

Renewal of Southside Chicago:
Systems - Thinking & Sustainable Urban Farming

by

Dishita Shah

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AUTHOR'S DECLARATION

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

ABSTRACT

The city of Chicago is one of the largest cities in the United States of America and has a long history as a manufacturing hub. However, over the last fifty years, its role as a manufacturing Centre has declined. This decline has led to job loss and significant erosion of urban fabric. Today the city of Chicago is seen as two cities. The divide in Chicago is due to both economic and social conditions, which in turn are amplified by longstanding forms of institutional racism-legal, economic, political, and social- inequalities that have marginalized communities. These communities become split off from the better-resourced neighborhoods. This process, known as 'Redlining,' has resulted in food deserts where economically disadvantaged neighborhoods do not have access to fresh food produce.

These food deserts have become an underlying cause for these people's chronic health issues and contribute to the decline of both social and urban fabric. This thesis explores the role of urban farming in rehabilitating neglected neighborhoods, exploring a systemic approach across a range of different scales. This thesis envisions repurposing empty lots in the Westside and Southside of Chicago. The idea is to introduce prototypes of urban farming and sustainable energy production. The scale ranges from single-family home lots to industrial lots. The thesis proposes an interdependent approach to development using bio-waste to generate energy. The integration of building systems, social and economic forces leading to urban rehabilitation are the key drivers of this thesis.

ACKNOWLEDGEMENTS

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Last but not least, I would like to thank my parents and siblings for their unconditional love, understanding, and support, without which I would not be here today.

DEDICATIONS

I dedicate this with love, affection and gratitude to my parents and my sisters without whom everything I have accomplished thus far would have been impossible.

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CHAPTER 1

1. INTRODUCTION

1. 1 INTRODUCTION

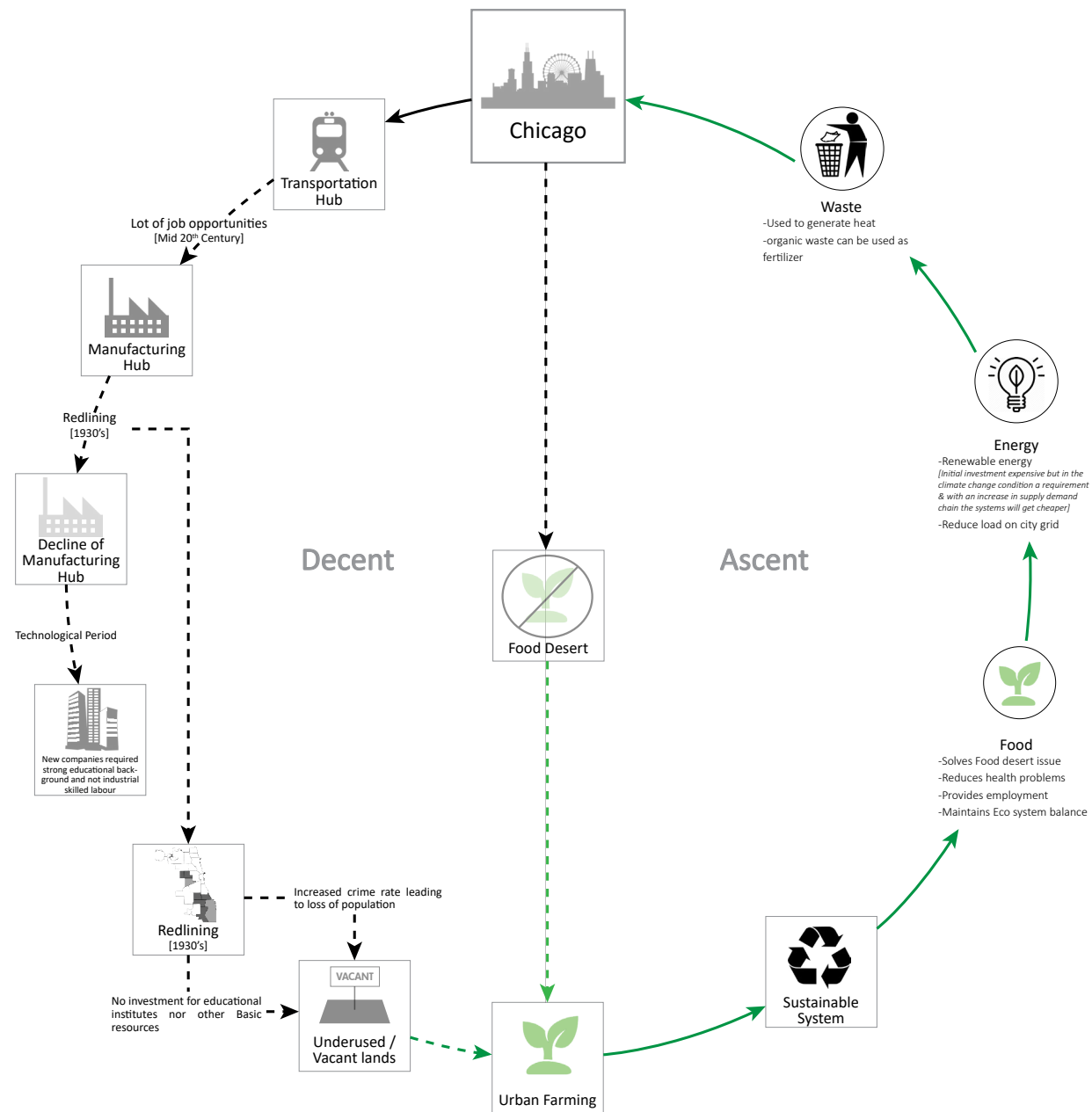


Fig. 1.1.1 Renewal of Chicago (by Author)

Chicago's Geographical location played a significant role in its existence as one of the major cities in America. The proposal and the construction of the Illinois and Michigan Canal to connect the great lakes to Mississippi river opened doors for trading between the United States and Europe. After the canal's construction, the railway lines were built, which connected Chicago to the rest of America. This intersection of shipping and railway made Chicago the major manufacturing hub as well as a transportation hub.

Its population kept increasing from the end of the 19th century and was at its peak in the mid-20th century. As a manufacturing and transportation hub, it had many job opportunities that pulled in people from all around. Before world war one there were a lot of Europeans who worked in Chicago. In the early 20th century, there were two major waves of people that came from the south, the Mexican migration and the great migration of African Americans who settled near these industrial districts to find job opportunities. At the start, these communities found it difficult to find jobs. However, after World War I, when Europeans moved away, the doors for African American communities opened, and that became the primary source of their income. There remained uncertainty and insecurities of jobs as depending on the demand and supply chain; they hired or removed people.

There had always been unjust in the wages, the employment opportunities between different communities, and majorly African American and white people, which led to riots between these communities leading to much loss of lives as well as left many people injured. After this event in the 1930s, redlining practice became rampant where the banks and the insurance companies would redline these communities and not invest in any money in these neighborhoods.

Chicago, as a manufacturing district, started declining after World War II (mid-20th century), which increased economic inequality as well as employment insecurities. Unemployment affected most of the minority communities.

The deindustrialization of Chicago led many industries to move out. The redlining issues kept increasing, and that led to a lot more crimes in these communities as there was no source of income.

The new companies that offered job opportunities required a strong education background and not skilled labor anymore. The number of people required for jobs decreased as humans got replaced with machines in the technological period. Due to redlining, there was no investment in the minority neighborhoods for educational purposes nor any other resources, i.e., as basic as supermarkets.

Since the 1990s till present, Chicago lost a considerable number of the population because of crime and redlining issues. One of the significant issues has been food deserts. These Marginalized communities do not have access to resourced neighborhoods. For fresh fruits and vegetables, they have to travel miles or get some eateries from the convenient stores, which is not the best source of nutrition. Restricted access to healthy food has magnified health disparities leading to high rates of chronic illness.

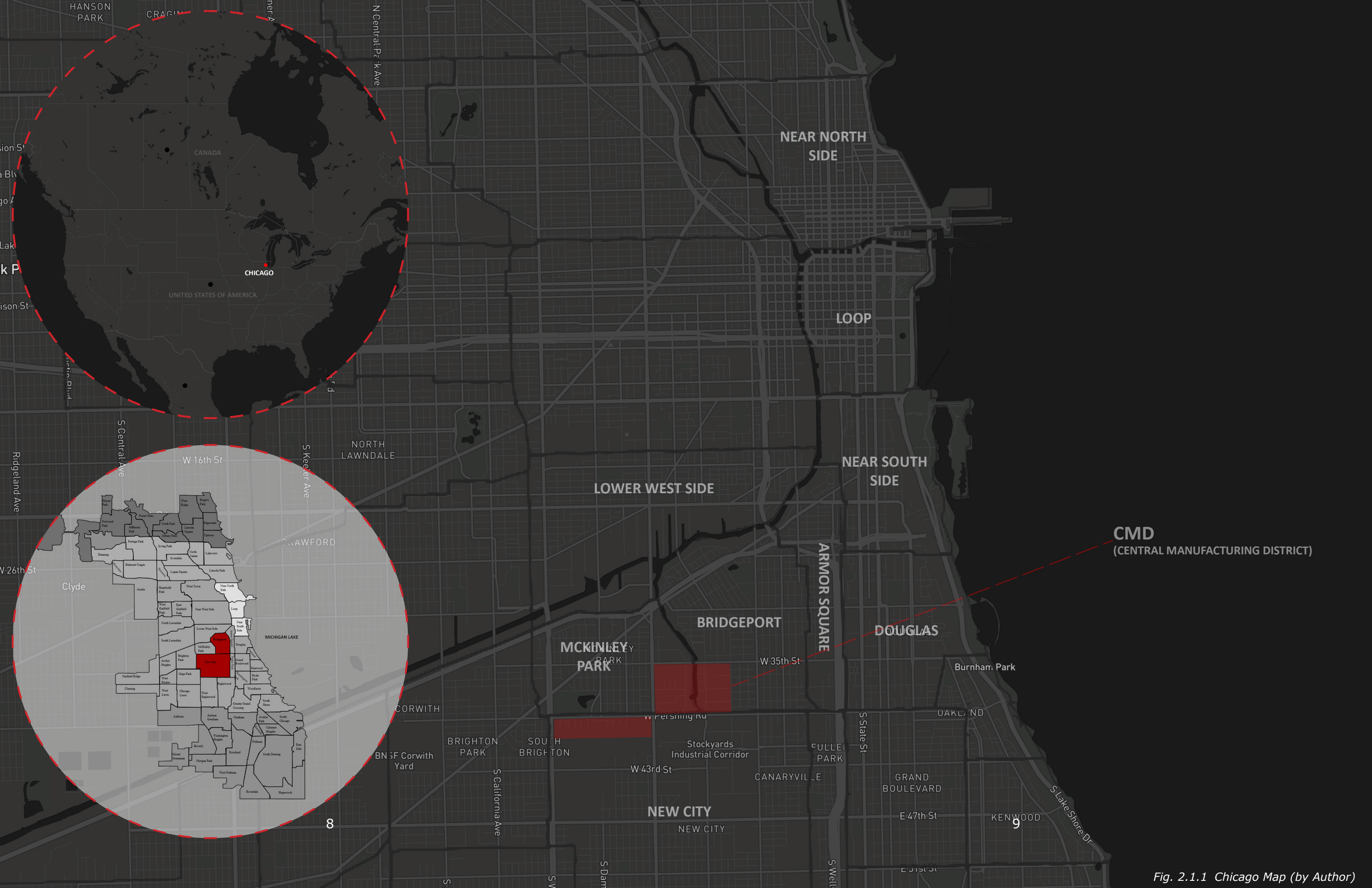
The south side of Chicago consists of the Central Manufacturing District, which was known as an economic generator a century ago. Now it is just underused. With the migration of many people due to redlining, there are a lot of empty single-family lots too. It has the potential of becoming an economic generator through urban farming using sustainable methods through a systems approach. Instead of importing food from different countries and cities, people could grow food in their vicinity to cater to the population. With the help of technology, there are methods to address the ways and types of crops that could be grown and harvested. Till now, California was the primary hub for farming and distributing food to the other parts of the country, but with the issue of availability of fresh water that would affect their production.

This project aims to introduce prototypes of urban farming

and sustainable energy production with the concept of Circular Economy at four different scales of lots, to address the issue of Food Desert and unemployment caused due to Redlining.

CHAPTER 2

- *CHICAGO MAP*
- *CENTRAL MANUFACTURING DISTRICT TIMELINE*
 1. *CHICAGO AS A MANUFACTURING DISTRICT*
 2. *HISTORY OF CENTRAL MANUFACTURING DISTRICT*
 3. *CENTRAL MANUFACTURING DISTRICT (CMD)*
 4. *REDLINING ISSUES & REVITALIZATION THEORIES*
 5. *COMMUNITY SETTLEMENTS AROUND CMD*



CMD
(CENTRAL MANUFACTURING DISTRICT)

Fig. 2.1.1 Chicago Map (by Author)

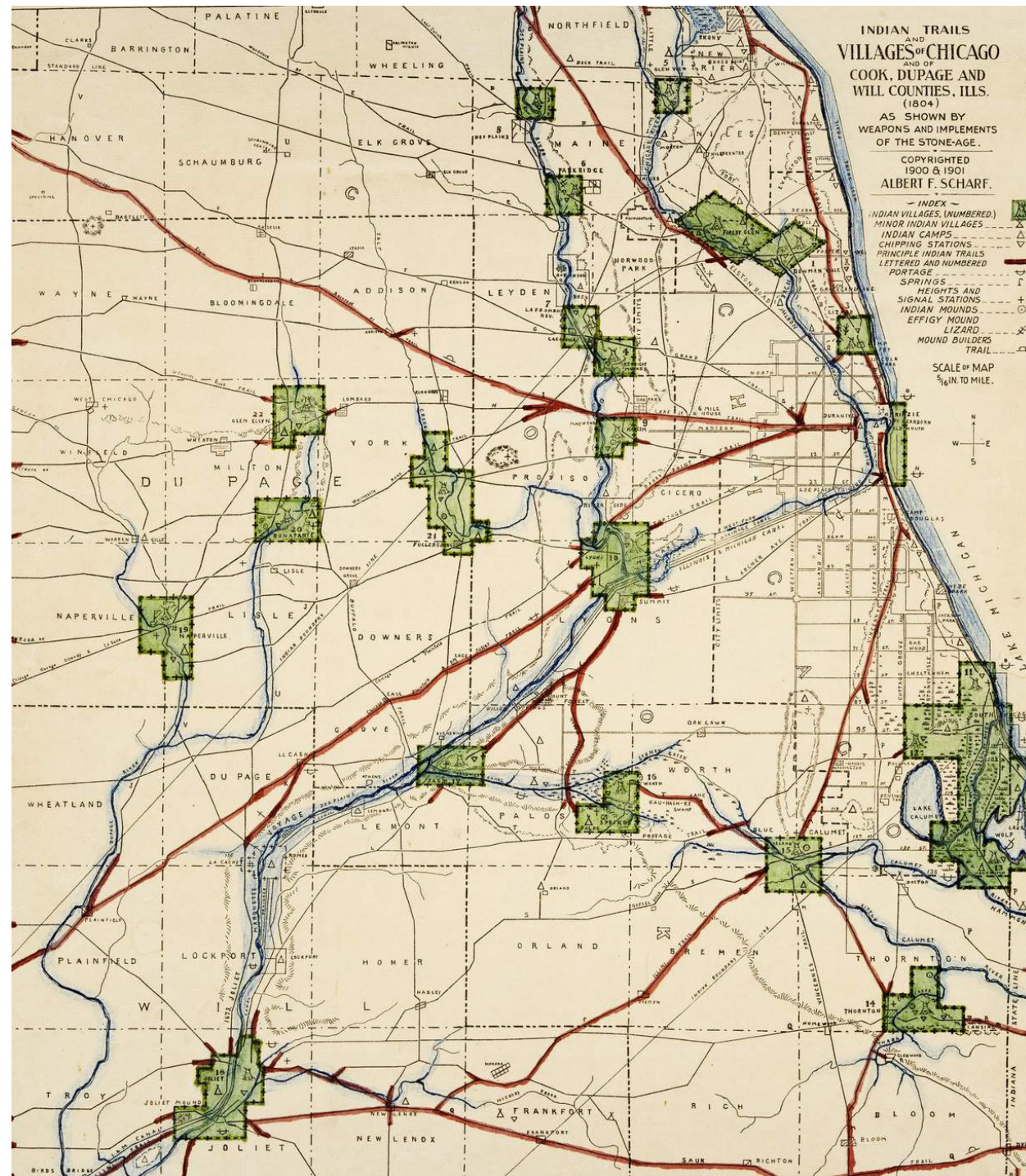


Fig. 2.1.2 An old map of Native American trails and villages in the Chicago area shows routes that mirror today's interstate highway system.

2.1 CHICAGO AS A MANUFACTURING DISTRICT

Chicago's transportation was dependent on the geographic location and the waterways that existed. The Chicago River was separated from the Des Plaines River by a small obstacle. Earlier, it flowed from great lakes and then to the St. Lawrence River and North Atlantic. The large Mississippi River system flowed out to the Gulf of Mexico.

This geographic condition created the foundation of Chicago. The growth of the city happened around the construction of the Illinois and Michigan Canal, whose construction began in 1836. The city officially came into existence a year later. Chicago, as a city, was built around transportation. To date, the Port of Chicago is one of the largest inland seaports in the world.

In 1848 they completed the construction of the Illinois and Michigan Canal and Chicago's first railway connection to the East coast. It was easier to build railways in Chicago because of the natural resources in the Midwest.

The forests and mines of Minnesota, Wisconsin, and Michigan would ship across the lakes timber and the iron

Fig. 2.1.3 Completed in 1848, the Illinois and Michigan canal linked the Great Lakes and the Mississippi River, helping establish Chicago as the center of Midwestern trade.



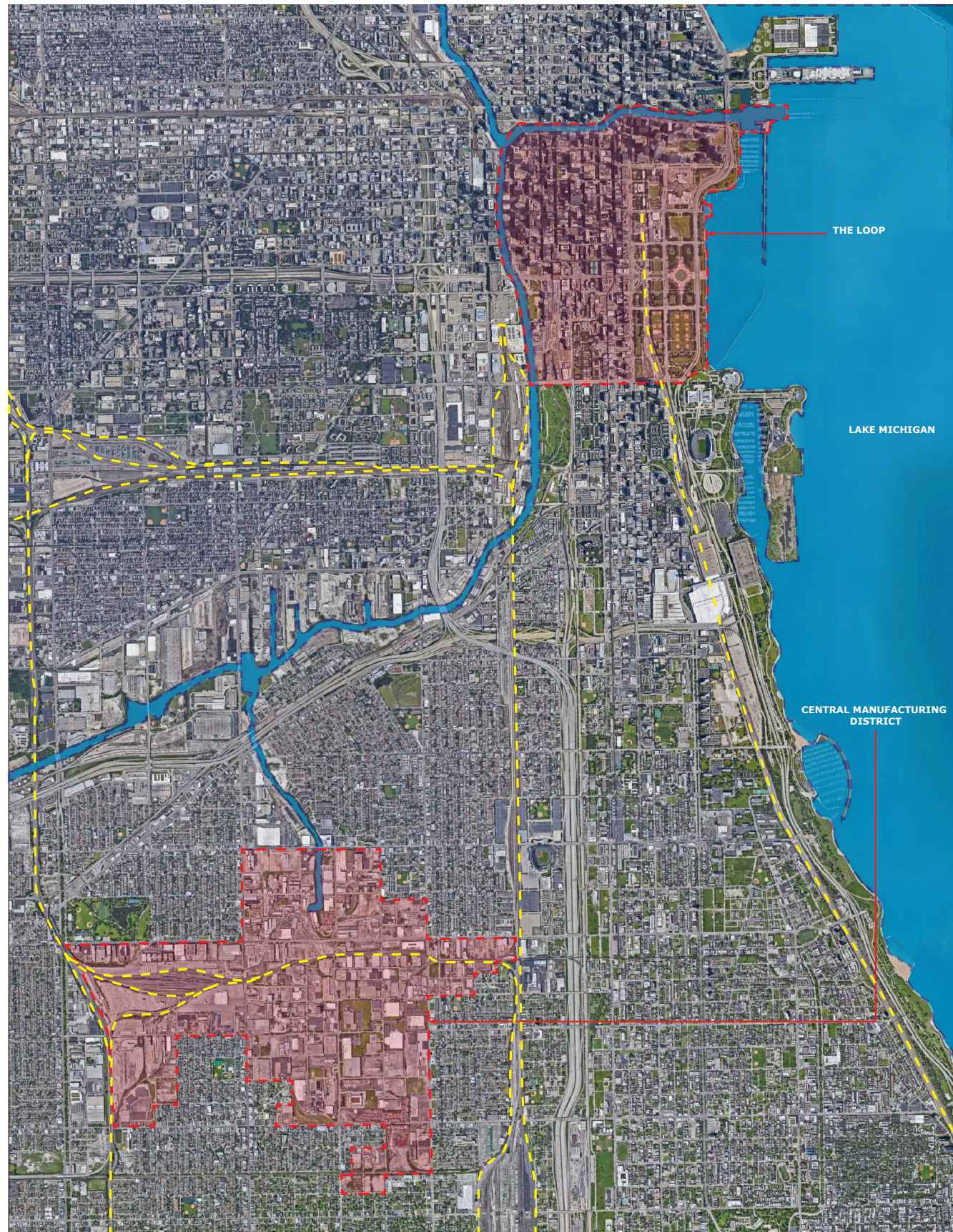


Fig. 2.1.4 Shipping and Railway Network in Chicago (by Author)

for the construction of tracks and rail ties. The steam engine would be powered by the coal that was mined in downstate Illinois and shipped via the new canal.

The new industrial system of transportation made Chicago the metropolis of the Midwest. The rail lines nerve center became Chicago. The geographical location made Chicago the major transportation hub. By 1860 eleven rail lines came into the city, leading to massive construction of train stations and depots throughout the region. "For the next century, the railroads brought the grain of the prairie, the timber of the North Country, the meat of the West, and the people of the world into Chicago."¹

Fig. 2.1.5 Network map from 1999, Chicago's central position in rail traffic is apparent (Koziarz, Jay. "Transportation That Built Chicago: The Railroads." Curbed Chicago, September 21, 2017.



1 "A Global Hub: The History of Chicago Transportation." Chicago Detours (blog), December 1, 2016. <https://www.chicagodetours.com/history-of-chicago-transportation-as-a-world-hub/>.



Fig. 2.2.1 Aerial View of Union Stock Yard, 1936



Fig. 2.2.2 "File:Livestock Chicago 1947.Jpg." Wikipedia, June 25, 2012.

2.2 HISTORY OF CENTRAL MANUFACTURING DISTRICT

Historically Central Manufacturing District was known as Back of the Yards. Generation of immigrants had settled in here. Different origin people led to some major social conflicts of modern times. Back of the yards got a lot of attention from novelists, activists, and social scientists for most of the twentieth century. The central manufacturing district is in the community area of New City. It extends from 39th to 55th streets between Halsted and the railway lines along Leavitt Street. It is just in the south and west of the former Union Stock Yard and next to the meatpacking plants, which was a giant sprawl until the 1950s, which was known as the most massive livestock yard and meatpacking center in the country.

The construction of railroads, the establishment of the Union Stock Yard, and the perfection of refrigerated boxcar led to the growth of the meatpacking industry in the neighborhood. World War 1 and in the 1920s small number of Mexican immigrants entered Back of the yards and settling in Bridgeport. They retained their Slavic character till the 1970s, after which it turned to the Chicano community, with African Americans being the minority.¹

Once the meatpacking industry ended in the 1960s, the Back of the Yards went through severe economic decline and physical deterioration. The industry began to decentralize by the mid-20th century, and stockyards wholly faded away by 1971.²

¹ "Back of the Yards." Accessed December 6, 2018. <http://www.encyclopedia.chicagohistory.org/pages/99.html>.

² "Stockyards, The Union - WTTW." Accessed December 6, 2018. <https://interactive.wttw.com/a/chicago-stories-union-stockyards>.



