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At Issue

Today's global food system is beset by serious challenges and risks. Rapid population growth, an increasingly urbanized society and a growing middle class will have profound impacts on food and nutrition security and put increasing pressure on the environment. The agriculture sector is one of the largest contributors of greenhouse gas emissions and one of the sectors most vulnerable to climate change, which increasingly threatens food systems. At the same time, 788 million people go hungry every day while 2.1 billion are overweight or obese and 2 billion people lack the nutrients to live a healthy life, according to the Global Panel on Agriculture and Food Systems for Nutrition's 2015 report Food Systems and Diets. These challenges are systemic and interconnected. Such large-scale, complex challenges require market-led, multistakeholder dialogue and coordinated action. These principles underpin the World Economic Forum System Initiative Shaping the Future of Food Security and Agriculture to achieve more inclusive, sustainable, efficient, nutritious and healthy food systems.

World Economic Forum

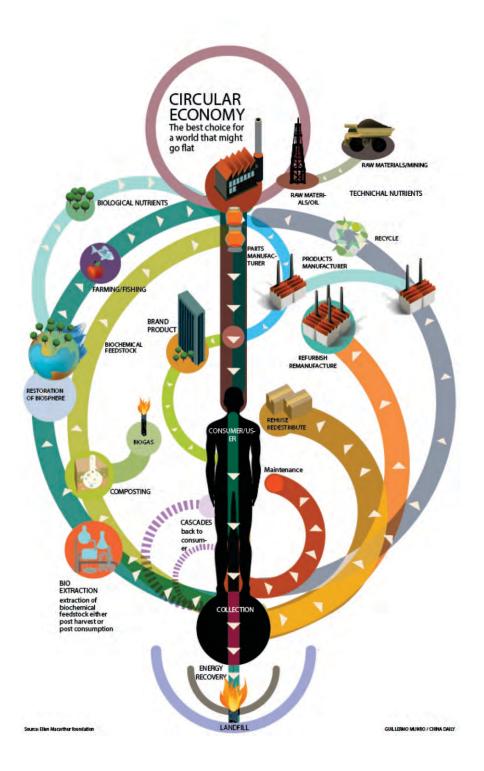


Background:

Towards a Circular Economy, Economic and Business Rationale for an Accelerated Transition

Source: www.ellenmacarthurfoundation.org/assets/downloads/publications/Ellen-MacArthur-Foundation-Towards-the-Circular-Economy-vol.1.pdf





Throughout its evolution and diversification, our industrial economy has never moved beyond one fundamental characteristic established in the early days of industrialization: a linear model of resource consumption that follows a 'take-makedispose' pattern. Companies extract materials, apply energy and labour to manufacture a product, and sell it to an end consumer—who then discards it when it no longer serves its purpose. While great strides have been made in improving resource efficiency, any system based on consumption rather than on the restorative use of resources entails significant losses all along the value chain.

The search for an industrial model that can further decouple sales revenues from material input hasincreased interest in concepts associated with the 'circular economy'. Though still a theoretical construct, the term 'circular economy' denotes an industrial economy that is restorative by intention and design. With the adoption of a circular economy, unlimited resources like labour take on a more central role in economic processes, and resources that are limited by natural supply play more of a supporting role. This concept holds considerable promise, as has already been verified in a number of industries, of being able to counter-act the imbalances currently building up between the supply of and demand for natural resources.

More efficiency remains desirable, but to address the magnitude of the resource crunch now approaching, minimizing inputs must be joined by innovating the way we work with the output. Making the leap from consuming and discarding products to using and reusing them to the maximum extent possible, in closer alignment with the patterns of living systems, is vital to ensure that continuing growth generates greater prosperity.

Since farming began in the Fertile Crescent around 10,000 years ago, the world's population has increased nearly 15,000- fold, from an estimated total of 4 million (less than half the population of Greater London, today) to pass the 7 billion mark in October 2011—and it is projected to grow to 9 billion by 2050. While about two billion people continue to subsist in basic agrarian

conditions or worse, three billion are expected to join the ranks of middle-class consumers by 2030. Their new prosperity will trigger a surge of demand both larger and in a shorter time period than the world has ever experienced. Even the most conservative projections for global economic growth over the next decade suggest that demand for oil, coal, iron ore, and other natural resources will rise by at least a third, with about 90% of that increase coming from growth in emerging markets.

The limits of linear consumption: Climate

Some resource industries could face disruption from variations in regional climates over time, particularly water and agriculture. The U.S. Environmental Protection Agency suggests that changes in climate could affect snow cover, stream flow, and glacial patterns—and hence fresh water supply, erosion patterns, irrigation needs, and flood management requirements, and thus the overall supply of agricultural products. Supply constraints and uncertainty would likely drive up prices and volatility. McKinsey research suggests that by 2030, the disparity between global water demand and watersupply could reach 40%, driven in large part by increased demand for energy production, which is highly water-intensive.

In this report, we argue for a specific type of productivity—a more 'circular' business model in which many more products are reused, refurbished, and redistributed than today. More components and materials could be remanufactured and ultimately recycled. And more food and other organic waste could loop through value-extracting processes such as biochemical extraction and anaerobic digestion. Our preliminary research shows that moving in the direction of such a model could lead to significant economic benefits for specific industries. It could more broadly help mitigate aspects of the current system that put pressure on resource supply, commodity prices, and volatility. It could also restore the natural capital that is essential for the continual provision of food, feed, and fibre.

The above text was extracted from the Ellen MaCarther Foundation report "Towards a Circular Economy". Llink provided under the title on this page.

