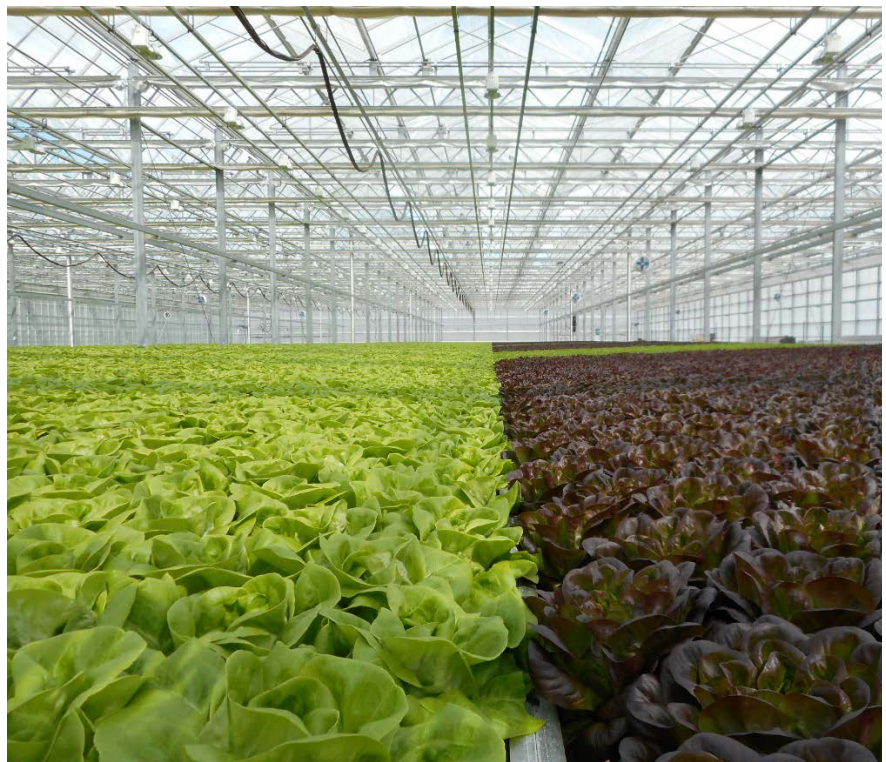




Cornell University
College of Agriculture and Life Sciences

MEETING REPORT



12/8/2015

CEA Advisory Board



CIFIS

The CEA Advisory Board was convened December 8th, 2015 in the interest of sharing the recent momentum around controlled environment agriculture, incorporating critical stakeholder input into the design of the new CEA business planning tools, and identifying concrete next steps. Forty attendees participated.

Meeting Report

CEA ADVISORY BOARD

Action Items from Meeting

- Neil Mattson to invite someone from New York State government, possibly from Ag & Markets, to sit on the CEA Advisory Board
- Miguel Gomez will share the experimental design prior to the consumer willingness-to-pay research
- Julie Stafford will share the final list of buyer segments and the proposed discussion guide for produce buyers prior to initiating interviews
- Neil and Miguel will provide an early prototype of the online, interactive spreadsheet for a sub-set of the Advisory Board (small and large growers to be represented) to offer feedback
- Curt Gooch will invite CEA Advisory Board members to the upcoming Summit on anaerobic digesters and CEA
- CEA email list will be shared and will provide name and affiliation of participants
- Neil Mattson and Julie Stafford will convene a discussion with each Working Group, potentially sequentially and by teleconference, by the end of March

ONE | CEA MOMENTUM THROUGHOUT 2015

Neil Mattson and Julie Stafford provided an overview of the evidence for a building momentum around CEA throughout 2015, through new funding streams, retail and food service trends, and emerging agricultural synergies.

Dr. Stafford reminded the group of the expansion Gotham Greens had undergone last spring by opening a new store in Chicago, as well as the recent \$13.65 million investment secured by BrightFarms, Inc. to meet the demand they are experiencing from leading supermarkets.

There was an update on the status of the Greenhouse Lighting and Systems Engineering [GLASE] Consortium. Dr. Mattson indicated that the Entrepreneur-in-Residence at NYSERDA had reviewed the GLASE plan and recommendations were being addressed. There was also recognition that our main purpose for the first half of today was to focus on guiding the research funded by the New York State Department of Agriculture and Markets since our last gathering in April 2015. Dr. Stafford also provided an overview of the inclusion of CEA in both the Southern Tier and Central NY applications to the Upstate Revitalization Initiative. The group discussed the possible implications if one or both areas were to be funded and pondered the increased urgency in meeting needs and taking action that might result.