Fig. 2.3.1 Central Manufacturing District



Fig. 2.3.2 Chicago's Central Manufacturing District

2.3 CENTRAL MANUFACTURING DISTRICT

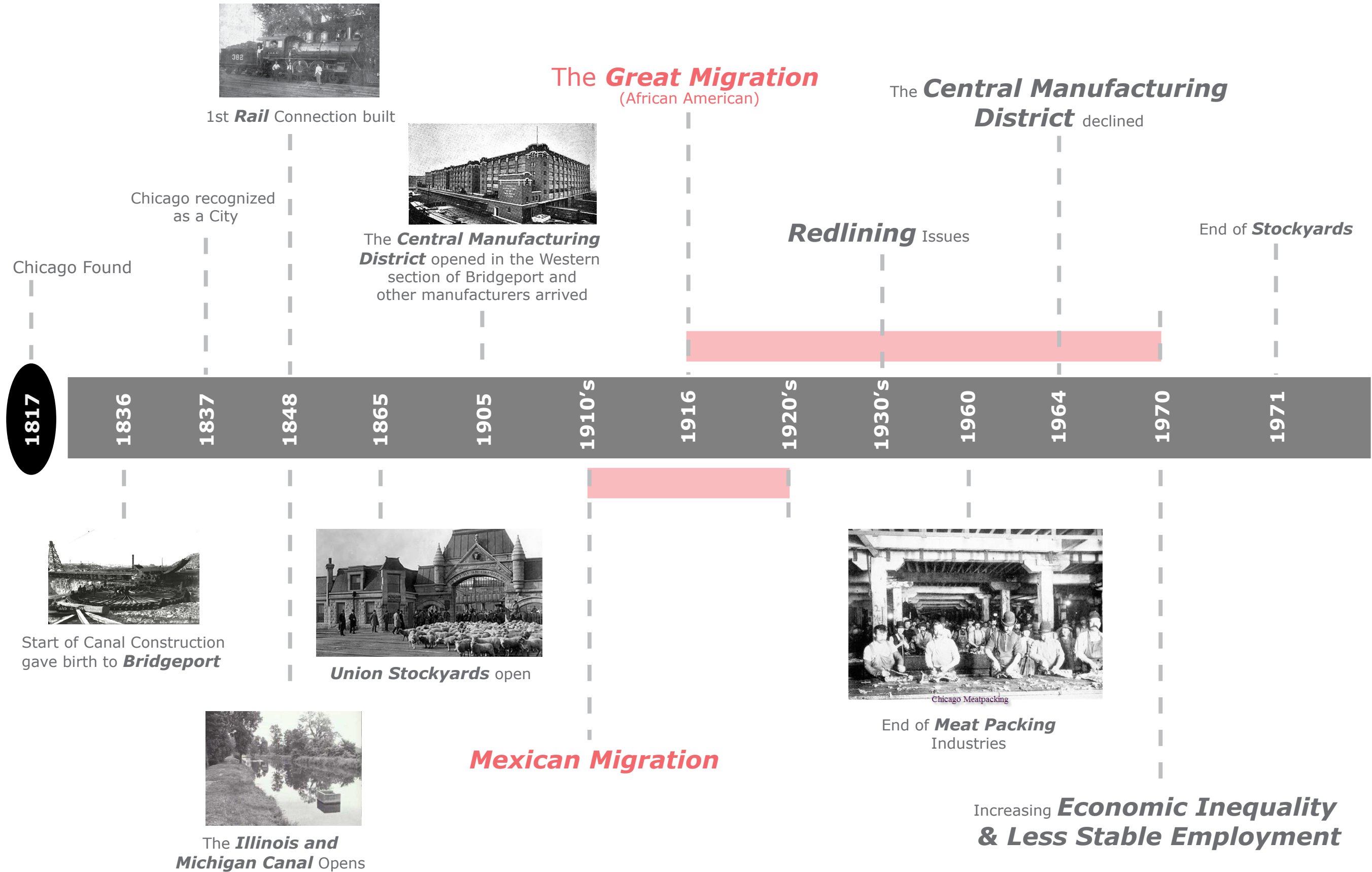
The Central Manufacturing District came into existence in 1905, when an east coast investor named Frederick Henry Prince was looking to expand the railroad, which served the nearby Union Stock Yard. He built an industrial park spread across 265 acres bounded by 35th Street on the north, 39th Street (Pershing Road) on the south, Morgan on the east, and Ashland on the west. Ninety acres were added on the south side of Pershing road a decade later, which included the district's iconic clock tower and industrial buildings.

CMD was the first planned industrial manufacturing district in the United States. At its peak, it had a mix of light and heavy industrial, warehouse, and distribution companies. It consisted of around 200 firms by 1915 and combined with stockyards; it employed around 40,000 employees. The transportation unification services with onsite rail terminal and railroads running directly between and into the buildings assured even the smallest company's affordable, and same-day shipping. The district offered combined heat, power, and other utilities. CMD was one of the largest industrial parks in the world that incorporated banks, business incubator services, and maintenance.¹

Currently, many CMD properties stand empty and not a part of the neighboring rail yard. The city owns many of the buildings as warehouse storage spaces, and some of the multi-story industrial buildings are on the market.²

¹ "Central Manufacturing District." Accessed December 6, 2018. <http://www.encyclopedia.chicagohistory.org/pages/785.html>.

² Chicago's Central Manufacturing District <https://www.cnt.org/sites/default/files/publications/Chicago%27sCentralManufacturingDistrict.pdf>



2.4 REDLINING ISSUES & REVITALIZATION THEORIES

The city of Chicago is seen as two cities. The divide in Chicago is due to the significant underlying casual factors in the American cities- a history of various forms of institutional racism- legal, economic, political, and social. These factors have continued to benefit white citizens. However, at the same time, the marginalized communities (i.e., African American, Hispanic/ Latino, Asian) are segregated and split off from the whole of resourced neighborhoods.

There has been a power differential in this place, where the north side maintains a superior position over the south side and the west side. This power maintains a constant split between the two parts of the city, existing side by side. The west and south side of Chicago carry certain disavowed function so the north side can continually succeed.¹

There has been Psychoanalysis done which help us understand the failed attempts at mixed neighborhoods; lack of empathy is a crucial obstacle to revitalizing disenfranchised communities. The unacceptable internal feelings the white residents hold towards other marginalized communities keep a constant divide.²

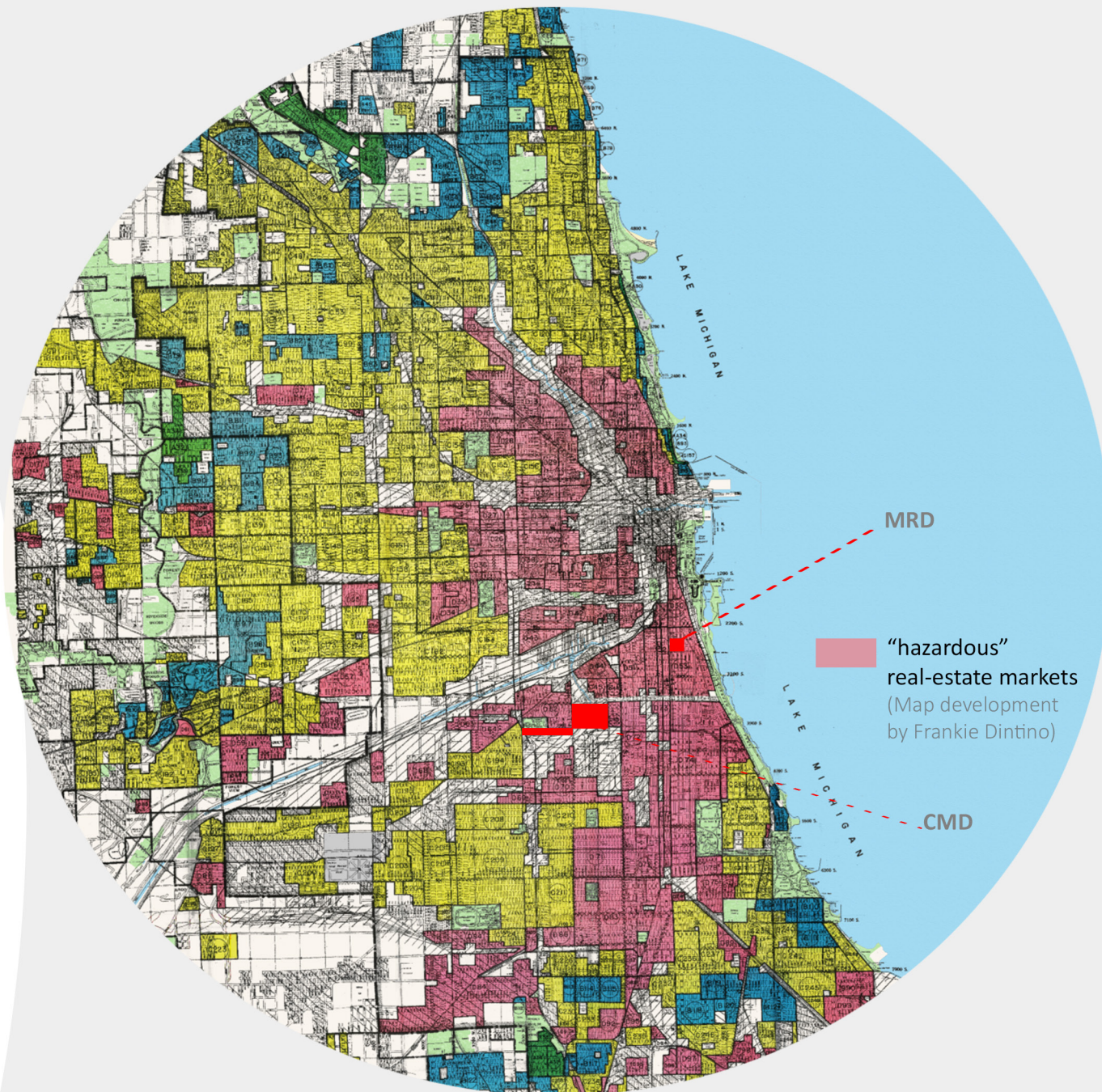
Revitalization of a place is a significant process. It involves different groups – Urban & Regional Planners, Scholars whose studies are one of the major insights, Policymakers, Activists, and the inhabitants of the community.

Planning Theories³ help figure out the methodology of

1 Semuels, Alana. "Chicago's Awful Divide." *The Atlantic*, March 28, 2018.

2 Ruiz, Gabriel. "University Forum: Revitalizing The South Side of Chicago." *Journal of the American Psychoanalytic Association* 65, no. 4 (2017): 687–93. <https://doi.org/10.1177/0003065117728073>.

3 Ross, Catherine, and Nancey Leigh. "Planning, Urban Revitalization, and the Inner City: An Exploration of Structural Racism."



VACANCY

UNEMPLOYMENT

CENTRAL MANUFACTURE DISTRICT

20

0-3% Vacant Houses > 27%

0-3% Unemployment Rate > 27%

Fig. 2.4.1 "The Case for Reparations by Ta-Nehisi Coates - The Atlantic." Accessed December 1, 2018.

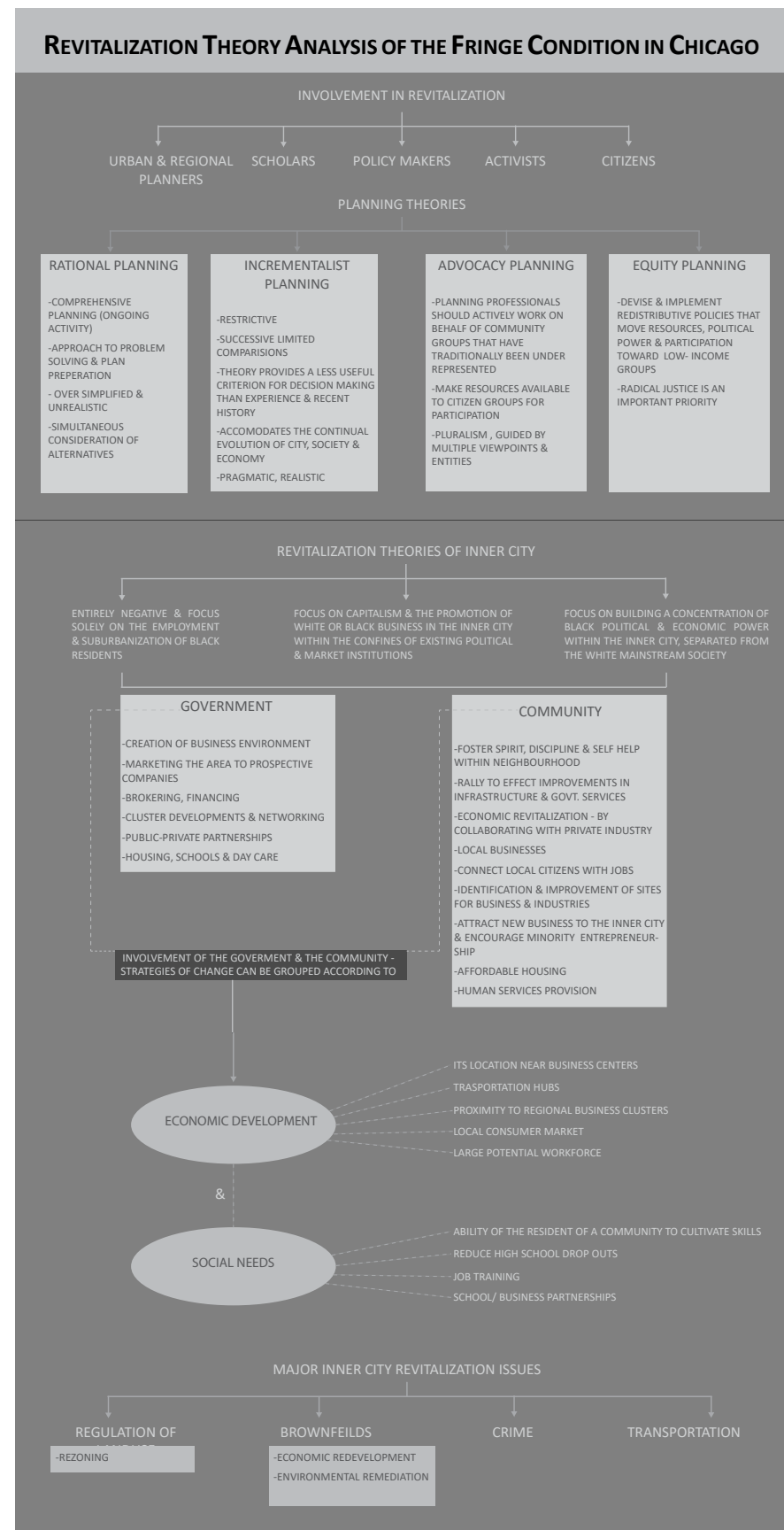


Fig. 2.4.2 Theory of Revitalization (By Author)

approaching this issue. There are different approaches for different types of issues. The one that I believe Chicago requires is the combination of Advocacy planning and equity planning. These two require the participation of the planners and the community hand in hand, where there are a firsthand experience and not just theories.

According to the revitalization theories, the most opt seems to be the one that focuses on building a concentration of political & economic power within the inner city for marginalized groups. I want to try at least and find out if there is a possibility of success by focusing on capitalism & the promotion of reducing the racial divide in the inner city.

For a revitalization, the community organizations need financial assistance from the government and their involvement in certain aspects to keep it going as the community organizations on their own have no legal authority, unless provided with some assistance from the government. Both together help in developing the economic and social development of the area to be revitalized.⁴

There have been several different approaches to revitalizing these areas. There have been some rezoning of areas that change the kind of development in these areas. Some other examples include the revitalizing of brownfields. These are Industrial plots that were demolished and left empty due to its contamination from these industrial chemicals.

Journal of Planning Literature 14, no. 3 (2000): pg. 367-80. <https://doi.org/10.1177/08854120022092719>.

4 Boston, T. D., and C. L. Ross. *The Inner City: Urban Poverty and Economic Development [Sic] in the Next Century*. Transaction Publishers, 1997. <https://books.google.ca/books?id=HGjSngEACAAJ>.

COMMUNITY SETTLEMENTS AROUND CENTRAL MANUFACTURING DISTRICT 2.5

History of Hispanic Communities in Chicago

The United States of America in the mid-late 1910s saw the first major wave of Mexican migration triggered by the social, economic, and political displacements of the Mexican Revolutionary years and the increase in industrial and agricultural employment in America. Mexicans arrived through both direct and indirect routes and worked as semiskilled and unskilled laborers in heavy industry and agriculture industries. Widely the male Mexican labor pool migrated to Chicago from the agricultural fields of the Midwest and towns, villages in Texas, and the Central Mexican States. The immigrants more likely belonged from the middle class than from the poor peasants. In the later years of the 1910s and early 1920s, many African Americans and Mexicans got hired to break the steel and packinghouse strikes.

More people migrated in the 1920s after hearing about the ready availability of work in Chicago. The industries also lobbied to remove Mexicans from the restrictions of the Immigration Act. These families would settle around these Industries.¹

¹ Arredondo, Gabriela F., and Derek Vaillant. "Mexicans." *Encyclopedia of Chicago*. Chicago: Chicago History Museum and the Newberry Library, 2005. <http://encyclopedia.chicagohistory.org/pages/824.html>.

History of African American Communities in Chicago

The Great Migration between 1916 to 1970, a long term movement of African Americans from the South of America to the urban North transformed Chicago and a few other northern cities. Out of 7 million African Americans that left the South during these decades, around 500,000 of them moved to Chicago. The industries turned away the African Americans for jobs until World War one started.

World War One led to the halting of immigrants from Europe. The demand for Chicago's manufactured goods increased, which required employers to hire a new source of labor for jobs. Therefore, the factories opened the doors for African Americans providing them the opportunity to claim their full citizenship through their participation in the industrial economy. So they started settling around the industrial district.

South of Central Manufacturing District is where these African American communities settled. They created churches, community organizations, important businesses, music, and literature.²

² "African Americans." Accessed December 5, 2018. <http://www.encyclopedia.chicagohistory.org/pages/27.html>.

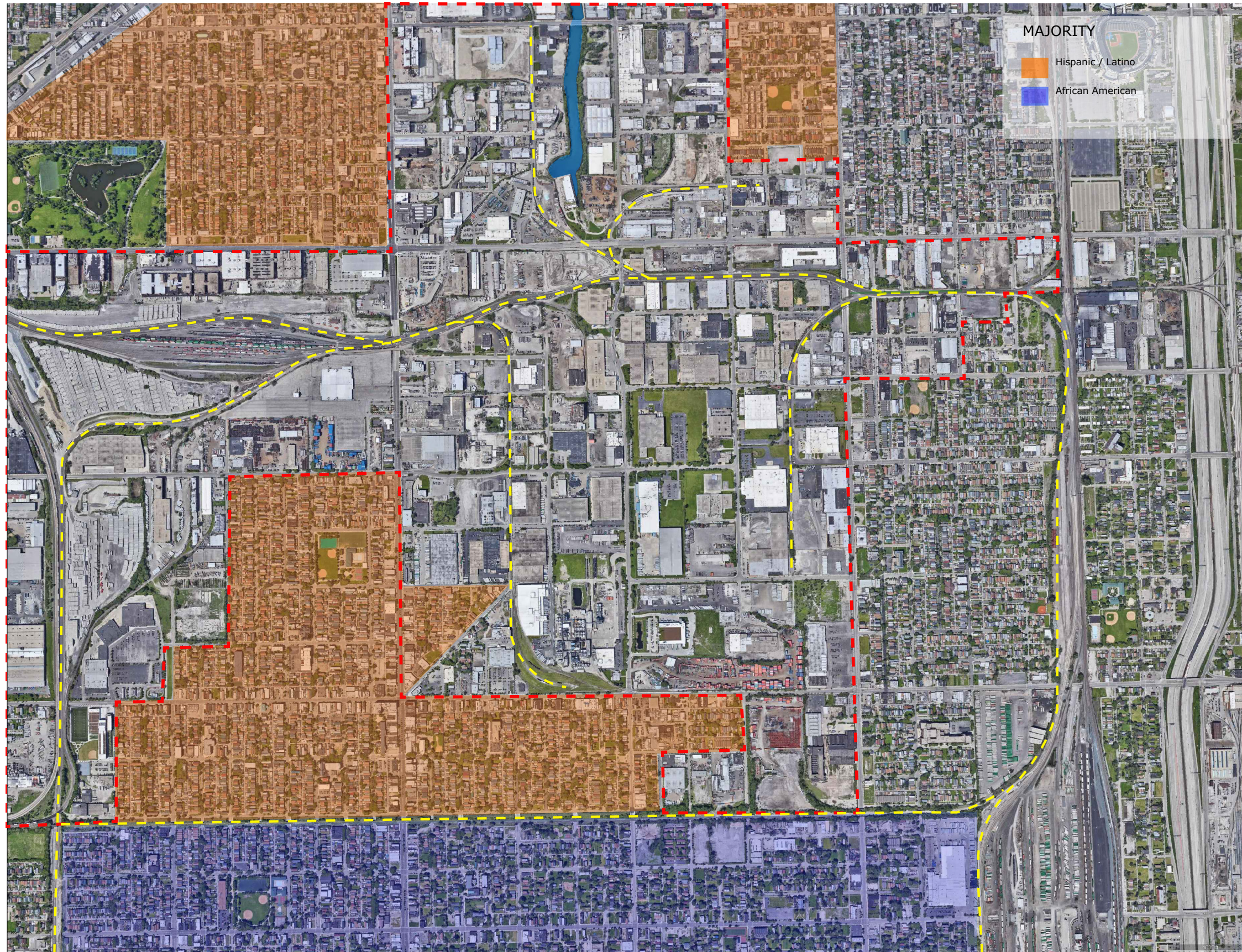
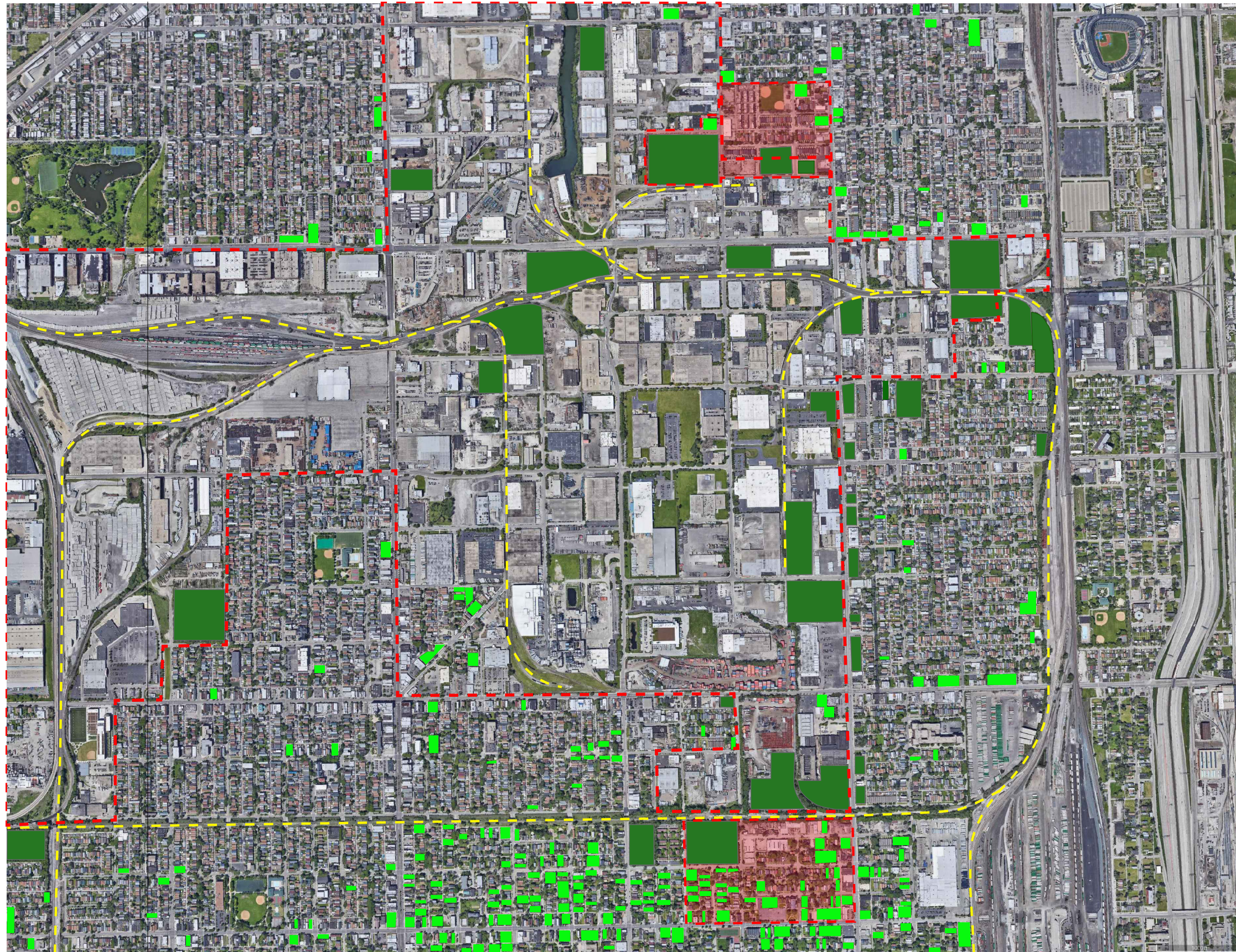


Fig. 2.5.1 Minority Groups surrounding the Central Manufacturing District (by Author)

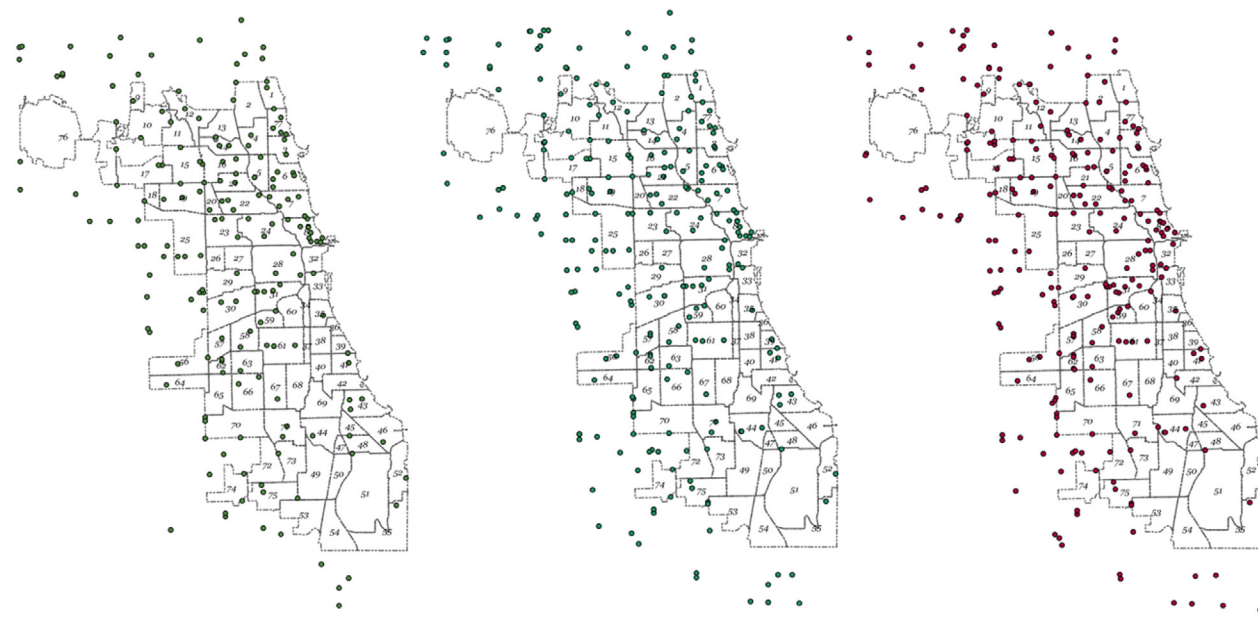


- EMPTY PARCEL LOTS
- BROWNFIELDS

Fig. 2.5.2 Underused or empty lands in and around Central Manufacturing District (by Author)

CHAPTER 3

1. *FOOD DESERTS IN CHICAGO*
2. *URBAN AGRICULTURE IN CHICAGO*



2007 2011 2014
 Fig. 3.1.1 Supermarket Locations across Chicago for years 2007, 2011, and 2014. Locations bordering Chicago included. Chicago community area boundaries shown with community area identification number.