Background

Mapping Global Trends in Food Security and Agriculture

Source: https://toplink.weforum.org/knowledge/insight/a1Gb000000pTDPEA2/explore/summary



Demographic and Demand Shifts

Key Issue: Population growth, an expanding middle class and urbanization are presenting challenges to global food systems.

Food demand is changing as a result of populations becoming more urbanized. This Rapid urbanization has led to a decline in rural population and to fewer people choosing farming as an occupation. Preferences for meat and dairy consumption, which are correlated with rising affluence, demand greater resources and are more environmentally detrimental to the planet. The changes in food consumption patterns will also have profound impacts on food and nutrition security.

Nutrition and Health

Key Issue: Patterns of hunger, micronutrient deficiency and obesity are shifting in developed and developing countries.

Across business, government and civil society, there is a growing focus on nutrition in the realm of agriculture and food systems – a shift of focus from the quantity to the quality of food produced. This is a response to the global trend towards rising levels of overweight and obesity while hunger persist in some parts of the world.

Environmental Footprint

Key Issue: Increasing stress from water resources, climate change, deforestation and other environmental issues.

Food systems today are unsustainable, and the increase in food demand resulting from a rapidly growing global population will further exacerbate its negative environmental impact - thus the importance of addressing the sustainability of the sector. Water availability, climate volatility and deforestation are among the most prominent environmental issues in the agriculture sector and represent significant risks and complexity. Fundamental changes in food systems are required to reverse natural resource depletion and damage to ecosystems, while increasing resiliency to climate change.

Technology and Innovation

Key Issue: Emerging technologies are disrupting and accelerating progress in the agriculture sector.

Food systems will be influenced by emerging technologies in the fields of artificial intelligence and robotics, biotechnology, gene editing, information technologies and machine learning. New advancements in agricultural biotech, digital technology and data analytics are already transforming agriculture through precision farming on an industrial scale in developed markets, and big data is leveraging information for risk reduction.

Value Chain Efficiency

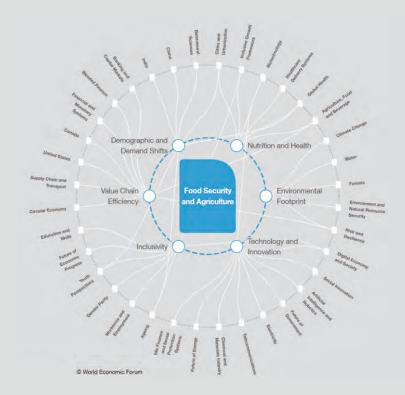
Key Issue: Process optimization with economic and social benefits, including the reduction of food loss and waste.

Food prices and supply are increasingly volatile due to market shocks from extreme weather, trade restrictions and commodity market fluctuations. Rural smallholder farmers in developing countries often lack timely information on market prices, agricultural techniques and weather forecast, and access to traditional financial services, making it difficult for them to adjust production, sell their produce in a timely manner and optimise supply chain management across the sector.

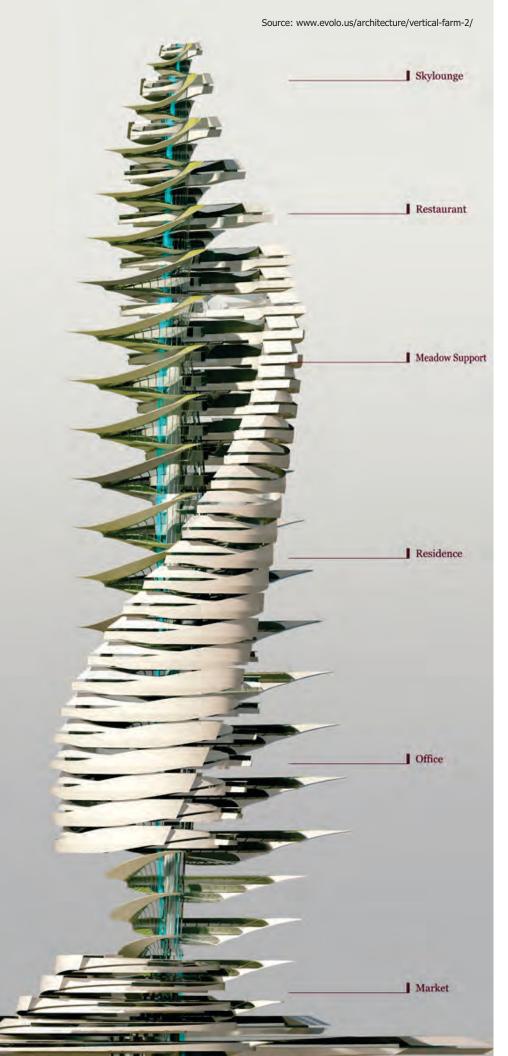
Inclusivity

Key Issue: Increasing focus on the agriculture sector for inclusive economic opportunities, especially for smallholder farmers, women and youth.

Food access remains unevenly distributed, with about 788 million people still suffering from hunger. The next generation of agriculture leadership is also a growing concern. Youth do not see the agriculture sector as an attractive area of work and often lack sufficient access to the education necessary to gain entrepreneurial agriculture skills. For solutions we must look to demographic trends. Women play a major part in making the agricultural sector work so we need to do more to encourage the contribution of women entrepreneurs in the agriculture space.



