

CHRISTOPHER W. CALLAHAN

Curriculum Vitae

OFFICE
PO Box 559, 310 Main St
Bennington, VT 05201
802-447-7582 x256
chris.callahan@uvm.edu

HOME
19 Spring St
Cambridge, NY 12816
860-380-0448
cwcallahanny@gmail.com

SUMMARY

I love to work on and lead teams that help people solve problems and apply appropriate knowledge and technology for the improvement of their businesses, their communities, and their lives. My current work focuses on the application of engineering and business knowledge to food systems. I work with food producers, processors, and distributors to improve efficiency, quality, safety, and profitability through the integration of technology, systems, and process controls. My research and educational programming includes protected culture (e.g. greenhouses, high-tunnels), postharvest practices and storage (e.g. food safety, efficiency, water management, environmental control, drying systems, humidification systems, refrigeration systems), energy use in the food system (e.g. farm-based biofuels, renewable energy systems, energy efficiency measures), and development of specialized harvest and postharvest equipment (e.g. hops harvesting, hops drying, meat curing). This work has led to a number of technical innovations that are either in application for patent or have been made available as open-source technology for public adoption.

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EDUCATION & EXPERIENCE

EDUCATION & LICENSURE

- 2006 P.E. - Professional Engineering License. State of New York, Department of Education, Office of the Professions, Albany, NY. #084264
- 2003 P.E. - Professional Engineering License. State of Connecticut, Department of Consumer Protection, Hartford, CT. #23000 (Inactive)
- 2003 M.B.A. - Technological Entrepreneurship, Rensselaer Polytechnic Institute, Troy, NY
- 1997 B.S. - Mechanical Engineering, Rensselaer Polytechnic Institute, Troy, NY

ACADEMIC & PROFESSIONAL EXPERIENCE

- 2012-Present University of Vermont Extension (College of Agriculture and Life Sciences) Bennington, VT.
- 2018- Extension Associate Professor of [Agricultural Engineering](#)
- 2016- Director, [The Northeast Center to Advance Food Safety \(NECAFS\)](#)
- 2012-2018 Extension Assistant Professor of Agricultural Engineering
- Develop and deliver extension educational programs and conduct research with relevance to the food system. Work focuses on postharvest and food safety practices, protected culture, and sustainable energy.
- 2005-2014 Callahan Engineering, PLLC, Cambridge, NY.
Principal
- Consulting on sustainable bioenergy projects, building energy modeling, fuel cell system design and development, and energy auditing for commercial and industrial clients.
- 1998-2005 UTC Fuel Cells. United Technologies Corporation, South Windsor, CT.
- Transportation fuel cell engine development. Gasoline and hydrogen fueled systems involving integration of mechanical, chemical, and electrical systems, modeling, control design, testing, verification, and validation. Integrated product development focused on systems engineering, requirements management, functional design and development, performance test and customer support. Business development. Standards generation. Intercultural technology transfer, IP management and technical education in private sector. International and multi-cultural R&D and product development team leadership.
- 1997-1998 Mestek, Inc., Westfield, MA.
- Boiler and combustion sub-system design and development. Detail design with 3D CAD focused on molded cast iron heat exchangers, sheet metal, and assembly.
- 1992-1997 Database Programmer, Self Employed, Various Locations.
- Design and development of relational databases using customer requirements definition processes, technical and functional design development, verification and validation. Focus was private and non-profit organizations.
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TEACHING**EXTENSION EDUCATION & OUTREACH PROGRAMS**

Formal Educational Event Summary

Year	Events	Attendees	Contact hours
2023	9	487	4,242
2022	12	584	3,575
2021	12	577	3,507
2020	15	716	3,205
2019	28	1,575	4,191
2018	14	649	3,290
Avg 2012-2017	11	664	1,230
Total 2010-2022	161	8,910	29,605