3.1 FOOD DESERTS IN CHICAGO

Food deserts are the outcome of Redlining. “Food deserts are geographic areas where residents’ access to affordable, healthy food options (especially fresh fruits and vegetables) is restricted or nonexistent due to the absence of grocery stores within convenient traveling distance.”¹ The areas affected by food deserts lack reasonable access to fresh and affordable foods. Restricted access to healthy food has magnified health disparities leading to high rates of chronic illness.

The City of Chicago, in the past few years, has led initiatives promoting new store openings in highly needed areas. Even after these attempts of positive steps, the research in a recent study of “Urban foodscape trends: Disparities in healthy food access in Chicago, 2007-2014”² showed that these new stores provided more options but only in the areas that had many other options. They did not help much in the areas that already had low access in 2007 and 2011.

The geographical pattern of grocery stores is a pattern of retail store investment and disinvestment. To bring in a change in spatial patterns, the City has tried to push investment to particular neighborhoods. It has been successful sometimes, but changing geographic investment patterns in this historically segregated City is a difficult job.

The policies could further include investing in making a

1 “Food Deserts Persist in Chicago despite More Supermarkets | Chicago Reporter.” Accessed December 1, 2018. <https://www.chicagoreporter.com/food-deserts-persist-in-chicago-despite-more-supermarkets/>

2 Kolak, Marynia, Michelle Bradley, Daniel R. Block, Lindsay Pool, Gaurang Garg, Chrissy Kelly Toman, Kyle Boatright, et al. “Urban Foodscape Trends: Disparities in Healthy Food Access in Chicago, 2007–2014.” *Health & Place* 52 (July 1, 2018): 231–39. <https://doi.org/10.1016/j.healthplace.2018.06.003>.

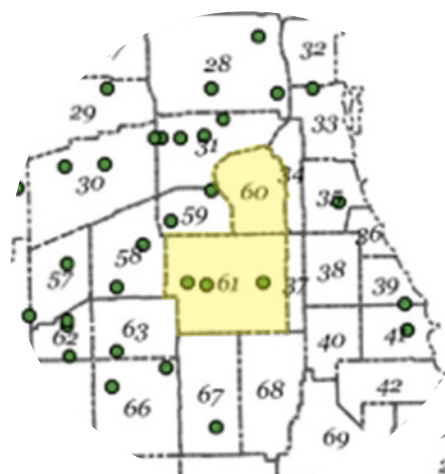


Fig. 3.1.2 2007 Supermarkets near CMD



Fig. 3.1.4 2014 Supermarkets near CMD



Fig. 3.1.3 2011 Supermarkets near CMD

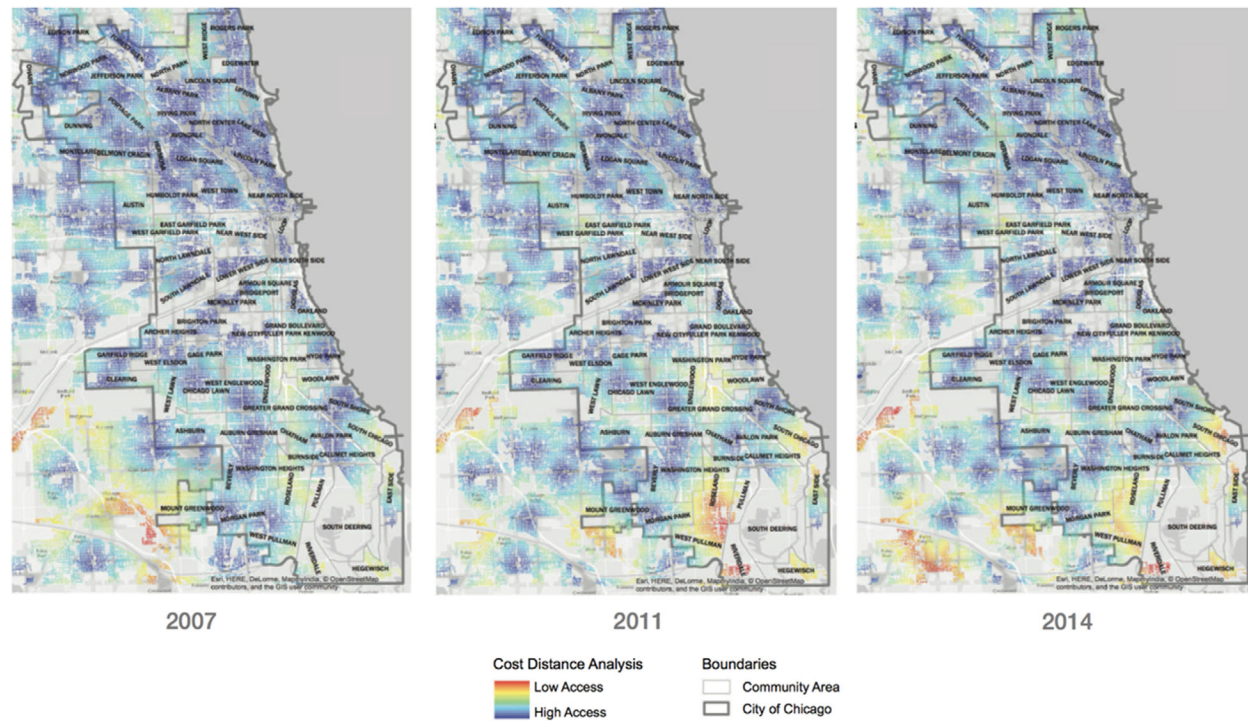


Fig. 3.1.5 Cost distance calculations on residential and mixed-use street networks for each year of analysis.

better public transportation system, supporting expansion for new community-supported agriculture practices for high quality, affordable, and reliable produce. Food uncertainty networks like food banks, non-profit grocers, and produce carts should be supported and expanded, while still advocating for sustainable and long term food options. While addressing the issue of food deserts, the underlying phenomena driving food inequity, like decades-long impacts of community disinvestment and racial segregation, should be taken into account to find solutions.

Nearly 500,000 people from African American communities live in food deserts, and more 400,000 people live in areas that have only fast-food restaurants and no grocery stores in the neighborhood.

Historically some food justice activists have desired to close this gap by opening food co-ops in these neighborhoods where supermarkets have been unsuccessful. These co-ops do not just sell fresh and organic fruits and vegetables, whole grains and bean, and soy-based products but to help people make healthy food choices, also educate the public by offering cooking and nutrition classes.³

³ “Food Deserts | Food Empowerment Project.” Accessed December 1, 2018. <http://www.foodispower.org/food-deserts/>.



Fig. 3.2.1 Benton House Backyard Botany (Garden, Benton House. "Benton House Backyard Botany: Lettuce Grow and Share!" Benton House Backyard Botany (blog), June 6, 2011.)



Altgeld Gardens Community Farm



Educare Preschool Farm



Roosevelt Square Youth Farm

Fig. 3.2.2 Urban Growers Collective ("Urban Growers Collective." Urban Growers Collective. Accessed December 3, 2018.)

3.2 URBAN AGRICULTURE IN CHICAGO

Food deserts in Chicago gets addressed at different scales of interventions – Food Donation, School Garden, Housing planters, pantry garden, urban farming, training programs, urban agriculture organizations, conservation projects, community garden and farms, orchard, restaurant catering garden, rooftop. Some of the examples are as follows.¹



Fig. 3.2.3 190 m² of planters (by Author)

Benton House Backyard Botany

Community Garden, Pantry Garden, Urban Farm, Food Donation

Benton house backyard botany is a community garden in Bridgeport neighborhood. They have high school volunteers who help them plant seeds for the warm summers in Chicago. They have a Sunday tradition of working and eating earth as a source of peaceful productivity and knowledge shared among themselves.²



Fig. 3.2.4 6 5 1 8 0 m² of farmland (by Author)

Urban Growers Collective

Urban Growers Collective was built upon the foundation of Growing Power, a nonprofit organization and land trust established in Milwaukee, WI in 1993. Urban Growers Collective demonstrate and support communities in developing community-based food systems where food is grown, prepared, and distributed within their home communities.

They operate seven urban farms on 11-acres of land predominately located on Chicago's south-side. These

1 "Chicago Urban Agriculture Mapping Project." *Advocates for Urban Agriculture (blog)*, May 9, 2012. <https://auachicago.wordpress.com/projects/urban-agriculture-mappinginventory-project/>.

2 Garden, Benton House. "Benton House Backyard Botany: Lettuce Grow and Share!" *Benton House Backyard Botany (blog)*, June 6, 2011. <http://bhbackyardbotany.blogspot.com/2011/06/well-our-community-garden-has-come.html>



Fig. 3.2.5 McCormick Place Rooftop Farm - Savor ("Rooftop Garden – Savor... Chicago." Accessed December 3, 2018. [http://www.savorchicagomcpl.com/sustainability/rooftop-garden/.](http://www.savorchicagomcpl.com/sustainability/rooftop-garden/))

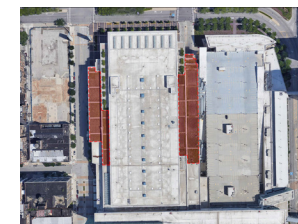


Fig. 3.2.6 5020 m² of rooftop produce

McCormick Place Rooftop Farm

Plants and vegetables can grow in different places and different conditions. Architects had planned an urban farming space on the rooftop of McCormick Place West Building. Green roofs were always built to mitigate the environmental impact of the building and creating a terrace event space. McCormick Place's 20,000 square foot rooftop was converted into the extensive farm-to-fork garden by Chicago Botanic Garden's Windy City Harvest program. Eight thousand pounds of produce is grown on the roof each year and gets used at the convention center. This also helps to reduce the need to transport produce at the convention center.⁴

³ "Urban Growers Collective." *Urban Growers Collective*. Accessed December 3, 2018. [https://urbangrowerscollective.org/.](https://urbangrowerscollective.org/)

⁴ "Rooftop Garden – Savor... Chicago." Accessed December 3, 2018. [http://www.savorchicagomcpl.com/sustainability/rooftop-garden/.](http://www.savorchicagomcpl.com/sustainability/rooftop-garden/)



Fig. 3.2.7 Method Soap Factory - Gotham Greens ("Method | Our Soap Factory." Method (blog). Accessed December 4, 2018.)

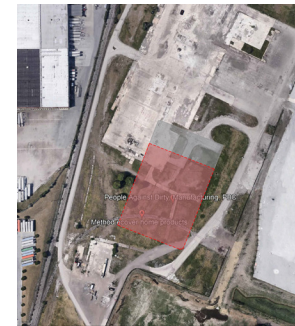


Fig. 3.2.8 11150 m² of roof greenhouse produce (by Author)

Method Soap Factory- Roof Urban Farming

Gotham Greens is an Urban agriculture company that has taken over 75,000 square feet of the Method soap factory in South East Chicago and created a commercial-scale greenhouse. They produce 500 tons of fresh, premium quality, pesticide-free produce yearly and provide it to the local community and neighboring retail and restaurant market.

Besides, 1520 square feet of rooftop canopy helps reduce energy usage, improve urban air quality, and decrease stormwater runoff, thus resulting in reducing stress on public sewer systems.⁵

⁵ "Method | Our Soap Factory." Method (blog). Accessed December 4, 2018. <https://methodhome.com/beyond-the-bottle/soap-factory/>.



Fig. 3.2.9 "Growing Home Farm - Google Search." Accessed April 3, 2019.



Fig. 3.2.10 "Growing Home Farm - Google Search." Accessed April 3, 2019.



Fig. 3.2.11 8882 m² of outdoor and hoop house food production

Growing Home – Wood Street Urban Farm

Growing Home was established in 1992. After Chicago Coalition for homeless acquired land for farming near a navy pier in Chicago, they decided to start an agricultural training program for homeless people.

Growing Home has two urban farms on Chicago's Southside, one being a farm in the Englewood neighborhood. This neighborhood used to thrive before the 1960s, but after the redlining issue, a significant population abandoned their lands and moved out, leaving a lot of vacant lots. Due to very less population, the crime rate of this area increased with the drug trafficking issue. Due to these difficult circumstances, the food vendors moved out, making this area a part of food dessert.

One of the primary goals of growing Home was to increase access to fresh produce in this neighborhood as well as job training and employment opportunities.⁶

⁶ "Growing Home's Urban Farms." Growing Home (blog). Accessed April 3, 2019. <http://growinghomeinc.org/our-farms/>.

CHAPTER 4

1. *SUSTAINABILITY*
2. *SYSTEMS - THINKING*
3. *LINEAR ECONOMY*
 - a. *BENTON HOUSE BACKYARD BOTANY*
 - b. *GROWING HOME*
 - c. *FARM ON OGDEN*
4. *CIRCULAR ECONOMY*
 - a. *GREEN ZONE (EXAMPLE)*

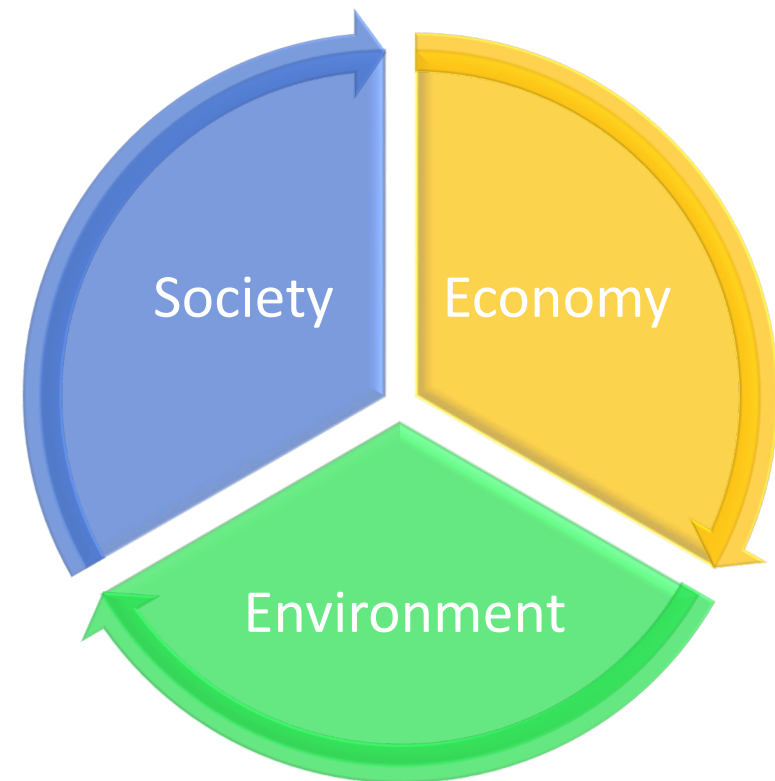


Fig. 4.1.1 Three pillars of Sustainability (by author)

Environmental Sustainability

- Environmental systems are in balance
- The rate at which natural resources get consumed should allow to replenish themselves

Economic Sustainability

- Human communities should have access to the basic resources i.e. financial and other to meet their needs
- Secures sources of livelihood

Social Sustainability

- Universal human rights and basic necessities to keep families and communities healthy and secure
- Personal, labor and cultural rights respected and protection from discrimination¹

¹ United Nations General Assembly "48. Sustainable development: managing and protecting our common environment" 2005 World Summit Outcome. 24 October 2005. Web. Retrieved 27 June 2013. < <http://daccess-dds-ny.un.org/doc/UNDOC/GEN/N05/487/60/PDF/N0548760.pdf?OpenElement> >

4.1 SUSTAINABILITY

The most often quoted definition of Sustainability comes from the UN World Commission on Environment and Development¹ which had released a report called Our Common Future:

*'Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.'*¹

The term sustainability was coined from the idea of 'sustainable development.' Industrialization was an attempt to raise the living standards, but in many countries, there still existed extreme poverty. The economic development was taking over the ecological health and social equity. It had become quite evident that we needed to harmonize with ecology for Sustainability.

Sustainability is a broader term that includes ecological, social, and economic dimensions. They all need to be considered as a whole for lasting prosperity.

The concept of sustainable development became more critical after the realization that the industrialization period was trying to raise living standards, but many countries were still dealing with extreme poverty. Economic development was at the cost of ecological health and social equity, where the richer were getting richer, and the poorer were paying the consequences. There need to be better ways of development that balance with nature.

We typically think of Sustainability as reducing the amount of waste production, reducing energy consumption, and material usage. At this point, reducing is not going to help with the idea of Sustainability. Sustainability is meant to be a long term action. It is to think of the life cycle of the products that are made and also what goes into making it.

¹ "Our Common Future: Report of the World Commission on Environment and Development." UN Documents. n.d. Web. Retrieved 27 June 2013. < <http://www.un-documents.net/ocf-02.htm> >

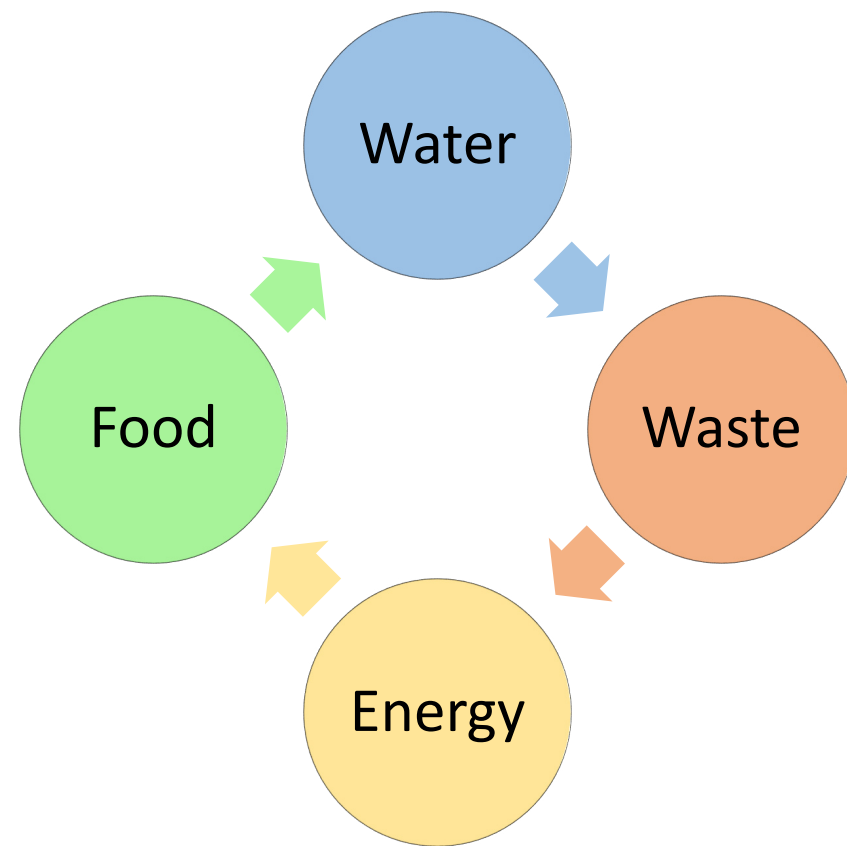


Fig. 4.1.2 Sustainability Fundamentals (by author)

Peter Senge (senior Lecturer in Behavioral and Policy Sciences at MIT Sloan School of Management) quotes in one of his interviews: ²

'Sustainability means paying attention to very fundamental needs—food, water, energy, and the waste and toxicity they produce.'

He also mentions that according to him, a good way to talk about Sustainability is to talk about the system asking questions like – “Where did what you make come from? Where did that component come from? (Tracing it back to the source in terms of something that’s harvested or extracted from nature) Where does it go?”²

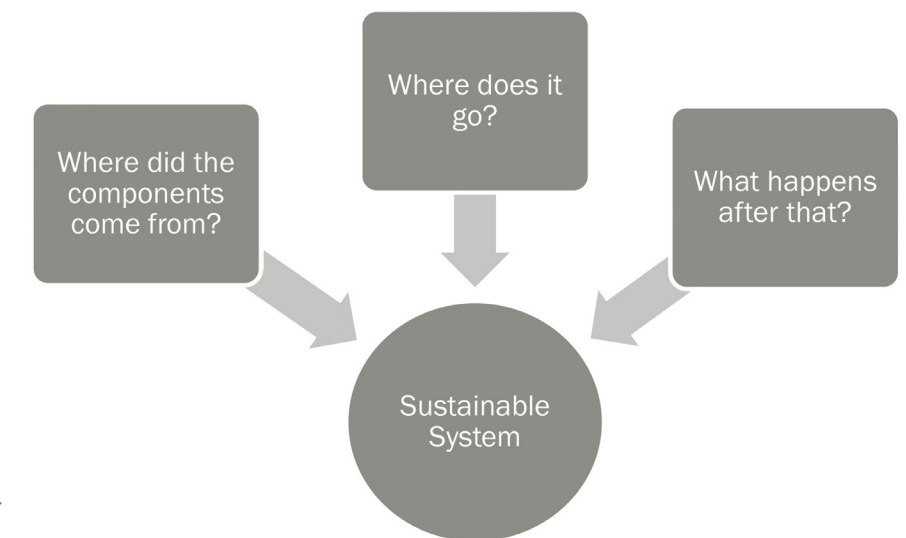


Fig. 4.1.3 Sustainability System (by author)

² “Sustainability: Not What You Think It Is.” Accessed September 25, 2019. <https://sloanreview.mit.edu/article/sustainability-its-not-what-you-think-it-is/>.



Fig. 4.2.1 Interdependence (by author)

Sustainability is Interdependence for example what is a House?

House is a conventional word that consists of different parts which makes it a house and to make this house you need stakeholders with different expertise like Architects, Structural Engineers, Mechanical Engineers, Contractors, Landscape Architects, etc. these are just the few in the larger system of the government approvals.

4.2 SYSTEMS THINKING

Systems thinking is the **interdependence** of the system's constituent parts and how it works in the long run in context to the other larger systems. Systems thinking works differently than the traditional method of breaking the system into individual components to study them. Systems thinking cannot exist without equilibrium, i.e., when the natural resources are overused without giving it the time it requires to replenish the system collapses. Balancing is the major concept of Systems thinking. A quote by Peter Senge defines Systems thinking as:

*"Systems thinking is a discipline for seeing wholes. It is a framework for seeing interrelationships rather than things, for seeing 'patterns of change' rather than static 'snapshots.'"*¹

We live in a post-Industrial era that led to globalization and brought a level of interdependence between nations and regions that never existed in the past. From food to waste and toxicity (where all countries are involved), we all have contributed to the environmental crisis and depletion of natural resources. We need to find sustainable methods of living. The change comes when the issues affecting them become personal. The major industrial companies have started to realize that the shortage of natural resources is going to start affecting the growth of their business, starting to understand that they need to collaborate with different expertise to find a better way of running their business. The Necessary Revolution by Peter Senge mentions how important it has become to have different experts as stakeholders at the table to run a sustainable system for the betterment of the generations that are yet to come.

Here is another thought by William McDonough & Micheal Braungart who have written the book Cradle to Cradle:

¹ Senge, Peter M. *The Fifth Discipline : The Art and Practice of the Learning Organization*. New York : Doubleday/Currency, [1990] ©1990, 1990.p.68-69

*"The key is not to make human industries and systems smaller, as efficiency advocates propound, but to design them to get bigger and better in a way that replenishes, restores, and nourishes the rest of the world. Thus the "right things" for manufacturers and industrialists to do are those that lead to good growth- more niches, health, nourishment, diversity, intelligence, and abundance- for this generation of inhabitants on the planet and for generations to come."*²

A better way of bringing about a systemic change would be to think about how we could eliminate the concept of 'waste.' The ecosystem does not work with the idea of waste because every natural element is biodegradable and food for another system. The material could be categorized into the biological and industrial mass. Biological mass naturally becomes food for the ecosystem, whereas the industrial mass could be circulated in a closed-loop system making it food for the industries.