- The rapidly growing global population is expected to reach 8.5 billion by 2030 and 9.7 billion by 2050, up from 7.3 billion in 2015, according to the United Nations' World Population Prospects 2015.
- According to the 2014 edition of World Urbanization
 Prospects, the percentage of people living in urban areas
 will increase from over 50% in 2014 to almost 66% by
 2050, equaling 2.5 billion additional urban residents by
 2050, with 90% of this growth taking place in Asia and
 Africa
- Research released by the University of Minnesota's
 Institute of the Environment in 2013 found that 36% of
 the world's crop calories were used for animal fed, and
 that shifting the allocation of crops towards human
 consumption could increase calories availability by 70%
 and feed an additional 4 billion people.
- The 2011 World Bank report Missing Food: The Case of Postharvest Grain Losses in Sub-Saharan Africa reported that about 10-20% of grains are lost post-harvest due to the lack of appropriate storage, processing and cooling equipment. Improving access to electricity could help farmers improve efficiency in the production, processing and commercialization of goods.
- A 1% increase in agricultural per capita GDP was proven to be five times more effective in reducing the poverty gap than the same increase in GDP per capita in other sectors.



Vertical Farming

An Emerging Response Strategy for a Circular Economy

Source: Dickson Despommier - www.verticalfarm.com

The Problem

The rise in population and the flight to urban areas is driving the need for more food production. The current world population of 7.2 billion is projected to increase by one billion during the next 12 years, reaching 9.6 billion by 2050. At the same time, globally, there is an increasing migration from rural to urban areas. It is currently predicted that by 2050, 69% of the world's population will live in cities. According to the UN, by 2050, we would need landmass the size of Brazil to feed our global population - this amount of agricultural land does not exist on earth.

The total global contribution of agriculture to GHG emissions considering all direct emissions (such as GHG emissions from soil and livestock) and indirect emissions (such as fossil fuel use, agrochemicals production and land conversion to agriculture) is about 30% of all global anthropogenic GHG emissions.

The Opportunity

Urban agriculture can reduce the carbon footprint of food, help create resilient cities and food systems, reduce the urban heat island and air-conditioning costs, reduce demands on city infrastructure, and create jobs. It is smaller in scale and usually more biodiverse.

Farming indoors is not a new concept, per se, as greenhouse-based agriculture has been in existence for some time. Most of these operations are small when compared to factory farms, but unlike their outdoor counterparts, these facilities can produce crops year-round. Japan, Scandinavia, New Zealand, the United States, and Canada have thriving greenhouse industries.

What is proposed here that differs radically from what now exists is to scale up the concept of indoor farming, in which a wide variety of produce is harvested in quantity enough to sustain even the largest of cities without significantly relying on resources beyond the city limits. Constructing the ideal vertical farm with a far greater yield per square foot [than current indoor farming practices] will require additional research and collaboration across a wide variety of industry sectors. Canada has yet to capitalize on this rapidly emerging sector, but we now have an opportunity to become global leaders.

By Definition

The vertical farm concept is about maximizing plant density to enable large numbers of people living in the built environment access to healthy, fresh vegetables year-round that are herbicide and pesticide-free. Skyscraper apartment buildings allow us to live comfortably in densely-populated urban settings. Vertical farms need to address the same density issue regarding how much of the edible plants we consume can be grown within the urban environment.

Greenhouses do not achieve the plant densities needed to supply food for millions of city dwellers. Insinuating hyper-dense food production facilities inside the city limits or just outside them is a game-changer, and if employed world-wide, would alter forever the way we access our food supply. Vertical farms offer the promise of finally being able to free up large swaths of land from traditional, soil-based agricultural practices, allowing abandoned farmland to return to their original ecological function of providing ecosystem services that promote healthy lives for all living things on Earth.

Advantages of Vertical Farming

- Climate Change Resiliency
- Year-round crop production, high yields and faster growth rates
- Significantly reduces transportation GHGs & encourages renewable energy and green building design
- Can make use of abandoned or unused properties
- Supports sustainability objectives for urban communities
- Uses up to 98% less water and can convert gray water to drinking water
- Creates new urban employment opportunities
- Reduces the risk of infection from agents transmitted at the agricultural interface
- Eliminates agricultural runoff
- Returns farmland to nature, helping to restore ecosystem functions and services

The Advanced Communities Centre

A Centennial College Leadership Project



Canada's first carbon-neutral living lab dedicated to clean technologies and sustainable urban food production.

The Advanced Communities Centre (ACC) is the next bold vision for Centennial College. Imagine a place that is Canada's first "carbon neutral" living lab dedicated to urban food production in a "net-zero" waste, water, and GHG emissions building. The Advanced Communities Centre will house new and emerging programming for the College in an environment that is built to test and catapult the sustainable urban agriculture movement – not only in Canada, but globally.

FEATURES

- Living Lab Innovation and entrepreneurship will be a primary focus at the Centre through applied research in cleantech, sustainable agriculture and resilient green building design.
- Carbon-Neutral Facility The Centre will demonstrate the best in environmental leadership by targeting net-zero energy and emissions for construction and operations. It will lead the market in low carbon building and renewable energy integration by acting as a showpiece for industry engagement.
- Training Mobilization The Centre will fill the market demand for a skilled and knowledgeable workforce in sustainable urban agriculture across the food and beverage manufacturing and processing sectors.
- Collaborative Environment The Canadian market is transforming into a low-carbon, circular economy supported by resilient, prosperous city planning. The Centre will be a leading example of how to succeed in these efforts by fostering collaboration across sectors, bringing together Centennial College students, staff, industry leaders, governments, NGOs and our academic partners.

THE FACILITY

By early estimations, the 120,000 sqft facility could be constructed with a total project cost of \$57 million (\$475 per sqft), including equipment, furnishings and computers.

