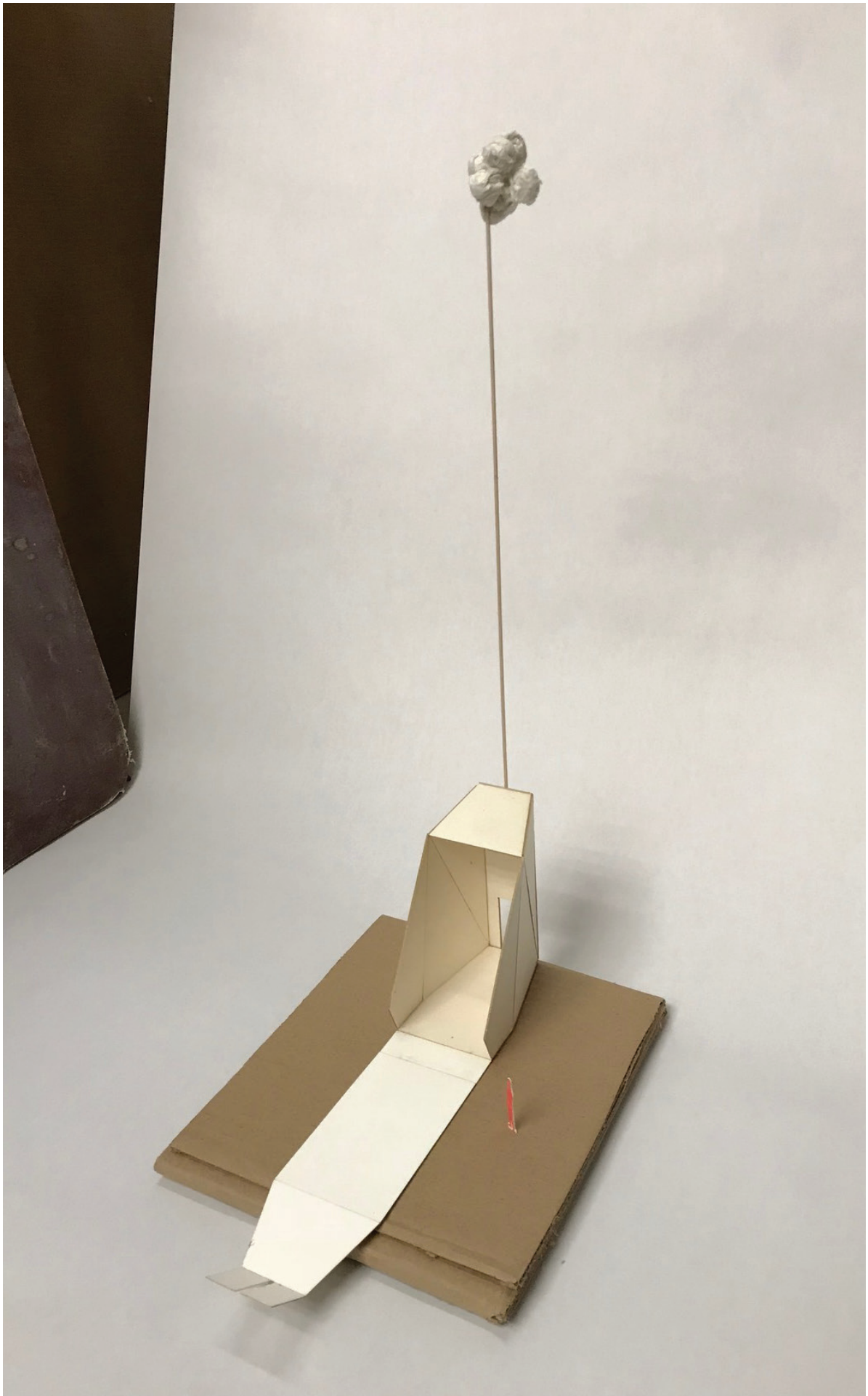
Plants need sunlight, water, carbon dioxide (CO<sub>2</sub>), warmth and nutrients to survive. The Greenhouse Effect team explored the phenomena of plant life through hands-on experiences, beginning with the planting of seeds and the construction of a suitable winter environment for the vegetables they would grow into. Our experiences lead to brainstorming about how we could create a suitable structure for the gardener, the plants and their natural environments. Because edible plants are living organisms, protection of their natural ecosystem was an equally important topic for us to consider. We posed questions such as: how can we reduce competition among the plants in

our greenhouse? What resources are needed to produce ideal growing conditions? Can humans benefit from this structure? Can the planet benefit from this structure? The possibility of being able to do more than grow food efficiently was inspiring. We then brought our inventions to life using the 3-D design program Rhinoceros® (Robert McNeel & Associates, Seattle, WA). In a large speculative scope, The Greenhouse Effect has the potential to become a world-wide land architecture project that solves both seasonal food production issues and sustainable energy shortage with inclined communities.

We began by trying to harness the ultimate form of energy: the sun. With the sun's energy, we could collect and melt snow to water the plants in the winter time and power mechanisms to open the greenhouse when the weather is ideal so the plants can grow most naturally. To benefit from our powersource most, we developed solar panel additions that turn toward the sun like a flower to maximize light capture. We ultimately decided that the structure trying to harness the same sun that our plants were utilizing to grow would cause some competition between the structure and the plants for light. After further consideration of the features of a plant's ecosystem and everything that exists within it, we directed our focus toward the wind. Wind is utilized in the reproduction cycle of some plants, but this element would be unnecessary for the plants contained within our structure.









With our knowledge of the logistics of The Greenhouse Effect project and the surrounding Michigan communities where wind is plentiful, we developed a way to generate power across the Great Lakes region using wind energy. The practice decided in this project is intended to give policymakers, regulators, developers, and community leaders the speculative and imaginative tools and narrative they need to make well-informed decisions about wind energy development and the byproduct potentials that can be created in this region. According to the U.S. Department of Energy (DoE) there are more than 700 gigawatts of potentially collectable wind power on the Great Lakes. That is about one-fifth of the total offshore wind power potential in all of the United States. With this substantial amount of power potential, efficiently replacing the U.S. fossil fuel industry with community approved, eco-friendly alternatives is imaginable.