² McDonough, William. *Cradle to Cradle : Remaking the Way We Make Things*. 1st ed. New York : North Point Press, 2002., 2002.p.78

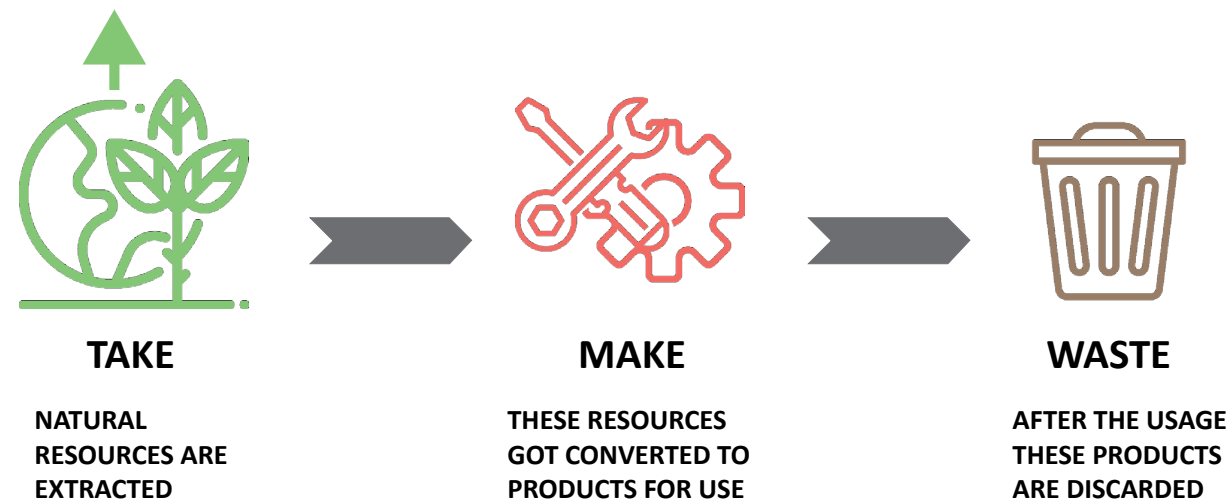


Fig. 4.3.1 Linear Economy (by Author)

4.3 LINEAR ECONOMY

Ellen Macarthur Foundation defines a linear economy as one where we take resources from the ground to make products which we use, and when we no longer want them, we discard it.¹ This pattern has been the reason for the uneven distribution of wealth by geographic region. Developed regions have primarily consumed the resources, and the materials have been imported from across the globe. An abundance of material and energy resources have been overwhelmed by industrial nations. Thus, materials have become cheaper in comparison to the cost of human labor. Resulting in the extensive use of the materials and economizing on human activity. This cycle of cheap material and expensive human labor has led to the natural consequence of neglecting recycling, reuse, and reduction of waste. The waste is not just material wastage; it also includes the source of energy.

While the linear economy has proven to be highly successful in generating material wealth in the modern period up to the 20th century, it shows weakness in the coming future.²

In the following subsections, there are some case studies I did on my visit to Chicago of different scales of urban community farms. These, in some aspects, follow the linear economy concept.

¹ "What Is the Circular Economy?" Accessed January 4, 2020. <https://www.ellenmacarthurfoundation.org/circular-economy/what-is-the-circular-economy>.

² Sariatli, Furkan. "Linear Economy Versus Circular Economy: A Comparative and Analyzer Study for Optimization of Economy for Sustainability." *Visegrad Journal on Bioeconomy and Sustainable Development* 6 (January 24, 2017). <https://doi.org/10.1515/vjbsd-2017-0005>.

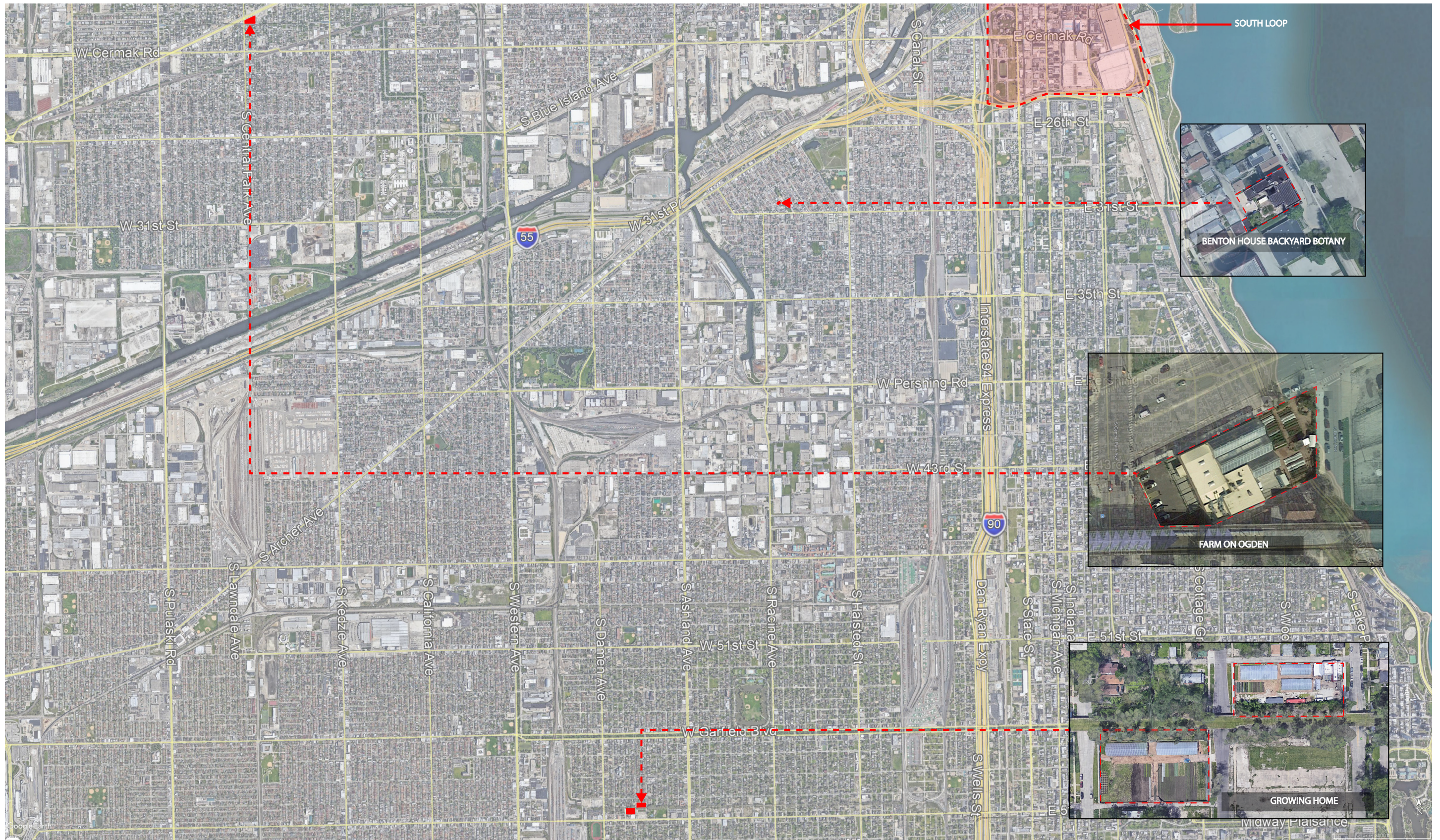


Fig. 4.3.2 Case Study Map (by Author)

4.3a BENTON HOUSE BACKYARD BOTANY

Benton house backyard is a small scale community center. They have a small community backyard farm where they grow easy growing crops importing compost and water supply. They have a food bank program where they provide fresh produce to people who do not have easy access to fresh groceries. On Sundays, they have a community kitchen where people gather to make food and socialize with other people. The waste that gets generated from the kitchen gets disposed of by the city on the outskirts.



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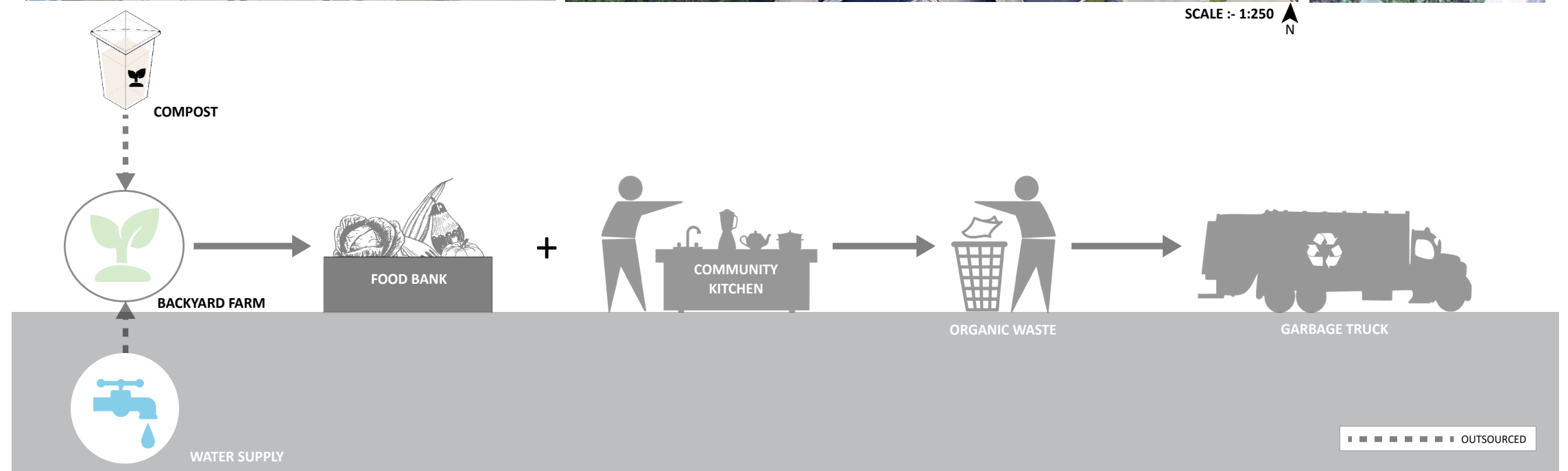


Fig. 4.3.3 Linear Economy cycle adopted by Benton House Backyard Botany (by Author)

4.3b GROWING HOME

Growing home is a social enterprise. They provide farm-based training for people with employment barriers. The process of farming they adopt is they start seedlings indoors during the cold winters and then transplant them after the last frost. They import compost for the crops and electricity to run the facility. They import compost for the crops and electricity to run the facility. To get some extra funds to run the facility and training program, they have weekly farm stands that also help with the whole issue of a food desert. However, instead of generating compost on-site with the organic waste they generate, it gets moved around, wasting more energy.



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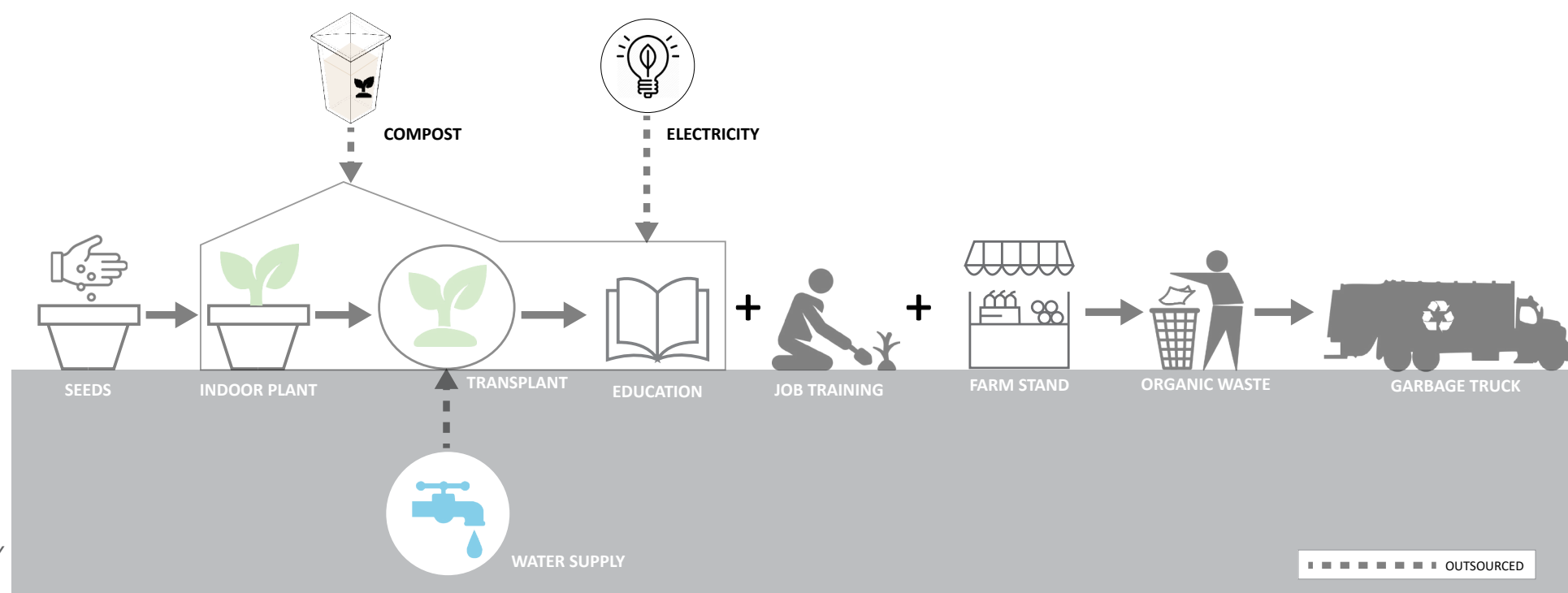
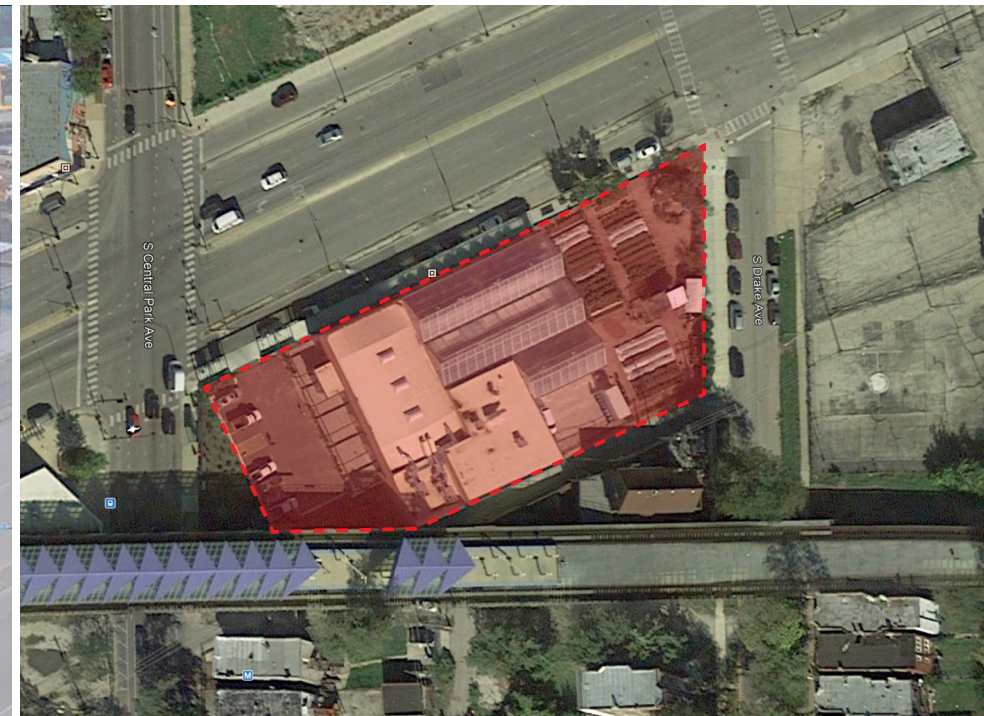


Fig. 4.3.4 Linear Economy cycle adopted by Growing home (by Author)

4.3c FARM ON OGDEN

Farm on Ogden follows a similar process as the other two facilities. It has an additional program of aquaponics which runs throughout the year and requires a constant source of electricity to maintain a specific temperature and provide sufficient lighting for the plants to grow. As we know, the primary source of electricity in the United States is generated through coal and nuclear power, which negates the idea of Sustainability.



SCALE :- 1:500

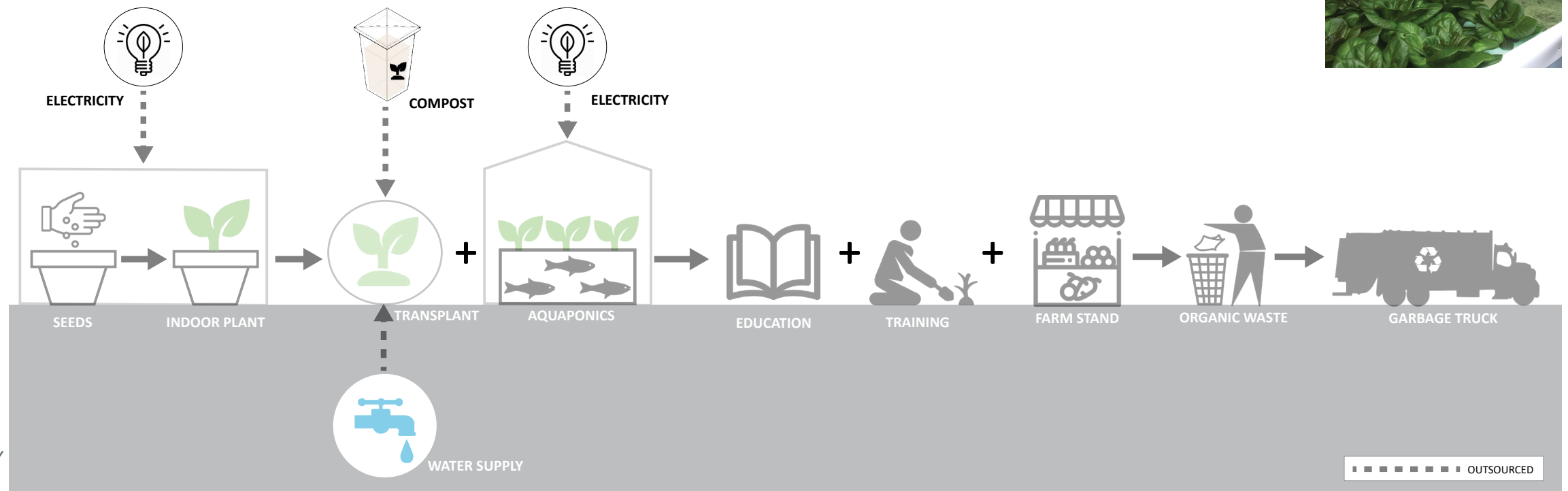


Fig. 4.3.5 Linear Economy cycle adopted by Farm on Ogden (by Author)

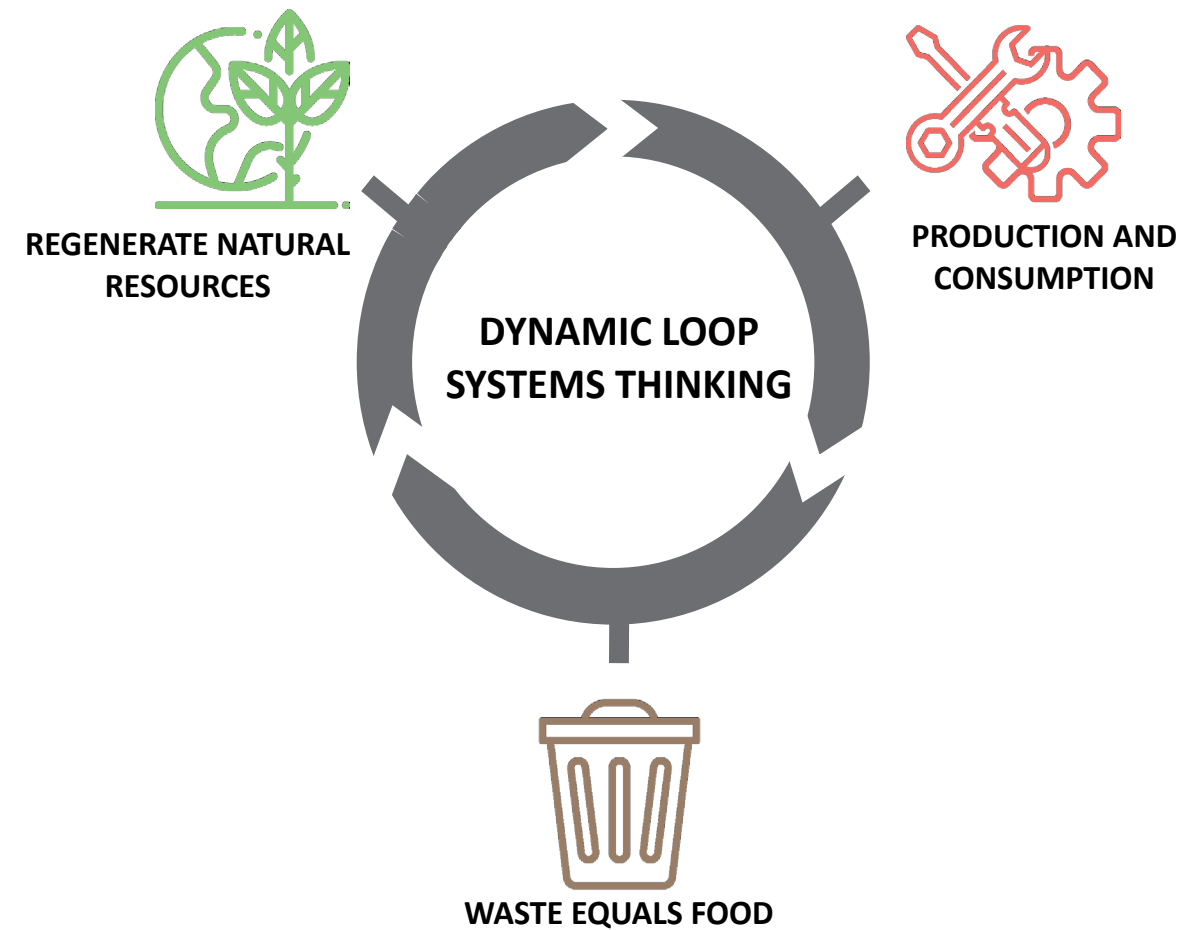


Fig. 4.4.1 Linear Economy (by Author)

4.4 CIRCULAR ECONOMY

In the globalization period, the idea of more production and more consumption was better, but that needs to be replaced entirely. There needs to be a positive development where the markets work systemically and automatically to make things better locally and globally. Environment-conscious economists have conceptualized that the Circular economy concept needs to be adopted instead of following the conventional linear economy.

A large number of theorists, researchers, and vocational parties have contributed to the concept of the Circular economy. But the phrase circular economy was introduced by Pearce and Turner. The idea of the circular economy starts with the question of how we utilize resources, how we make and use these products, and what we do with the materials afterward. Only then the economy could thrive and benefit everyone within the limits of our planet. A small local urban farming community-based organization 'the plant' has realized the value of this concept and started to look into their systems to see how the Circular economy concept could be incorporated.

Proposed by Janine Benyus, a biologist and a co-founder of Biomimicry institute, the economic system needs to mimic the ways of nature, to cope with commercial and industrial challenges and adopt the operational efficiency that nature follows. The circular economy is not going back in time. It is the ultimate solution to climate change problems, which takes the scientific approach towards industrial ecology, converting the systems to closed-loop, minimizing the idea of wastage.¹

¹ "What Is the Circular Economy?" Accessed January 4, 2020. <https://www.ellenmacarthurfoundation.org/circular-economy/what-is-the-circular-economy>.

4.4a GREEN ZONE



Fig. 4.4.2 "Welcome to EcoCycleDesign." Accessed November 5, 2019.



Fig. 4.4.3 "North Sweden Cleantech - Green Zone - A Road to Sustainability." Accessed November 5, 2019.



Fig. 4.4.4 "North Sweden Cleantech - Green Zone - A Road to Sustainability." Accessed November 5, 2019.

The Green Zone in Umea, Sweden, is the most environmentally friendly car dealership in the world. It is one such example which, instead of linear thinking, has a loop system. When Green Zone was built, it was one of its kind. Ford Motor Company, McDonald's, and Statoil collaborated with the architect Anders Nyquist to develop this eco-friendly and energy-efficient project.

The buildings work like natural systems, for example, excess heat from the restaurant kitchens was piped directly to heat the car dealership and filling gas station. The wastewater was recycled and reused, they incorporated green roofs, reusable and recyclable material was used, and an indoor air purifying system was developed.

'The concept of fitting together different businesses in an integrated design where waste by-products in one become resources for another is known as "industrial ecology," and does indeed work like a forest.' – The Necessary Revolution, by Peter Senge¹

Fig. 4.4.5 "Welcome to EcoCycleDesign." Accessed November 5, 2019.

Examples of savings at GreenZone



¹ Senge, P. (2009). The necessary revolution. Leader To Leader, 2009(51), p.65.

