Feasibility Study of a Controlled Environment Agriculture Ecosystem in Kentucky

Executive summary

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This study was carried out by Wageningen Economic Research, University of Kentucky and University of Pikeville, with the support of Vision Granted Consultants, and is a synthesis of two assignments, provided by Kentucky Agricultural Development Board and the Dutch Ministry of Agriculture, Nature and Food Quality.

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This research focuses on making recommendations for the development of a Controlled Environment Agriculture (CEA) Ecosystem in Kentucky. As an approach, a desk study was conducted, a large number of experts interviewed, and a field visit to the Netherlands was made. The desk study consists of an analysis of learning experiences of the Dutch CEA ecosystem and an analysis of the Kentucky CEA Ecosystem through a cluster analysis of the horticultural complex, using the Triple Helix model and Porter's Five Forces. For this purpose, six Dutch agrocluster experts were interviewed and six stakeholders active in the Kentucky horticultural supply chain. In addition, the Knowledge System in Kentucky was examined using the Agricultural Knowledge and Innovation System approach by interviewing 29 local experts. The results were translated into 10 recommendations elaborated into more than 30 actions for the development of the CEA ecosystem in Kentucky.

Key words: Kentucky, AgTech Ecosystem, Controlled Environment Agriculture (CEA), feasibility study, Dutch agroclusters, AKIS, cluster analysis, horticulture

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Preface

This study provides a number of practical recommendations to support the development of an AgTech Ecosystem, defined as Controlled Environment Agriculture (CEA) in the state of Kentucky in the United States of America. This advice is primarily aimed at the Kentucky Agricultural Development Board, and the Government of Kentucky, being the co-commissioners of this study, but also for private companies, knowledge institutions and other non-governmental organizations, such as sector organisations.

This report is a synthesis of two assignments, provided by the Kentucky Agricultural Development Board and the Dutch Ministry of Agriculture, Nature and Food Quality. The report builds on the findings of an Inception study, delivered in November 2021, commissioned by NL Works, part of the Netherlands Enterprise Agency. A joint team of researchers from the University of Kentucky, Wageningen University & Research, Vision Granted consultants conducted the study with support from the University of Pikeville.

The study describes the results of a comprehensive analysis of horticultural products produced in high-tech greenhouses in Kentucky using Porter's Five Forces, an analysis of the Agricultural Knowledge and Innovation climate, and an analysis of the learning points from the development of the Dutch CEA Ecosystem. The results are based on existing literature and several consultations with a large number of stakeholders.

The results will support the Kentucky private and public sector in making choices for establishing a successful CEA ecosystem in cooperation with the Dutch private and public sector.

We would like to express our gratitude for the support of the commissioning parties, including
Mrs. Angelica Sanchez Vega, Mrs. Anne Franklin and Mr. Joshua Seeberg from the U.S. and
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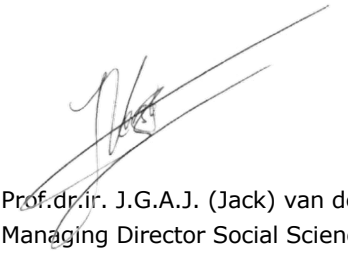
Furthermore, we thank all those whom we have spoken to as researchers and who have candidly shared their opinions and views.



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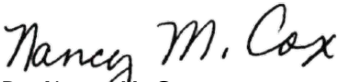

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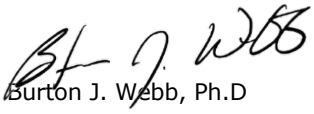

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Executive summary

As Kentucky seeks to increase the impact of Controlled Environment Agriculture (CEA) it is instructive to look to parts of the world where CEA contributes significantly to economic and food production. One such place is the Netherlands. In this report, we seek to compare and contrast the CEA opportunities in Kentucky and the Netherlands with an eye toward learning as much as possible so that we might accelerate growth across the commonwealth of Kentucky. Indeed, the recommendations and action items in this report are ready to be leveraged by innovative stakeholders across the industry. Collaboration across disciplines, industries, and policy is of critical importance and will set the tone for other industries seeking to call Kentucky home.