The Greenhouse Effect proposes a statewide project in partnership with the DoE to use some of the offshore area surrounding the Great Lakes for sustainable food production and wind energy collection in unison. We interpreted wind pattern maps of the Great Lakes region to find best locations to place greenhouses with attached nutrient, element (ie. solar, wind, water), and energy-collecting balloons (EC-balloons). With permission from the communities, these structures will be built to supply the plant food production and energy needs of that community. We placed a particular focus on the Michigan region surrounded by Lake Michigan and Lake Huron. The entire Michigan project includes several fields of two thousand EC-balloons; each incorporating a base conservatory for food sustainability. Each community has a greenhouse with EC-balloons that provides food production opportunities in the winter time, as well as harnessed wind energy to the power grid of the greenhouse, the com-

Generating Cloud Regional Network



Coal plant (14.8%)



Natural gas plant (30.8%)



Nuclear electric power (9.6%)



Petroleum (oil) plant (37.2%)



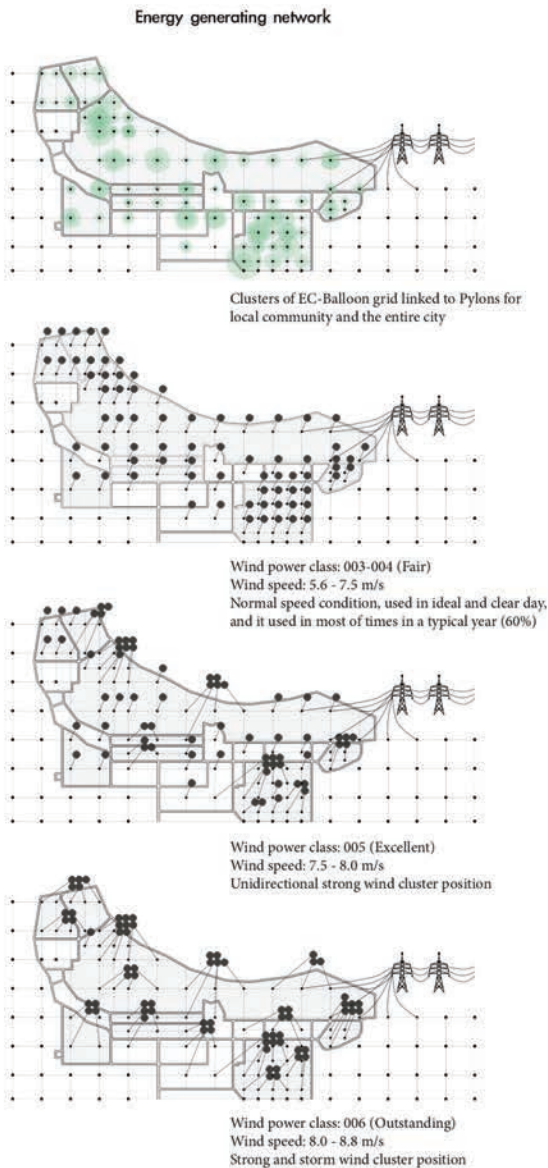
According to the U.S. Department of Energy there are more than 700 gigawatts of potential wind power on the Great Lakes. That is about one-fifth of the total offshore wind power potential in all of the United States. With this amount of power potentials, it is not hard to imagine the replacement of coal and oil field in the U.S can be efficient and substantial.

The project is to turn the offshore areas around the Great Lakes, in this mega-structure, it focused on particularly in Michigan region around Lake Michigan and Lake Huron. The entire project includes a several field of two thousand "EC-balloons" (Energy-collecting balloons) and each incorporating a base conservatory for food sustainability in each community during the winter time. EC-balloons are airborne wind turbine systems to produce kinetic energy from the wind, and including essential nutrients and elements for the plants constantly infusing to the ground conservatory, this project will both produce energy and sustainability for the entire community along the coast line.



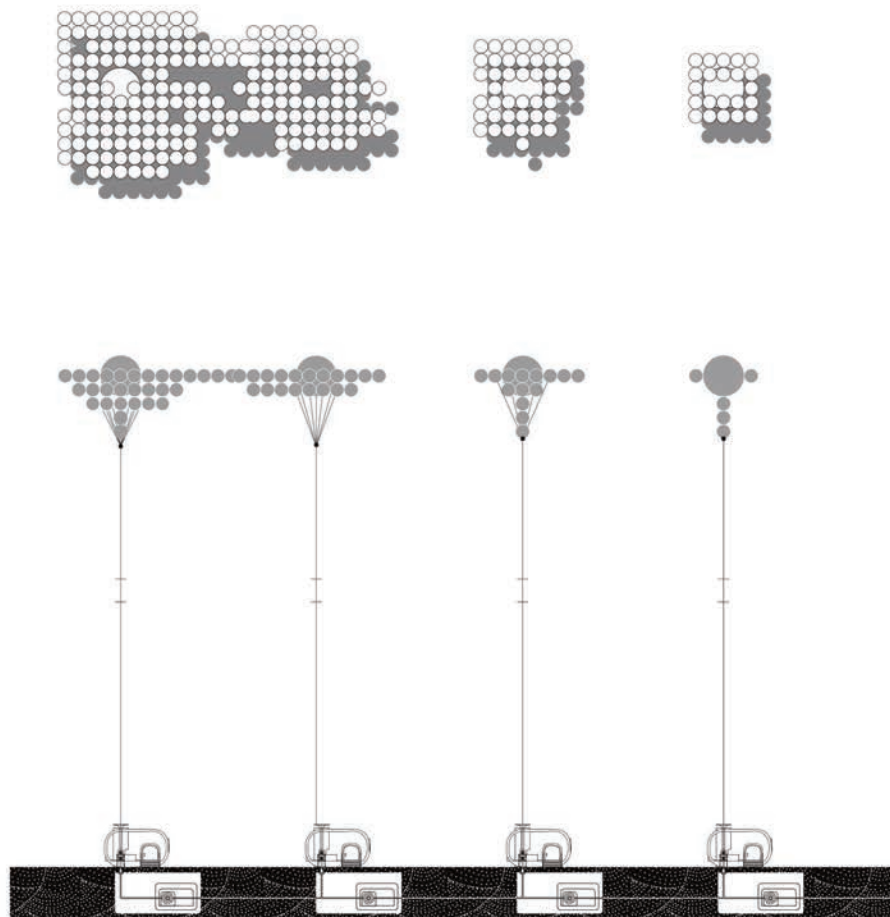
munity, and the larger grid year round. The greenhouses will be placed into the infrastructural grading system along the shoreline. Each point is connected to the local power plant. Based on different wind levels, mainly characterized in three types, we will use wind energy to power the greenhouse and even the entire state.