CHAPTER 5

1. *SUSTAINABLE URBAN FARMING SYSTEMS*
 - a. *AQUAPONIC SYSTEM*
 - b. *GEO THERMAL*
 - c. *ECO MACHINE*

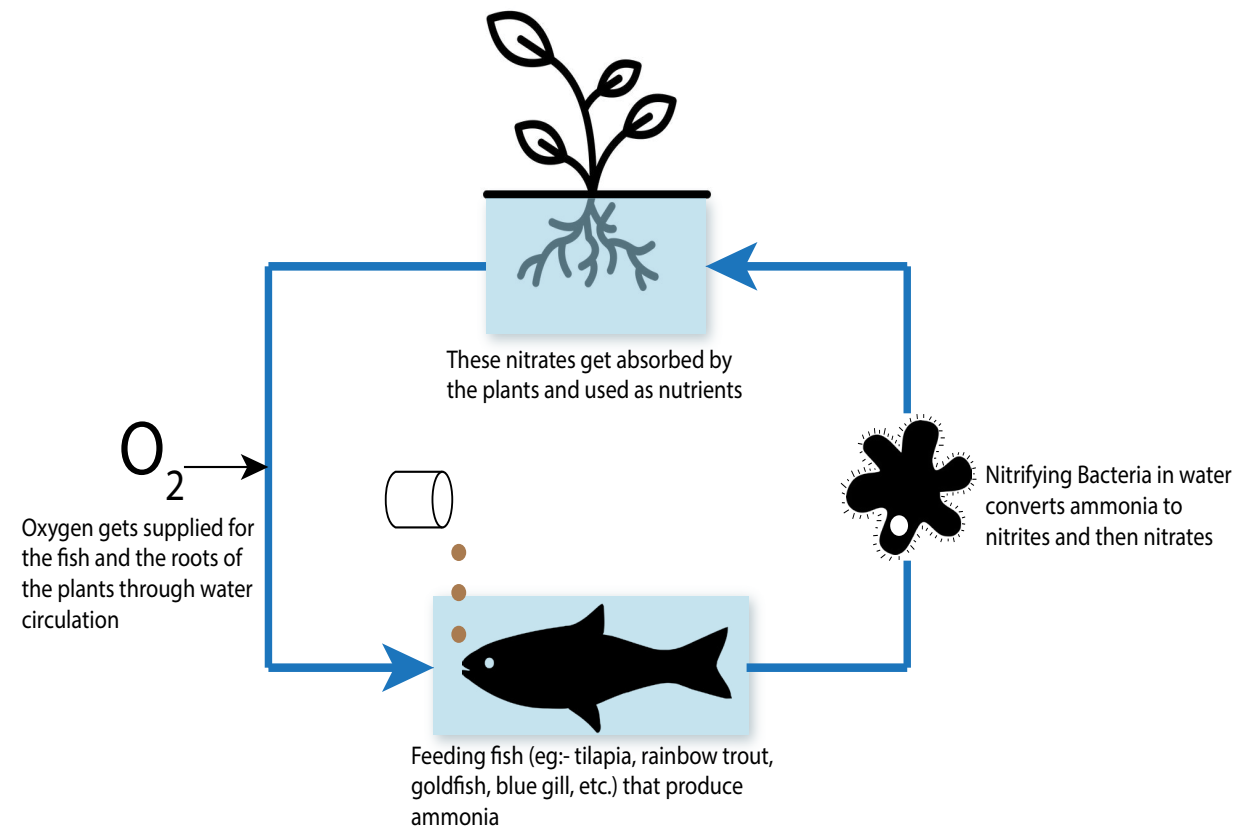


Fig. 5.1.1 Aquaponic System (by Author)

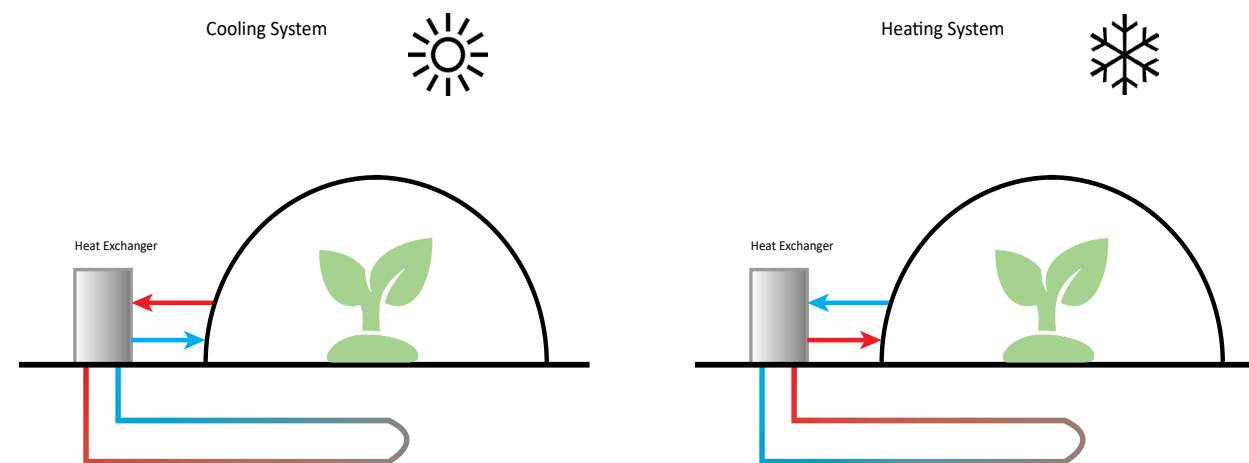


Fig. 5.1.2 Geothermal Energy (by Author)

5.1 SUSTAINABLE URBAN FARMING SYSTEMS

a Aquaponics System

This agriculture technology capitalizes on the basic principle that animal wastes in the form of urine, feces, and CO₂ are the exact resources needed by plants. Similarly, plant metabolic “waste” is in the form of oxygen, which is required by animals. The plants absorb the fish waste from the water rendering the pond habitable for these fishes. This dependence on one another shows a symbiotic relationship between the plants and the animals, making it a closed-loop system where very little wastage is seen.¹

b Geothermal

Geothermal Energy is the heat that is derived from the Earth’s crust.

GEO (Earth) THERMAL (Heat)

At different depth’s Earth has varying temperatures stored in reservoirs of hot water. This steam and hot water get converted into energy by the wells drilled into the Earth and pipes installed, which use water as its medium. This energy is used to generate electricity, direct use, and heating and cooling.²

¹ Road, Institute of Environmental Sustainability · 1032 W. Sheridan, Chicago, and Disclaimer 2020 · Privacy Policy. “Aquaponics: Institute of Environmental Sustainability: Loyola University Chicago.” Loyola University Chicago - Institute of Environmental Sustainability. Accessed January 4, 2020. /sustainability/initiatives/urban-agriculture/aquaponics/.

² “Geothermal Basics | Department of Energy.” Accessed January 4, 2020. <https://www.energy.gov/eere/geothermal/geothermal-basics>.

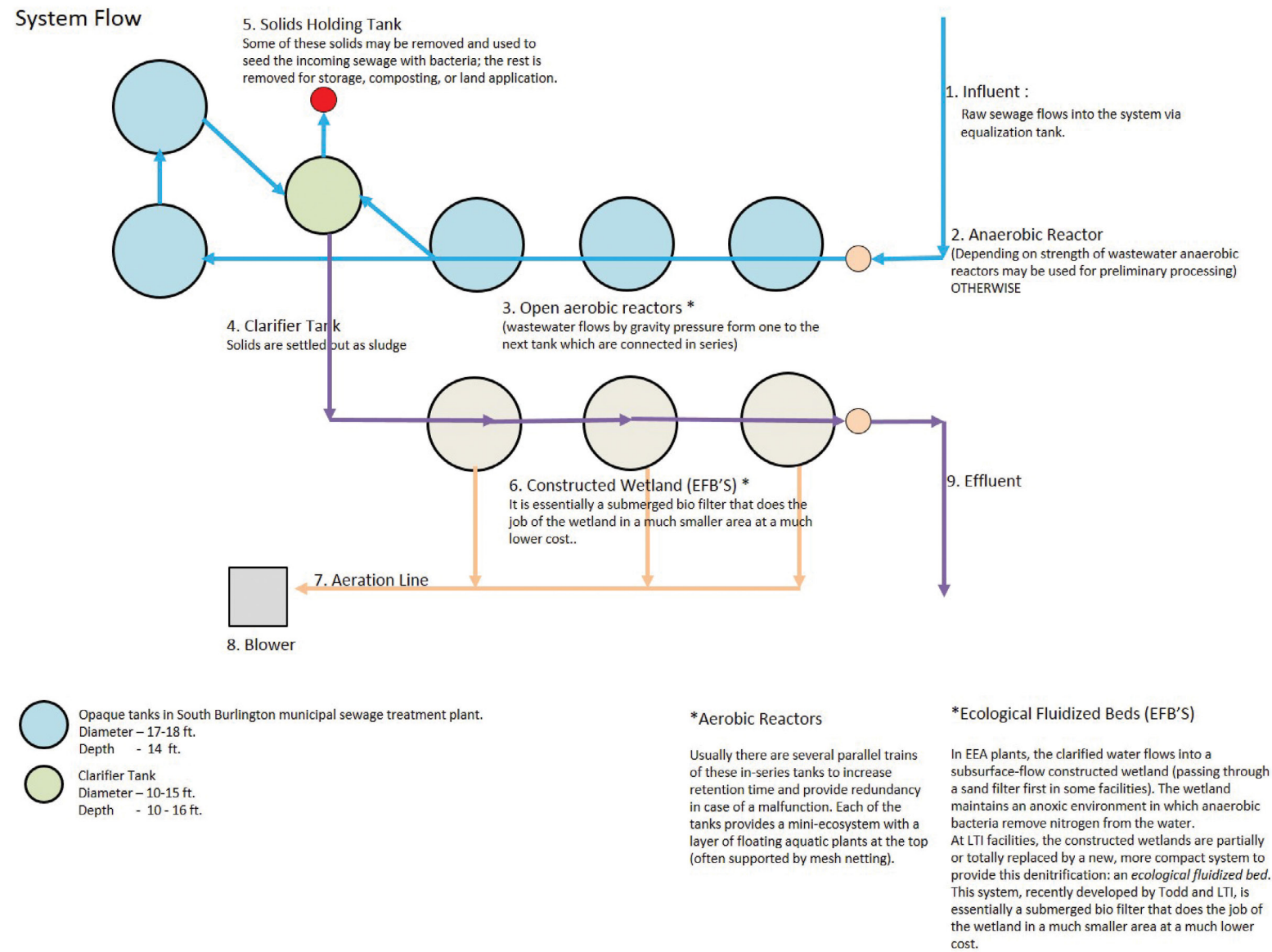


Fig. 5.1.3 "Wastesystem_South Burlington Municipal Eco-Machine – Urban Ecology | CMU SoA." Accessed November 11, 2019.

C Eco-Machine/ Living Machine

An Eco-Machine is a custom-built wastewater treatment system inspired by living ecosystems. It utilizes a series of tanks to clean the water and support vegetation and a variety of other organisms. The inventing company, John Todd Ecological Design, a non-profit organization, describes Eco-Machines as "microcosmic ecosystems." Eco-Machines mimics the processes of a natural ecosystem, where a diverse set of interacting organisms clean contaminated water via naturally occurring processes. This system is aesthetically appealing.³

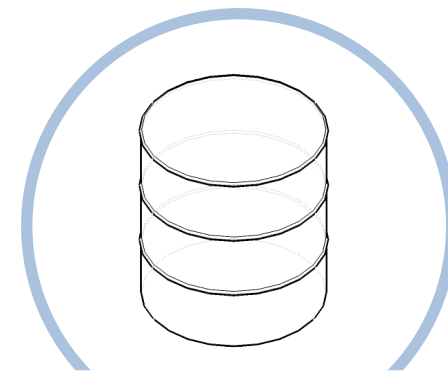
³ "Wastesystem_South Burlington Municipal Eco-Machine – Urban Ecology | CMU SoA." Accessed January 4, 2020. https://urbanecologycmu.wordpress.com/2015/11/18/wastesystem_south-burlington-municipal-eco-machine/.

CHAPTER 6

- 1. KIT OF PARTS_ENERGY SYSTEMS*
- 2. KIT OF PARTS_PROGRAMS*
- 3. SELECTED SITES*
 - a. NEIGHBORHOOD_VACANT LOTS*

6.1 KIT OF PARTS _ ENERGY SYSTEMS

This thesis proposes urban farming practice with systems thinking approach addressing food deserts, unemployment, health, and climatic change problems. The intent is to use the kit of parts to generate energy on-site to produce fresh produce based on the scale of the lot, affordability, and investment availability by the investor. The process takes into consideration of these systems productions in industries not being sustainable. However, in the longer run, these systems generate much more energy and help save economically and are cleaner for the environment. These systems could be applied to different scales to generate different kinds of energy to run the facility sustainably.

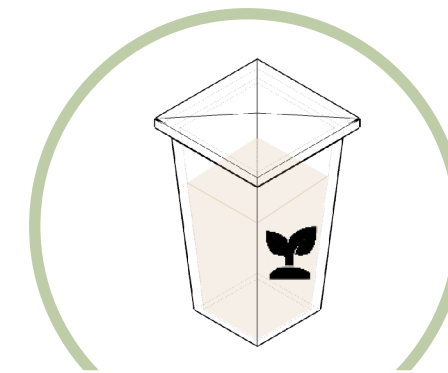


PASSIVE HEATING

How many Barrels? ¹

Thumb Rule -

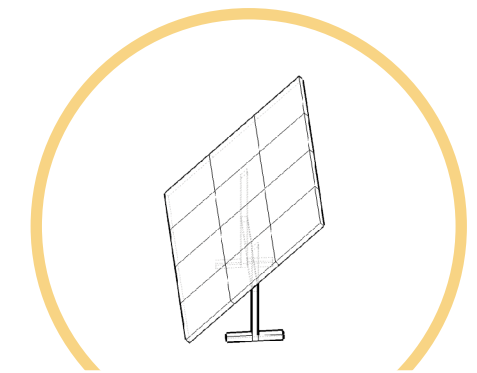
1. Season Extension - 2.5 gallons/ft²
2. All Season - 5 gallons/ft²



PASSIVE HEATING

How to make Compost? ²

1. Decomposition- Carbon to Nitrogen ratio = 24:1
2. Keep it moist



SOLAR HEATING

Solar Panel output ³

1. Common size 5kW takes upto 400 ft² space
2. 1 panel - 250 W, Size of 20 ft² output 17.5-42.5 kWh of AC per month

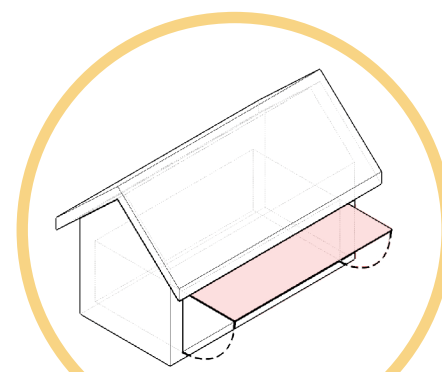
¹ "Bradford Research Center // Passive Solar Greenhouse." Accessed January 9, 2020. <https://bradford.missouri.edu/passive-solar-greenhouse/>.

² "Carbon to Nitrogen Ratios in Cropping Systems USDA" https://www.nrcs.usda.gov › FSE_DOCUMENTS › nrcseprd331820

³ Solar News. "Solar Panel Output: How Much Do Solar Panels Produce? | EnergySage," November 1, 2019. <https://news.energysage.com/what-is-the-power-output-of-a-solar-panel/>.

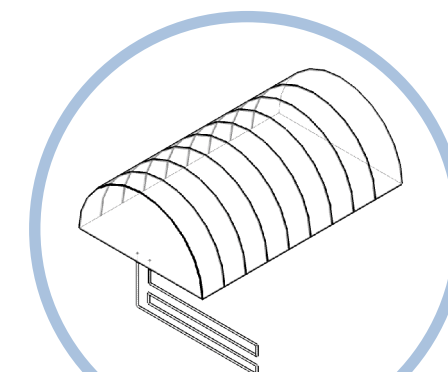
⁴ Energy.gov. "Choosing and Installing Geothermal Heat Pumps." Accessed January 9, 2020. <https://www.energy.gov/energysaver/choosing-and-installing-geothermal-heat-pumps>.

⁵ "Wastesystem_South Burlington Municipal Eco-Machine – Urban Ecology | CMU SoA." Accessed January 4, 2020. https://urbanecologycmu.wordpress.com/2015/11/18/wastesystem_south-burlington-municipal-eco-machine/.



CLIMATE RESPONSIVE STRUCTURES

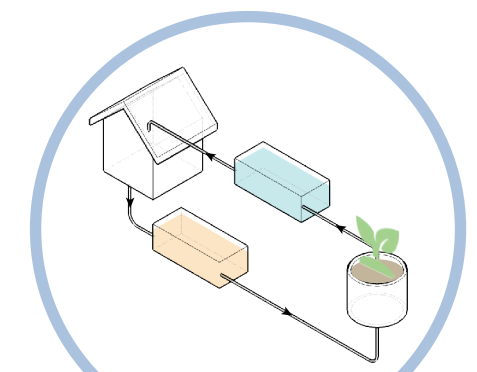
1. To prevent loss of heat in Winters
2. To increase natural ventilation in Summers



GEO THERMAL ENERGY

Geothermal Cost v/s saving: ⁴

1. Geothermal heat pump costs \$2500/ton (3-ton reqd. for Residential Scale)
2. Cost savings for heating 30-70 %
3. Cost saving for cooling 20-50%

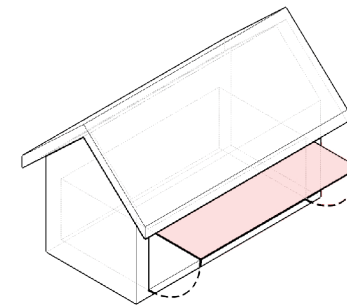
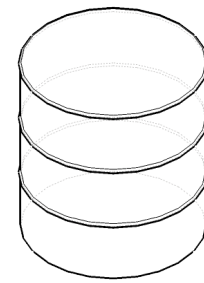


ECOMACHINE

⁵-Eco-Machine exists in South Burlington.
-It is built in a greenhouse, it goes through different stages to achieve stable nutrient removal from sewage.
-Aesthetic beauty and lack of offensive odor it works in a residential neighbourhood.

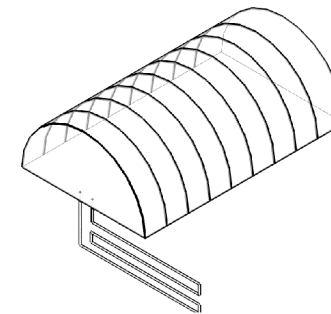
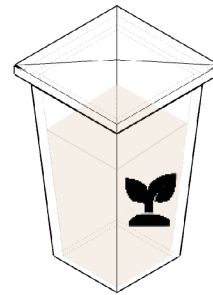
Fig. 6.1.1 Kit of parts_Energy systems (by Author)

Water barrels are the most inexpensive system used in hoop houses or greenhouses to extend the season. They are painted black to absorb maximum heat during the day time, and they release the heat at night in cold winters.



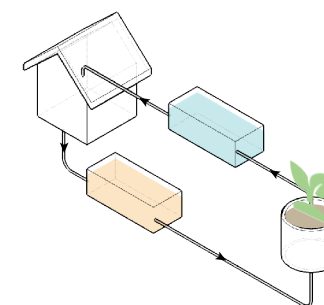
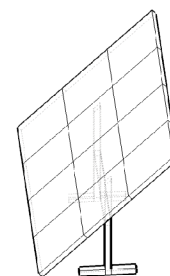
Climate responsive flexible structures are one of the best ways to consider saving energy consumption; in summers, natural ventilation and in winters, airtight structures would save much energy.

Composting is a natural method that is well known but not implemented by many. During my stay in Chicago, I came across many farmers complaining about no proper system for organic waste disposal. Preferably that waste could be used to create compost, which gives heat and nutrients to the crops and would save money on buying expensive readymade compost.



According to the Geothermal Research Council, geothermal energy is heat derived from the earth. At different depths, the earth stores heat at different temperatures and that heat is used to generate electricity and heating and cooling.

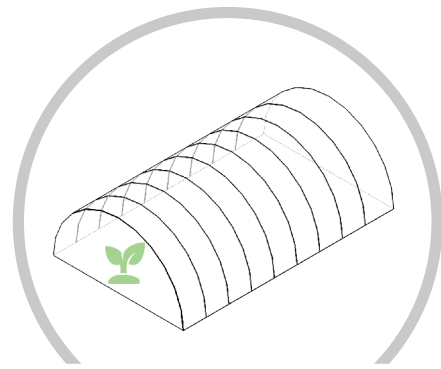
Solar panels initial investment is high, but if sufficient panels installed, it could save from \$400 to \$2000 yearly. *(Based on the calculations made from the design and pg.79 thumb rule)*



An Eco-Machine is a custom-built wastewater treatment system inspired by living ecosystems. The inventing company, John Todd Ecological Design, describes Eco-Machines as "microcosmic ecosystems." Eco-Machines mimics the processes of a natural ecosystem, where a diverse set of interacting organisms clean contaminated water via naturally occurring processes

For social growth, these programmatic facilities would help elevate the living standards for the community with the food production infrastructure, educational, and research labs, helping them gain knowledge and find jobs in urban farming and related fields. Farm stands and cafes bring in economic development in these neighborhoods.

6.2 KIT OF PARTS _ PROGRAMS



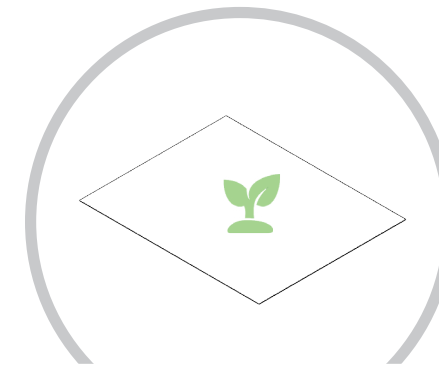
GREENHOUSE

Helps with season extension for food production.



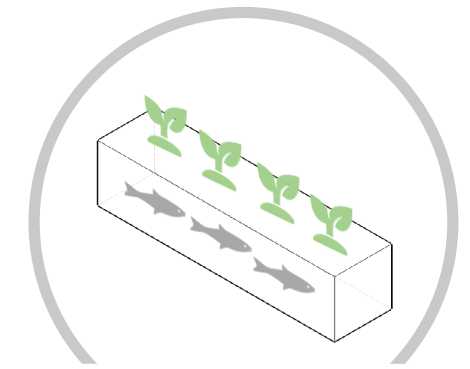
INCUBATOR GREENHOUSE

These are designed to help new urban farmers to start their business. It provides them with space to grow and equipments. There are mentors that help them with advice and assistance



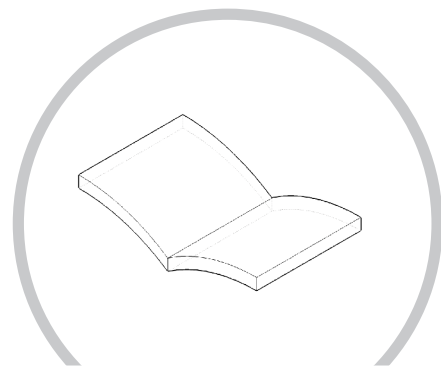
OUTDOOR FARM

Grows fresh produce between last frost and the first frost date



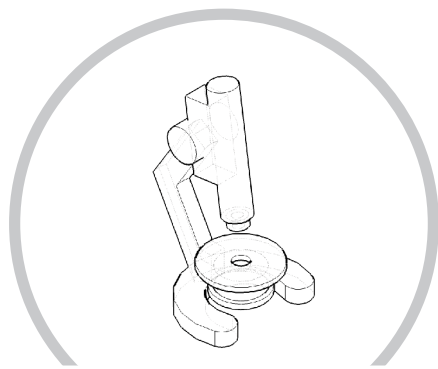
AQUAPONICS

This system is a self sustaining system which provides the food the nutrients it requires and feed fish in return. With regulation temprature this system works all season



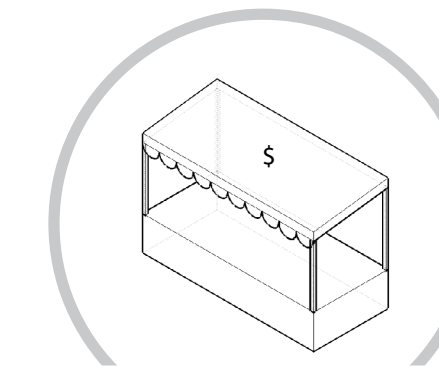
EDUCATIONAL FACILITY

Educating community about urban farming methodologies and training to grow quality food. Also educate people about healthy food habits to avoid chronic health disease



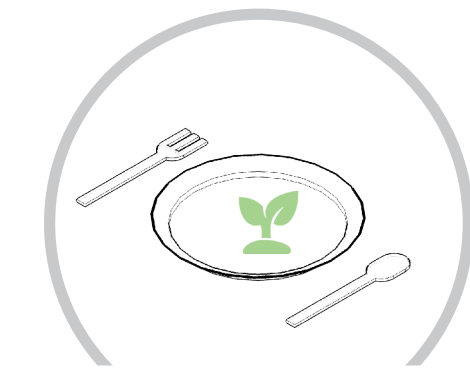
RESEARCH FACILITY

With the changing and new technologies there have been alot of developments in the farming industry. It continually gives new opportunities to grow food in sustainable ways.



FARMSTAND

Farmstands allow for fresh produce grown locally to be distributed in these food desert neighbourhoods.



CAFE/ RESTAURANT

Cafes/ Restaurants bring in people from different places increasing job opportunities for locals and also increase economy for these people.

Fig. 6.2.1 Kit of parts_Programs (by Author)



Fig. 6.3.1 Sites for Proposed Prototypes (By Author)

6.3a NEIGHBORHOOD _ VACANT LOTS

This New City neighborhood has a lot of vacant lands that can be used to repurpose and revitalize the neighborhood.



Fig. 6.3.2 New City Neighborhood (by Author)



Fig. 6.3.4 New City Neighborhood (by Author)



Fig. 6.3.3 New City Neighborhood (by Author)



Fig. 6.3.5 New City Neighborhood (by Author)

CHAPTER 7

- *SINGLE FAMILY HOUSE*
 1. *SCENARIOS*
 2. *SYSTEMS DIAGRAM*
 3. *PROTOTYPE*
- *MULTI-RESIDENTIAL*
 4. *SCENARIOS*
 5. *SYSTEMS DIAGRAM*
 6. *PROTOTYPE*
- *COMMUNITY SCALE*
 7. *SCENARIOS*
 8. *SYSTEMS DIAGRAM*
 9. *PROTOTYPE*
- *INDUSTRIAL SCALE*
 10. *SCENARIOS*
 11. *SYSTEMS DIAGRAM*

There are four different scales prototypes that I am proposing, which are directly proportional to the investment availability in the systems, the available space, and the time and effort one wishes to invest. The proposal tries to address climatic, economic, and social sustainability. Climatic problems are addressed by generating on-site energy to support itself, plus the community, and encouraging localization. Economic sustainability is achieved by creating job opportunities in these different scale prototypes and creating programs that bring in people from other neighborhoods — the design aspect of food production, distribution, and education address social sustainability.

7.1 SINGLE FAMILY HOUSE_SCENARIO

The family consists of grandparents, parents, and two kids.

1

The Grandparents had moved from Texas to Chicago during the second great migration in search of a job.

2

During the world war, the demand for labor in steel industries increased; that's where he worked.

3

After the decline of the manufacturing district, he was jobless, and with no educational background, he couldn't find another job.

4

Redlining [1930's]

Underused / Vacant lands

Redlining had caused a lot of people from their neighborhood to move out, leaving a lot of land underused.