Background

In Kentucky, the economic downturn in 2008 resulted in the decimation of an already struggling coal industry. In the years that followed, the low price of alternative fuels and the emergence of a global pandemic combined to eliminate over 100,000 jobs from the Commonwealth. An energy and water-rich state, Kentucky is currently struggling to redefine its economic future. In recent years, a variety of industries have emerged that offer hope to people struggling to find productive work. Among them, the CEA industry stands apart. Since 2018, approximately $1.6bn has been invested in CEA, resulting in the construction of dozens of acres of high-tech greenhouses and indoor farm facilities in Kentucky.

In early 2020, a group of government officials joined with academics and industry partners to study the ways in which the Netherlands has clustered and developed the CEA industry. The Netherlands has the most advanced and productive CEA systems in the world, exporting more fresh food than any country other than the United States, despite the fact that the Netherlands is roughly the size of Eastern Kentucky. They returned to Kentucky in the early weeks of March 2020, and despite the rapid emergence of a global pandemic, formed a collaborative agreement dedicated to building a CEA Ecosystem that resembles the system they saw in the Netherlands. Twenty-six businesses, educational institutions, and government partners are now part of this collaborative effort which links the Commonwealth of Kentucky to the Netherlands. This collaboration between the Netherlands and Kentucky can be fruitful for multiple sectors than only for CEA.

By 2021, two independent but interrelated feasibility studies had begun; a case study Kentucky Horti Center by the Dutch consultancy, HortiTech, and an inception study conducted by Wageningen University & Research (WUR). The inception study was continued by the feasibility study you now hold which was conducted as a joint venture by the partners described herein. **The objective of this study is to expand upon the recommendations of the inception study by describing in detail the conditions needed to build an ecosystem sufficient to support the growth of CEA across the region.** While the results of this study are primarily intended to direct the growth and development of the Controlled Environment Agriculture (CEA) as part of the AgTech ecosystem, many of the recommendations will also benefit other agricultural and related sectors.

Controlled Environment Agriculture (CEA)

In traditional agriculture, the farmer (or grower as they are known in the Netherlands) plants their crops in the soil and is, thereafter, at the mercy of the weather. Sun and rain come and go. Some years are more productive than others and you can never be sure how much plants will produce. In controlled environments, nearly all of the variables that affect crop production can be controlled to produce the best-tasting foods in predictable quantities. In Dutch systems, the production of foods like tomatoes, cucumbers, peppers, berries, and flowers has been maximized to a tremendous extent.

CEA growing includes everything from hoop-covered rows of plants (minimal control) to greenhouses (intermediate control) to fully indoor growing systems (maximum control). In general, the more control over growing conditions the more technology is used. When we refer to low-tech, mid-tech, or high-tech CEA systems, those are simple plastic covers, high tunnels that can be ventilated with irrigation systems, and

glasshouse greenhouses with heating and/or cooling facilities, recycling of drainage water, CO_2 dosing, and lighting systems, respectively. Indoor farming, where everything, including light, is controlled, also belongs to the latter category.

CEA is a technologically intensive process that results in the concentration of food production in some very specific ways. For a CEA system to be successful, it must be located on suitable land in a location that is aesthetically pleasing at best, and at worst, not disruptive to neighbors. Nearby, there must be a sufficiently trained pool of laborers whose skills range from manual labor (picking, pruning, etc.) to highly technical. Since large CEA projects are expensive to build and operate, there must be adequate capital to fund CEA operators. Running large CEA farms requires access to water, energy, nutrients, and crop protection insurance. Management of these inputs with the proper control of the climate in the CEA requires extensive skill and expertise. Depending on the product, CEA operations will produce large amounts of biomatter waste which must be cleared from the system in an environmentally sustainable manner. Finally, and in the case of CEA production nearly every day of the year, marketable plant products must be collected, packaged, and transported to markets quickly to ensure freshness while maintaining taste and quality.