The opening session closed with commenting that four of the top five food trends for 2016 identified by the National Restaurant Association include locally-sourced, locally grown, hyper-local sourcing and natural ingredients/minimally processed food. All of these relate to CEA. Restaurants appear to be a sector that we have not incorporated sufficiently to date. In addition, new opportunities to use energy more efficiently by linking anaerobic digesters and CEA facilities was mentioned as a topic to be discussed more fully later in the day. Finally, a NYS map with the location of CEA growers and suppliers was proposed. Participants were encouraged to add to the map, as this was to be a “work in progress.”



TWO | "BUSINESS TOOLS TO STIMULATE GROWTH OF NYS'S YEAR-ROUND GREENHOUSE VEGETABLE INDUSTRY": RESEARCH DESIGN INPUT

Neil Mattson introduced the Advisory Board to the Specialty Crop Block Grant funded by NYS Ag. And Markets that was designed and submitted immediately following the April 2015 Stakeholder Forum in response to growers' and stakeholders' expressed needs. He shared that the CEA proposal was one of only two grants that received a "definitely fund" designation out of the 20 competing, emphasizing the importance placed on year-round growing potential by the funding agencies.

The overall goal is to help grow the number of within-state CEA growers. The grant states a target outcome of 10 new CEA vegetable facilities in NYS, annual producing \$5 million in crops by 2020 as a result of project activities. To achieve this outcome, the project proposes to conduct research on consumers' willingness-to-pay for locally-grown produce and on produce buyers' stated needs in order to buy local. In parallel the project will develop interactive spreadsheet tools used to estimate the capital investment and operating expenses for building and operating a year-round CEA vegetable facility in NYS. Collectively, this information will be used for new or transitioning entrepreneurs to aid in developing realistic business plans and in accessing capital.

The project also includes outreach efforts to share the business tools with 400 existing or potential operations. Participants in the outreach activities will be invited to apply for one of 30 spots at a 2-day CEA entrepreneur workshop. The workshop will include presentations on marketing and business planning from team members and key members of the advisory panel including current CEA producers, financiers and produce buyers. Attendees will be expected to develop a business plan following the workshop.

Ultimately, this work will contribute to New York becoming the food capital of the east coast.

Neil articulated that the role of the Advisory Board was to provide input on the research design so that the final output is as relevant as possible for CEA producers throughout the state.

Board members inquired whether or not anyone from the state was involved and whether someone from Ag and Markets should sit on the board. While Neil had held conversations with individuals at the state level, he stated that no one was on the board as of yet. This will be a follow-up Action Item.

It was also recommended that we reach out to the Food Industry Alliance for their support and connections. Joe Berman recommended contacting either Mike Rosen (CEO) or Maston Sansom (VP of State Government Relations).

Consumer Willingness to Pay: Dr. Miguel Gomez facilitated a discussion on consumer willingness to pay. As background, Miguel shared the previous work on the East Coast Broccoli Project and described the BDM auction-type task in which 150 consumers will participate at the economics research lab on the Cornell campus. He asked participants to identify the physical and insinuated attributes that may impact a consumer's willingness to pay. A dynamic discussion ensued and a number of questions were raised in terms of definitions of local/non-local, locally grown versus organic, and "local" not necessarily meaning "fresher."

At a broad level, food safety, flavor and health were identified. However, it was also recognized that some information that consumers might find helpful producers and/or retailers are not able, or willing, to provide due to federal regulations or business implications. Some examples include: pick time to table, pick time to market, and nutritional value or quality. It was also pointed out that plant nutrients are dynamic, not static, and nutritional value will be influenced by when the harvest happens (early or late, high or low light), root substrate, and environmental conditions. It was not clear that the desire for a nutritional quality rating would be able to be included at this time.

Food waste was also discussed in terms of shrinkage during shipping. The example of an institutional food distributor experiencing 50 – 57% shrinkage was mentioned, as was the understanding that one quarter of trucks shipping from CA to NY lose their produce to food waste. Countering this potential benefit of locally-grown produce was the fact that processing plants are not necessarily in place nearby, but non-local producers may be more likely to have access to established processing infrastructure, Non-local may, in some cases, be "fresher."