5

Food Desert

Due to not having enough income and no easy access to healthy food, the grandparents got diabetes.

6

In the meantime, their son managed to travel distances to get a decent education and found himself a job. Money that he earned was not sufficient enough for him to run his family.

7

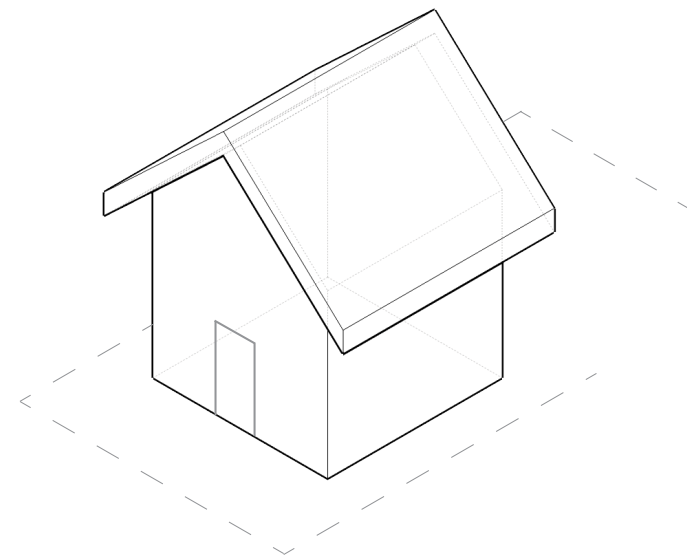
So for side income, the family decided to open a small home-based cafe where they would use some freshly grown produce that they grew in their backyard also use it for their cooking purpose. Rest of the products they bought from the farmers market in the neighborhood.

8

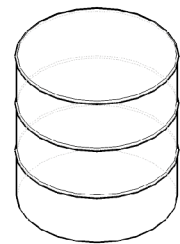
Fig. 7.1.1 Single Family House_Scenario (by Author)

7.2 SINGLE FAMILY HOUSE_SYSTEMS DIAGRAM

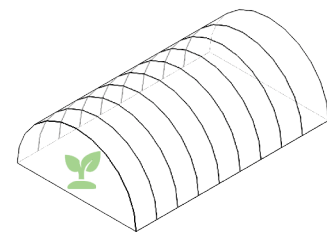
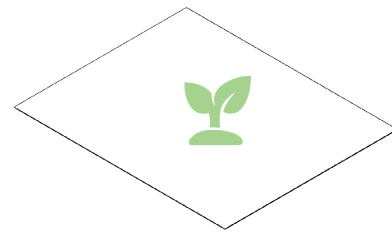
As the scenario describes, the house has a small cafe that has a hoop house , solarium ,and a backyard garden space for food production depending on the various seasons. They use the inexpensive water barrels, and the natural source of light to extend the crop growing season. The organic waste from the kitchen and the farming practices gets composted in the backyard using Tumbler composting which gets reused for the crops to provide heat as well as the nutrients that are required by for these organic crops.



ENERGY



PROGRAM



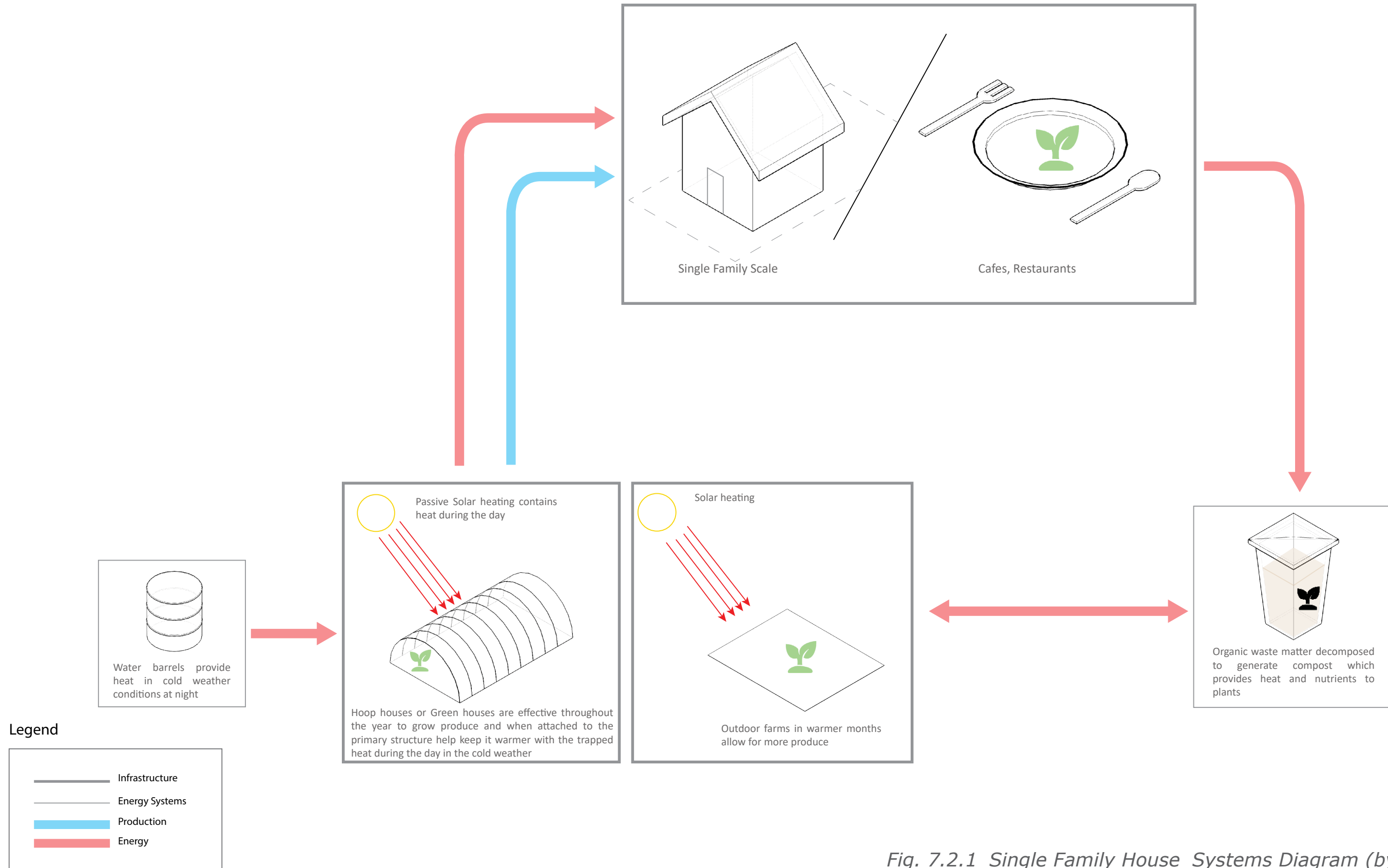
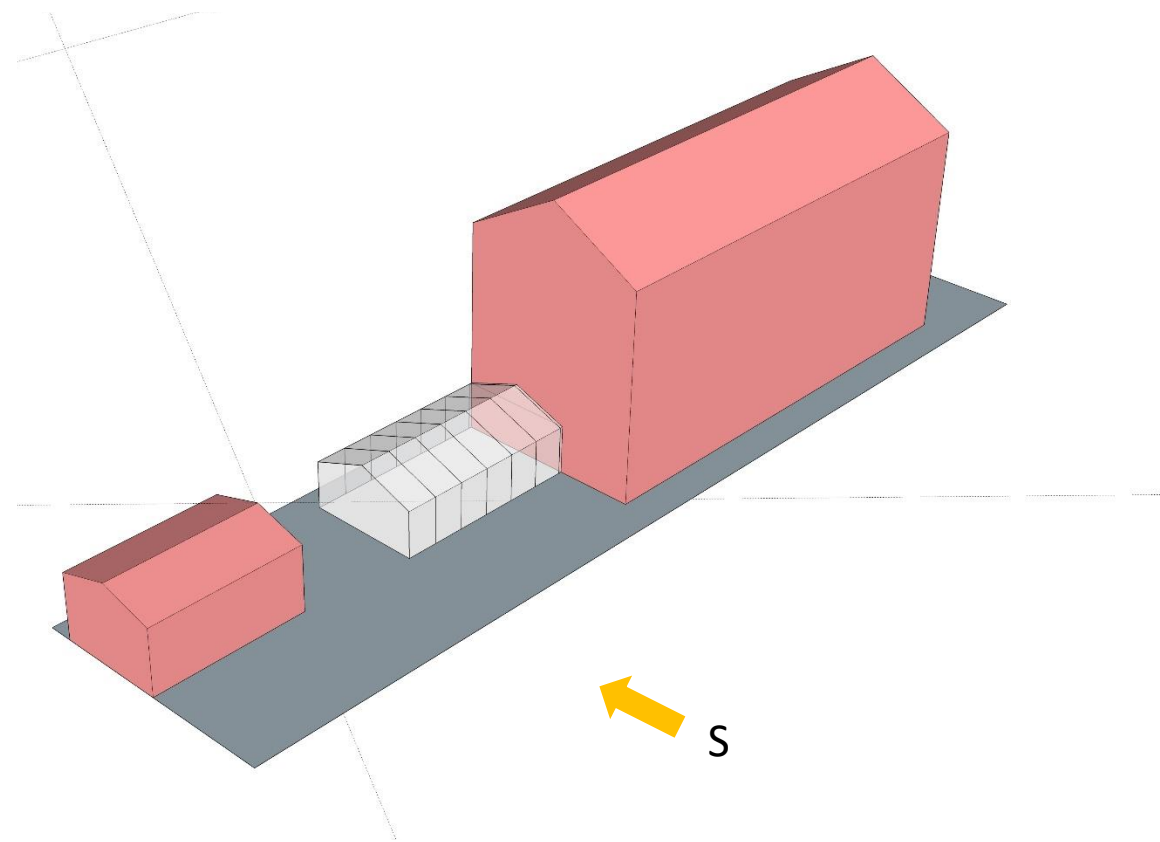


Fig. 7.2.1 Single Family House_Systems Diagram (by Author)

7.3 SINGLE FAMILY HOUSE_PROTOTYPE

This axonometric sets a view of all the systems coming together to make it function in an existing house with the context. This prototype could also become a social gathering space for different occasions, and events that occur throughout the year. This residential scale project works on the basic structure of urban farming with minimum investments.



■ Fixed Structure

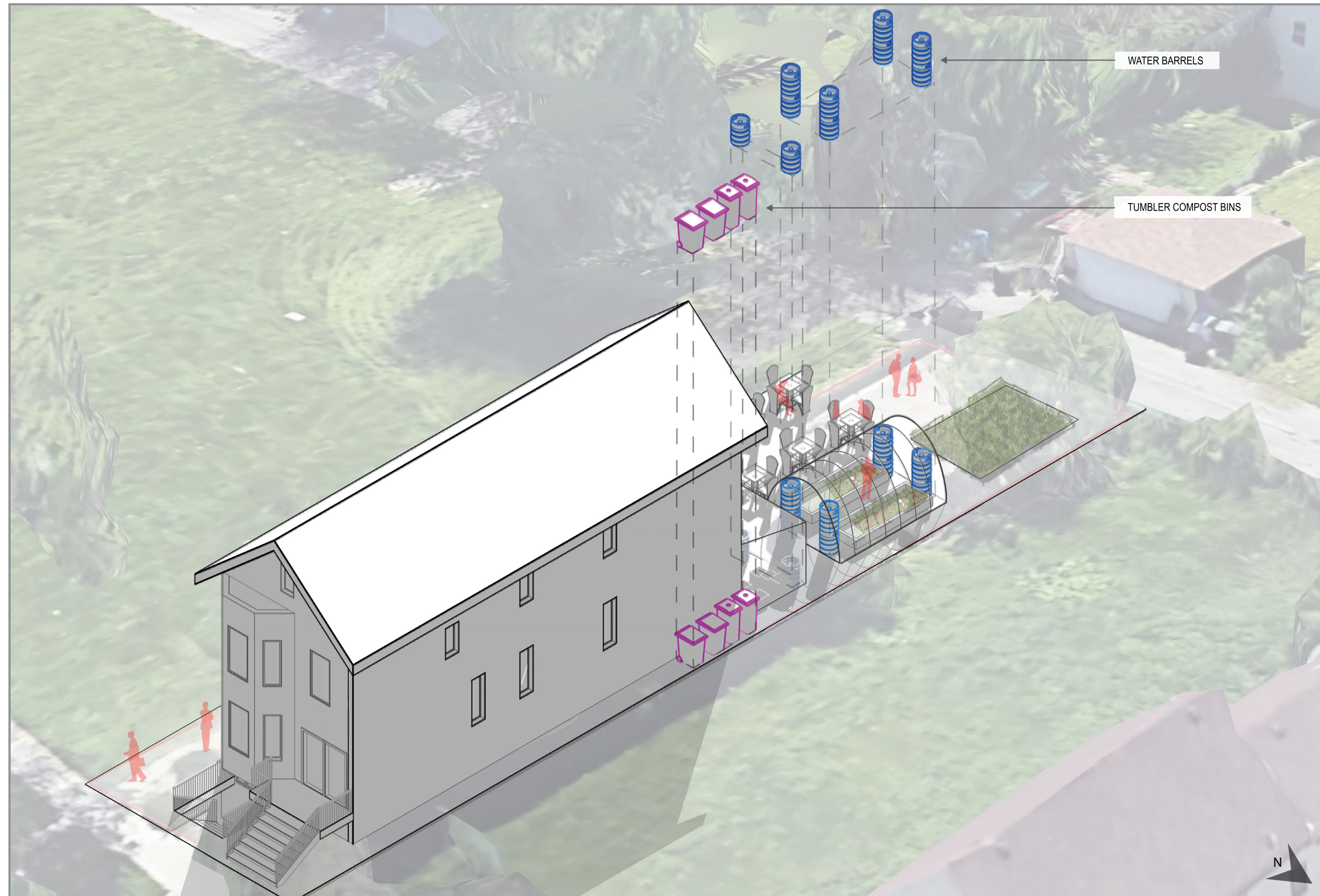


Fig. 7.3.1 Single Family House_Prototype (by Author)

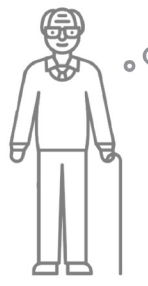

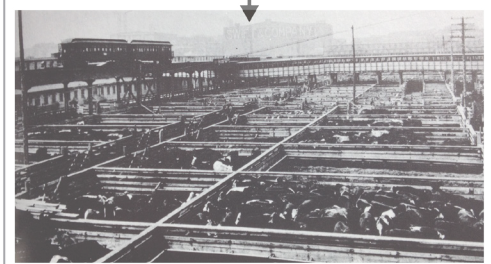
7.4 MULTI-RESIDENTIAL_SCENARIO




The founder of this non-profit organization has lived all his life in Chicago.

CEO of Non-Profit Organization

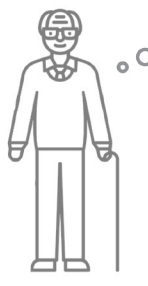
1

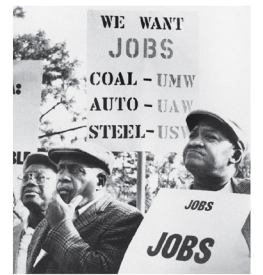
His father used to work at a meatpacking factory in the back of the yards before Redlining practices became rampant.

Meatpacking Factory

2

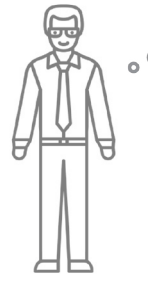




JOB LOSS



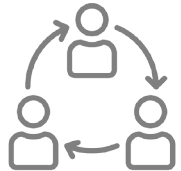
After the decline of the Factories, his father had no job

3

Social Science

University of Chicago



Community Recovery

With all the hard work that his father had put in, he finds himself lucky to have been able to get a master's in Social Science. He has spent the last 26 years helping out with different ways of community recovery

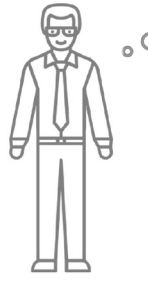
4



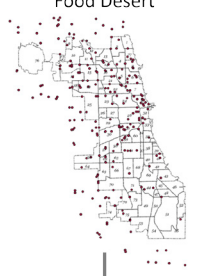
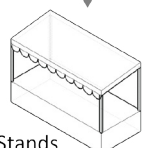


He had the vision to help homeless Chicagoans gain job skills and rebuild their confidence through urban farming. They would get paid weekly and also gain job experience and job - readiness training at this non-profit organization.

5



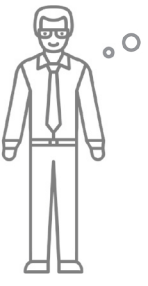
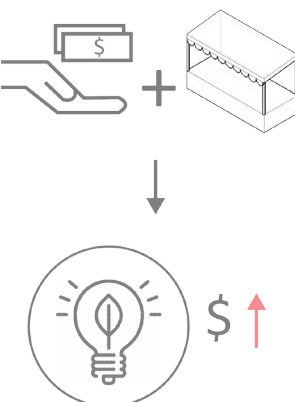
Food Desert

Farm Stands

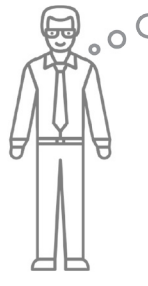
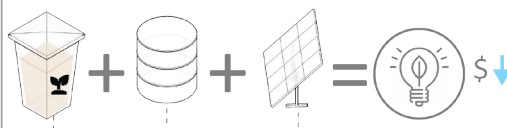
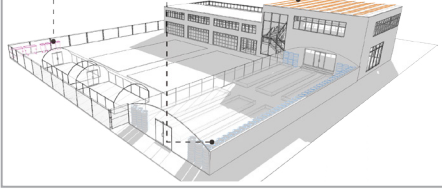
The organization would also keep weekly farm stands for the produce they grew to provide easy access to the neighborhood and also get some funds to run their Centre

6

But these funds and even the funds from the government were not sufficient to run the facility as the maintenance cost of the property was high

7

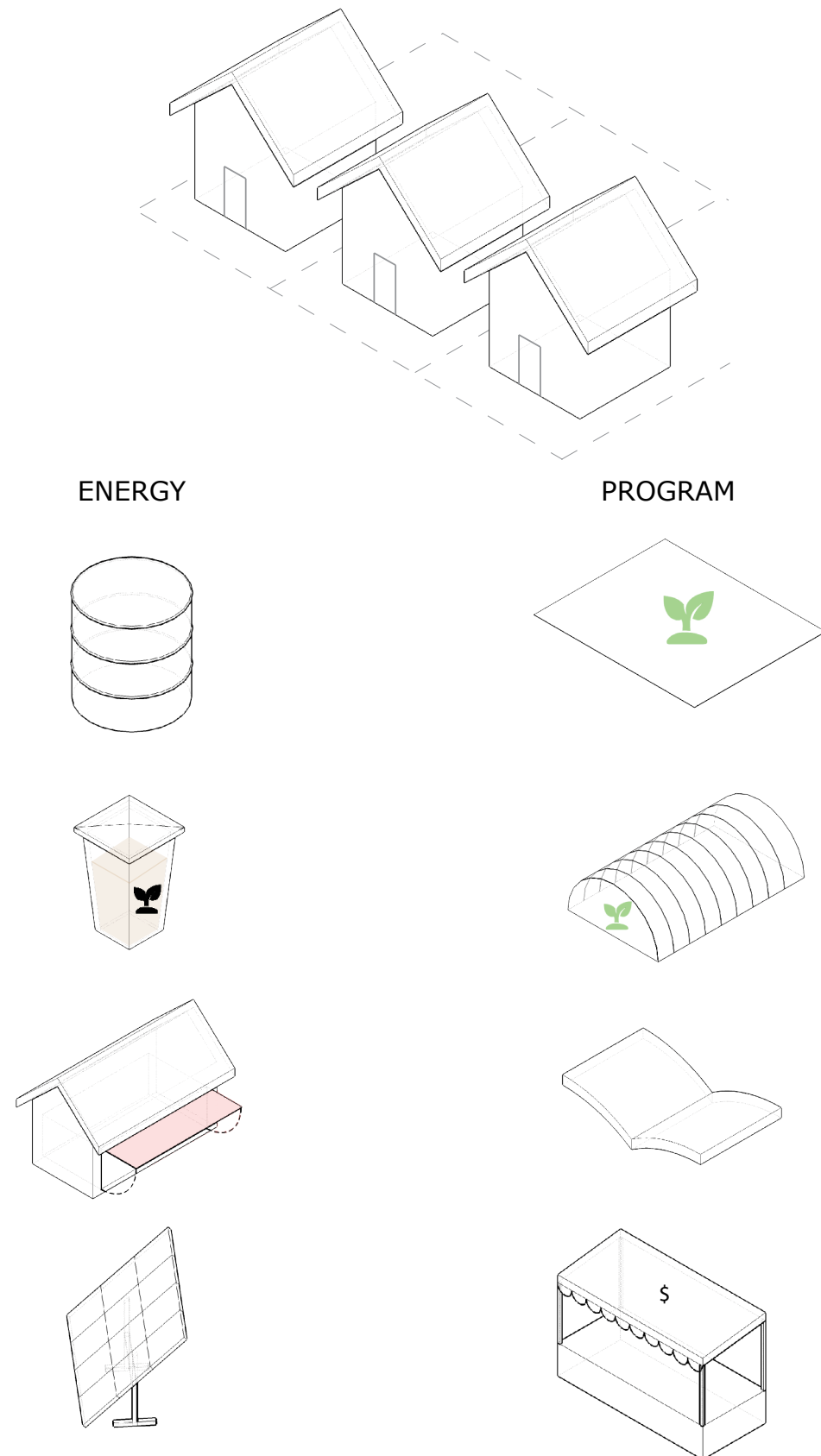
So what if some energy could be produced on the site to run the facility and decrease dependency on the city grid system for electricity, and produce compost on-site for the crops

8

Fig. 7.4.1 Multi-Residential_Scenario (by Author)

7.5 MULTI-RESIDENTIAL_SYSTEMS DIAGRAM

The non-profit organization has job training and educational programs for urban farming, farmers market, and weekly farm stands where they sell fresh produce that is grown in their greenhouse and open farm space, according to the climatic conditions. In response to climatic conditions, the infrastructure is built to be flexible in responding to different seasons and conserve energy. The solar panels would generate approximately 2800kWh/month in the warmer months, and the water barrels would help further to extend the growing season for the crops. The organic waste would be converted to compost using tumbler composting methods and Worm farm composting in the outdoor farms. This compost gets circulated back in the greenhouse and farms for the crops to get the maximum nutrients.