The CEA Ecosystem

Biological ecosystems are complex, interconnected networks of plants, animals, microorganisms, and climates that all work together to sustain life. Remove one thing from the ecosystem and the entire system is thrown off. Typically, biological ecosystems evolve slowly and the component parts become more complex and interdependent as time goes by.

In each sector of the Kentucky economy, there are examples of emerging ecosystems at various stages of development. Toyota has been making vehicles in Kentucky for more than two decades. They need hundreds of parts suppliers, engineers, capital, chip manufacturers, and energy and transportation infrastructure. The manufacturing ecosystem that Toyota inhabits is somewhat robust, but there remain a few glaring deficiencies - like the absence of a microchip manufacturer. Indeed, the U.S. automobile industry has still not recovered fully from the decline in the availability of microchips. The CEA ecosystem is no different, though the specific components are unique to the Agricultural industry.

We can think of this as the farm-to-table component of the ecosystem. At every step along the way, also known as the horticultural supply chain, there are partners in the CEA industry. Production itself is only a small portion of the equation; financing, building, maintaining, seeds, inputs, and using the technology to produce food are each intricate steps in the dance which require partners.

Still, these are the visible, obvious parts of the CEA ecosystem. Less obvious is the need to develop a focus on CEA in education, extension and research institutions, both as a way to train CEA farmers and workers and as a source of new knowledge. State and local governments will need to understand and enact policies and procedures which facilitate the special needs of CEA. Industrial clusters will need to be developed that coexist well together. For example, plants need CO_2 to grow and greenhouses require additional CO_2 inside to optimize the growth of plants. If governments could enact policies that would encourage the producers of CO_2 to co-locate with growers, the majority of CO_2 production might be quickly recycled into plant material rather than entering the atmosphere. Circular systems like these might be encouraged for CEA waste products as well. From solar farms to commercial composting facilities and water management systems, the world of CEA has developed systems and solutions that might be used across other industries as well. It is this cooperation across industry, education, and government that has made the Dutch CEA ecosystem so successful. They refer to this level of intentional cooperation as the triple helix model.

CEA is important to the world and Kentucky may be the key

The world is changing in ways that make the production of food increasingly important. As the climate warms and sea levels continue to rise, extreme weather events are becoming more common around the world. Changes in both climate and weather impact open agriculture's ability to produce enough food to feed our planet's population. In 2015, the United Nations published a report entitled Transforming Our World: The 2030 agenda for sustainable development. Embedded in that report were 17 goals for a sustainable planet, the Sustainable Development Goals (SDGs).

Sustainable production systems like CEA contribute to meeting at least 8 of the SDGs and score better than open field production on each. While each of these objectives is worthy of attention, the most important contributions are:

- **#2 Ending Hunger** through greater yield, due to longer growing and harvesting seasons, local production, and better quality;
- **#3 Good Health and Well-being** through increased production of affordable healthy fruits and vegetables that encourage more healthy food consumption in Kentucky and the surrounding states, contributing to a healthy society;
- **#8 Decent work & economic growth**: CEA contributes to the economic development of a region by creating jobs from manual labor to highly skilled labor;
- **#9 Industry, innovation, and infrastructure**: CEA is a very innovative and high-tech industry, utilizing automatization, robotics, and data management. It requires good infrastructural facilities such as good roads, refrigerated collection centers, standardized transport carriers, etc.;
- **#12 Responsible consumption and production**: CEA increases food security by producing locally rather than importing, optimizing yield, and using sustainable production techniques with limited to no emissions.

CEA offers opportunities for both sustainable economic growth and contribution to a healthy population. Many areas of Kentucky are suitable for CEA, with Central Kentucky being the most suitable.