- 2023 Strategizing to Advance Future Extension and Research for Controlled Environment Agriculture (SAFER CEA). A. Shaw, K. Gibson, S. Ilic, M. Ivey, M. Amalaradjou & **C. Callahan**. Organizing Committee & Panel Participant. The Ohio State University Controlled Environment Agriculture Research Complex. April 12-14, 2023. [54 attendees, 24 hours, 1,296 contact hours]
- Hygienic Design, Cleaning, and Sanitizing for Produce Farms. Workshop Series for Wild Blueberry, Tree Fruit, and Diversified Vegetable Producers. R. Machado, L. Werner, **C. Callahan**, J. Perry, G. Koehler, L. Calderwood, S. Datta. Hygienic Design and Hands-on Learning Lead. Hope, Monmouth, and Auburn, Maine. April 4-6, 2023. [42 attendees, 8 hours, 336 contact hours]
- Cold Storage for Produce Farms: Best Practices for Quality, Efficiency, and Produce Safety. **C. Callahan**. NL Horticulture Producers Council 2023 Annual Conference. Gander, Newfoundland, Canada. March 8, 2023. [60 attendees, 1 hour, 60 contact hours]
- Post Harvest Handling of Fruit & Vegetable Crops. **C. Callahan**. NL Horticulture Producers Council 2023 Annual Conference. Gander, Newfoundland, Canada. March 7, 2023. [60 attendees, 1 hour, 60 contact hours]
- Cold Storage for Produce Farms: Best Practices for Quality, Efficiency, and Produce Safety. **C. Callahan**. Colorado Fruit and Vegetable Growers Association Annual Meeting and Conference. Westminster, CO. February 21, 2023. [61 attendees, 1 hour, 61 contact hours]
- NECAFS Annual Meeting and Conference. E. Newbold & **C. Callahan**. Hartford, CT. January 18-19, 2023. [140 attendees over 2 days, 16 hours, 2,240 contact hours]
- Produce Safety Alliance Grower Training. H. Estrin, K. Sweet, **C. Callahan**, A. Chamberlin, T. Diego. Module 1 – Introduction to Produce Safety and Module 5.2 Postharvest Agricultural Water. Berlin, VT. January 23, 2023. [17 attendees, 8 hours, 136 contact hours]
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- Sustainable Energy Sources and Energy Efficiency for Greenhouses, Tunnels, and Hydroponic Operations: What's Working Now and What May the Future Hold? **C. Callahan**. From Food to Flowers: Everything Local Hybrid Conference. Springfield, IL. January 13, 2023. [32 attendees, 1 hour, 32 contact hours]
- Produce Safety Systems: What are the key systems, equipment and tools I should be thinking about? **C. Callahan**. From Food to Flowers: Everything Local Hybrid Conference. Springfield, IL. January 13, 2023. [21 attendees, 1 hour, 21 contact hours]
- 2022 High Tunnel and Greenhouse Ventilation: Challenges, Practice, and Trends. **C. Callahan**. New England Fruit and Vegetable Conference. Manchester, VT. December 15, 2022. [40 attendees, 30 minutes, 20 contact hours]
- Farmer to Farmer: Wash Pack and Postharvest. **C. Callahan**, P. Arnold, C. Alexander, A. Chamberlin. New England Fruit and Vegetable Conference. Manchester, VT. December 14, 2022. Facilitator. [60 attendees, 2 hours, 120 contact hours]
- PFAS, Postharvest, and Produce Safety. **C. Callahan**, C. Goosen, A. Nordell, J. Davis, P. O'Brien, M. O'Brien, K. Donald, A. Reid, E. Keen, A. Mueller, K. Burns. New England Fruit and Vegetable Conference. Manchester, VT. December 14, 2022. Moderator and Organizer. [80 attendees, 2 hours, 160 contact hours]
- Cold Chain Management Workshop. Three presentations: Why Good Crops Go Bad: Postharvest Physiology, Keeping Your Cool. Building a Strong Cold Chain with pre-cooling, storage, quality, and safety, and Cleaning and Sanitizing Overview. M. Sullins, M. Ritchie, **C. Callahan**. Remote, Colorado State University. December 2, 2022. [16 attendees 2.5 hours, 40 contact hours]
- This is What Produce Safety Looks Like on Our Farm. **C. Callahan** and A. Chamberlin. MOFGA Farmer to Farmer Conference. Belfast, ME. November 7, 2022. [24 attendees, 1.5 hours, 35 contact hours]
- Farmer to Farmer Twilight: Precooling and Storage at Harvest Farm. Whately, MA. L. McKeag, G. Gem, S. Schufele, & **C. Callahan**. September 8, 2022. [30 attendees, 2 hours, 60 contact hours.]
- SCRUB Project Summary. **C. Callahan**, V. Grubinger, H. Estrin, W. Mitchel, P. Tocco, A. Chamberlin, R. Hadad, T. Wankco. National USDA FSOP Project Directors Meeting. Hybrid. May 25, 2022. Orlando, FL. [54 attendees, 15 minutes, 13.5 contact hours]
- NECAFS Summary. **C. Callahan**, E. Newbold, S. Fogarty, A. Fitzgerald. National USDA FSOP Project Directors Meeting. Hybrid. May 25, 2022. Orlando, FL. [54 attendees, 15 minutes, 13.5 contact hours]
- Garlic School. C. Stewart, F. Hay, & **C. Callahan**. Cornell Cooperative Extension. Virtual. March 22, 2022. [34 attendees, 2 hours, 68 contact hours]
- Cold Pressing Oil: Experiences from Oilseed Crops in the Northeast. **C. Callahan**. Industrial Hemp Conference. Virtual. March 16, 2022. [16 attendees, 1 hour, 16 contact hours]
- Produce Safety Alliance Grower Training. E. Newbold, H. Estrin, **C. Callahan**, K. Sweet, A. Chamberlin, T. Diego, O. Cultrara. Module 1 – Introduction to Produce Safety and Module 5.2 Postharvest Agricultural Water. Online via web meeting. March 8&9, 2022. [26 attendees, 8 hours, 208 contact hours]

- NECAFS Annual Meeting and Conference. E. Newbold & **C. Callahan**. Virtual. January 18-20, 2022. [80-150 attendees over 3 days, 24 hours, 2,728 contact hours]
- 2021 Produce Safety Alliance Grower Training. E. Hogdon, **C. Callahan**, L. McDermott, L. Pashow, M. Thurston, S. Card. Module 1 – Introduction to Produce Safety and Module 6 Cleaning and Sanitizing. Online via web meeting. December 8-9, 2021. [26 attendees, 8 hours, 208 contact hours]
- Managing High Tunnels and Greenhouses for Temperature and Humidity. MOFGA Farmer to Farmer. A. Chamberlin, P. O'Brien, R. Maden and **C. Callahan**. November 5, 2021. [16 attendees, 1.5 hours, 24 contact hours]
- Packshed Improvements for Efficiency and Food Safety. MOFGA Farmer to Farmer. A. Chamberlin, P. O'Brien, and **C. Callahan**. November 5, 2021. [27 attendees, 1.5 hours, 41 contact hours]
- City Rat, Country Rat: Understanding Rats and the Best Practices for Controlling Produce Safety Risks on Urban and Rural Farms. National Farmers Union Stories from the Field. Y. Gonzalez and **C. Callahan**. August 26, 2021. [16 participants, 2 hours, 32 contact hours]
- Postharvest Planning for Profit, Efficiency & Food Safety. **C. Callahan**, D. Allen, T. Mendell, D. Paulk, C. Alexander. New Hampshire Fruit and Vegetable Growers Association, Winter Conference, Virtual. March 27, 2021. [60 attendees, 1.5 hours, 90 contact hours]
- Cleaning and Sanitizing Workshop Series. E. Bihn, **C. Callahan**, E. Demmings. Virtual. March 11 – April 8, 2021. [43 Attendees, 4 hours, 172 contact hours]
- Hemp Drying Basics. **C. Callahan** and G. Schimelpfenig. Online. UVM NW Crops and Soils Industrial Hemp Conference. February 26, 2021. [45 attendees, 1 hour, 45 contact hours]
- AZS Rinse Conveyor Users Group Webinar. A. Chamberlin, H. Shirk, **C. Callahan**. Online. February 22, 2021. [12 attendees, 2 hours, 24 contact hours]
- Cleaning, Sanitizing, and Disinfecting: Differences, Equipment and Tools for Produce Farms and Packing Houses...and Drains. **C. Callahan**. US Food and Drug Administration, Western Regional Center, National Farmers Union Cleaning and Sanitization Workshop. February 9, 2021. [90 minutes, 20 attendees, 30 contact hours]
- Food Safety Concerns in Produce Packing Houses. Sanitary Design of Packing Houses: An Introduction to Hygienic Design for Produce Farms. **C. Callahan**. Mid-Atlantic Fruit and Vegetable Conference. February 8, 2021. [95 attendees, 45 minutes, 71 contact hours]
- Designing exclusion netting support systems that provide long term control of SWD and maximum utility for berry farmers. **C. Callahan**. New York Expo – Berry Session. October 19 2020. [84 attendees, 30 minutes, 42 contact hours.]
- NECAFS Annual Meeting and Conference. E. Newbold & **C. Callahan**. Virtual. February 16-18, 2021. [75-133 attendees over 3 days, 24 hours, 2,728 contact hours]
- 2020 Cooler Construction Basics and Temperature and Humidity Control. **C. Callahan** and S. Sanford. Cornell Winter Crop Storage School. Cornell Cooperative Extension. December 8, 2020. [65 attendees, 2 hours, 2 contact hours.]
- UVM Extension Horticulture Team Virtual Twilight: Bags, Bins and Liners. **C. Callahan**, H. Estrin, A. Chamberlin. December 2, 2020. [32 attendees, 1 hour, 32 contact hours]
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The Post-Harvest Management Team (PHMT): A Case Study in Transdisciplinary Extension Collaboration. **C. Callahan**, G. Nickerson, H. Estrin, M. Cannella, B. Miller, A. Chamberlin, R. Schattman, & J. Brown. UVM Extension Sustainable Ag & Forests Result Area Team Meeting. November 2, 2020. [17 attendees 20 minutes, 6 contact hours.]