EC-balloons are airborne wind turbine systems that produce kinetic energy from the wind. Based on three wind-types, when wind speed is between 5.6 - 7.5, EC-balloons are individually ascending to the sky, to collect stable electricity. When wind speed is between 7.5 - 8, half of the balloons will be clustered together to receive more electricity. Following by the same logic, when wind speed is between 8 - 8.8, all the balloons are binding together. Using the weather as a source of energy, The Greenhouse Effect aims to sustainably provide both plants and people with

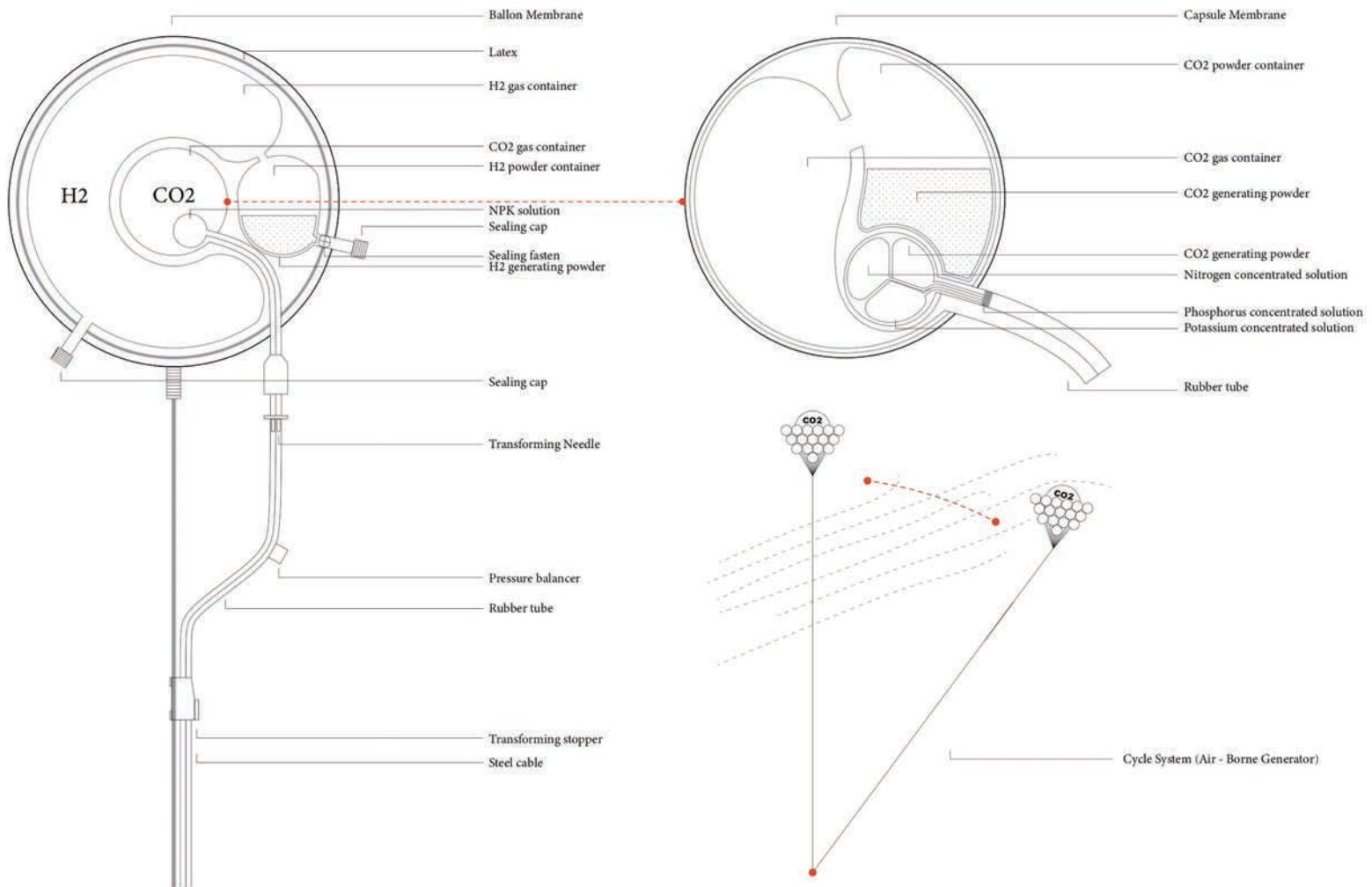


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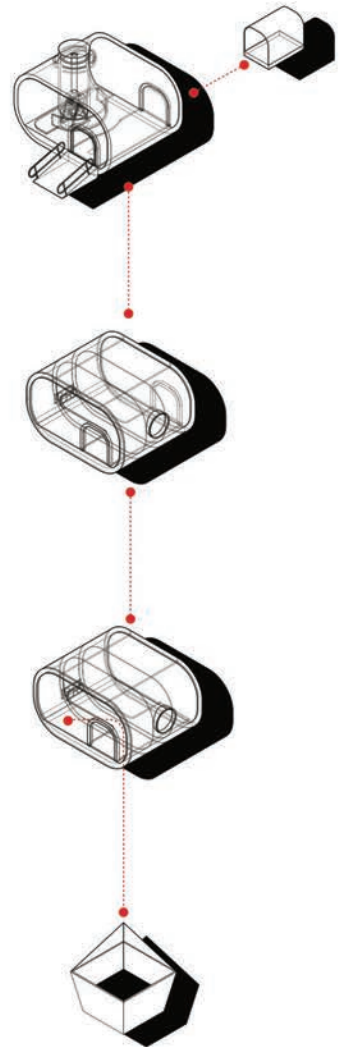
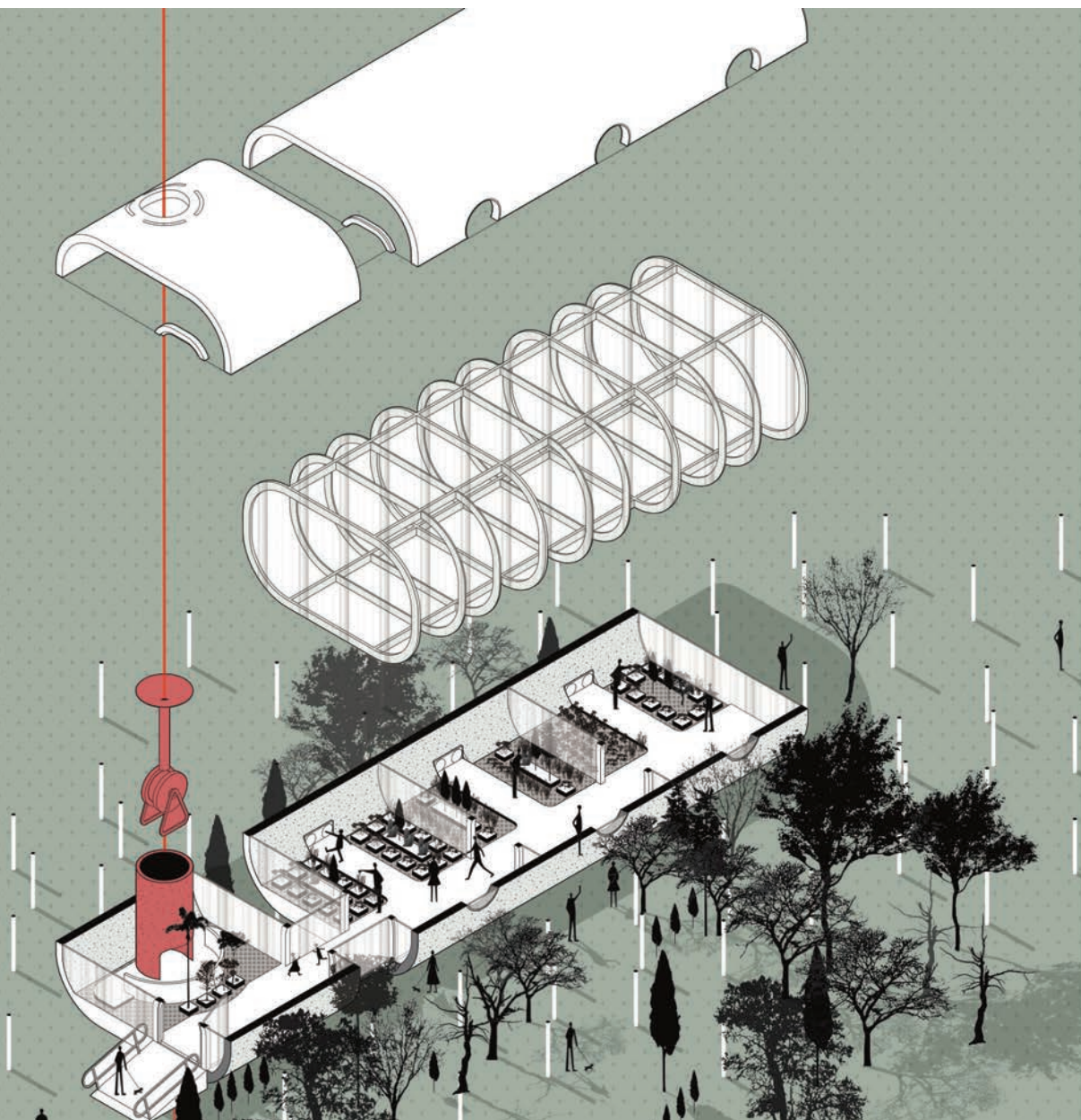
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After finding an energy source to power our inventions, we designed a system to work in tandem with the EC-balloons that gathers excess essential nutrients and elements from the environment and infuses them into the ground conservatory for the plants. A system that cycles carbon dioxide (CO<sub>2</sub>) into the greenhouse for the plants to use in photosynthesis and oxygen (O<sub>2</sub>) out of the greenhouse to the environment was designed. This mechanism will improve air quality in favor of both the plants and the planet by reducing competition among the plants in the greenhouse for CO<sub>2</sub> while also replenishing the depleted atmospheric O<sub>2</sub> content seen in recent decades.



Other features explored for implementation in our greenhouses include inventions that make maintenance of the garden easy such as an automatic seed sower, smart water collection and distribution systems (eg. amplification of solar heat to melt captured snow for water), programs that inform you when fruits and vegetables are ready to be harvested. The Greenhouse Effect's land architecture project will produce both energy and effortless sustainability for the entire community along the Michigan Great Lakes coastline. With the specific weather patterns and needs of each future community project met, the combination of a self-sustaining greenhouse that also contributes energy to the power grid can make food production and energy gathering a more natural, and sustainable process. Future projects of The Greenhouse Effect aim to invent community based solutions to planting a happier, healthier, more sustainable future in every aspect.