Recommended Space Allocation -120,000sqft:

- Academic classrooms and labs 40,000 square feet
- Applied research and innovation centre 30,000 square feet
- Business incubation and partnership space 20,000 square feet
- Urban agriculture 30,000 square feet

MARKET OPPORTUNITIES

- Low levels of academic activity in urban agriculture:
 Across Canada, there are low levels of activity in Canada in urban agriculture and particularly in aquaponics, hydroponics and vertical farming (no academic vertical farming activity at all in fact). While there is a higher level of activity internationally, it is not comprehensive nor institutional. This represents an opportunity to be a leader in this field.
- Gap in highly-qualified workforce: The urban agriculture and food and beverage manufacturing and processing sectors have identified a high need for skilled and knowledgeable workers. There is an opportunity to train students in the latest advancements and to provide them with a particularly versatile skillset, making them highly desirable employees in rapidly changing industries.
- Changing consumer and marketplace pressures in the food industry: With growing pressures and demand for food (but a decrease in the number of people farming), food costs are increasing at a rate higher than the increase in average income of working adults. Shifting demographics are influencing trends towards food products with enhanced nutrition, ethical food choices and environmentally sustainable diets.
- Demonstrating Resiliency: Climate conditions, growing populations and urban intensification, has left global food production and food supply vulnerable. In order to create resilient cities and mitigate climate risk, urban centres must find innovative, sustainable and local solutions for growing food.

Cost-Effective Food Production Solutions: Technology
utilized in the development of the Centre could implement a
system that can grow food economically competitive with
conventional agriculture in Canada. This is due to the rapidly
declining price of LED grow lights, solar PV reaching grid parity,
more control over grow environments leading to greater and more
consistent crop production and advanced building design
standards that can meet passive house design standards at close
to conventional costs (can reduce energy demand by up to 90%).

KEY TARGET MARKETS

- Greater Toronto Area (GTA): Toronto is one of the largest food and beverage clusters on the continent (alongside Chicago, New York and Los Angeles). It is home to more than half of all the food processing activities in Ontario. In 2011, Toronto's food and beverage cluster had annual sales of about \$17 billion.
- Ontario: Ontario is home to one of the largest and most significant food and beverage clusters in North America, with manufacturing revenue of \$36.9 billion in 2012. There are nearly 3,000 food and beverage businesses in the province, from multinationals to successful SMEs. A total of 96,700 people work in the food manufacturing industry.
- Canada: According to Agriculture and Agri-Food Canada, the food and beverage industry is the second largest manufacturing industry in Canada in terms of value of production with shipments worth \$105.5 billion in 2014. It accounts for 17% of total manufacturing shipments and for 2% of Gross Domestic Product (GDP). It's the largest manufacturing employer and provides employment for 246,000 Canadians.

A Central Hub for Innovation

How can the ACC facilitate new business development

opportunities in urban farming across Canada?

Revitalize farming in Canada.

& Finance

The Advanced Communities Centre will be a state-of-the-art research facility that will test the latest processes and technologies designed to bring urban vertical farming into the mainstream.

Focused on three fundamental pillars of training, open innovation and research collaboration, the Advanced Communities Centre will be a central "Hub" where leaders from across sectors can explore new opportunities through the growing urban agriculture market. The chart below provides a cross section of the primary sectors that can make major contributions to the development of the Advanced Communities Centre. As industry, government and academia come together to turn vision into reality starting in 2018, we will work together to identify the opportunities and the challenges that will need to be addressed for long term project success.

What advanced green building design features can How can the ACC position food and agriculture be adopted? as one of the primary solution to resilient city planning? Food & **Sustainable** · What level design certification is possible? • The ACC will stand as the test lab for indoor farming **Agriculture** Design across Canada. What plants, systems & technologies will How will the ACC demonstrate the latest in resilient be included to meet this objective? building strategies? • With agriculture contributing up to 51% of the world's How will robotics and the latest A.I. technology be GHG emissions, How can the ACC contribute to Canada's integrated into the planting/harvesting process? Advanced international commitments on Climate Change? **Climate &** How can the ACC facilitate collaboration among **Manufacturing Emissions** • What systems and processes are needed to ensure the Canada's business leadership to create next gen manufacturing opportunities for sustainable food ACC operates to carbon neutral? production? The ACC Hub What renewable energy systems can be integrated into • How can the latest transportation technologies, including Research & Development the ACC and how can they be used to demonstrate for electric and autonomous vehicles, streamline fleet Tech Testing & Verification future building projects? distribution processes while reducing carbon emissions? **Clean Energy Transportation** • Is it possible for the ACC to achieve Net Zero Energy? **Technology** • Can drone technology and the Internet of Things & Distribution Materials & Processes support produce delivery within local communities? **Industry Collaboration** Economic Development Market Awareness How will the Internet of Things drive efficiencies and As part of the "circular economy" strategy, **Education & Training** how will the ACC meet targets of zero waste? improve production? Intelligent Community Outreach **Waste** What intelligent building systems can be integrated to · Can plant matter waste-to-energy technology be Communication **Management** maximize operational efficiencies? demonstrated at the ACC? **Systems** How will data be used to improve processes? What business models can be adopted to ensure · The ACC will strive to be leaders in water circular economic principles are successful for longconservation and reclamation. What collaboration Business, term prosperity? Water strategies with Canadian water NGOs and tech **Operations** developers can be established to maximize leadership Conservation

