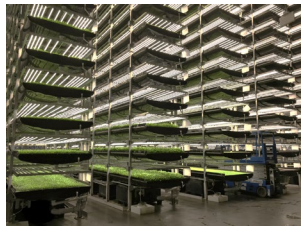

Building Sustainable Triple Bottom Line Indoor Farms

Dr. Eric W. Stein
Center of Excellence for Indoor Agriculture
Penn State

Presented on Oct 29 2020
Hosted by Indoor Ag-Con

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Acknowledgements

AeroFarms®

AppHarvest

f˚fth season

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Outline

- Introductions
- Defining Sustainability and the Triple Bottom Line
- B-Certification
- About the Farms
- Discussion
- Summary and Conclusions

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About the Panelists: Dave Nichols

- **Affiliations**
  - Director of Strategy, AppHarvest
  - Managing Director, Pangea Capital Partners
- **Background**
  - 15 years working with venture start-ups
  - Socially responsible investing
  - Carbon credit projects
  - Clean energy and clean-tech finance
- **Education**
  - Columbia Business School (MBA)
  - University of Delaware (BS)

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About the Panelists: Alexander Rudnicki

- **Affiliation**
  - Head of Farm Design, AeroFarms
  - Leads daily operations for vertical farm capable of growing 1.5M lbs of produce annually
- **Background**
  - Project estimation
  - Market research and business development
  - Renewable energy
- **Education**
  - Columbia University, Environmental Science & Policy (MPA)
  - Columbia University (BS)

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About the Panelists: Grant Vandenbussche

- **Affiliation**
  - Chief Category Officer at Fifth Season
  - Strategy, Finance, Product, Business Development, Marketing, and Sales
- **Background**
  - Product and Business Development
  - International Operations
- **Education**
  - Carnegie Mellon University – Tepper School of Business (MBA)
  - Michigan State University (BS)

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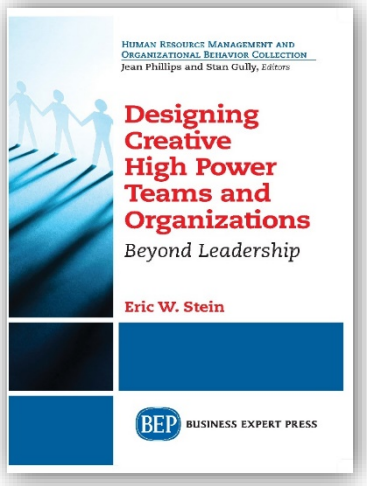
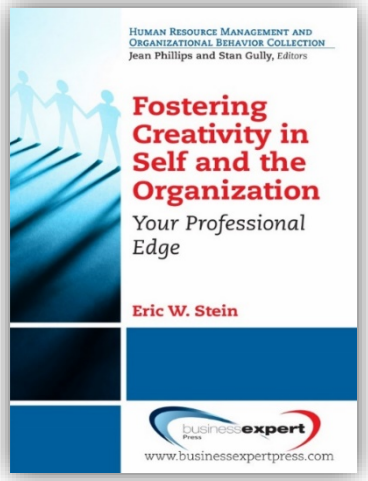
About the Moderator

- **Affiliations**
  - Tenured Associate Professor of Management Science and Information Systems at Penn State Great Valley School of Graduate Professional Studies
  - Executive Director of the Center of Excellence for Indoor Agriculture
- **Background**
  - Business school professor
  - Consultant to business and industry
  - Author of two books on creativity, innovation and strategy
  - Run a small R&D indoor vertical farm
- **Education**
  - The Wharton School at the University of Pennsylvania, Ph.D. (Managerial Science)
  - Amherst College (BA) Physics





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About the Center of Excellence

- Our mission is to accelerate the global transition to indoor farming production methods that are safe and sustainable and to empower indoor and vertical farmers with the knowledge, tools and resources to build profitable businesses.
- “Indoor Ag Center Best-in-Class Awards”™ for Growers and Equipment Manufacturers

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Indooragcenter.org

What is Sustainable Development and the Triple Bottom Line?

Sustainable Development Defined

- Sustainable development involves the simultaneous pursuit of economic prosperity, environmental quality and social equity.
- Companies aiming for sustainability need to perform not against a single, financial bottom line but against this triple bottom line.