Designing exclusion netting support systems that provide long term control of SWD and maximum utility for berry farmers. **C. Callahan**, G. Loeb, & L. McDermott. Northeast Tree Fruit IPM Meeting. October 19, 2020. [46 attendees, 20 minutes, 15 contact hours.]

SWD Netting Structure Overview. Open House at the Berry Patch, Stephentown, NY. October 14, 2020. In-person and telecast as a Zoom meeting. [19 attendees, 2 hours, 38 contact hours.]

Safe and Efficient Hemp Drying. **C. Callahan**, G. Schimelpfenig, L. Morlino, L. Wheeler. NW Crops and Soils / New and Beginning Farmer Hemp Webinar and blog post. August 6, 2020. [28 attendees, 1 hour, 28 contact hours]

Controlling Humidity and Condensation in Coolers. H. Bryant, M Choate, P. Franklin, **C. Callahan**, A. Chamberlin. Virtual Summer Twilight and Video Playlist. UNH Extension and UVM Extension. July 29, 2020. [32 attendees, 2 hours, 64 contact hours]

UVM Extension Horticulture Team Virtual Twilight: Spotted Wing Drosophila. V. Grubinger, R. Maden, **C. Callahan**. July 29, 2020. [18 attendees, 1 hour, 18 contact hours]

Produce Safety Alliance Grower Training. H. Estrin, **C. Callahan**, D. Ruppert, A. Chamberlin, K. Sweet, G. Wall, G. Clithero, T. Diego. Module 3 – Soil Amendments and Module 5.1 Agricultural Water. Online via web meeting. May 5-6, 2020. [11 attendees, 8 hours, 88 contact hours]

AZS Rinse Conveyor Users Group Webinar. **C. Callahan**, A. Chamberlin, H. Shirk. Online. March 5, 2020. [24 attendees, 2 hours, 48 contact hours]

Wegmans Grower Winter Training. Hygienic Design for Produce Farms. **C. Callahan**, A. Chamberlin, E. Newbold, E. Bihn. Rochester, NY. February 25, 2020. [100 attendees, 3 hours, 300 contact hours]

NECAFS Annual Meeting and Conference. E. Newbold & **C. Callahan**. Philadelphia, PA. February 11-13, 2020. [135 attendees, 16 hours, 2,160 contact hours]

Project Planning for Postharvest Efficiency, Profitability & Food Safety. **C. Callahan**, A. Chamberlin, T. Mendell. Pennsylvania Association for Sustainable Agriculture, Winter Conference, Lancaster, PA. February 6, 2020. [60 attendees, 4 hours, 240 contact hours]

Sanitary Design of Packing Houses: Introduction to Hygienic Design for Produce Farms. **C. Callahan**. New Jersey Agricultural Convention and Conference, Atlantic City, NJ. February 5, 2020. [50 attendees, 0.5 hours, 25 contact hours]

2019 FSMA: Irrigation and Produce Safety Update. **C. Callahan**. Northeast Specialty Crop Water Symposium. Davis Center, University of Vermont. December 19, 2019. [30 attendees, 30 minutes, 15 contact hours]

Farmer to Farmer Session: Technology. New England Fruit and Vegetable Conference. **C. Callahan** (Moderator) Manchester, NH. December 12, 2019. [50 attendees, 1 hour, 50 contact hours]

Pre-Cooling and Curing Crops. New England Fruit and Vegetable Conference. **C. Callahan** and A. Chamberlin. Manchester, NH. December 12, 2019. [230 attendees, 30 minutes, 115 contact hours]

Floors, Walls, Bins, and other Postharvest Surfaces. New England Fruit and Vegetable Conference. A. Chamberlin and **C. Callahan** Manchester, NH. December 12, 2019. [150 attendees, 30 minutes, 75 contact hours]

High Tunnels as Systems. New England Fruit and Vegetable Conference. **C. Callahan**. Manchester, NH. December 11, 2019. [230 attendees, 30 minutes, 115 contact hours]

Post-Harvest Handling of Onions & Garlic. New England Fruit and Vegetable Conference. **C. Callahan**. Manchester, NH. December 11, 2019. [100 attendees, 30 minutes, 50 contact hours]

Hygienic Design: Train the Trainer. November 26, 2019. **C. Callahan**. Online. [15 attendees, 2 hours, 30 contact hours]

Washing Machine Greens Spinner Conversion Workshop. A. Chamberlin, **C. Callahan**, H. Estrin, M. Dragon. Randolph Technical Career Center, Randolph, VT. November 19, 2019. [11 attendees, 5 hours, 55 contact hours]

Can You Hack It? On-farm Innovations. **C. Callahan** and A. Chamberlin. Maine Organic Farmers and Gardeners Association (MOFGA) – Farmer to Farmer Conference. Northport, ME. November 3, 2019. [25 attendees, 1.5 hours, 48 contact hours]

Techniques & Set-Ups for Washing and Postharvest Handling. A. Chamberlin and **C. Callahan**. Maine Organic Farmers and Gardeners Association (MOFGA) – Farmer to Farmer Conference. Northport, ME. November 3, 2019. [15 attendees, 3 hours, 45 contact hours]

Winter Crops: Handling, Washing, and Storage. **C. Callahan** and A. Chamberlin. Maine Organic Farmers and Gardeners Association (MOFGA) – Farmer to Farmer Conference. Northport, ME. November 3, 2019. [15 attendees, 3 hours, 45 contact hours]

Washing Machine Greens Spinner Conversion Workshop. A. Chamberlin and **C. Callahan**. Maine Organic Farmers and Gardeners Association (MOFGA), Unity, ME. November 1, 2019. [6 attendees, 4 hours, 24 contact hours]

Hops Harvesting and Drying Basics. Presentation and Hands-on Workshop. **C. Callahan**. Farm Scale Hops Production Workshop. Pennsylvania State University, State College, PA. October 21, 2019. [28 attendees, 3 hours, 84 contact hours]

Introduction to Hygienic Design for Produce Farms. **C. Callahan**. North Carolina Produce Safety Task Force, Produce Professionals Conference 2019. Asheville, NC. October 10, 2019. [44 attendees, 1.5 hours, 66 contact hours]

Project Planning for Postharvest Efficiency, Profitability & Food Safety. **C. Callahan**, H. Estrin, A. Chamberlin. T. Mendell, J. Mendell, L. Bulger, & B. Shervin. Footprint Farm, Starksboro, VT. August 21, 2019. [20 attendees, 4 hours, 80 contact hours]

Ventilation in Greenhouses and High Tunnels. **C. Callahan**. NOFA MA Summer Conference. Hampshire College, Amherst, MA. August 11, 2019. [12 attendees, 1.5 hour, 18 contact hours]

Project Planning for Postharvest Efficiency, Profitability & Food Safety. **C. Callahan**, H. Estrin, A. Chamberlin. L. McDermott, C. Stewart, E. Hodgdon, S. Arnold, P. Arnold, R.