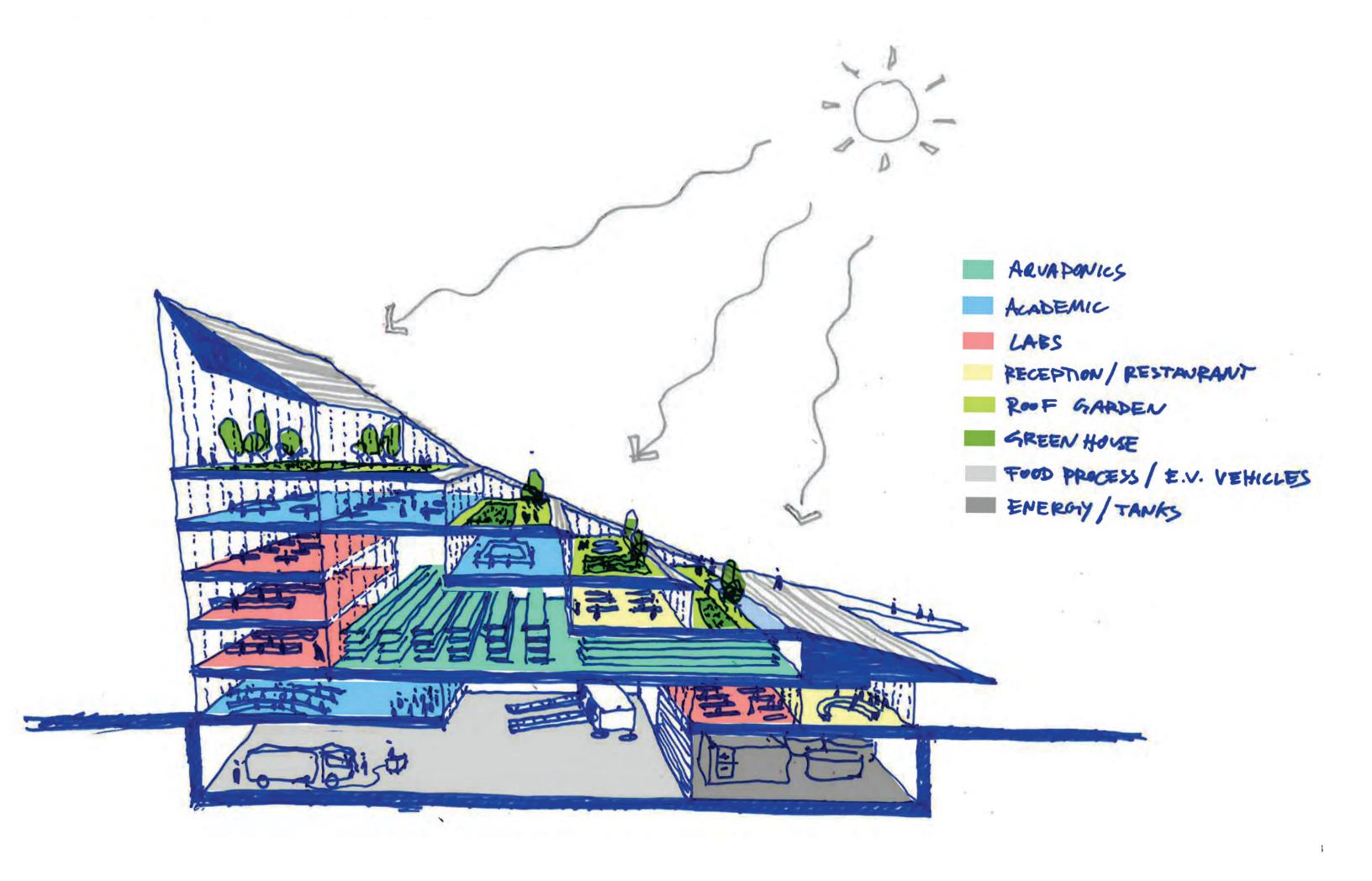
opportunities?