# THE GREENHOUSE EFFECT



PLANTING A HEALTHIER, STRONGER,  
MORE SUSTAINABLE LIFE.

## Logo and Marketing Strategy

Through our logo we want to showcase the greenhouse as people helping people, people helping the Earth, and the Earth helping us as two hands come together to form a new beginning - "Planting a healthier, stronger, more sustainable life."

**Business Objective:** Re-envision the way people attain fresh, healthy produce through cost-efficient materials and unique technological design aspects.  
Fundamental Entity (From what perspective are we

going to market?): We are going to market through the perspective of planting a healthier, stronger, and more sustainable future for all members of the Detroit community.

**Core Competence (What differentiates us from our competitors?):** Our research and advancements in technology, and unique product design, differentiate us from competitors.

## Goals:

**Short-Term:** Release product and have it be fully functioning by this coming summer for preparation for winter season of 2019-2020.

**Long-Term:** Increase greenhouse use during the winter months by 35% within the next 3 years for large, urban gardeners to small, single-home families.

**Marketing Objective:** In all marketing strategies, companies are either looking to retain or acquire new users. For our product, we wish to acquire new users because we are an entirely new product that does not have any current users to retain.

## Aim:

**Segmentation:** We are initially segmenting the market by focusing on the Detroit-Metro communities.

Target: We are looking to target our product/company towards Detroit community leaders such as, Rosalyn Flint, the Detroit Community Schools Board of Directors, and other government officials directly pertaining to the Detroit-Metro Area. By targeting people who believe in the beauty of their city, and all the possibilities it has to grow, they will then inspire others around them- parents, grandparents, and children- to use our product and plant a new beginning.

**Positioning:** To plant a cognitive flag in our user's minds, we designed a unique logo and tagline, "Planting a healthier, stronger, more sustainable future." By associating the logo with the tagline, people in the market will remember our product and company ideology and associate it with bettering the community/world around them. Revolving our product within the realm of bettering homes and communities, our "Pod" will become more than a mere greenhouse; rather, it becomes a beacon that shines light on growth and beauty for a healthy future.

## How will we spread the word?

We will spread the word through a social media campaign. Informative graphics and images showing the effects of the product on health and the community will entice the leaders to learn more. While a secondary effect of this product is environmental sustainability by sustaining locally-sourced food, the perpetuated message is health and fitness. Many of our students

are passionate about basketball, but they only eat affordable, processed foods. Our social media campaign will highlight the importance of healthy eating in athletics. Furthermore, it will show how this local food source is affordable for them and their families. Since most of our leaders are adults who may not use social media, a lot of our campaign will also involve reaching people directly through canvassing. Since our target audience is leaders, we can find specific people and pitch our idea to them in person. That way, they can ask us questions, and we can tell them more about how their communities could specifically benefit. The hope is that leaders will be able to help us integrate the pods into the various Detroit communities, allowing people at all levels of society to be involved in the implementation. We will also look into companies that are already dealing with food insecurity in Detroit to see if we can combine forces with their organizations and our product.

# Business Model Summary

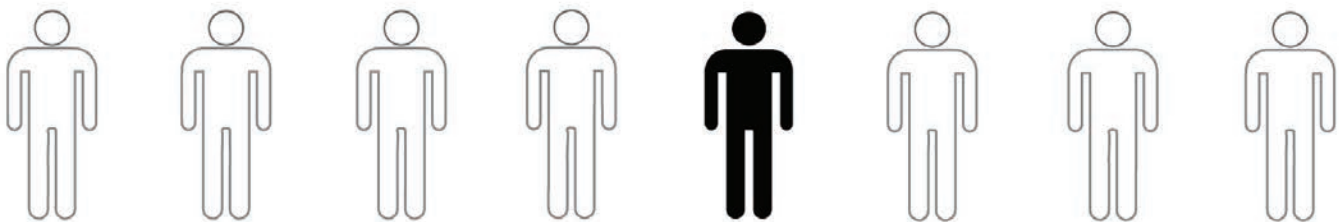
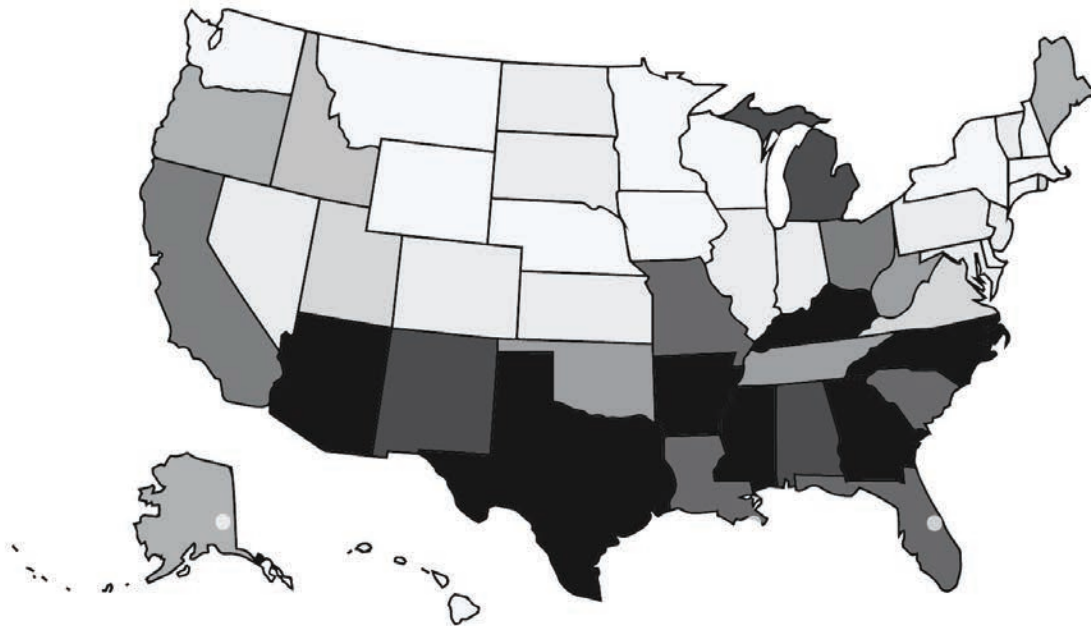
(how Might We statement)