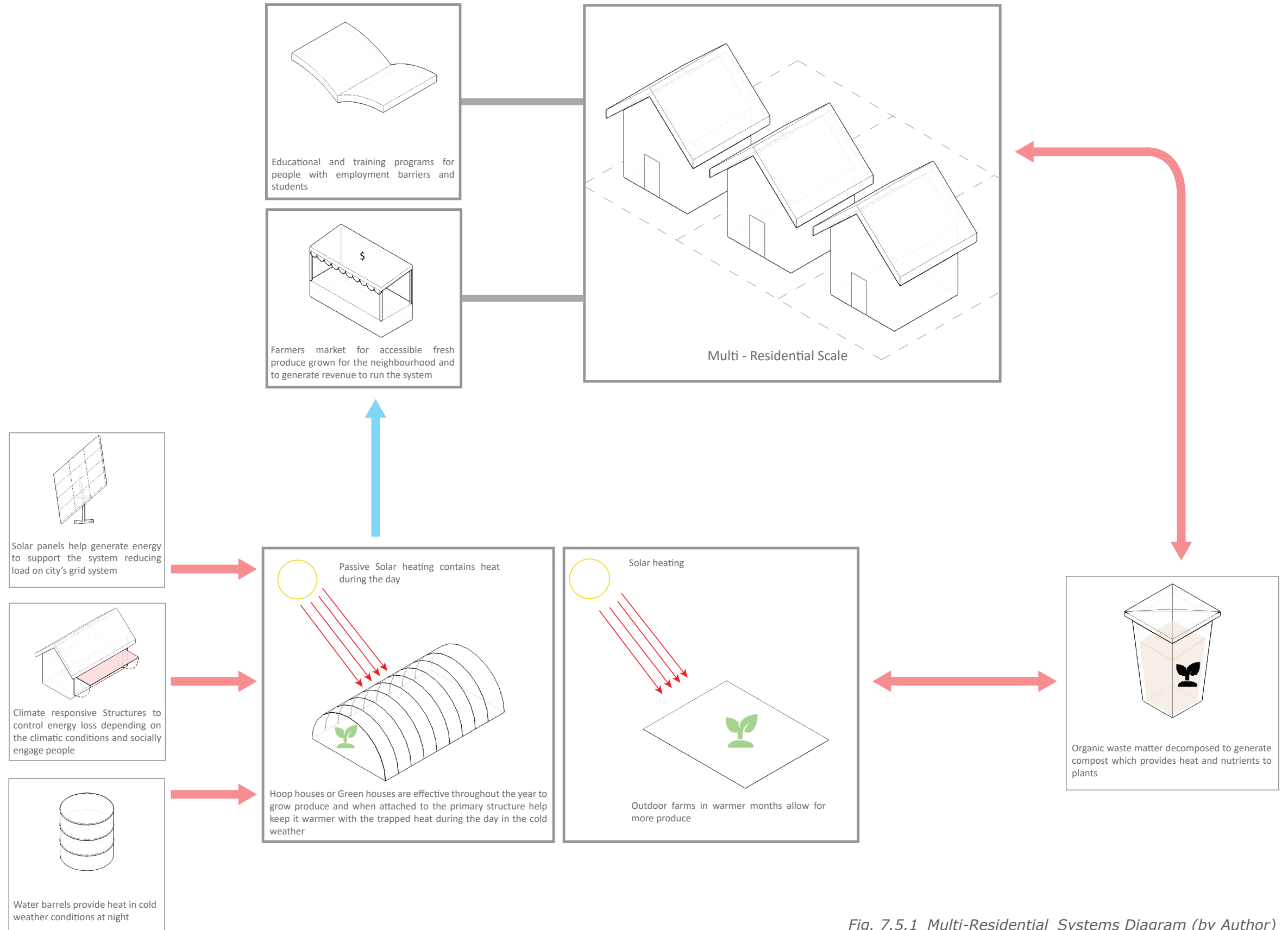
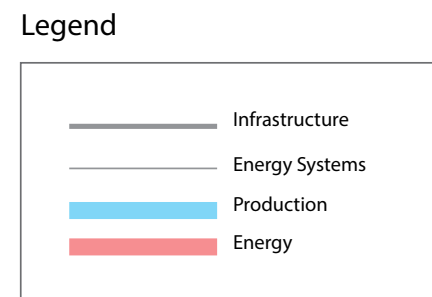
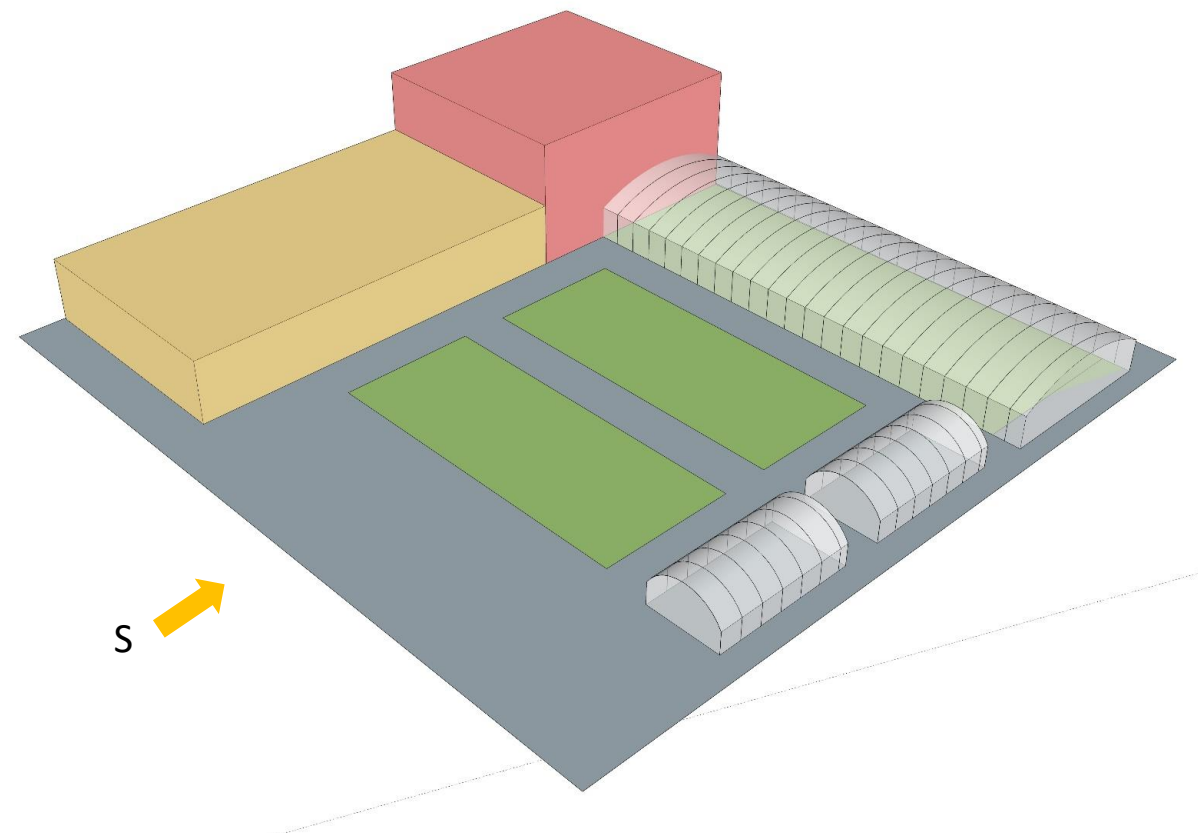


Fig. 7.5.1 Multi-Residential_Systems Diagram (by Author)

7.6 MULTI-RESIDENTIAL_PROTOTYPE

This aerial view is conveying the systems that are used to run the facility, considering the context and trying to revitalize the neighborhood bringing in more activity. It also illustrates the flexibility of the structure adhered to the street, engaging with the public inviting them in. The weekly farmstands bring in people from the neighborhood, providing them healthy choices of fresh produce.



- Fixed Structure
- Climate Responsive Structure
- Outdoor Farm

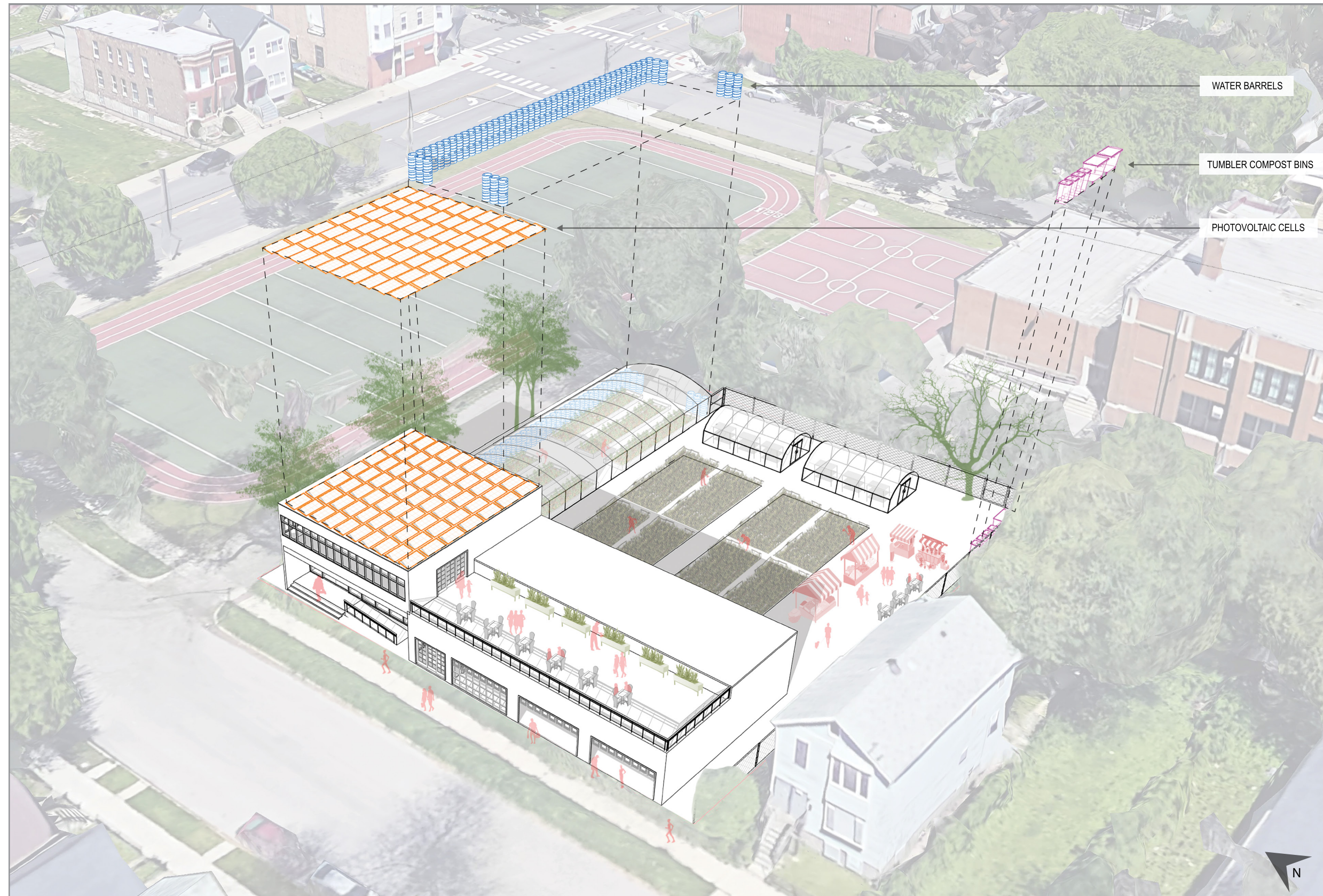

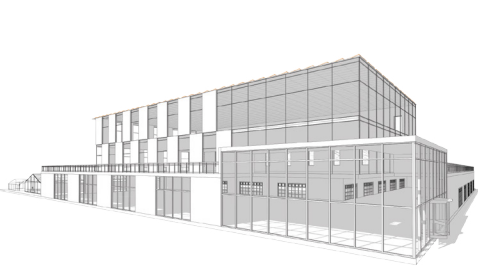


Fig. 7.6.1 Multi-Residential_Prototype (by Author)

7.7 COMMUNITY SCALE_SCENARIO

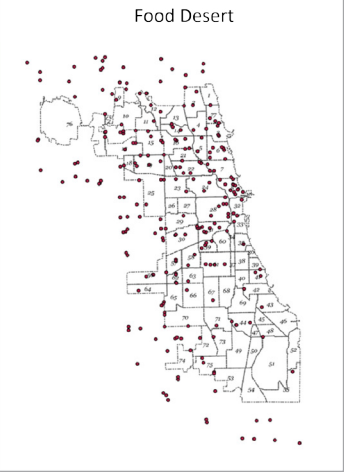


The structure is a multiuse facility. It was built by the public sector to create a resilient, sustainable food system for local communities as a social cause.




Charity public sector

Food Desert



The facility was developed in response to food desert. It provides training to the people in the community interested in farming practices. Also it helps with economic development of the neighborhood

1
2

The facility is run by the local community to support and help sustain a healthy urban community by bringing food, health, and jobs together in one location.


Food
Health
Jobs





They educate people by providing certificate programs in farming, food safety, and culinary arts.

Farming
Food Safety
Culinary Arts


3
4




Aquaponics grow food here all year round and gets prepared and distributed to people who don't always have easy access to fresh produce




Aquaponics



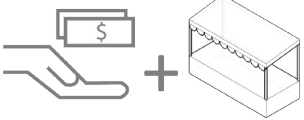



Diabetes
Heart Problems
High Blood Pressure


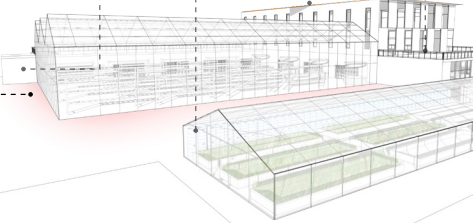
They make boxes of fresh produce with the nutrition education and cooking process to patients suffering from diabetes, heart problems and high blood pressure



5
6

Being a community service center, it doesn't get many funds. During the winter, the facility uses a lot of energy to run the facility.

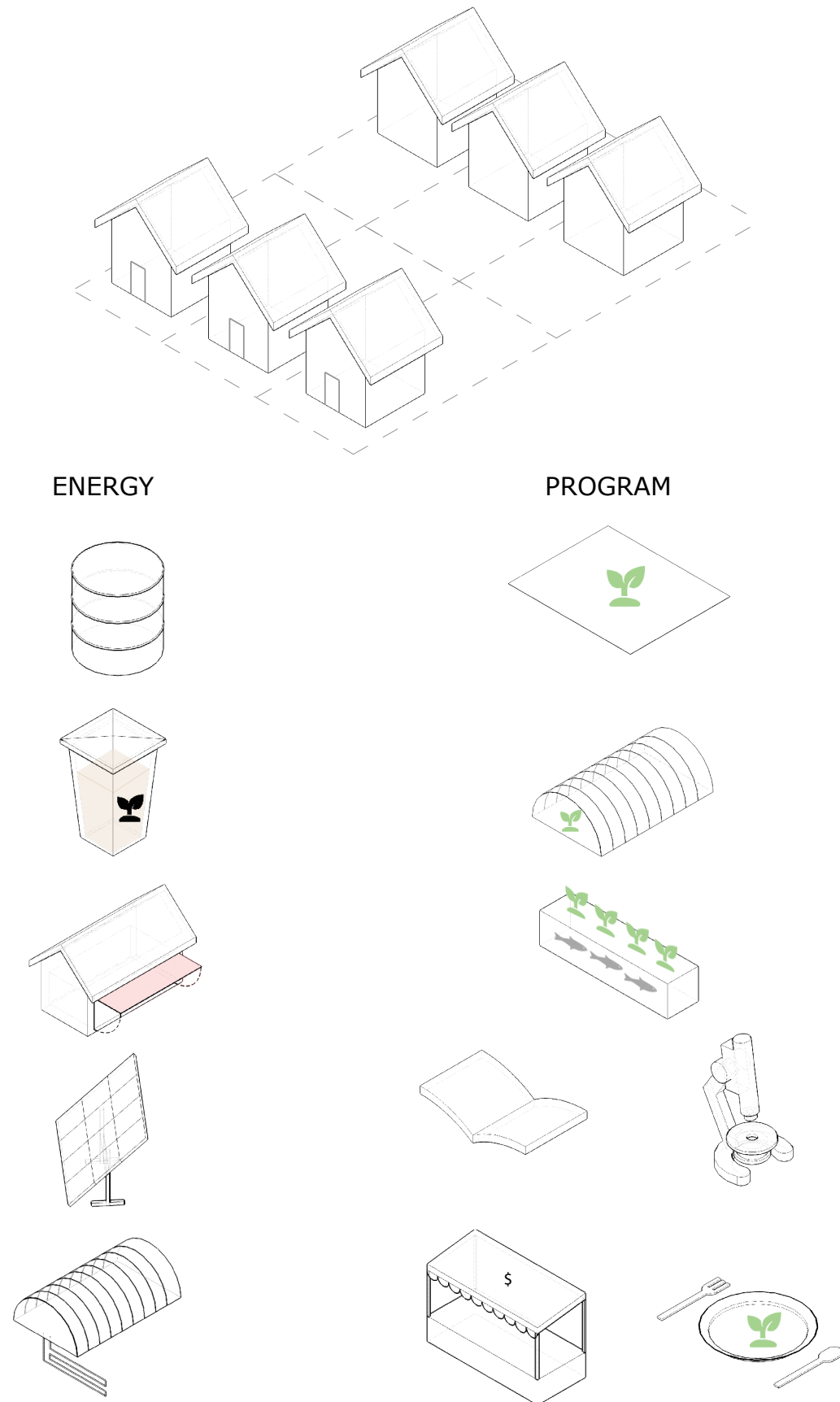



So what if some energy could be produced on the site to run the facility and decrease dependency on the city grid system for electricity, and produce compost on-site for the crops

7
8

Fig. 7.7.1 Community Scale_Scenario (by Author)

7.8 COMMUNITY SCALE_SYSTEMS DIAGRAM



The community prototype consists of educational and research programs, farmstands that provide fresh produce to the locals and the cafe that brings in people from the surrounding neighborhoods. The production of the fresh produce happens through the aquaponic system, greenhouses, and the outdoor farming spaces. The significant energy generating systems would be geothermal and solar panels, while the water barrels and the climate responsive design would provide additional aid to generate and conserve energy. With bigger the facility, there is more production of organic waste from the cafes and farming practice, which would all get composted using effective microorganisms composting method and reused on the site.

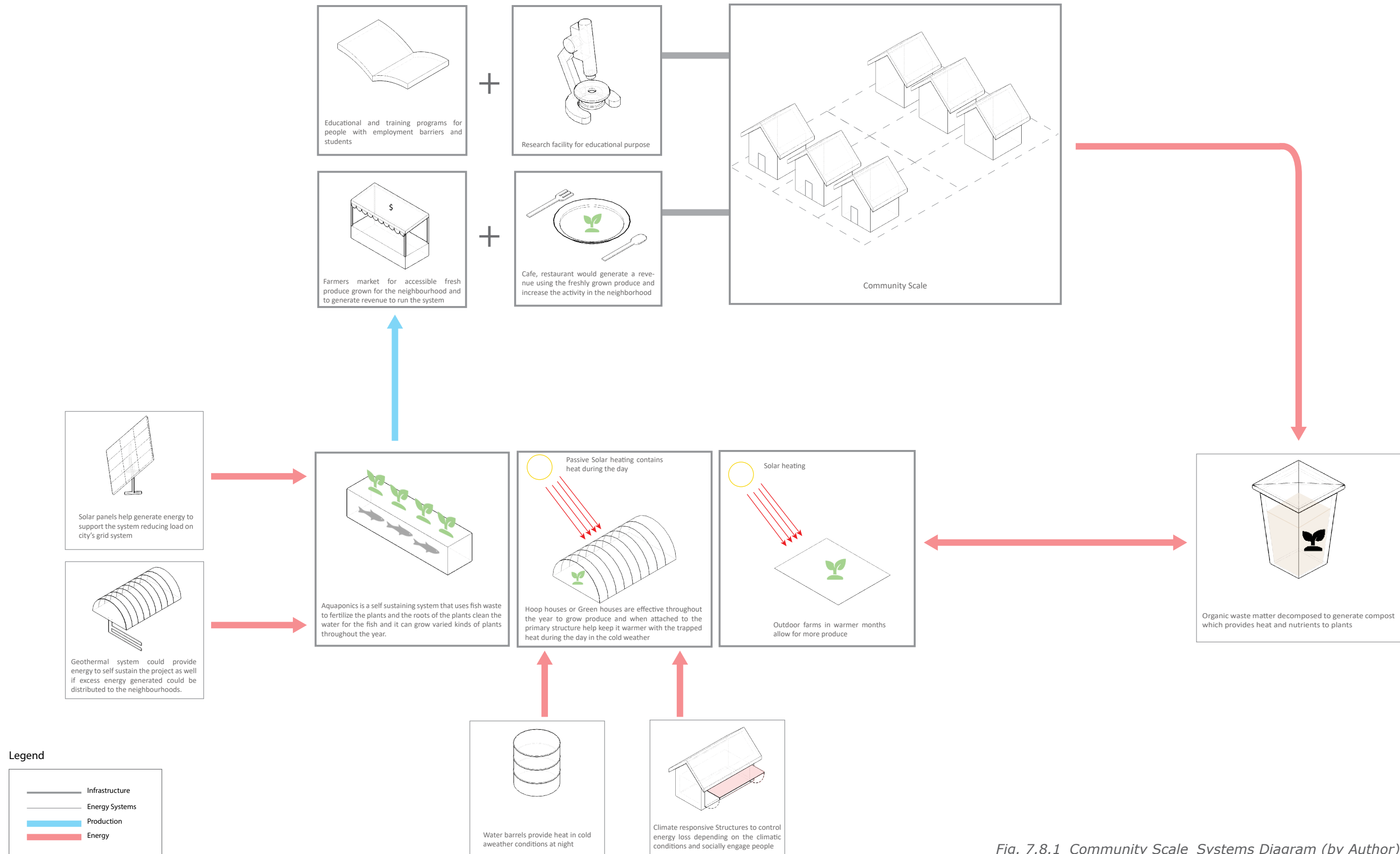
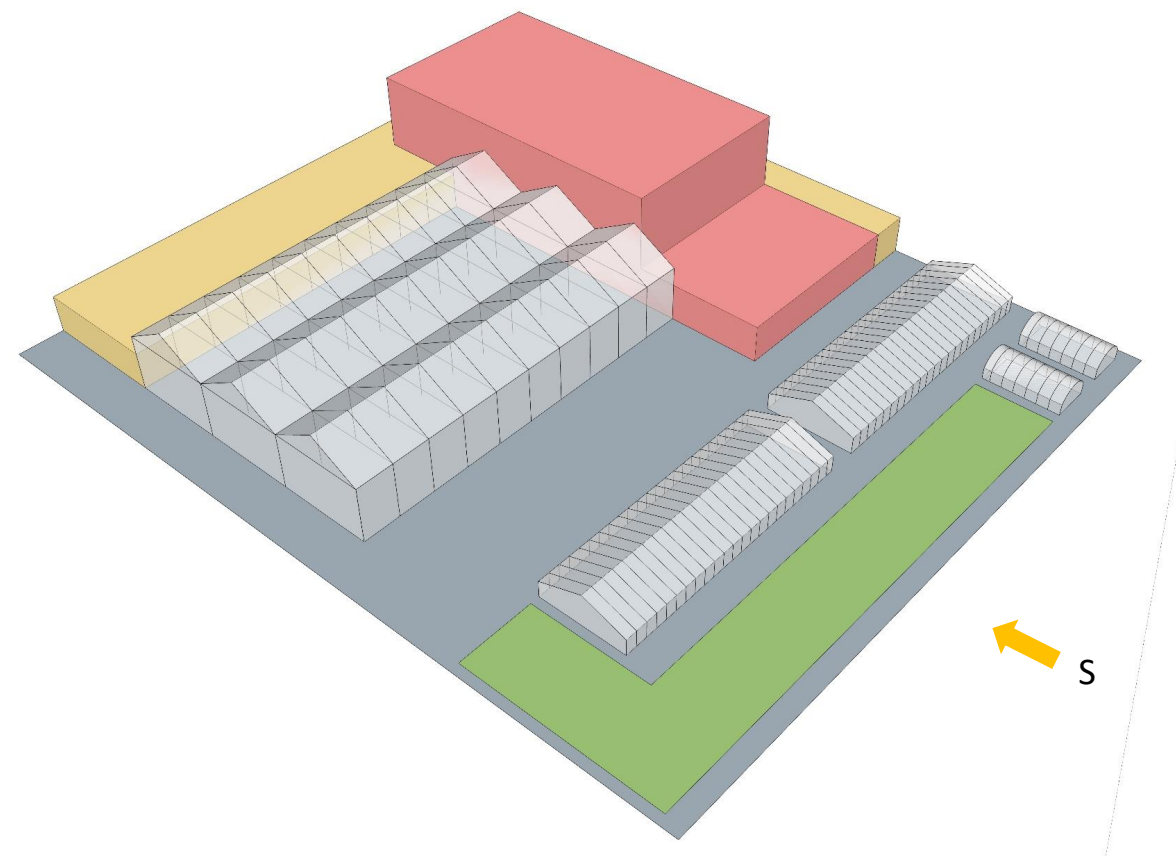


Fig. 7.8.1 Community Scale_Systems Diagram (by Author)

7.9 COMMUNITY SCALE_PROTOTYPE

This aerial view is conveying the systems that are used to run the facility, considering the context and trying to revitalize the neighborhood bringing in more activity. The rear street on the north side of the structure is a pedestrian street, which makes it a choice of space for the more intimate market during weekends. It gives a more festive vibe making it safer for adults as well as children. The facility also acts as an educational center for kids and having training programs. It builds a community of its own, helping each other with food production knowledge and experience.



- Fixed Structure
- Climate Responsive Structure
- Outdoor Farm

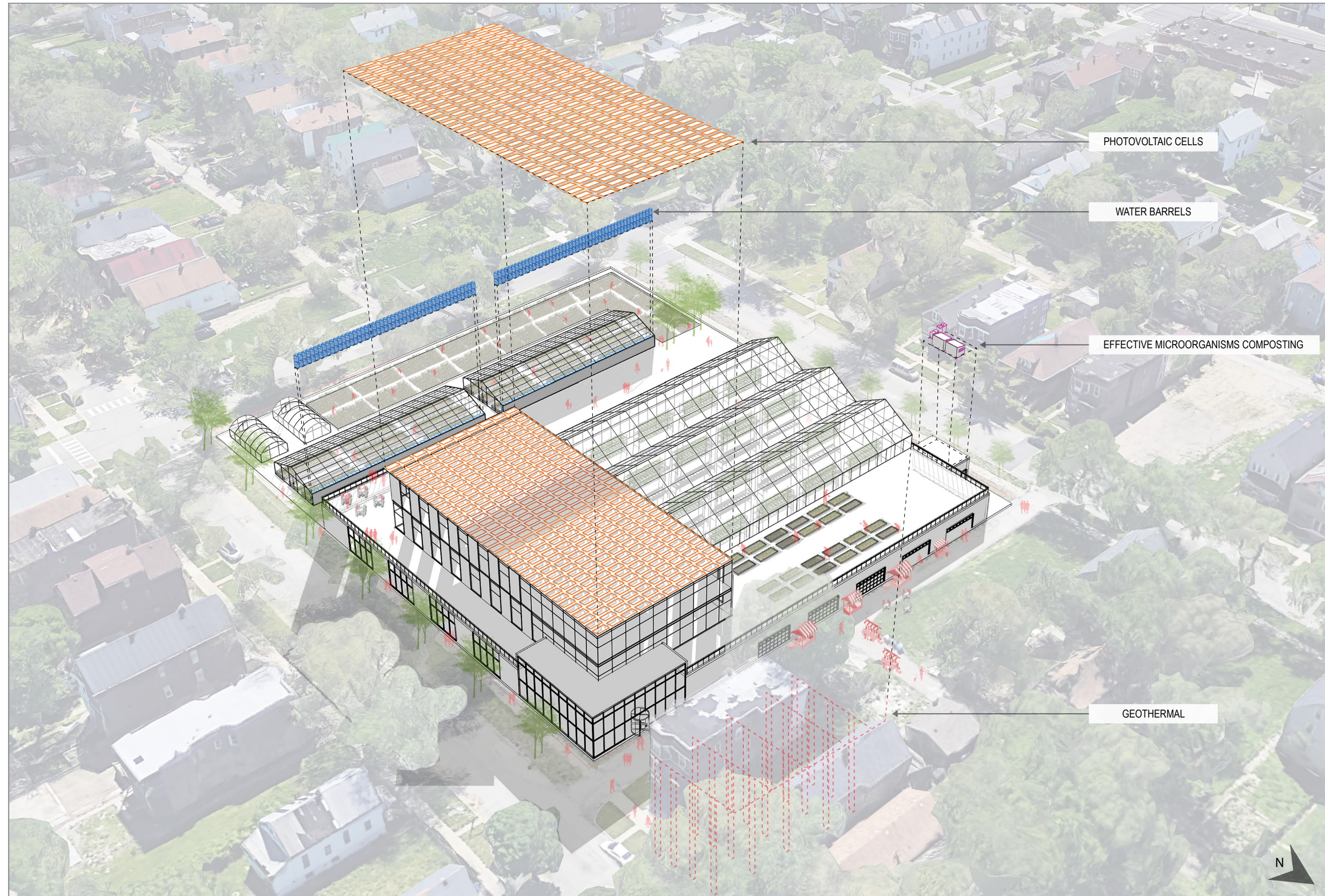



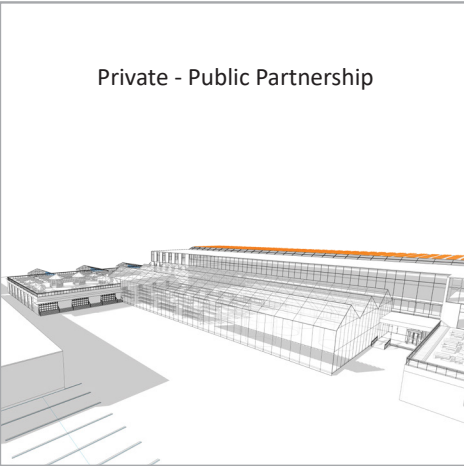
Fig. 7.9.1 Community Scale_Prototype (by Author)

7.10 INDUSTRIAL SCALE_SCENARIO




Private - Public Partnership

The industrial-scale is a private non-profit organization. A businessman decided to build this project after seeing the studies of food scarcity and the high rate of unemployment in the west and the south side of Chicago. It's developed in collaboration with the government using tax increment financing.