The Advanced Communities Centre

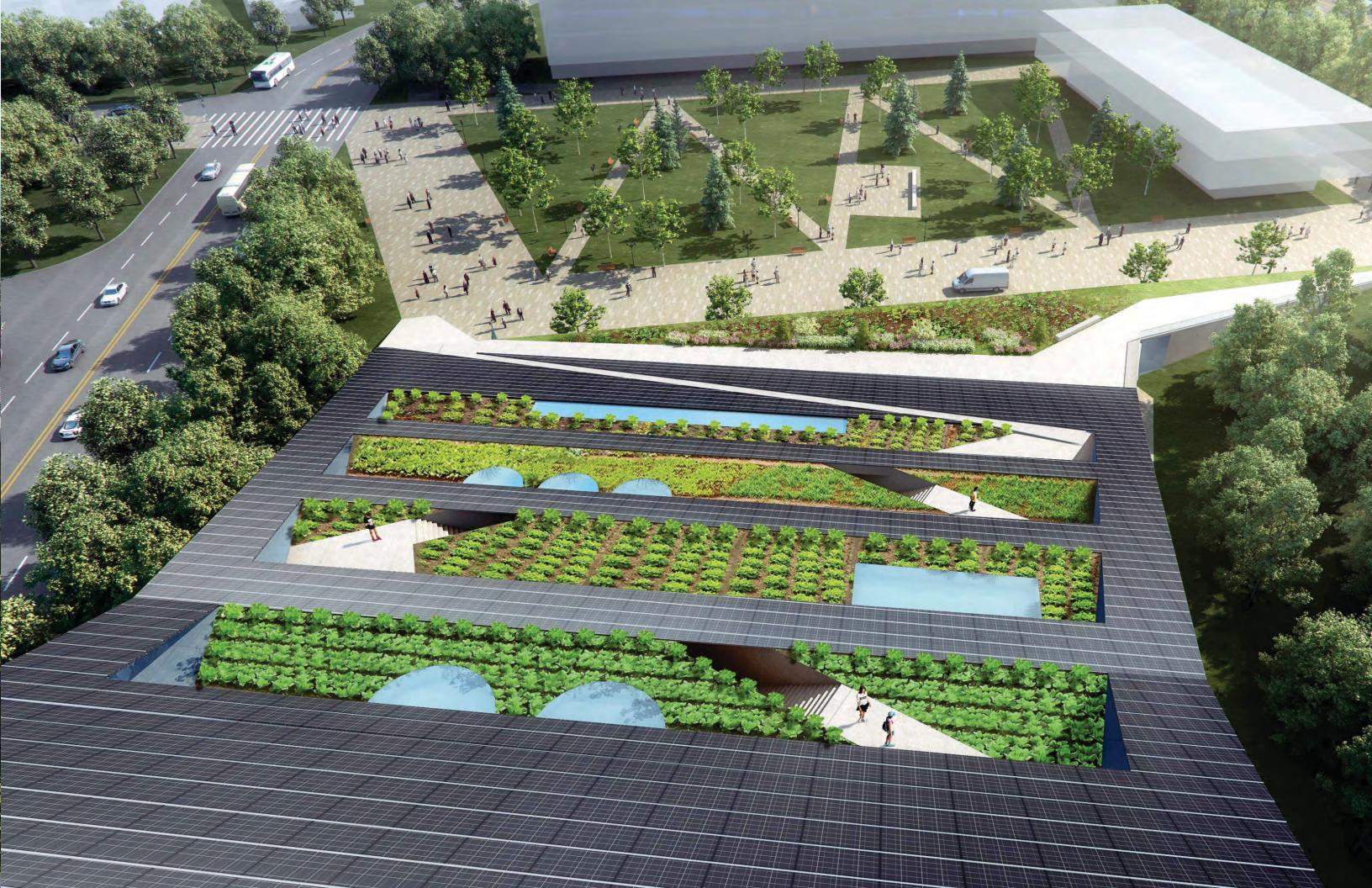
A Developing Concept





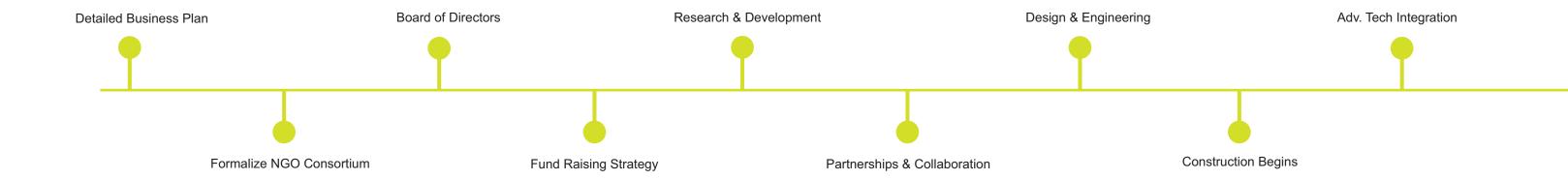






Proposed Development Strategy

Advanced Communities Centre



Governance

The Centennial College Cleantech Advisory Board currently in place will work with College executives and partners to engage a consortium of leaders from across sectors and over see the formation of a Board of Directors. This consortium of leaders will be crucial to help guide the development of the project, introduce new opportunities and represent the Centre during development efforts.

The Board of Directors will be made up of respected market leaders from each of the following categories:

- Agriculture
- Architecture
- Engineering
- Robotics
- Advanced Manufacturing
- Chemistry & Materials
- Energy Management
- Clean Technology
- Produce Distribution
- Government Relations
- Aboriginal Communities
- Academia

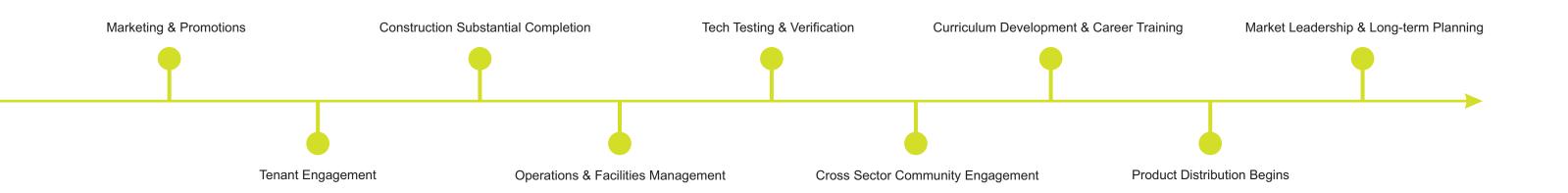
- Marketing & Communications
- Transportation Systems
- IT/Data Management
- Intelligent Buildings
- Ecology & Biodiversity
- · Health & Medicine

Design & Development

The Advanced Communities Centre will be new type of hyper-efficient, intelligent building. It will incorporate the latest materials and technologies available to ensure the operational performance can meet aggressive energy and water conservation strategies. GHG emissions will also be tracked to meet the goal of a "carbon neutral". To achieve these objectives, a series of design workshops will be held to explore all opportunities. Leaders from across disciplines will be invited to the workshop to provide their expertise and offer creative solutions.

During the design phase, it will be important to identify a build partner that can work with the College and the Consortium over the life-cycle of the project to ensure continuity from design, construction, financing, operations and maintenance. It will be crucial for this build partner to establish a history with the Project from the beginning and work closely with the Consortium's executive staff over the coming years to maintain optimum performance and reduce operating costs.