**Impact Goals:** How might we tackle food production during the winter months?

<p><b>Key Partners</b></p> <p>University of Michigan</p> <p>Detroit Community School</p> <p>Rosalyn Flint, Urban Country Tea House</p> <p>Michigan Urban Farming Initiative</p> <p>Earthworks Urban Farm</p> <p>Keep Growing Detroit</p>	<p><b>Key Activities</b></p> <p>Planting/Gardening for all ages</p> <p>Education for young children on sustainability and gardening practices</p> <p>How to build and maintain the greenhouse</p> <p><b>Key Resources</b></p> <p>what do you need?</p> <p>space? time?</p> <p>Materials: Weather-treated wood, Screws and metal joints, Polycarbonate Sheets, Plastic for insulation, Tarp/Liner, Soil, Compost</p> <p>Space: Can be done at home</p> <p>Time: 3-5 days</p>	<p><b>Value Proposition</b></p> <p>what will the impact goal bring?</p> <p>Our impact goal will bring fresh produce directly to the home, without the need of a grocery store.</p> <p>It will also introduce a healthier lifestyle, education of food choices, and result in a decrease of food insecurity in the Detroit Metro Area.</p>	<p>Other organizations doing related work (near peers or aspirational peers)</p> <p>Keep Growing Detroit</p> <p>Rosalyn Flint</p> <p>Detroit Community School</p>	<p>how does your project fulfill a need related orgs do not/or do so differently?</p> <p>Using cost-efficient materials, and introducing unique technological advancements ("Smart Gardening Systems"), our product goes a step beyond our competitors, and directly brings the product (greenhouse and fresh produce) directly to the home.</p>
<p><b>Cost Structure</b> what are your costs roughly for? monthly/weekly/hourly?</p> <p>Our costs are for materials, and making of the smart gardening system.</p> <p>Avg. Cost per Greenhouse: \$100-\$150</p>		<p>do you seek grant or corporate support? any sales of services?</p> <p><b>Revenue Streams</b></p> <p>We hope to seek support through start-up grants, and partnerships. First, we want to establish the product amongst community leaders. Then, we wish to sell the product separately once it has been established in the community.</p> <p>Sale of services consists of the "Greenhouse Package"; preset materials that come with instructions for the user on how to build</p>		

# TAKE A LOOK IN YOUR BACKYARD

OBSERVING FOOD INSECURITY IN THE UNITED STATES



40 MILLION  
ADULTS

1 IN 8 AMERICANS ARE  
FOOD INSECURE

12 MILLION  
CHILDREN

## Infographic

After all our research and production of the Pod itself, we came to the realization that while food production is our main issue, food insecurity is also a pressing matter that directly relates to our project and the Detroit community. It is estimated that 1 in 8 people are considered food insecure in the US, showing that food insecurity is not just a problem pertaining to third-world countries; rather it is also an issue here

in the US. Food insecurity is everywhere - it is not just someone else's problem. Food insecurity defines the ongoing socio-economic crisis between the community and the lack of physical or financial access to safe and nutritious food every day; we are hoping that being able to produce one's own food will relieve some of these pressures.



# Interviews

Our group conducted a series of interviews to learn more about our topic. We have compiled summaries of our most valuable interviews here:

## **AC – Social Worker**

Ms. AC grew up on the south side of Chicago. Her and her family lived and continue to live below the poverty line. She spent time in and out of homelessness throughout her childhood and often struggled with food insecurity issues. Although community gardens were not a resource in her area at the time of her childhood, AC is very familiar with the mechanisms behind them.

She likes the idea of how they bring the community together. Food is often used as a social tool to bring people together and the community gardens have the potential to do so.

However, AC recognized many concerns surrounding the gardens' funding and maintenance. There will always be a need for upkeep, but the money and resources are not always available. For example, water quality is one of numerous issues that come up in these communities. Plants grown in poor quality water may not grow well or spread bacteria upon consumption.

When entering a community to discuss the addition of a garden or greenhouse to the area, it is important to set them up with tools rather than ideas. If the contents of the garden are easily incorporated into the current diet of the population, a garden can expand the options of food resources. Otherwise, AC has pointed to other sources of help that the community is most likely aware of. Programs such as WIC, Bridge, and community service centers will always offer access to food and other necessities for those battling food insecurity. So many people readily give back, especially during the holiday season and tons upon tons of food is donated each year.

Increased seasonal food insecurity may be a concern in communities that rely heavily on community gardens, but experience cold winter months. Community

greenhouses may be a solution to some of this issue, but cannot solve the entire issue.

## **LBC – Mother**

Mrs. LBC is an upper-middle class mother of three. Her and her family enjoy dinner together every evening, she prepares nutritional sack lunches for them to take to school and work every day, and she makes sure to send them out the door with a fruit and oatmeal every morning. LBC stresses the importance of eating right to her family on a regular basis. She knows that lack of nutrients can greatly affect growth, mood, performance, and overall health.

I asked LBC to imagine a situation where she could not provide all of these things to her family. Where would she turn? What would she do to get something on the table? LBC admitted that because she comes from a place of privilege, she is not aware of all of the resources her community has to offer. She said the first places she would turn to are her family and her parish. She brought up the soup kitchens she has volunteered at as an option, but recognized that where she is located, they would be hard to access.