1






BROWNFIELDS

With this being a brownfield lot, the land is quite contaminated, but the government has a program where they provide funds for revitalizing it.


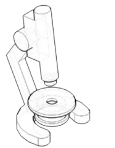



2

This scale of the project provides a lot of potential for labor as well as desk jobs for people living in the neighborhood. With the kind of programs that this industry offers, it becomes a major social hub.



3

Farming
Food Safety
Culinary Arts
Lectures
Educational trips

It also provides an opportunity for different kinds of learning scenarios for all age groups. They also have the facility for holding lectures and interactive discussion and research programs

4

With the fresh produce production at a large scale, they have many authentic cultural cafes and restaurants in the facility that they could support, and these become an attraction for people to come to explore.

5




Expert Advice + **Tools**

They also have incubator farm programs where they provide tools and expert advice for the first two years to the new farmers who want to become an entrepreneur in urban farming and start their own business.

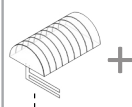

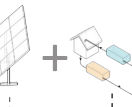




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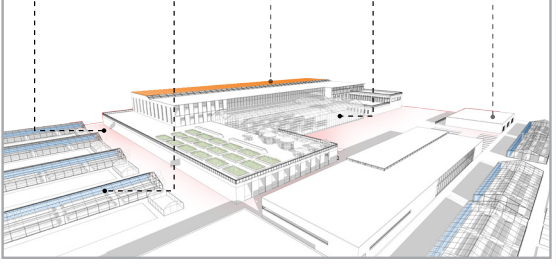



The composting system would also work at a community scale where the organic waste from the other household could be processed in this facility and provide it back to the community.

7

This facility has a lot of potentials to generate enough energy to run the facility as well as it would give some back to the community creating some funds of it and act as an economic booster

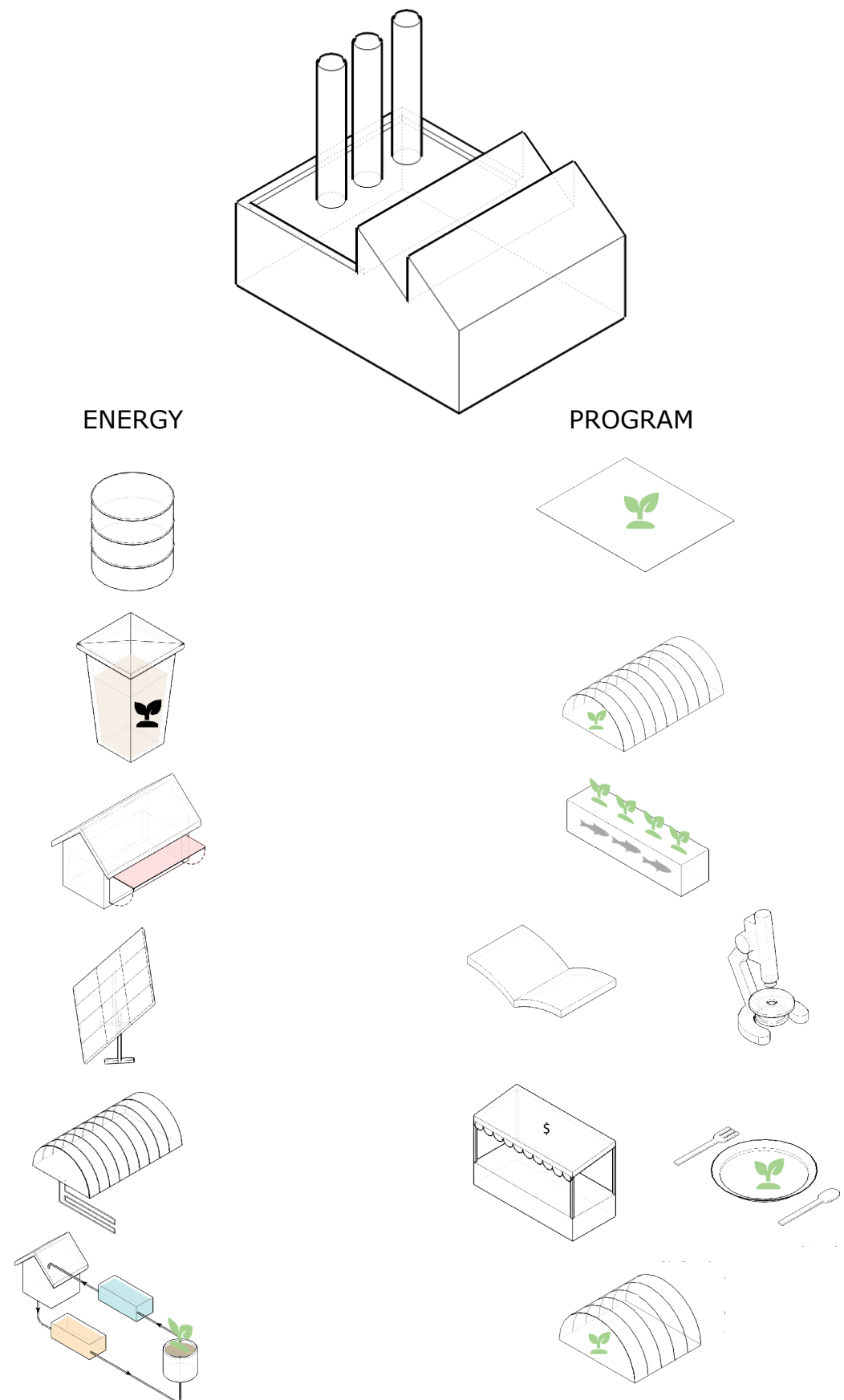


8

Fig. 7.10.1 Industrial Scale_Scenario (by Author)

7.11 INDUSTRIAL SCALE_SYSTEMS DIAGRAM

The industrial prototype would incorporate educational and research programs. They would also promote lecture series for social benefit. The farmstand, farmers market, and authentic cultural cafes and restaurants would be one of the economic generators. These cafes and restaurants would use fresh produce grown on this site through the aquaponics system and incubator farm programs benefiting the farmers. The primary energy generating system used is solar panels and geothermal. They have enough systems installed to supply power to the whole facility yearly and additional to give it back to the community generating revenue out of it. It also has provisions for composting organic waste from the site as well as help the community with their organic waste. The eco machine installed also helps with converting sewage to gray water, which gets used for crops and other purposes.



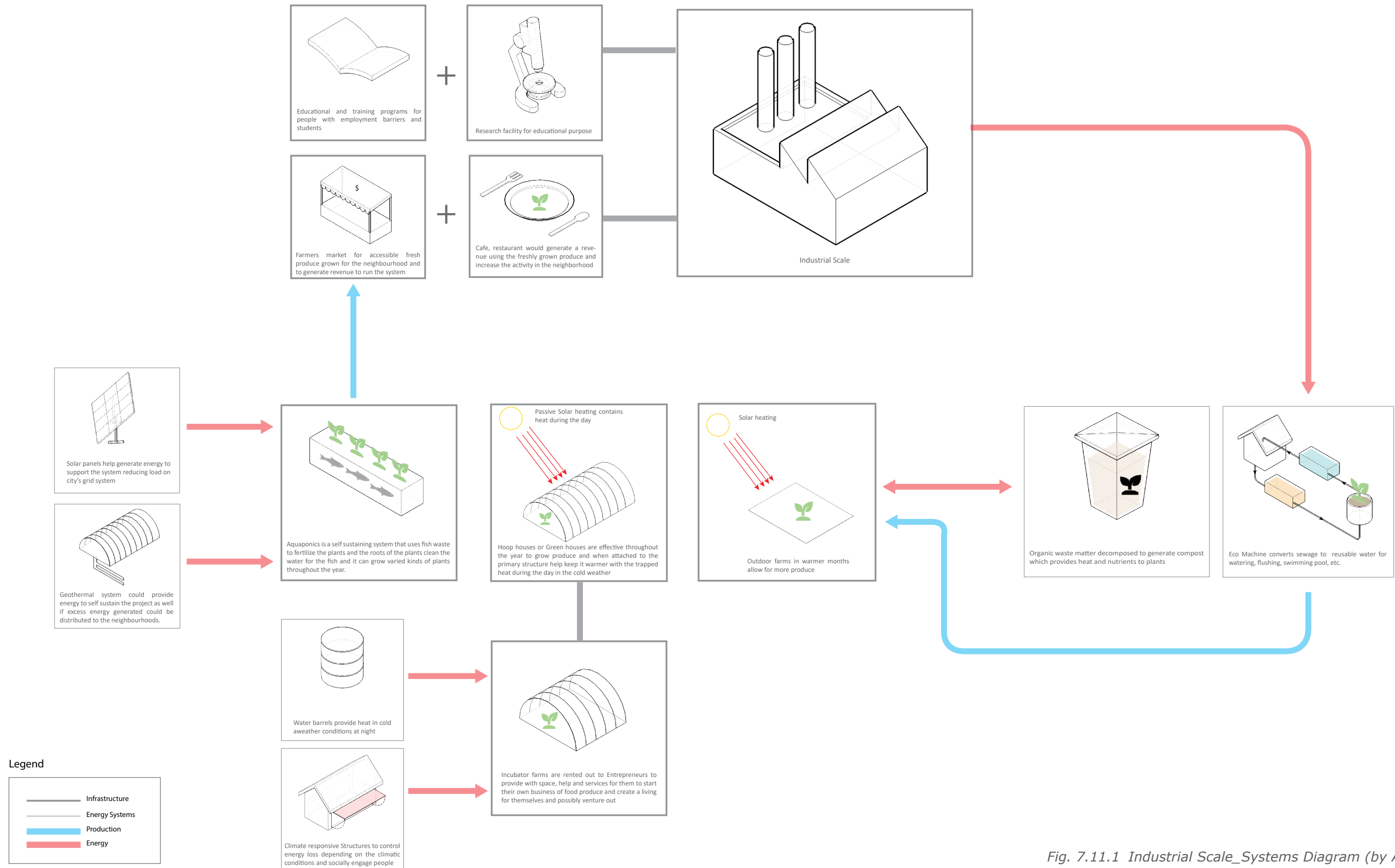
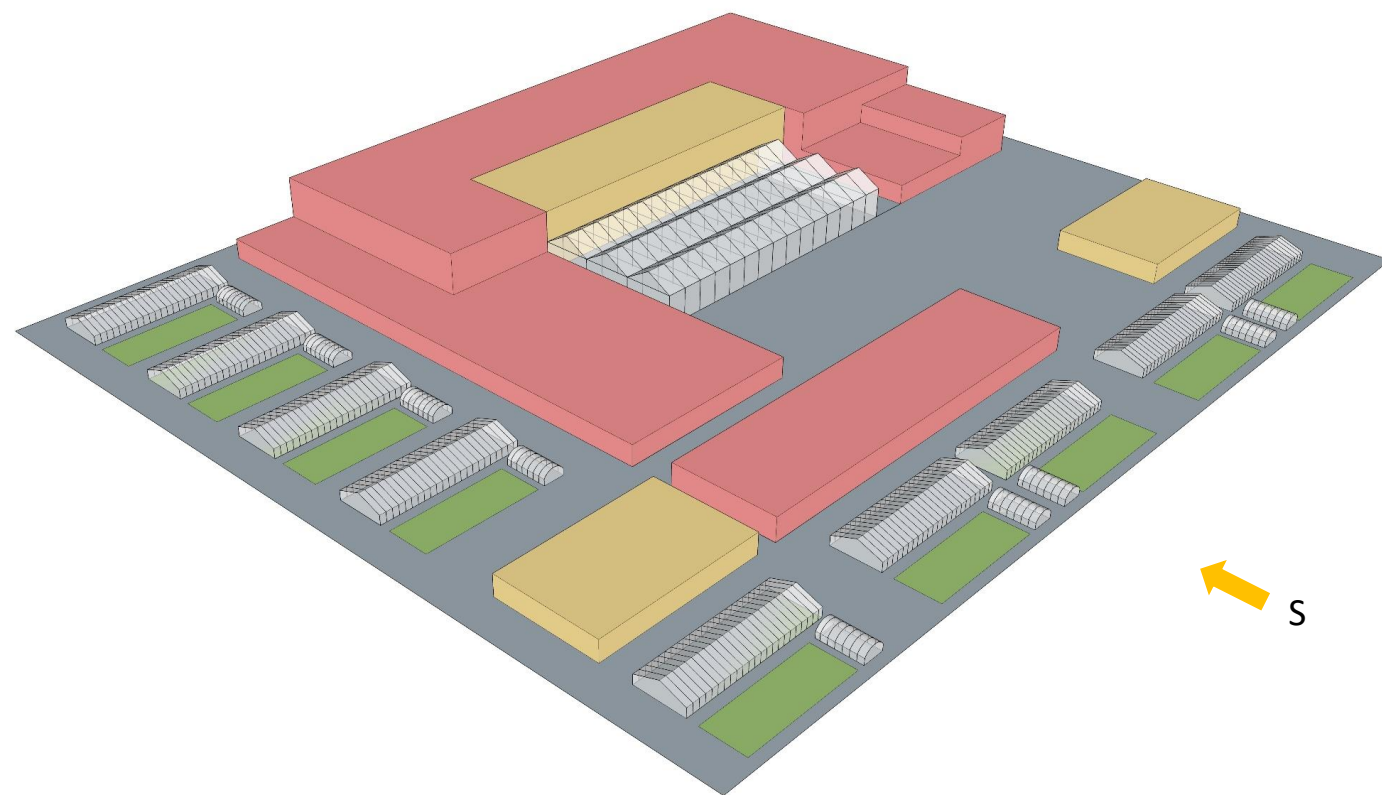


Fig. 7.11.1 Industrial Scale_Systems Diagram (by Author)

7.12 INDUSTRIAL SCALE_PROTOTYPE

This Industrial prototype would be an excellent revitalization project for the neighborhood, which would provide for food, more job opportunities, economic generator of the neighborhood, and generating cleaner energy out of the system. The incubator farm project trains entrepreneurs who would provide more job opportunities to locals in the neighborhood. The living machine is going to provide cleaner water, and it is aesthetically appealing. The incubator kitchen program brings in people with different experiences to give knowledge about healthy food eating options and how to fight chronic health disease.



- Fixed Structure
- Climate Responsive Structure
- Outdoor Farm

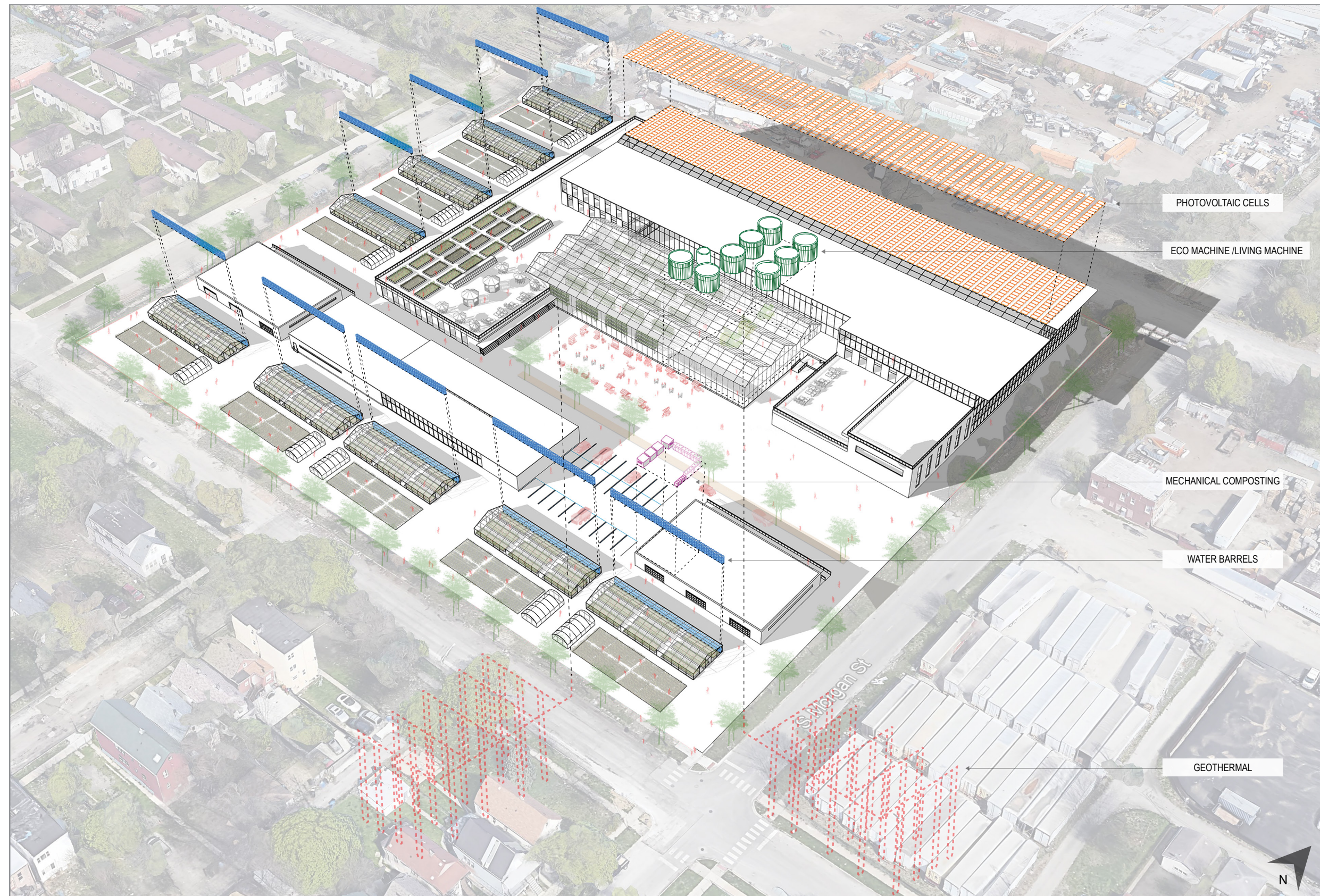


Fig. 7.12.1 Industrial Scale_Prototype (by Author)

CHAPTER 8

- *CONCLUSION*

8.0 CONCLUSION

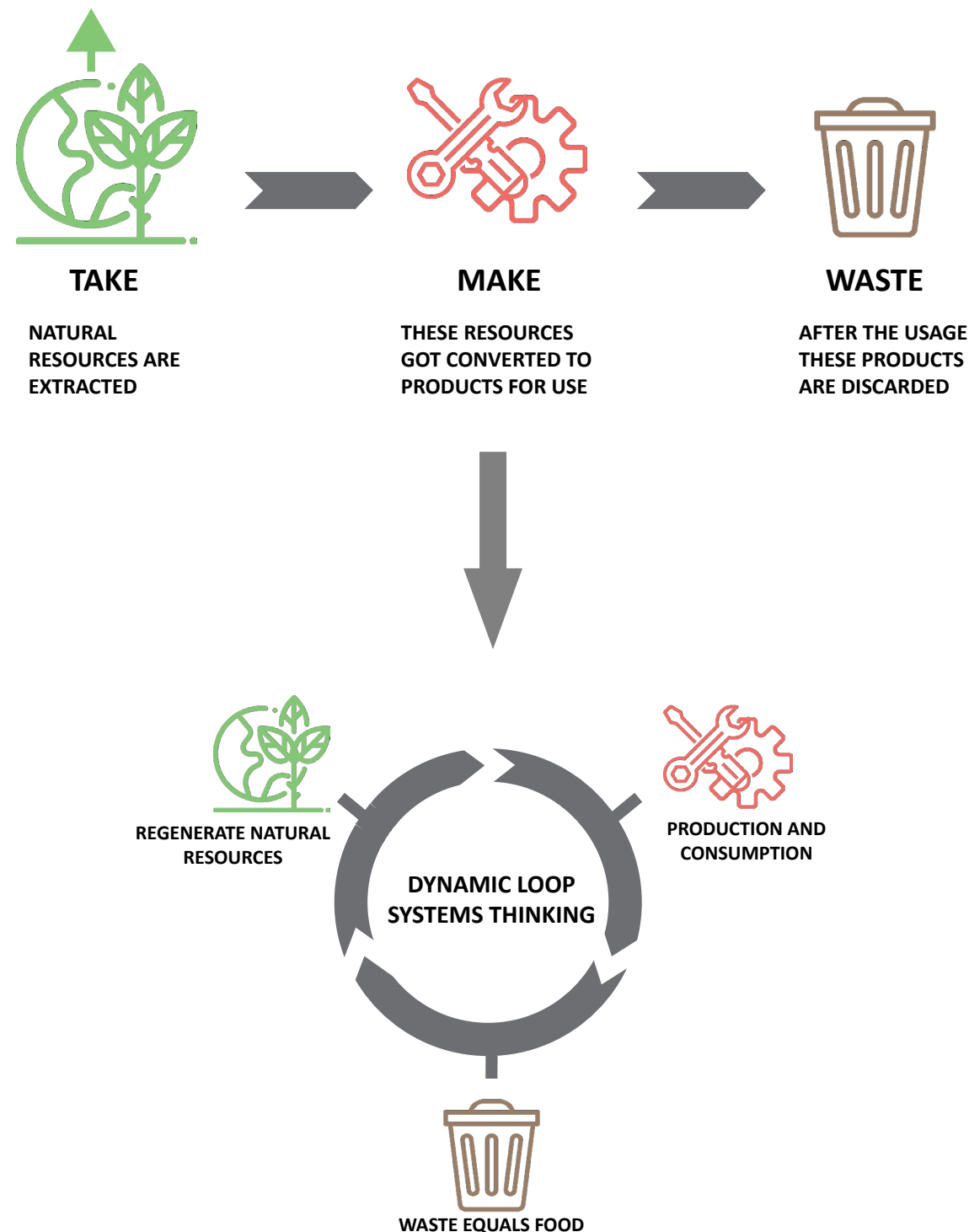
Food deserts and climate change were the two significant problems that inspired this thesis. In November 2017, I visited Chicago to see the Architecture Biennale. As I explored the city and read more deeply about Chicago's history and the legacy of segregation, it only served to reaffirm the socio-spatial divide that I had felt while traversing the city. Initially, I had no idea what my thesis would look like. The problem remained the same, but the process and methods to tackle the problem kept changing. I realized that the issue of redlining and food deserts is so vast that no one solution can solve it entirely.

Food plays an essential role in all our lives. On realizing how in these parts of the city, the so-called "Food Deserts," people are deprived of the basic needs of fresh produce; I knew that the solution entailed finding ways to bring locally sourced food to these communities. On researching 'food desert,' I found that Chicago had many initiatives trying to address the issue.

When I revisited Chicago in February 2019, intending to understand the 'urban farming' movement that is slowly getting rooted in the city. I visited non-profit organizations, talked to university professors, and attended lecture series.

Peter Senge's presentation at the Aalto Systems Forum, 2014, was a turning point for the thesis. I began to think about the devastating impacts that our actions are causing on the environment. Even the practice of urban farming, which should be seen as positive, is not enough, as the primary resources that it consumes from the earth can potentially cause harm than mitigation. In light of this, it seemed necessary to understand how the world needs to change from an economy based on linear thinking and start implementing a circular economy concept.

The methods of intensive urban farming have drastically changed from ancient farming practices. Less land area is required, leading to less degradation in soil quality, and



various energy-consuming farming technologies have evolved, leading to better water management practices, which in turn promote less energy wastage.

Therefore, this thesis envisions a self-sustaining system, where instead of following a linear economy method, it adopts a circular economy model. There are four different scales of prototypes that I am proposing, which are based on four levels of investment. The proposal tries to address climatic, economic, and social sustainability. Climatic problems are addressed by generating in-situ energy to support itself, as well as the community, and encourage localization. Economic sustainability is achieved by creating job opportunities at different scale and creating programs that will attract people from other underserved neighborhoods. Each design proposal addresses food production, distribution, education, and social sustainability.

During my panel discussion, there was an interesting discussion about how this project will impact existing the community. In response, I would say that it will be interesting to see how the urban fabric evolves with the introduction and evolution of these prototypes and how the social fabric of the neighborhood changes as these once underserved communities become better places to live and raise families.

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