Building Operations

On parallel course with construction time lines, an operational strategy must be developed that will include facilities management, tenant engagement and energy performance. The building's operations must also work in unison with urban agriculture objectives. Plant health, harvesting processes, product distribution plans, etc. must all be in place. To accomplish all that is required for operational success, experienced leaders from across sectors will be engaged to develop a comprehensive systems strategy.

One of the primary objectives for the Centre is to be a living lab for young professionals and industry leaders to test the latest materials and technologies on the market. It will be important to be recognized across sectors for the Centre's ability to test and verify all technologies associated with controlled indoor farming practices. The Advanced Communities Centre will be the "go to" location to interact with the latest methods, technologies and industry professionals. Research publications will also be produced in partnership with academic partners, government and industry for public distribution.

Market Leadership

In Canada, we historically do not celebrate successes effectively enough to influence market transformations. We need to ensure the Advanced Communities Centre is recognized across Canada and internationally for leadership in circular economic principals, urban agriculture, as well as contributions to climate change mitigation and adaptation. A respected marketing firm will be engaged to create a campaign that will showcase the Project's leadership in sustainable development for the built environment.

A new job and career training program for mature students and industry professionals will be developed to encourage the adoption of a new market opportunity in Ontario around indoor farming. The Centre as a test lab will be used to demonstrate processes and identify opportunities to expand into other indoor farming facilities. Vacant industrial properties in municipalities across Canada can be transformed into indoor food production centres. Leadership from the Advance Communities Centre can provide start up companies with the tools and resources needed for long term business success in urban agriculture.

Who Else is Leading the Emerging Vertical Farm Industry?

A Global Market Snapshot

Plantagon World Food Building

Linköping, Sweden



From the Website

www.plantagon.com

In Linköping, Sweden February 9, 2012 the first Plantagon Greenhouse broke ground. A new type of greenhouse for vertical farming; an international Centre of Excellence for Urban Agriculture; a demo-plant for Swedish clean-tech and a climate-smart way to use excess heating and CO2 from industries. The potential is tremendous and ambitions high for the new greenhouse being built in Linköping, Sweden, near the regional energy company, Tekniska Verken. Not least, it will be a new landmark for the people in Linköping to enjoy. Once the drafting stage is complete, construction of the greenhouse will take an estimated 12-16 months.

This marks the realization of the vision of creating functional sustainable solutions for the growing cities of today and tomorrow, where we can grow food in the cities in a resource-smart way, making use of the special conditions of the city. The Plantagon greenhouse, developed together with Sweco, is designed for vertical agriculture of vegetables in urban areas. In cooperation with several partners, Plantagon plans to develop integrated solutions for energy, excess heat, waste, CO2 and water.

With this greenhouse we're developing and fine-tuning the technical systems required for vertical farming in urban areas, together with several well-known Swedish partner companies. We want to gather expertise in the field, and our long-term objective is to create an international Center of Excellence for Urban Agriculture in Linköping.

Concept

We develop innovative solutions to meet the rising demand for locally grown food in cities all around the world. We minimize the use of transportation, land, energy and water – using waste products in the process but leaving no waste behind.

Business Model

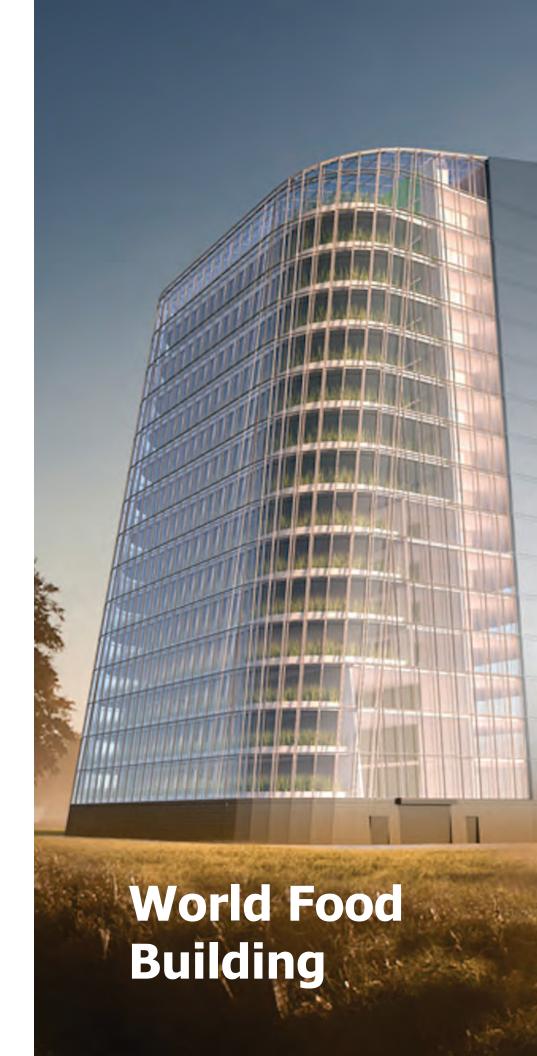
At a corporate level, Plantagon does not assume any ownership of the buildings or the equipment. Plantagon is the developer and operator of urban farms, and receives a management fee and a performance fee when operating the plant.