The current state of CEA

The differences that exist between the state of the CEA industry in the Netherlands and the Commonwealth are quite striking. While in Kentucky the CEA cluster is in start-up mode, the Dutch CEA cluster has existed for over 100 years. Comparing the two clusters that are in vastly different stages of development can be challenging. In the Netherlands, there are approximately 25,000 acres of glasshouse greenhouses that must be carefully placed in a country that is roughly the size of Eastern Kentucky. For this reason, strict zoning requirements limit greenhouse locations in the Netherlands. While Kentucky has much more space to grow, the Commonwealth can benefit from the Dutch experience by taking advantage of regional clustering earlier in the development of CEA. The corporate cooperation required to accomplish clustering may not be as fast as an individual entrepreneur's path, but will ultimately bring cluster benefits and long-term cost reductions for energy, logistics, and labor.

One strength of the Dutch horticultural ecosystem can be found in its balanced approach to cooperation and competition. Cooperation can be seen in the way Dutch companies work together to strengthen the market power of producers, develop a skilled labor force, and in the creation of fundamental knowledge and (pre-competitive) innovation. Competition drives innovations in marketing and in technology development, ensuring a continuous focus on efficiency for all stakeholders.

Another reason for the success of the Dutch CEA is due in large part to a good knowledge system and willingness to share knowledge to ensure (education) and maintain (courses) the knowledge and skills for CEA for new and existing employees at all levels of the supply chain. This knowledge system is characterized by intensive connections of knowledge parties (research, extension, education) that has been transformed over time into to the Triple Helix approach, formalized in one of the nine existing Top sectors called "Horticulture and Starting Materials": Triple meaning the collaboration between 1) government, 2) research & education, and 3) industry. This approach to knowledge sharing is both policy and practice in the Netherlands.

By contrast, there are many attractive aspects of CEA and its potential in Kentucky agriculture is quite impressive. Kentucky has location and cost advantages for production efficiency, logistics, and market proximity. There is a good base of interest in CEA ranging from simple high tunnels to extremely sophisticated large-scale systems. Kentucky does have some locational and resource advantages compared to some other regions, especially for proximity to key markets, relatively low energy input costs, and an opportunity to enter value added products within the CEA space.

Markets for many commodity products traditionally produced in CEA systems are highly competitive. Similar to the Netherlands, the vegetable sector is highly competitive in the U.S. Spain is to the Netherlands what

Mexico is to the U.S. Low-cost labor and ideal growing conditions help to keep cost prices low. To address this competition, Dutch horticulture has specialized in high-quality horticultural products and adding value to the product through complete assortment offerings, new varieties, high-quality packaging, and fast logistics services, all resulting in a better, tastier product in grocery markets. Likewise, Kentucky should focus on varieties that are not imported from Mexico, high-value products with short shelf life (strawberries, leafy greens, etc.), good logistics, and high-end products (infant food, specialties, snack vegetables, fresh herbs, etc.), more added value (fresh washed, packed, ready-to-eat, ready-to-cook, etc.), ingredients for the pharmaceutical or cosmetic industry (medicinal herbs, vanilla, etc.) or ornamentals (indoor and outdoor plants and flowers). Kentucky should join the Netherlands in their search for new means of mechanization and automation, thereby reducing the cost of labor.

Topics for Discussion

As we reviewed the data generated by this work and our more detailed conversations with academics and growers in the Commonwealth of Kentucky, several themes/concerns continually made their way into the discussion. Though a few of them overlap with the recommendations section that will follow, we believe they are worthy of mention in this executive summary.

We must be aware of the push/pull relationship that exists between the investment in technology and the available markets for produce. The additional investment in CEA's technology should be recouped through increased income from higher production, new crops and improved quality. In recent years, existing regional direct markets for small-scale high tunnel growers seem to absorb this increase in production and better quality. However, when quantities rise new outlets must be found to market the product. These small-scale entrepreneurs will have to learn to take full advantage of high tunnels opportunities, establish and manage supply chains, cooperate with fellow growers to pool production, and enter into sales agreements with wholesalers or retailers. This will create a market pull for further intensification rather than via a technology push. Market pull and technology push go hand in hand.