While the local versus non-local dimension may have served as a surrogate marker for a range of indirectly-related variables in the past, it was not clear that this comparison should be the basis of consumer decision making at this time. Consumers may make the wrong inference from a local versus non-local description. Educating consumers was a primary concern of Advisory Board participants.

The grant funds the ability to examine two products: Lettuce and tomatoes. Participants concurred that these were acceptable and needed.

Miguel will send out the experimental design for review prior to the consumer willingness-to-pay research being undertaken.

Produce Buyer Requirements: Julie Stafford shifted the focus to the demands of produce buyers and what they are looking for in locally-grown produce. She explained that the grant expected 10 different buyers to be interviewed. One of the first issues raised by the Advisory Board was the definition of the "produce buyer segment." There was agreement that a produce buyer must be an individual with responsibility for making a decision to buy; none of the interviewees should merely influence the buying decision. This then led to a discussion about which channels of distribution should be represented. Some board members were looking for large and sustainable channels, while others mentioned local channels regardless of size. For larger producers this list included: mass market (e.g., Wal-Mart), specialty stores, institutional (e.g., restaurants) and distributors (e.g., one in Michigan controls 80% of the business). However, for smaller producers the list included local customers (e.g., through farmers markets) and restaurants. Julie will follow up with an examination of the size of different channels and propose the sub-segments to be represented.

The remainder of the discussion covered products (i.e., lettuce and tomatoes), product attributes, packaging and price. The group pointed out that there might be some differences depending on which product the buyer is evaluating. There was also a relevant debate regarding if a buyer would purchase from one grower for six months and then switch to another. Participants recognized that buyers do not want to buy from 150 different CEA producers and that seasonality is still an issue. Consumers in NYS cannot buy local year round without CEA. There was a need expressed for Cornell to help provide infrastructure and guidance to guarantee a continuous, year-long supply. Finally, maintaining good communication was acknowledged to be the key to the entire process, for producers to have a market and buyers to have a consistent source to meet consumer demand.

Important attributes included: GAPS certification, novelty of the product, nutritional value, “look good, taste good, good nutritional value.” One board member commented, “If you cannot produce those (food safety) documents, you are out of business.” Novelty in shape and color were attractive attributes but only so far. If the product was too removed from what consumers are used to seeing, it was thought not to do well in the marketplace. Packaging was touched on and recognized to be a feature for differentiation which CEA producers should work on.

In terms of price, the group identified that if the price for CA produce is the same as local this sometimes raises questions – i.e. in some cases a premium price might be expected by consumers purchasing a premium product. Again, the group ended with a call for education in various market spaces and the need to motivate consumers through a range of communication channels.

Julie will send the final list of buyer segments and the proposed discussion guide for produce buyers out to the Advisory Board prior to initiating interviews.

Interactive Cost-production Tool: Neil and Miguel facilitated the last area for the Advisory Board to provide input for the grant project, which was the financing for CEA. They explained that the intent was to construct an online, interactive spreadsheet which producers could utilize as a cost-production tool. The tool would provide initial costs and set benchmarks, but entrepreneurs could adapt it for his or her own purpose. There was extensive discussion among board members around the differences in facility size and the implications of being a small grower versus a large grower. Some contended that small growers cannot afford a costly structure and there will be a need to determine the target audience. In particular, the high impact of energy costs was mentioned and participants expressed the need for an energy model to be incorporated in the development of the cost structure. There was debate also as to whether CEA was a mainstream, mass market production channel for agriculture yet or not, with different levels of experience represented in the room.

The feedback will be incorporated into draft outline of the scope and categories for the business planning tools which will be shared with the Advisory board for review.

THREE | CASE STUDIES ACROSS CEA EXPERIENCES

Three case studies were presented to provide a range of issues and types of decisions facing CEA growers. Two of the three case studies touched on energy use, how it varies and how to mitigate the cost. Dr. Kale Harbick shared information on energy costs of greenhouses versus vertical farms, while Mr. Curt Gooch examined the potential benefit of linking an anaerobic digester and a greenhouse. Dr. Phillip Griffiths shared a case study on vegetable breeding for CEA which could spark interest in new types of crops for market growth.