She thought having access to a community garden or greenhouse would aid in the nutritional value of her diet. Fruits and vegetables are expensive in grocery stores and even more expensive in convenience stores. Having the opportunity to pick fresh and eat fresh could be important in maintaining fiber and vitamin levels in an otherwise restricted diet.

## **SL – College Student (Senior)**

Ms. SL is a senior at the University of Michigan (Ann Arbor) studying business. It is not just that she doesn't have much time to cook, but she lacks the skills to do so. She also does not own a car which makes accessing a grocery store a very cumbersome task. The closest grocery store being over 2 miles from her place of residence.

Due to these limitations SL often orders in, makes runs to 711, and eats frozen meals to supplement her diet. SL admits that her diet is by no means balanced,

especially because she has dietary restrictions she must be careful of. Gluten is in so many of these frozen meals and restricts the variety of dishes available to her.

She also mentioned how expensive her dietary lifestyle has become and confesses that she could never afford it on her own. SL's family has been able to afford her expensive habits only by making cut backs on other forms of spending (ie. switching to bargain toiletries, clothing, etc.). When asked what she would do if that money were simply not available, SL said she would look for opportunities on campus where free food is distributed (similar to how many ARTDES 314 students lived on \$4 a day) and probably have to learn how to cook and work the bus system to go get affordable groceries. She was not enthusiastic to give these tasks a try and expressed her gratitude for what she has. She did mention that if she had easier access to grocery stores over convenience stores and restaurants that her diet may contain more nutritional foods such as fruits and vegetables.

### **Carly Sharp - Runs UofM Campus Farm**

*What does the University of Michigan's Campus Farm do?*

The Campus Farm sells most of its produce to MDining (i.e. all of the dining halls on campus) and Ross School of Business in order to get fresh, locally grown produce to students on campus. Additionally, to expand access to our produce, we've also created (via a collaborative effort with Net Impact and Student Food Co) the Produce Pickup. Pickup is on Thursdays in Mason Hall from 11:30am-3pm and students sign up to gain access to our weekly produce availability list. When the Campus Farm was created (about 5 years ago), the idea was to provide a space for students to learn to grow local, organic produce that students of all backgrounds would have access to on campus. When we have volunteers come out each week, we try to teach them a bit about our farming techniques and what it means to be organic and food safety certified, and we also try to make sure that they get to go home with some produce as well!

*Is it difficult to teach new people how to garden?*

It is not too difficult! We have volunteers come out to the farm every Friday (4-6pm) and Sunday (1-3pm), many of whom have had no experience with farming or even gardening. For our typical workdays

we have volunteers help us with tasks such as harvesting, seeding, weeding, planting, etc. This can all be demonstrated to a group of volunteers in a manner of minutes and then they can just repeat until the task is finished!

*What plants do you grow in your greenhouses in the winter?*

We grow cold-hardy greens in the hoopouses all winter (i.e. kale, spinach, mustard greens), because they can survive through the freezing/thawing cycles of the soil in the winter (and the hoopouses keep the temperature around 32F even on really cold days). Spinach will create new growth as long as the temperature is above 40F, but even in the coldest weeks of winter we can still harvest the leaves even if they aren't growing. We also grow microgreens and herbs in our heated greenhouse space all winter since they are low maintenance and cost-effective.

*Do you see any advantages/disadvantages of relying on community/school gardens for a sustainable food source in an impoverished community (instead of alternatives like organic grocery stores, farmers markets, etc.)?*

Advantages: education - teaches future generations about sustainable food, better emotional/mental/physical health.

Disadvantages: takes opportunities away from the community for making profit, could subtract from the economic potential of farmers markets/local CSAs .

*If you could add anything to your greenhouses to make them better/more effective, what would it be?*

Adding lights to the hoopouses would allow us to work longer hours in there since it gets dark in Michigan winters around 5 or 6pm.

### **Professor Joe Trumpey - Teaches Stamps Green Building Class**

Advantages to community gardens is ownership and commitment to food.

Disadvantage is scale - it is hard to do - it's a lot of work - academic year does not overlap well with most productive times of the year.

*What do you think of our greenhouse idea?*

It's a good idea, but training and maintenance is a key question. They need daily attention. Operating expenses to heat them is rough. A hoop house means cold frame not needing heat - but fewer food options

and still needs maintenance. Spinach and kale is the unheated option.

### **Liana's Grandma**

My grandma who immigrated to California from the Philippines with her husband and baby in the late 1960s. Her family was very poor in the Philippines, and she had 9 siblings. I talked to her about food, since big family meals are such a staple of Filipino life. She said that she actually didn't really know how to cook until she came to the U.S. When she did, she cooked healthy food for her two children, even though she worked as a nurse (and her husband worked as an accountant).

In the Philippines, they got their food (vegetables, fruits, and fish mostly) from the local market. That was their easiest access to food, whereas here it's much easier to access unhealthy, processed food. Even though the food she ate growing up was relatively nutritious, they could still not afford to be well-fed, "which is why all Filipinos are short."

They didn't have refrigerators, so they had to go very often to the market to get fresh food. That was interesting to me because when our food spoils, we switch to processed food that doesn't need refrigeration.

They also had to cook every night because they couldn't afford restaurants, and there weren't even too many restaurants in her small town. Now, she loves gardening and cooking for family gatherings. Food is still a very important part of life; they drive hours to get the best mangos from the Asian market in LA, and she grows a lot of her own fruits and vegetables in her backyard.

### **Kim Storm - Nutritionist in Newport Beach, CA**

*How would you define food insecurity from the perspective of a nutritionist?*

Food insecurity refers to a situation when someone doesn't have access to nutritious healthy food.