The World Business Council for Sustainable Development .
https://www.sustainabilityambassadors.org/sustainability-defined

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The Triple Bottom Line (TBL)

- People
  - Community impact
  - Fair wages
  - Transparency and Accountability
  - Governance
  - Working conditions
- Planet
  - Product and service value
  - Land use
  - Inputs – water, energy, raw materials
  - Outputs – e.g., solid waste, water, air
  - Transportation and distribution
  - End of life for products
- Profit
  - All business must derive a profit from venture otherwise it is not economically sustainable

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Farm-Centric View of Sustainability
-Value Chain-

5. Social Impacts

2. Environment:
- Water
- Air
- Land
- Energy

Suppliers
- Raw Materials

1. Farm
- Production

Distributor
- Packaging
- Transport

Consumer
- Products

3. Waste
- Packaging
- End of Life Products

Sustainable Practices

4. Impacts
- Human Health
- Water, Air, Land
- Solid Waste
- Bio-diversity
- CO2 and Heat

"Externalities"

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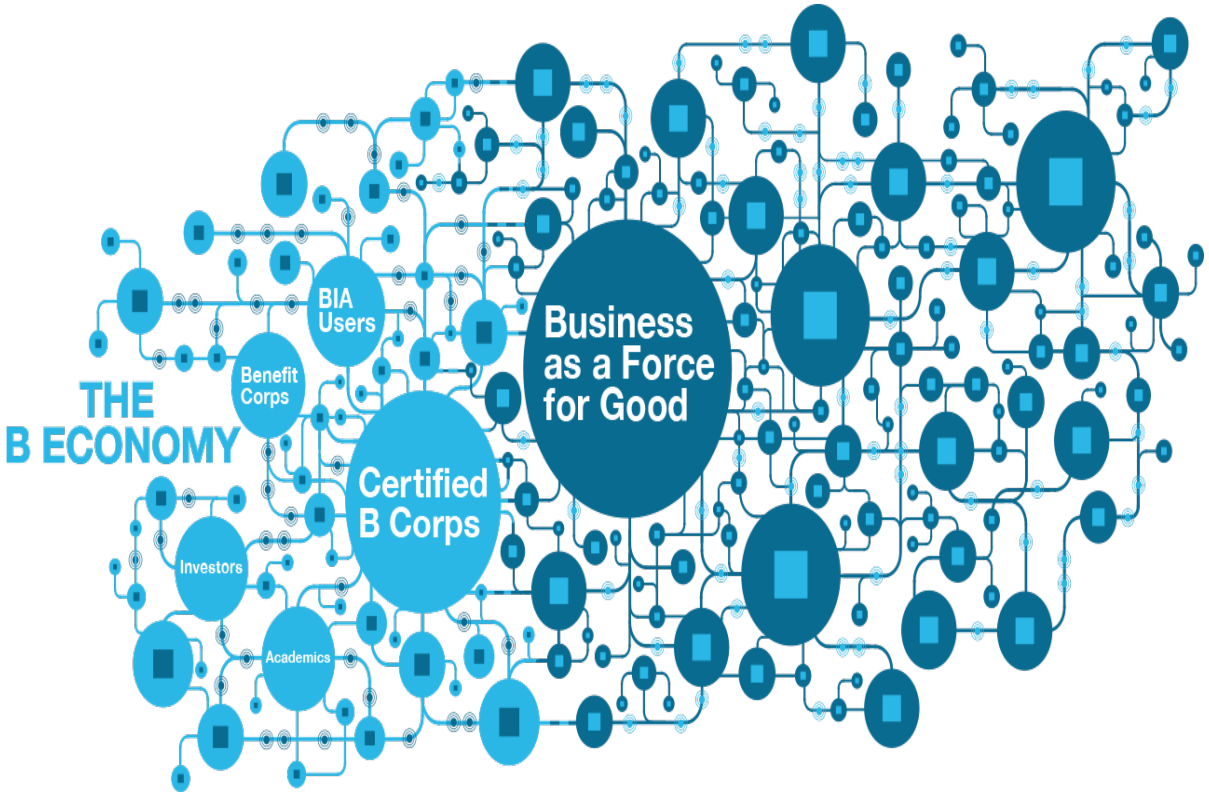
Recognition for TBL Companies: B-Certification

- B-Certification by B-Lab
  - Demonstrates commitment to TBL principles and measures them
- Open to any company that is chartered as a Benefit (B) Corporation
- It begins with a B Impact Assessment (BIA)
  - Includes workers, community, environment, and customers