Arnold, & K. Atkins. Pleasant Valley Farm. Argyle, NY. August 1, 2019. [20 attendees, 4 hours, 80 contact hours]

Produce Safety Alliance Grower Training. **C. Callahan**, E. Hodgdon, L. McDermott, A. Finley, M. Basedow, & L. Pashow. Lead Trainer, Module 1 – Introduction to Produce Safety, and Module 5.1 Agricultural Water. Warrensburg, NY. July 15, 2019. [16 attendees, 8 hours, 128 contact hours]

Building a One-Way Street: Backflow Prevention Strategies for Produce Farms. **C. Callahan**. Webinar. May 20, 2019. Role: Creator and Lead Instructor. [65 attendees, 1 hour, 65 contact hours]

Sanitary Design and Practice Considerations. **C. Callahan**, R. Hadad, E. Bihn, E. Demmings, A. Chamberlin. Cornell AgriTech. Geneva, NY. March 27, 2019. Role: Lead Course Developer, Instructor for sections on drying, hygienic design, and hands-on activity related to equipment evaluation. [30 attendees, 7 hours, 210 contact hours]

Produce Safety Alliance Grower Training. **C. Callahan**, H. Estrin, A. Chamberlin, K. Sweet, D. Giroux, T. Diego. Lead Trainer, Module 1 – Introduction to Produce Safety, and Module 5.2 Postharvest Agricultural Water. Middlebury, VT. March 19, 2019. [20 attendees, 8 hours, 160 contact hours]

Postharvest Handling and Storage. H. Estrin, & A. Chamberlin. **C. Callahan**: Curricular content support. NOFA-VT Winter Conference, Burlington VT. February 16, 2019. [19 attendees, 6 hours, 114 contact hours]

NECAFS Annual Meeting and Conference. E. Newbold & **C. Callahan**. Albany, NY. February 5-7, 2019. [120 attendees, 16 hours, 1,920 contact hours]

Postharvest Handling and Storage. **C. Callahan**, H. Estrin, & A. Chamberlin. Vermont Vegetable and Berry Growers Annual Meeting. Fairlee, VT. January 22, 2019. [19 attendees, 6 hours, 114 contact hours]

The New Frontiers in Garlic Production. Half-Day Intensive. C. Stewart, E. Fraser, B. Fox, & **C. Callahan** (Postharvest handling.) NOFA-NY Winter Conference. Saratoga Springs, NY. January 19, 2019. [49 attendees, 3 hours, 147 contact hours]

Wash Lines to Storage Buildings Intensive: Post-Harvest Construction Projects. Half-Day Intensive. **C. Callahan**, E. Fellenz, L. MacDougall, D. Kent, T Mendell, & J. Mendell. NOFA-NY Winter Conference. Saratoga Springs, NY. January 19, 2019. [56 attendees, 3 hours, 168 contact hours]

2018 The Northeast Center to Advance Food Safety: An Overview. **C. Callahan** and E. Newbold. New York State Association for Food Protection (NYSAFP) Annual Meeting. Syracuse, NY. [32 attendees, 1 hour, 32 contact hours]

High Tunnel Twilight. H. Bryant, R. Sideman, G. Hamilton, **C. Callahan**. UNH Farm. N. Haverhill, NH. August 15, 2018. [20 attendees, 2 hours, 40 contact hours]

Allium Twilight. **C. Callahan**, C. Stewart, H. Prussack. High Meadows Farm. July 12, 2018. [25 attendees, 3 hours, 75 contact hours]

Postharvest Practices in Berries. **C. Callahan**. Northeast Berry Call. June 12, 2018. Webinar.

Produce Safety in Broccoli. **C. Callahan** and E. Bihn. May 14, 2018. Webinar. [36 attendees, 1 hour, 36 contact hours]

Excelling with Excel. **C. Callahan** and G. Deziel. UVM Extension Professional Improvement Conference. Woodstock, VT. May 9, 2018. [40 attendees, 1 hour, 40 contact hours]

Web Meetings that Work. **C. Callahan** and M. Tracy. UVM Extension Professional Improvement Conference. Woodstock, VT. May 8, 2018. [30 attendees, 1 hour, 30 contact hours]

Wash / Pack Design Workshop. Hardwick, VT. D. Keeney, H. Estrin, A. Chamberlin, **C. Callahan**. April 12, 2018. [40 attendees, 1 hour, 40 contact hours]

Produce Safety Alliance Grower Training. Module 5.2 Postharvest Agricultural Water. St. Johnsbury, VT. April 11, 2018. [40 attendees, 1 hour, 40 contact hours]

National Coordination Center (NCC) Training Advisory Council (TAC). Albuquerque, NM. February 1, 2018. [30 attendees, 12 hours, 360 contact hours]

Overview of the Northeast Center to Advance Food Safety (NECFAS). **C. Callahan**. Sunrise Session - Manufactured Foods Regulatory Professional Association (MFRPA). Albuquerque, NM. February 1, 2018. [120 attendees, 1 hour, 120 contact hours]

NECAFS Steering Team Meeting. Baltimore, MD, January 25, 2018 [26 attendees, 4 hours, 204 contact hours]

NECAFS Annual Meeting and Conference. Baltimore, MD. January 23-24, 2018. [130 attendees, 16 hours, 2,080 contact hours]

Growing, Washing & Packing High Tunnel Winter Greens: Doing It and Doing It Well. **C. Callahan**, J. Reid, R. Hadad, P. Arnold, K. Arnold, & S. Arnold. NOFA-NY Winter Conference. Saratoga Springs, NY. January 18, 2018. [40 attendees, 7 hours, 280 contact hours]

2017 Infrastructure Design with the FSMA Produce Safety Rule on the Mind. **C. Callahan**. New England Vegetable and Fruit Conference. Manchester, NH. December 14, 2017. [140 attendees, 45 minutes, 106 contact hours]

Postharvest Handling Can Improve Fresh Market Success. **C. Callahan**. New England Vegetable and Fruit Conference. Manchester, NH. December 14, 2017. [70 attendees, 45 minutes, 53 contact hours]