*What does an overly processed diet look like/do to the human body? In an adult? In children/young adults?*

Unfortunately, the multi-trillion dollar food industry that is growing, manufacturing, marketing, and serving "food like substances" is making us (as a nation) sick and fat. Both adults and children who eat the "Standard American Diet"—lots of highly processed

foods and meat, lots of added fat and sugar, lots of refined grains — suffer high rates of obesity, type 2 diabetes, cardiovascular disease and cancer. People that eat more traditional diets consisting of whole grains, fruits, vegetables, beans and legumes, nuts and seeds, and sustainable animal products don't seem to suffer from such high rates of chronic disease.

*How long do these effects of eating processed food take to show themselves? (ie weight, diabetes, cancers, etc.)*

The foods we eat have both an immediate and long term impact on our health. Foods provide caloric energy and micronutrients to help the body function properly on a daily basis. Food also delivers information to our cells that affects how our DNA is expressed (epigenetics). Over the course of months and years, the foods (or food like substances we are exposed to) have a profound effect on chronic disease development and the aging process. When it comes to diet, the overall pattern is much more important for health than what someone eats in a single meal. For example, eating an apple won't provide someone with a lifetime protection against getting sick just like eating one highly processed fast food meal won't immediately give someone diabetes or cancer. It's the daily patterns we engage in that matter most.

*Do you feel access to nutritional information and advice is readily available, or not?*

Thanks to the internet, there is more information than ever available about nutrition. Unfortunately, many sources are not credible and can cause confusion about what to eat. It's important to thoroughly vet your sources when it comes to nutrition advice! Some people have a vested interest in persuading you to adopt a certain diet/eating pattern.

*My group and I are building a functioning greenhouse to help alleviate food insecurity in poor, urban areas. Do you think this would help the issue? What kinds of plants would you recommend us planting?*

I think this is a terrific idea! A few years back a dietitian colleague of mine started a garden in a hospital in Detroit to increase access to healthy food for low income families. It has been a tremendous success! It would be great if seasonal vegetables were available in your greenhouse. The Seasonal Food Guide is a great resource for seeing what produce is in season in your area. Also, if I had to choose one thing to advise you to plant, it would be broccoli is such a nutritional

time for the owner, it will encourage the user to spend less time with the greenhouse itself, but enjoy the accessibility and efficiency of the plants the greenhouse helps produce. The greenhouse is merely an addition that will ease some burdens of everyday life in low-income communities that don't necessarily have access to fresh food/ingredients.

Also, by making the product centered on the idea of family- this will help further the product for generations to come. Considering children directly learn from their parents about what is good and what is bad, the access to having fresh foods right in the home/neighborhood year round will inspire parents and children of all sorts to look into healthier lifestyles via the greenhouse.

powerhouse. One cup provides cancer fighting anti-inflammatory compounds like sulforaphane, immune supporting vitamin C, and plenty of fiber for healthy digestion!

### **Laura Pincolini - K-12 Teacher in Reno, NV**

*How would you define what food insecurity is from the perspective of a teacher?*

Having never heard this term before, I feel like I know exactly what it means having worked at a Title One school for 10 years. Food insecurity means that a student is unaware where their meals will come from if any and can lead to anxiety which enables a student to not think clearly in school in order to learn. At the school I worked at breakfast and lunch were provided so dinner and food on the weekends would be questionable.

*When you were teaching, how many students do you think ate healthy/well-balanced diets? How many ate processed foods and free school meals?*

Hug High offered free school meals to 100% of our students, however; that doesn't mean they all ate it. Hug was a closed campus school for most students during lunch. The only students that could leave and go off campus were called "green light" juniors and seniors. This "green light" referred to any junior or senior that was credit sufficient. Most of the outside food that I would see come into my classroom was unhealthy- ever heard of Takis or hot Cheetos? Gross! I saw these eaten on a number of occasions for breakfast. These are a hit for young Hispanic students. I did hear some students talk about making homemade tamales, pozole, and other Hispanic traditional dishes. I would have to say that the majority 85% of my students probably did NOT eat a healthy/well balanced meal.

*Did students ever come to you personally regarding issues with hunger/food insecurity?*

I always had food in my room. I had makings for peanut butter and jelly sandwiches and students knew they didn't have to give me any reasons, they could just come and make one.

*If food insecurity was solved, do you think education/test scores would improve?*

Sure, I think there could be data collected that would support this theory. The adolescent brain needs to be nurtured with healthy choices. Making unhealthy

choices due to lack of options would definitely affect healthy brain function.

*My group and I are currently building small greenhouses that can be used at schools or even homes, do you think this would help alleviate hunger/food insecurity within poor communities?*

I've seen a few gardens at schools in our area. Students learn to plant, grow, and cultivate fresh vegetables then cook with them in their Foods classes. This is all facilitated by the Foods teachers. I love the idea, however, you can lead a horse to water but you can't make him drink... There would have to be some kind of education around maintaining these greenhouses. The Who, What, When, and How will all have to be established in order for this great idea to manifest and be maintained.

### **Mom and Dad**

After speaking with my mom and dad about our greenhouse project and overall ideas of food insecurity, they mentioned that they once struggled with food insecurity when I was born. After they were married for 7 years, my dad lost his job just as they found out my mom was pregnant with me. My parents recount this time as, "one of the scariest times of their lives." My parents were living on my mom's income alone, alongside not just their own expenses but also a newborn baby's as well. As I got older, pressure was added because I started to need formula and food. My parents then sought cheaper food options- such as mac and cheese, frozen vegetables, cans of tuna, and fast food.

When I asked about cheaper food options, my parents said that they wanted fresh options but due to monetary constraints, they didn't have the ability to do so. While they did have access to food/grocery stores, they didn't have the opportunity to consistently purchase fresh and healthy products.

Further, when prompted about planting and using vegetables/fruits that could be grown in a garden, my mom mentioned that they didn't have the added time to care for a full garden, although they wish they could have at the time.

This really got me thinking about the furthering of technology for our greenhouse. If we add more aspects to it that eliminate as much of the 'chores' attitude/