B Impact Scoring: Criteria for Evaluation

- People
  - Governance
  - Workers
  - Community
  - Customers
- Planet
  - Environment
- Profits
  - Required to stay in business
- Scoring
  - 0 to 200
  - Must be 80 or better for cert

See how they compare

King Arthur Flour Company
B Impact Report

103 B IMPACT SCORE

Impact Area	Average score of other businesses*	King Arthur Flour Company
Governance	10	14
Transparency	6	10
Accountability	3	4
Workers	22	61
Compensation, Benefits & Training	15	18
Worker Ownership	2	37
Work Environment	4	6
Community	32	16
Community Products & Services	15	0
Suppliers & Distributors	4	2
Local Involvement	5	4
Job Creation	2	1
Diversity	2	3
Civic Engagement & Giving	4	5
Environment	9	12
Environmental Products & Services	4	1
Land, Office, Plant	4	5
Inputs	2	2
Outputs	1	1
Transportation, Distribution & Suppliers	1	2
Overall B Impact Score	*80*	103

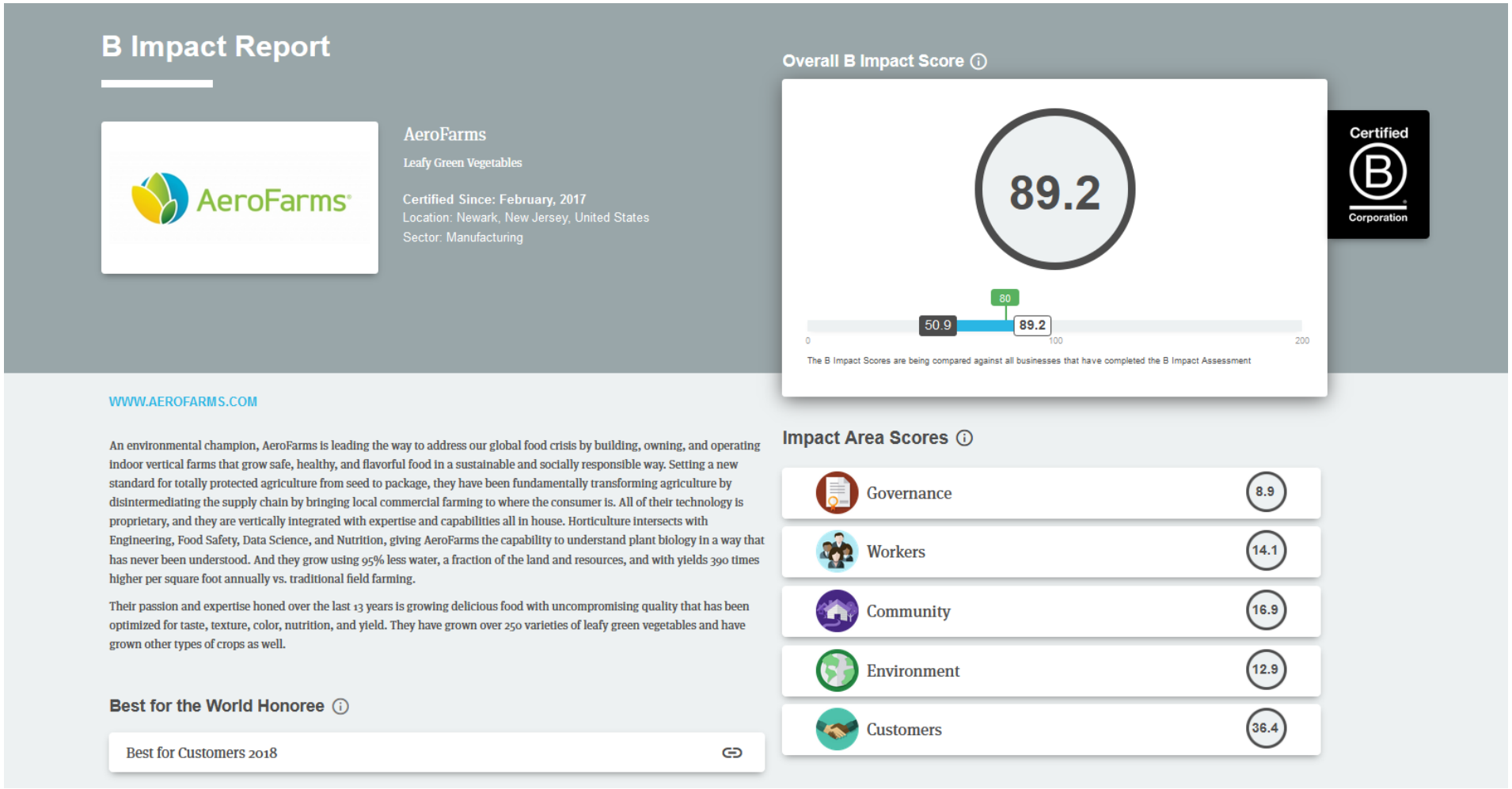
*Of all businesses that have completed the B Impact Assessment.