Postharvest Cooling and Curing. **C. Callahan**. New England Vegetable and Fruit Conference. Manchester, NH. December 13, 2017. [320 attendees, 45 minutes, 240 contact hours]

Postharvest Handling and Storage for Small Farms. **C. Callahan**. Great Lakes Expo. Grand Rapids, MI. December 7, 2017. [30 attendees, 45 minutes, 23 contact hours]

Produce Safety Recordkeeping: Requirements and Tools. **C. Callahan**. Great Lakes Expo. Grand Rapids, MI. December 7, 2017. [50 attendees, 30 minutes, 25 contact hours]

Practical Produce Safety in Coolers. **C. Callahan**. Great Lakes Expo. Grand Rapids, MI. December 5, 2017. [100 attendees, 30 minutes, 50 contact hours]

Winter Crop School. C. Stewart, C. Bornt, J. P. Courtens, **C. Callahan**. Cornell Cooperative Extension. Saratoga Springs, NY. November 30, 2017. [60 attendees, 6 hours, 360 contact hours]

Pre-Cooling and Curing. A Farmer-to-Farmer Workshop. **C. Callahan** & B. Hopkins. Maine Organic Farmers and Gardeners Association. Northport, ME. November 6, 2017. [30 attendees, 3 hours, 90 contact hours]

Introduction to Farm Energy Analysis: A Workshop for Users of Energy Audits. **C. Callahan**, A. J. Both, T. Manning, and D. Ciolkosz. Rutgers EcoComplex, Bordentown, NJ. August 22-24, 2017. [13 attendees, 20 hours, 260 contact hours]

Food Hub Management Certificate Program. The University of Vermont.

CENC_FHMCP101. **C. Callahan**. Instructor for Technology Module. April 17, 2017. [30 participants, 1-hour class, average of 1 hour outside of class – 60 contact hours]

New Farming Technology from Sweden. **C. Callahan** & S. Johnson. UVM Extension NWCS Team NGGA Winter Grains Conference. March 23, 2017. Essex, VT. [60 attendees, 1 hour. 60 contact hours]

NECAFS Steering Team Meeting. Project PI and Meeting Organizer. January 11, 2017. Boston, MA. [30 attendees, 4 hours. 120 contact hours]

Northeast Regional Food Safety Symposium: A Joint Meeting of NECAFS and NEASDA. January 10, 2017. Boston, MA. Program Organizer and Host. [70 attendees, 6 hours. 560 contact hours]

2016 Produce Safety Alliance: Food Safety Modernization Act (FSMA) Produce Safety Rule Train the Trainer Course. With the Produce Safety Alliance. November 16, 2016. Brattleboro, VT. [60 attendees. 8 hours. 480 contact hours]

Crop Storage: Maximizing long term crop storage through innovations in technology (and some good old-fashioned basic principles.) **C. Callahan**. UNH Extension Northern Growers Conference. October 26, 2016. Whitefield, NH. [110 attendees. 1 hour. 110 contact hours]

Regional Round Table Webinar: A Virtual Poster Session for 18 Regional Food Safety Projects in the Northeast. Part of the Northeast Center to Advance Food Safety (NECAFS). With E. Newbold. October 16, 2016. [30 participants, 1.5 hour, 45 contact hours].

The Power and Perils of Partnerships. **C. Callahan**. UVM Extension Fall Program Meeting. September 27, 2016. S. Royalton, VT. [50 participants, 1 hour, 50 contact hours]

NECAFS Webinar: Lessons Learned in State Collaborations on Food Safety. Part of the Northeast Center to Advance Food Safety (NECAFS). With E. Newbold and the Produce Safety Alliance. September 19, 2016. [82 participants, 1.0 hour, 82 contact hours].

Food Hub Management Certificate Program. The University of Vermont.

CENC_FHMCP101. **C. Callahan**. Instructor for Technology Module. May 9. [26 participants, 1-hour class, average of 1 hour outside of class – 78 contact hours]

Basics of Drying Principles and Systems. **C. Callahan**. Farmer Workshop. For the Vermont Medicinal Herb Cooperative. April 29. Warren, VT. [9 participants, 2 hours each – 18 contact hours]

Winter Growing in Cold Climates. **C. Callahan** & C. Pierce. Farmer Workshop. Funded by Vermont Technical College. February 22-23. Shelburne, VT. [14 participants, 12 hours each – 168 contact hours]

2015 Food Storage. Farmer to Farmer Workshop. Maine Organic Farmer and Growers Association (MOFGA) Farmer to Farmer Conference. November 5, 2015. Lincolnville, ME. [40 participants, 2 hours each – 80 contact hours]

Postharvest Quality: A Workshop for the Vermont Gleaning Collective. September 2, 2015. Middlebury, VT. [15 participants, 1.5 hours – 22.5 contact hours]

Food Hub Management Certificate Program. The University of Vermont.
CENC_FHMCP101. Instructor for Technology Module. [21 participants, 1-hour class,
average of 2 hours outside of class – 63 contact hours]

Farm Energy IQ – Biodiesel and Straight Vegetable Oil Module. Training modules for both
farmers and agricultural service providers developed under a multi-state NE-SARE project
#ENE12-128. [50 participants, 24 hours – 1200 contact hours]

2014 Crop Storage. Webinar. Condensed version of the longer workshop series from the Fall.
[30 participants, 1.0 contact hours each – 30 contact hours].

Crop Storage. Workshop Series. October 14 - Middlebury, VT. October 21 – Berlin, VT.
Curriculum development and workshop delivery. One-day workshops focused on
improved understanding of long-term fruit and vegetable storage and general
temperature and humidity control in storage. [30 participants, 3.5 contact hours each –
105 contact hours]

Greenhouse Energy Extravaganza. One-day multi track session coordinated by M. Skinner
of UVM Entomology Lab. September 4, 2014. [60 participants, 1.0 contact hour each, 60
contact hours.]