Great care must be given to selecting the locations in which to build clusters for the CEA system. The inception study conducted by Wageningen University & Research indicated that the Central part of Kentucky is most suitable. Because logistics are important, the intersection of the I-75 and I-64 corridors in Central Kentucky held the greatest transportation potential. Proximity to cities also increases the availability of a skilled labor force. This same location, in Central Kentucky, might be home to an innovation demonstration center that extends throughout the Commonwealth.

Perhaps the most critical investment will be in a statewide network of institutions involved in innovation, research, and education, scientifically called the Agricultural Innovation and Knowledge System (AKIS). CEA growers will inevitably experience real-world problems that must be solved in research and development centers spread across the Commonwealth. Sharing knowledge is powerful and necessary if the CEA industry broadly, and CEA in particular, is to thrive. Demonstration centers (the Dutch call these Horticenters), educational programs, and job skill development should be done near where workers live so they can enter the labor force and quickly upskill to better-paying positions in the industry. As CEA reaches into the far corners of the state, it must also carry the message of hope that started this summary. Agriculture, in particularly CEA, is a vibrant and innovative industry, there is hope for family farms, and mid-tech high tunnels, and it can be found in high-tech sustainable CEA. The generation of students in elementary, middle, and high school across the state are part of generation Z. As a whole, these students care more about collaboration, sustainability, and our place in the world. Certainly more than the Boomers, Gen X, and the Millennials. Engaging their innovative abilities with the UN sustainability goals will also be important, and AKIS can help.

Finally, we must discuss collaboration across the Dutch Triple Helix in Kentucky. The government, the private sector, and educational institutions each have an important role to play in the development of CEA. At present, each works independently, doing what they can to move the CEA industry forward, but working alone is not enough. Significant partnerships must be established, funded, and maintained across the helix for Kentucky to replicate anything close to what the Netherlands has accomplished.

The recommendations

Examining the differences between the Dutch system and the developing systems in Kentucky, this study provides a number of recommendations.

Each of these recommendations comes with action items that are listed below:

1. **Establish a state-wide CEA industry development Taskforce.** One of the most important lessons we can learn from the Netherlands is that collaboration across the Triple Helix is essential. While the Commonwealth of Kentucky does have a taskforce looking at AgTech, we believe there is room for a taskforce specific to CEA. The CEA industry development Taskforce should be the first step toward formal collaboration between growers, educational institutions, and governmental agencies (the Triple Helix Model). Representatives from across each of these sectors should be selected based on their support for the idea of developing the CEA industry. The taskforce must be non-partisan and committed to the economic development of the entire Commonwealth.
   - The Kentucky Department of Agriculture (KDA) should take the initiative to create this CEA Industry Development Taskforce, including balanced agency representation.

2. **Establish a Kentucky greenhouse growers council.** In addition to the Triple Helix, a professional member organization of greenhouse growers should be formed to guide the spatial, relational, and temporal organization of greenhouses, R&D centers, and other co-clustered businesses. This growers council should review state policy and make recommendations to elected officials on behalf of the greenhouse growers across the state.
   - The University of Kentucky and the Kentucky Horticulture Council should take the initiative to create this Kentucky Greenhouse Growers Council.