About the Indoor Farms of the Panelists

Aerofarms

- About
  - Founded 2004
  - $196M in funding
  - 125 employees
  - B-Certified
- Global Headquarters (Rome Street-2016)
  - Size: 70,000 sq. ft.
  - Harvest: Up to 2 million pounds per year
- R&D Farm (Market Street-2013)
  - Size: 5500 sq. ft.
  - Harvest: R&D
- Newark Farm (Ferry Street-2015)
  - Size: 30,000 sq. ft.
- R&D Farm - Abu Dhabi (Future)
  - Size: 90,000 sq. ft.

B Impact Report: AeroFarms



B Impact Report: AeroFarms

Governance — 8.9

Mission & Engagement	1.1
Corporate Accountability	1.3
Ethics	0.9
Transparency	3.1
+ Mission Locked	2.5

Community — 16.9

Job Creation	5.2
Diversity & Inclusion	2.3
Civic Engagement & Giving	6.0
Local Involvement	2.0
Suppliers, Distributors & Product	1.1

Environment — 12.9

Land, Office, Plant	3.2
Inputs	5.7
Outputs	1.0
Transportation, Distribution & Suppliers	2.2
N/A Points	0.4

Workers — 14.1

Compensation & Wages	2.3
Benefits	4.0
Training & Education	1.3
Worker Ownership	2.2
Management & Worker Communication	1.3
Job Flexibility/Corporate Culture	1.3
Occupational Health & Safety	1.1

Customers — 36.4

+ Health & Wellness Improvement	6.2
+ Serving in Need Populations	30.1

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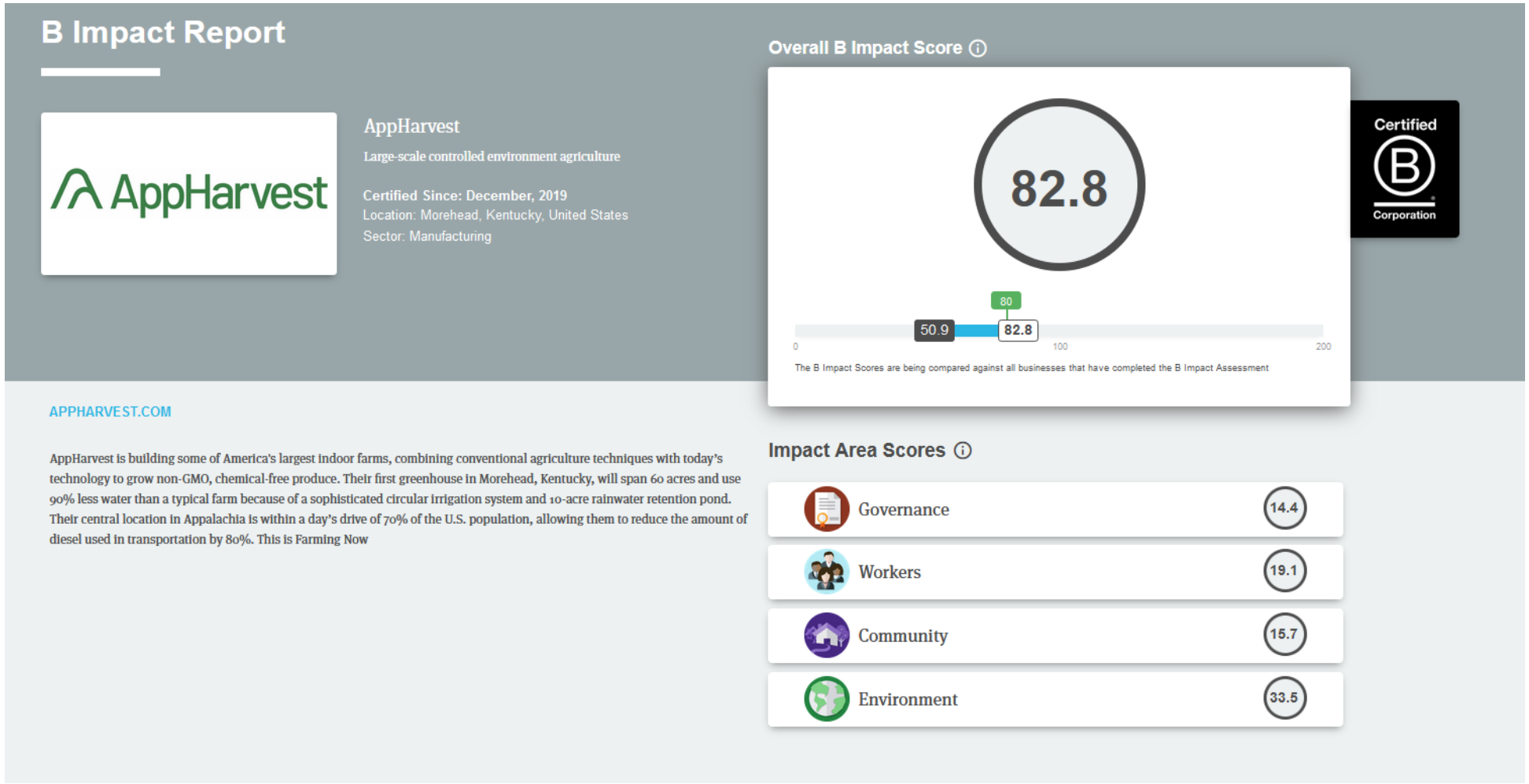
AppHarvest