On-Farm Oilseed Pressing for Fuel and Food. Webinar as part of the NEWBio Program.
April 8, 2014. [26 participants, 1.0 contact hour each, 26 contact hours]

Guest Lecture: Energy in the Food System. CDAE ENVS-295: The Real Cost of Food. With
E. Garza 11/4/2014. [20 students, 1.0 contact hour each – 20 contact hours]

Crop Storage. Workshop Series. Invited delivery of a five-day workshop series in five
locations throughout the Atlantic Canadian Provinces (NB, PEI, NS). Curriculum based
upon the 2013 Fall series in Vermont. [130 participants, 6.5 contact hours each – 845
contact hours]

Engineering Challenges and Solutions in Vermont's Food System. College of Engineering,
Math and Science, Civil and Environmental Engineering Department. Seminar.
1/31/2014. [30 faculty peers, 1.0 contact hour each – 30 contact hours]

Guest Lecture: Alternative Energy and Energy Efficiency in Greenhouses. CALS PSS-127:
Greenhouse Operations and Management. With C. Armstrong. 1/29/2014. [20 students,
1.0 contact hour each – 20 contact hours]

2013 Designing a Good Storage System: An Engineer's Perspective. Presenter and member of
a panel discussion at 2014 New England Fruit and Vegetable Conference. Manchester,
NH. December 18, 2013. [325 participants, 0.75 contact hours each – 244 contact
hours]

Guest Lecture: Energy in the Food System. CDAE ENVS-295: Energy Use in US Food
Systems. With E. Garza. 11/11/2013. [20 students, 1.0 contact hours each – 20 contact
hours]

Crop Storage. Webinar for New Farmers. Condensed version of the longer workshop
series from the Fall. [30 participants, 1.0 contact hours each – 30 contact hours]

Crop Storage. Workshop Series. Curriculum development and workshop delivery. April
2013-March 2015. One-day workshops focused on improved understanding of long-term
fruit and vegetable storage and general temperature and humidity control in storage. [72
participants, 6.5 contact hours each – 468 contact hours]

Greenhouse and High Tunnel Tour. Winter 2012/Spring 2013. Farmer to Farmer field education program focused on greenhouse and high tunnel selection, design and operation. Tour was developed into a video archive jointly with NOFA-VT for broad distribution via YouTube. [7 videos, 4 hours total, 507 views as of 3/5/2014]

Technological Challenges & Solutions for Food Businesses. Moderation of Roundtable Discussion at the 2013 National Farm Viability Conference. September 27, 2013. Middlebury, VT.

Practical Produce Safety Workshop. Storage Component. April 11, 2013. Vergennes, VT. [30 participants, 1.0 contact hours each - 30 contact hours]

Vermont Vegetable and Berry Growers Association Annual Meeting. “Storing Your Crops: Tips and Tools for Success.” January 28, 2013. Montpelier, VT. [200 participants, 0.5 contact hours each – 100 contact hours]

2012 Oilseed, Meal, Oil and Biodiesel Quality Best Practices. Annual VT Oilseed Growers Meeting. Berlin, VT. [12 attendees, 1 hour, 12 contact hours]

2011 The UVM Mobile Hop Picker. NEHA Annual Conference. November 5, 2011. Troy, NY. [100 attendees, 30 minutes, 50 contact hours]

Hop Harvester Showcase. September 7, 2011. Borderview Farm, Alburgh, VT. [50 attendees, 30 minutes, 25 contact hours]

Hop Field Day and Open House. August 25, 2011. Four Star Farm, Northfield, MA. [50 attendees, 30 minutes, 25 contact hours]

Field Day and Open House. Oilseed Pressing and Biodiesel. August 4, 2011. Borderview Farm, Alburgh, VT. [50 attendees, 30 minutes, 25 contact hours]

INVITED PRESENTATIONS

2020 Designing exclusion netting support systems that provide long term control of SWD and maximum utility for berry farmers. New England, New York and Canadian Fruit Pest Call. October 19, 2020. [10 min, 79 attendees, 13 contact hours]

2019 Wired (Panel). Southern Vermont Economy Summit. May 23, 2019. West Dover, VT. [30 attendees, 1 hour, 30 contact hours]

The Magic of Postharvest in the Culinary World. Blue Hill at Stone Barns Center for Agriculture. March 21, 2019. Pocotino Hills, NY.

2015 Harvesting and Drying Hops. New England Vegetable and Fruit Conference. December 17, 2015. Manchester, NH.

Ideas for Harvest and Handling from California. New England Vegetable and Fruit Conference. December 15, 2015. Manchester, NH.

On-farm Biodiesel: A Decade of Experience in Vermont. 2015 National Extension Energy Summit. April, 2015. Seattle, WA.

Heating Greenhouses with Biomass in Vermont: A Learning Community. 2015 National Extension Energy Summit. April, 2015. Seattle, WA.

The NOFA VT Winter Conference. “Why Good Vegetables Go Bad.” February 14, 2015. Burlington, VT.

The Ohio State University Hops Conference. “Hops Harvesting Round-up and Drying: Scale and Technique for Quality.” February 6, 2015. Wooster, OH.

- New England Certified Crop Advisors Training. “Energy in Agriculture: Where Are We?.” February 4, 2015. Portsmouth, NH.
- New England Certified Crop Advisors Training. “Converting Oilseeds to Biodiesel” February 4, 2015. Portsmouth, NH.
- Vermont Vegetable and Berry Growers Association Annual Meeting – Special Postharvest Conference. “Crop Storage Top Ten” January 21, 2015. Fairlee, VT.
- Maine Vegetable and Small Fruit Growers Association Annual Meeting. “Postharvest Practices for Quality and Safety.” January 13, 2015. Augusta, ME.
- 2014 Northeast Hops Alliance, Annual Meeting and Conference. “Harvesting and Beyond” December 6, 2014. Morrisville, NY.
- New England Extension In-Service. “Food Hubs, Technology & Extension.” October 28, 2014. Northwood, NH.
- Farm to Plate Network Gathering. “Deep Dive Roundtable: Farm Viability.” October 23, 2014. Killington, VT.
- Vermont Oilseed Producers Meeting. “Oilseed Economics: Overview of Production Economics with Historical & Current Conditions.” March 3, 2014. Burlington, VT.
- Vermont Oilseed Producers Meeting. “Final Report: Small Scale Oilseed Press Evaluations.” March 3, 2014. Burlington, VT. With Hannah Harwood.
- 2013 Northeast Hops Alliance, Annual Meeting and Conference. “Hops Harvesters: What’s Out There?” December 2013. Morrisville, NY.
- Vermont Quebec Bioenergy Challenge. Cross border forum concerning opportunities and commonalities among Vermont communities and those of the Eastern Townships of Quebec. Topic presented was Farm-Scale Biofuels. October 26, 2013. Sherbrooke, QC.
- Vermont Oilseed Producers Meeting. “Small Scale Oilseed Press Evaluations: Preliminary Test Results. March 19, 2013. Berlin, VT.
- Northeast Hops Alliance, Maryland Hops Conference. “The UVM Mobile Hops Harvester and Modular Oast.” March 8, 2013. Frederick, MD.
- UVM Winter Hops Conference. “The UVM Mobile Hops Harvester and Modular Oast.” February 22, 2013. Essex, VT.
- 2012 Northeast Hops Alliance, Annual Meeting and Conference. “The UVM Mobile Hops Harvester and Modular Oast.” December 1, 2012. Morrisville, NY.
- Annual Crops and Soils Field Day. UVM Extension Alburgh Field Research Farm. Alburgh, VT. August 9, 2012. Supported similar events at Four Star Farm in Northfield, MA on August 25, 2012 and at Borderview Farm in Alburgh, VT on September 7, 2011.
- 2011 Vermont Oilseed Producers Meeting. “The Oilseed Cost and Profit Calculator.” February 15, 2011. Berlin, VT.
- 2010 Northeast Agricultural Energy Conference. “[On-farm Biodiesel Safety.](#)” Manchester, NH. March 16, 2010.
- Northeast Agricultural Energy Conference. “[Greenhouse Energy Efficiency and Renewable Energy Practices.](#)” Manchester, NH. March 16, 2010.