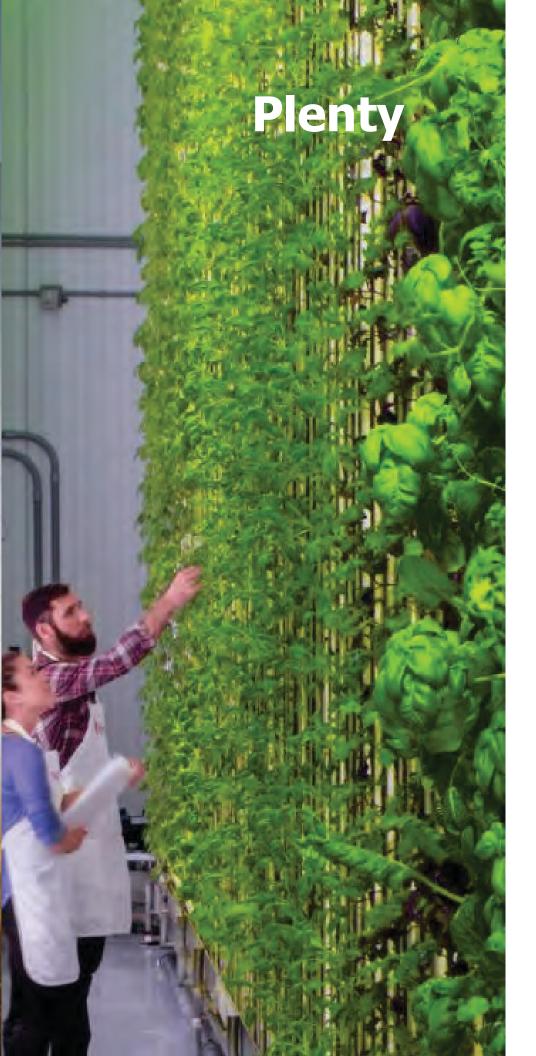
Rational

- Direct access to a large local population consuming fresh produce daily.
- Real estate with integrated urban agriculture solutions will increase in attractiveness and value.
- Cities around the globe have set targets to increase sustainability and seek innovative solutions to reduce the strain on existing infrastructure and resources.

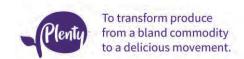
Current Status of the World Food Building

Recipient of the 2016 International Architecture Awards, Milan Italy.









From the Website

www.plenty.ag

Plenty is a new kind of farm for a new kind of world. We're on a mission to bring fresh, local produce to communities everywhere in a way that's better for the environment. Our local field-scale indoor vertical farms are creating a healthier, more delicious and sustainable future.

The world is in dire need of rapid innovation in order to feed the 7+ billion humans on Earth without continuing to destroy it, and Plenty is here to deliver! Our vertical farms use 99% less water than conventional fields, yield up to 350x more per square foot, are pesticide-free and produce zero fertilizer runoff. And since our farms are local, we cut thousands of miles out of the supply chain, reducing tons and tons of emissions.

Fortunately, the most powerful trends occurring in technology today create the opportunity to address agriculture's biggest challenges. The amalgamation of crop science, artificial intelligence, big data and the rise of the Internet of Things (IoT), coupled with falling energy prices and the availability of increasingly efficient LED lighting create the opportunity to completely overhaul how the world grows produce.

This company wants to build a giant indoor farm next to every major city in the world. Vertical farming may finally be growing up.

Its virtues, relative to conventional agriculture, have long been clear. Indoors, the climate can be controlled year-round. Pests can be minimized, and with them pesticides. Water and nutrients can be applied in precise quantities. By going up rather than out, a vertical farm can produce more food per acre of land. And by siting close to an urban area, it can reduce long distribution chains, getting fresher food to customers' tables, quicker.

In the News

Jeff Bezos-backed indoor farming startup Plenty opens 100K square-foot facility in Seattle region

www.geekwire.com

An indoor farming startup backed by some of the biggest names in tech has arrived in Seattle, expanding its effort to change how people eat fruits and vegetables.

Plenty today announced that it will open a 100,000 square-foot farm in Kent, Washington where the 3-year-old company will grow pesticide-free, "backyard quality" produce for consumers in Seattle and Vancouver, B.C. It's the first time the startup has expanded beyond its home markets in South San Francisco and Wyoming; it will also be the company's first "full-scale" farm.

Plenty grows its plants in 20-foot tall towers inside a climate-controlled facility with LED lights. It does not use pesticides, herbicides, synthetic fertilizers, or GMOs. The system uses thousands of infrared cameras and sensors to collect data in the farms, which is then analyzed using machine learning to optimize how the plants grow.

Plenty said its technology can achieve yields of up to 350 times greater than traditional agriculture while using 1 percent of the water and barely any land compared to conventional methods. Plenty's farms can also grow plants — up to 300 variants of produce — year-round, regardless of season, which helps increase efficiency. Its proximity to cities also means that produce doesn't sit in trucks for days or weeks before ultimately arriving on your kitchen table.

Investors are bullish about the company's potential. Backers of Plenty's \$200 million round in July included SoftBank (via its Vision Fund); Alphabet Chairman Eric Schmidt (through Innovation Endeavors); Amazon founder Jeff Bezos (through Bezos Expeditions); DCM Ventures; Data Collective; Finistere Ventures; and Louis Bacon.

In an interview with GeekWire, Plenty CEO and co-founder Matt Barnard said Seattle's relative lack of access to local produce and the region's emphasis on healthy food made it a perfect place to expand.

Kurt Kelty, Tesla's former director of battery technology, is moving into a very different sector of the tech industry: indoor agriculture. He has joined vertical farming startup Plenty as the senior vice president of operations and market development, according to Bloomberg. Kelty, who worked at Tesla for over a decade and left in early 2017, was one of the earliest executives at the vehicle startup founded by Elon Musk. www.businessinsider.com