- About
  - Founded in 2017
  - Morehead, KY
  - 47 employees
  - B-Certified
- Total Funding
  - Initial-$150M
  - 3-4Q 2020-Novus-$475M IPO
- Farm
  - 60 acre greenhouse complex
  - Crops: Tomatoes
  - Water retention system
  - First Harvest: 2021

B Impact Report: AppHarvest



B Impact Report: AppHarvest

Governance — 14.4

Mission & Engagement	1.5
Ethics & Transparency	2.8
+ Mission Locked	10.0

Environment — 33.5

Environmental Management	2.7
Air & Climate	1.3
Water	3.4
Land & Life	1.9
+ Environmentally Innovative Manufacturing Process	23.9
+ Toxin Reduction / Remediation	N/A

Workers — 19.1

Financial Security	10.1
Health, Wellness, & Safety	3.0
Career Development	2.9
Engagement & Satisfaction	3.0

Community — 15.7

Diversity, Equity, & Inclusion	2.5
Economic Impact	4.3
Civic Engagement & Giving	6.3
Supply Chain Management	0.0
N/A Points	2.5

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Fifth Season

- About
  - Braddock, PA
  - Founded 2015
  - Funding $40M
  - Originally RoBotany
  - Ties to Carnegie Mellon
  - Not B-certified but committed to many of the same TBL principles
- Farm
  - 60,000 ft2 farm
  - Crops: leafy greens
  - Intensive applications of robotics and automation in farm
  - Reduced labor and operating costs

Panel Discussion

Panel Topics

- Discussion (30 mins)
  - Moderator will interview panelists for their insights and thought leadership on topic.
- Panelists will discuss ways indoor farms can:
  - (i) contribute to people through mission, jobs and beneficiaries;
  - (ii) contribute to the planet through operations, methods of production and distribution channels;
  - (iii) build indoor farms that can achieve long-term sustainable economic results while supporting contributions to people and the planet.
- Q&A (10 mins)
  - Panelists will field questions from the audience supplied through the chat feature
- Summary and Conclusions (5 mins)
  - Moderator and panelists make closing comments

Conclusions

Summary and Conclusions

- Sustainable development and the Triple Bottom Line are important ways to frame the impact of indoor farms
  - People
  - Planet
  - Profits
- TBL indoor farms provide significant opportunities for social investing

To Learn More and Next Steps

- Go to: **indooragcenter.org**
  - View Presentation
  - Find other related information
- Benchmarking
  - We are conducting a bench-marking study
  - Open to all indoor farms, grow system manufacturers, and lighting manufacturers
  - We will offer awards and recognition for best-in-class finalists
  - Go to indooragcenter.org for more info

Contact Info

- Eric W. Stein, Ph.D.
- Email:
  - estein@ericwstein.com
- Web sites:
  - ericwstein.com
  - ideasmethod.com
  - Indooragcenter.org
- Twitter:
  - ericsteinphd
- Phone:
  - Skype: cire3500
  - Google: 484-727-8874

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Q & A

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