MENTORING

- 2019 Cambridge Central School Senior – J. Boyne. Digital Pump Hour Meter with Cloud-based Data Recording. Unpaid Intern. November 2019 - Present.
Agricultural Engineering Summer Internship. R. Buckley. Mixed Scope Engineering Internship Focused on Programming, Automation, and Electromechanical Systems. Paid Intern. May 2019 – June 2020.
- 2018 UVM Food Systems Graduate Program – S. Lyman (formerly Tichonuk.) “UVM Extension Data Visualization Needs Assessment.” Masters: Food Systems. May 2019.
- 2016 Guide to Professional Licensure. Panel at 2016 ASABE Annual Meeting. Orlando, FL. Sponsored by the Young Professionals Council (YPC) and Professional Engineers Institute (PEI).
- 2015 Senior Experience in Engineering Design (SEED) ME185 Team Mentor –. Greenhouse and High-Tunnel Environmental Control Automation System. T. O’Neill, C. Ray, E. Melloni, A. Towle.
- 2014 Senior Experience in Engineering Design (SEED) ME185 Team Mentor – C. Millar, M. Lane, H. Duncan. Small Scale Egg Washing Device.
- 2013 Agricultural Engineering Intern – S. Rossier. Provided mentorship and developmental opportunities for a recent high school graduate entering engineering school in the Fall. Paid Intern. Summer 2013.

SCHOLARSHIP

PUBLICATIONS & PRESENTATIONS

OUTREACH & EXTENSION PUBLICATIONS

Extension Publication Summary

Year	Publications	New	Revised
2023	7	7	0
2022	26	18	8
2021	15	12	3
2020	17	15	2
2019	20	19	1
2018	18	18	0
Avg 2012-2017	5	5	0
Total 2012-2022	140	126	14

- 2023 **C. Callahan** and A. Chamberlin. Farmer's Favorites: Shipping Containers and Their Use on Vegetable Farms. [Blog Post](#). May 26, 2023
- A. Chamberlin and **C. Callahan**. Expanding Infrastructure and Maximizing its Potential at Jericho Settlers Farm. [Blog Post](#). May 18, 2023
- A. Chamberlin and **C. Callahan**. Natural Light in the Packshed at High Meadows Farm. [Blog Post](#). May 15, 2023.
- C. Callahan**. Top 5: Working with Contractors on a Postharvest Project. [Blog Post](#). March 16, 2023.
- C. Callahan**. Managing Humidity and Condensation in Coolers. [Blog Post](#). March 1, 2023.
- C. Callahan**. Duijndam Machines – Used Equipment from Europe. [Blog Post](#). February 2, 2023.
- D. Riggs, **C. Callahan**, G. Loeb, L. McDermott. Protecting Berry Crops from Invasive Pests with Exclusion Netting. *Scientia*. January 12, 2023.
- 2022 A. Chamberlin & **C. Callahan**. Easy, Breezy, Three Season Packshed at Stout Oak Farm. [Blog Post](#) and [Video Case Study](#). December 9, 2022.
- A. Chamberlin & **C. Callahan**. New Metal Building from Scratch at Hall Brook Farm. [Blog Post](#), [360 Degree Tour](#), and [Video Case Study](#). December 7, 2022.
- C. Sams, S. Sargent, J. Davis, **C. Callahan**, J. Eccleston, & T. Bjorkman. [Cooling Methods for Broccoli: A Guide for Eastern Growers](#). University of Tennessee Extension. PB 1904. August 24, 2022.
- A. Chamberlin and **C. Callahan**. The Next Chapter: Renovating a Barn to Sustain Indian Line Farm. [Blog Post](#) and [Video Case Study](#). August 22, 2022.
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- C. Callahan** and G. Schimelpfenig. Drying and Curing Herbs and Flowers (Hops, Hemp, and Everything Else!) [Blog Post](#). July 26, 2022 revision of February 23, 2021 publication.
- C. Callahan**, B. Mitchell, P. Tocco, A. Chamberlin. [Detergents for Farm Food Contact Surfaces](#). [Blog Post](#). June 26, 2022.
- C. Callahan**, B. Mitchell, P. Tocco, A. Chamberlin. [“Dry Cleaning” on Produce Farms: Alternatives to Water and Detergents](#). [Blog Post](#). June 22, 2022.
- A. Chamberlin & **C. Callahan**. [Farmer’s Favorites: Cleaning Tools](#). June 10, 2022.
- P. Tocco, **C. Callahan**, H. Borden & A. Work. [Michigan State University Online Produce Safety Supervisor Training](#). Food Safety Resource Clearinghouse. June 1, 2022.
- C. Callahan**. [Exclusion Netting for Spotted Wing Drosophila \(SWD\)](#). [Ag Engineering Blog Post](#). May 10, 2022.
- C. Callahan**. [Calculating Greenhouse and High Tunnel Heat Loss](#). [Ag Engineering Blog Post](#). April 19, 2022 revision of April 1, 2015 publication.
- A. Chamberlin & **C. Callahan**. [Patient Pursuit of Packshed Happiness at Ananda Gardens](#). February 25, 2022.
- C. Callahan**, H. Estrin, A. Chamberlin. [Planning an Efficient and Safe Wash/Pack Area](#). [Blog Post](#). February 18, 2022 revision of February 9, 2020 publication.
- C. Callahan**. [Starting-up Heaters without Getting Burned – Greenhouse and High Tunnel Heater Safety Checks](#). [Blog Post](#). February 18, 2022.
- C. Callahan** and A. Chamberlin. [Greens Spinners for Farm Use](#). [Blog Post and Fact Sheet](#). February 8, 2022 revision of April 16, 2020 publication.
- C. Callahan**. [Safely Dispensing Sanitizers](#). [Blog Post](#). February 15, 2022 revision of December 15, 2020 publication.
- A. Chamberlin & **C. Callahan**. [Portable Handsfree Handwashing Station](#). [Video](#). January 26, 2022.
- C. Callahan**. [Thermostats for Agriculture](#). [Ag Engineering Blog Post](#). January 25, 2022 revision of May 3, 2016 publication.
- C. Callahan**. [Preventing Freezing in Produce Coolers](#). [Blog Post](#). January 25, 2022.
- C. Callahan** and A. Chamberlin. [Rats \(and Other Rodents\)](#). [Fact sheet and Bog Post](#). January 21, 2022 revision October 9, 2017 publication.
- C. Callahan**. [Getting Started with Growth Chambers](#). [Blog Post](#). January 14, 2022 revision of March 12, 2019 publication.
- 2021 A. Chamberlin & **C. Callahan**. [Root Washing Systems for Produce Farms](#). [Blog Post](#). December 16, 2021.
- C. Callahan**. [Warm Rooms for Storage Crops & Freeze Protection for Coolers](#). [Blog Post](#). November 29, 2021.
- C. Callahan**. [Ventilation in Greenhouses and High Tunnels](#). [Blog Post](#). November 5, 2021 revision of August 14, 2019 publication.
- A. Chamberlin and **C. Callahan**. [Building a Better Greens Bubbler](#). [Blog Post](#), [Fact Sheet](#) and [Video](#). October 6, 2021.
- C. Callahan** & A. Chamberlin. [Farm Cooler Checklist](#). [Blog Post and Fact Sheet](#). September 21, 2021 revision of April 17, 2017 publication.
-