3. **Invest in and develop CEA research and development, extension, and innovation networks.** CEA businesses need continual innovation to maintain a competitive advantage. This requires educated and skilled entrepreneurs and employees at all levels. Innovation networks have the additional benefit of creating new knowledge that often leads to spin-off industries. The benefits of rapid investment in education and research cannot be overstated.
   - If the Agritech Research & Development (ARD) Center Kentucky ('PATH Kentucky') will be approved by the Build Back Better program, this will mean a jumpstart for the development of the CEA Research and Development. Just recently, the proposal for a UPIKE AgTech Innovation Center of Excellence has been approved already. Both CEA research and development facilities, focusing on sustainable agriculture methods, will be the centers for knowledge development, demonstrations and business development;
   - The KDA and the Taskforce should develop a comprehensive Public Private Partnership research program most supportive to firms in a CEA industry in Kentucky, focusing on the sustainable production and trade of vegetables and ornamentals;
   - The KADB should evaluate the Dutch Coupon program and whether this would be implementable in Kentucky;
   - There should be investments in specialization of the extension workers in CEA skills as well as investments in staffing levels;
   - The Extension Service should organize a knowledge enhancement program for CEA farmers or farmers interested in CEA of demonstrations at existing experienced CEA farms in coordination and cooperation with the planned new research centers mentioned above;
   - The Extension Service, in cooperation with the USDA-NASS, should develop a report entitled "Quantitative Information for Greenhouse Horticulture: key figures for vegetable, cut flower, pot and bedding plant crops, containing financial and technical economic data";
   - The University of Kentucky together with other academic partners in the state and in the US should set up a CEA knowledge network in the U.S.;
   - Encourage international academic collaborations, such as currently being developed between University of Kentucky and Wageningen University & Research.

4. **Invest in and develop CEA educational programs.** CEA educational programs across the educational lifespan can open the doors of opportunity for students and adults who want to work in an industry that will always be needed by every person on the planet. As the CEA industry grows, there will be a

significant need for well-trained managers, growers, and logisticians. Higher education must respond as well by offering programming that meets the myriad of needs generated by the CEA industry. From engineering, to robotics, to finance, the Kentucky workforce must come to understand the value of AgTech and CEA.
   - The Kentucky Education Department should evaluate the benefits of a CEA education & innovation platform, in which all agricultural colleges in Kentucky unite in, acting as a booster, accelerator and connector between business, education and government;
   - Council on Post-secondary Education (CPE) continues establishing student exchange programs between Kentucky Academic Institutions and those in the Netherlands;
   - The CPE and Kentucky Education Association (KEA) should develop a coordinated CEA curriculum across the whole learning chain (from elementary school to University);
   - Procurement of knowledge and teaching materials by the agricultural colleges associated with CEA in Kentucky from the applied agricultural Dutch schools.
   - Framing and promoting CEA education as a green lifestyle education instead of an agricultural education;
   - Demonstrations of CEA in schools such as the ongoing program AgTech classroom program of Appharvest which is already at more than a dozen schools.

5. **Establish a clear pathway for open field and mid-tech high tunnel growers to grow towards high-tech CEA production**. Although the family farm has been disappearing for more than a generation, by using CEA technologies, family farms can be profitable and sustainable in scale-appropriate ways, as the Netherlands has shown. This is especially true for value-added and difficult-to-grow products. The pathway exists, but it needs to be carefully marked for Kentucky farmers to find the way.
   - The Taskforce should evaluate and demonstrate new and applicable mid-tech and high-tech technologies for potential use in Kentucky;
   - The Taskforce should investigate the affordable availability of capital and insurance options for CEA development for companies developing from mid-tech to high-tech, as well as for high-tech companies.

6. **Encourage market development and value chain management for Kentucky-based CEA firms through cooperation.** As Kentucky CEA firms produce more products, there will be an ongoing need to cooperate to generate new markets for their products. Innovations that increase the size of the available market should be incentivized in a way that encourages collaboration.
   - The Taskforce should increase marketing opportunities for small-scale growers to open up new direct markets and institutional markets in Kentucky and surrounding states through a coordinated marketing approach to further cooperation among growers, auctions and traders in Kentucky;
   - The Taskforce and KDA should invest in a chain management knowledge building program for growers and other stakeholders in the CEA value chain;
   - The KDA could examine the European Common Market Organization Instrument for potential adaptation and implementation in Kentucky.