- In Kale's case study of energy costs of greenhouses versus vertical farms, he reminded the group that rigorous energy modeling techniques have been used in the commercial building sector for decades. Now he and the Cornell CEA team are applying them to CEA structures. Under currently available conditions, Kale reported that a plant factory (i.e., one story vertical farm) consumes three to six times the lighting electricity of a greenhouse with equivalent yield, depending on location. Even with HVAC included, he emphasized, a plant factory consumes more energy than a greenhouse with equivalent yield, and the disparity grows in southern latitudes. New and different energy scenarios are required for vertical farms to be economically feasible.
- Curt described the opportunity of harnessing the energy emitted from an anaerobic digester on a dairy farm to running a CEA operation on land nearby. He shared that there are 25 digesters in the state of NY and that 75% of the heat generated by digesters is currently wasted. The data he showed indicated that there is more heat available from the digester than what is needed by the greenhouse. He alerted the group to an upcoming summit in 2016 which present ideas on this issue.
- Phillip focused on how to engage the market with color and nutritional value. He contended that unlike past behavior where consumers demanded simplicity, today's consumer desires more diversity. He showed diversification in baby greens and microgreens, tomatoes shaped like a pepper, and variations in kale and broccoli. He also pointed out that vertical systems of today are typically growing crops that were bred for the field, when there could be breeding efforts specifically for indoor growing. He engaged the imagination by sharing examples of where high color is directly related to high nutrition, as is true with chlorophyll, carotenoids, anthocyanins and betalains.

FOUR | CEA ENTREPRENEURS: SIGNS OF THE FUTURE

Four entrepreneurs shared their vision and plans with the group. It was clear that innovation in NYS CEA is well underway.

- Tim Madden of CEA Fresh Farms engaged the audience with pictures of a high-tech, robotic system intended to be installed north of Syracuse. CEA Fresh Farms intends to grow over the next five years in 20-acre increments.
- John Cummings of Wheatfield Gardens described their combined heat and power system that adds heat, cools and removes humidity. Their process is under patent review. Their system will use red, white and blue lighting.
- George Slilaty described his group's interest in a farm-to-fork marketplace they plan to bring about through three tactics: a physical place where growers can commercialize their products, a virtual community with social networking and value-added services including a democratizing market access approach which links farmer to retailers, and scalable CEA facilities near centers of food packaging and distribution beginning with one planned for Binghamton.

- John Noble of Synergy, LLC and Noblehurst Farms, Inc. described one of his dairy farms and the anaerobic digester that he operates there. He invited attendees to engage with him to explore the possibility of transitioning 50 acres next to his digester to a greenhouse-based synergistic facility.

FIVE | PRIORITIES AND NEXT STEPS

Neil and Julie facilitated the afternoon discussion among the Advisory Board attendees to identify priorities and next steps. The discussion was wide-ranging and passionate with some of the same topics as in April but with a greater determination to achieve the transformation necessary for CEA to thrive in New York State. The topics included the need for capital, development of CEA-focused educational programs such as Master Growers, representation and lobbyists, and innovative approaches to energy availability and usage. Following three rounds of issue summarization, the Advisory Board agreed on establishing four CEA Working Groups, each with a leader:

- **CAPITAL/FINANACIAL INVESTMENT** to be led by Bill Vogelgesang of Epoch Purposeful Investing
- **EDUCATION & TRAINING** to be led by Tim Madden of CEA FreshFarms
- **POLICY/PROFESSIONAL ASSOCIATION** to be led by Keith Sernick of State Street Advisers or Joe Berman of PriceChopper
- **RESEARCH & DEVELOPMENT** to be led by Mike Rutzke of Cornell University

Working Groups were charged with securing four to five members and identifying goals (short-, medium-, long-term). The Groups were encouraged to imagine the vision of their desired “future state” and then to work backwards to achieve that vision.

Advisory Board members indicated a strong desire to meet, or at least connect, quarterly. They also inquired as to what the implications might be if URI funding for CEA came through in the next few days. [See Post-script for a summary.]

- The next Advisory Board meeting will be held in July 2016

Postscript - Upstate Revitalization Initiative

It is with great excitement that we share with you that Central NY, the Southern Tier and the Finger Lakes Economic Development Regions each received \$500 million as part of the URI awards. In particular, we congratulate CEA Fresh Farms for the investment they were awarded as part of Central NY. Cornell also received an award related to agriculture and CEA, including the development of the Plant Sciences Innovation & Business Development Center. This will provide us with the momentum needed to help each other, to grow the upstate NY economy, and to serve our customers better far into the future.