7. **Develop a CEA workforce development plan in collaboration with the CEA industry development taskforce.** In the last two years, hundreds of people have been employed in CEA firms and that number is expected to double in the next two years. The Commonwealth needs a workforce development plan that will rapidly train frontline workers and enable those who chose to upskill access to the training they need. CEA firms will do some of this on their own, but a joint effort will be much more effective.
   - The Taskforce should design a workforce development plan with the main focus of training existing staff working in CEA;
   - Specialized staffing agencies for CEA should be encouraged and the development of workforce training should be prioritized.

8. **Develop and pursue a CEA spatial development strategy involving state and local agency partners.** One of the first tasks of the Taskforce should be the identification of several sites across the state that might be developed as CEA cluster development locations, greenports, and R&D centers.

Proximity to employees, water, energy, land, transportation, and markets will all be increasingly important, making Central Kentucky most suitable for the development of CEA.
   - Develop and pursue a CEA spatial development strategy, including the optimal location of the Agritech Research & Development (ARD) Center Kentucky, taken into account that Central Kentucky is most suitable for the development of CEA;
   - CEA industry should work with the Kentucky Energy and Environmental Cabinet to identify integrated, site specific options for purchasing energy and maximizing energy efficiency;
   - Additional research is needed into if and how CEA can be legally qualified as an agricultural activity in spatial designing.

9. **Devise and plan for sustainability within Kentucky's CEA ecosystem.** The goal for Kentucky CEA firms should be no net emissions. This means sustainable energy production, water use, and waste recycling. Kentucky has some systems in place to assist with this goal. Investments should be made in these systems and they should be located near the CEA firms' greenhouse sites wherever possible.
   - Study by the energy sector on the usage of sustainable energy or waste heat possibilities in CEA in Kentucky;
   - Study how cogeneration (Combined Heat & Power (CHP)) in CEA can be used in cooperation with the state energy supply industry;
   - The CEA industry, through the Growers Council and University partners should evaluate current waste management options and limitations and identify future needs;
   - The KDA should develop an comprehensive incentive and regulation program for sustainable CEA investment exploring how Dutch stimulation instruments could be utilized in Kentucky.

10. **Communicate the CEA story with society.** The story of CEA is a good one: economic development, employment, safe & healthy food production, and zero emissions. Educational and marketing campaigns can highlight the true benefits of CEA. Communication requires investment and a clear plan that includes education and fun events like festivals and cooking. Tell the story, and tell it with food.
   - The Taskforce should bring a good and understandable story to the general public in which CEA provides healthy, fresh and safe products and creates new interesting jobs for them, in analogy to other sector stories the as horse and the bourbon industry;
   - The Taskforce should organize an annual open day for general public to show how the products are grown in analogy with the Dutch "Welcome in the Greenhouse";
   - The Taskforce should organize an annual Food Festival in the state of Kentucky informing and inspiring consumers about healthy food and sustainable production systems like CEA;
   - The Taskforce should organize recreational activities such as flower parades or vegetable and fruit parades, like there are in the Netherlands.

CEA growers come in all sizes and produce a wide range of products. While the narrative of this executive summary carries the reader from an open field to a high-tech CEA system, there are many entry points to CEA growing systems. We all seem drawn to the large, flashy production facilities that are being built in certain corners of the Commonwealth. We must remember that other visions exist in this space as well. It is with the broadest possible spectrum of possibilities in mind that we leave you to read the full report.

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The mission of Wageningen University & Research is "To explore the potential of nature to improve the quality of life". Under the banner Wageningen University & Research, Wageningen University and the specialised research institutes of the Wageningen Research Foundation have joined forces in contributing to finding solutions to important questions in the domain of healthy food and living environment. With its roughly 30 branches, 7,200 employees (6,400 fte) and 13,200 students and over 150,000 participants to WUR's Life Long Learning, Wageningen University & Research is one of the leading organisations in its domain. The unique Wageningen approach lies in its integrated approach to issues and the collaboration between different disciplines.