A. Chamberlin & **C. Callahan**. Cleaning Tools for Produce Farms. [Blog post](#), [YouTube Video Series](#) and [Guidesheet](#). August 26, 2021.

C. Callahan. Repairing Cracks and Pits in Concrete Floors. [Blog post](#), [Guidesheet](#) and [YouTube Video Series](#). August 4, 2021.

A. Chamberlin & **C. Callahan**. Bins, Buckets, Baskets & Totes. [Blog Post](#). May 28, 2021 revision of January 23, 2019 publication.

C. Callahan, A. Chamberlin, D. Riggs, G. Loeb, S. Hesler, L McDermott, N. Field, G. Blanchette. Installing Improved Exclusion Netting System at The Berry Patch. [YouTube Video Series](#). May 18, 2021.

C. Callahan. Adapter for Driving Earth Anchors with an Earth Auger. [Design Sheet](#). May 18 2021.

A. Chamberlin and **C. Callahan**. Sharpening the Edges: Wash/Pack Efficiencies in a New Farm Building at Small Axe Farm. [Blog Post](#), [Fact Sheet](#) and [Video Case Study](#). April 23, 2021.

C. Callahan and G. Schimelpfenig. Drying and Curing Herbs and Flowers (Hops, Hemp, and Everything Else!) [Blog Post](#). February 23, 2021.

A. Chamberlin, H. Shirk, **C. Callahan**. AZS Rinse Conveyor User's Guide. [Guide Sheet](#). February 22, 2021.

C. Callahan. Sanitary Design of Packing Houses: An Introduction to Hygienic Design for Produce Farms. [Video playlist](#) recorded from workshop curriculum. 7 videos, 50 minutes. February 8, 2021.

2020 **C. Callahan**. Safely Dispensing Sanitizers. [Blog Post](#). December 15, 2020.

C. Callahan. Shedding Some Light in the Shed - Lighting for Indoor Work on the Farm. [Blog Post](#). November 23, 2020.

A. Chamberlin and **C. Callahan**. Giving a Dairy Barn New Life at New Leaf Organics. [Blog Post](#), [Fact Sheet](#) and [Video Case Study](#). September 30, 2020.

C. Callahan. Safe and Efficient Drying of Hemp. [Blog Post](#). August 6, 2020.

A. Chamberlin and **C. Callahan**. Washing Machine Greens Spinners: Cleaning Tips. [Blog Post](#). July 6, 2020.

A. Chamberlin and **C. Callahan**. Spray Tables for Produce Farms. [Blog Post](#). June 2, 2020.

C. Callahan and A. Chamberlin. Improving Handwashing Stations. [Blog Post](#) and [Fact Sheet](#). June 9, 2020.

C. Callahan and A. Chamberlin. Drains for Produce Farms. [Blog Post](#) and [Fact Sheet](#). April 23, 2020.

C. Callahan and A. Rodriguez. Trench Drain for Vegetable Wash and Pack. [Construction Drawing](#). April 23, 2020.

C. Callahan and A. Chamberlin. [Greens Spinners for Farm Use](#). [Blog Post](#) and [Fact Sheet](#). Updated April 16, 2020.

C. Callahan. A Guide to Cleaning, Sanitizing, and Disinfecting for Produce Farms. With review and input from team members of the Produce Safety Alliance (Cornell University), H. Estrin (UVM Extension), L. McKeag (UMass Extension), P. Tocco (Michigan State University),

- A. Hultberg (University of Minnesota). [Blog Post](#) and [Factsheet](#). March 30, 2020. Revised April 16, 2020.
- A. Work, P. Tocco, and **C. Callahan**. Hygienic Design on Produce Farms. [Video](#). In collaboration with Michigan State University Produce Safety Team. April 6, 2020.
- P. Tocco and **C. Callahan**. Risks Posed by Cats on Produce Farms. [Fact Sheet](#). Michigan State University and UVM Extension. March 14, 2020.
- C. Callahan**, H. Estrin, V. Grubinger, T. Diego, A. Chamberlin, R. Madden. Considerations for Fruit and Vegetable Growers Related to Coronavirus & COVID-19. [Blog Post](#) and Podcast. March 13, 2020. Updated March 18, 2020.
- C. Callahan**, H. Estrin, A. Chamberlin. Planning an Efficient and Safe Wash/Pack Area. [Blog Post](#) (also published jointly on the High Mowing Seeds Blog, “[The Seed Hopper](#)”). February 9, 2020.
- 2019 **C. Callahan**, E. Bihn, and A. Chamberlin. Hygienic Design for Produce Farms. [Fact Sheet](#) and [Evaluation Checklist](#). February 9, 2020. Revision.
- A. Chamberlin and **C. Callahan**. Washing Machine Greens Spinner Conversion Standard Operating Procedure – Speed Queen. [Fact Sheet](#). November 9, 2019.
- A. Chamberlin and **C. Callahan**. Washing Machine Greens Spinner Conversion Standard Operating Procedure – Whirlpool. [Fact Sheet](#). November 9, 2019.
- A. Chamberlin and **C. Callahan**. Washing Machine Greens Spinner Shopping Advice. [Blog Post](#). October 17, 2019.
- C. Callahan**. Ventilation in Greenhouses and High Tunnels. [Blog Post](#). August 14, 2019
- A. Chamberlin and **C. Callahan**. Wheels Keep Things Moving at Root 5 Farm. [Blog Post](#), [Fact Sheet](#), and [Video Case Study](#). August 2, 2019.
- A. Chamberlin and **C. Callahan**. All About Alliums: Twilight Meeting [Video Recording](#). July 30, 2019.
- C. Callahan** and A. Chamberlin. Forced Air Cooling: Field Trials. [Blog Post](#) and [Fact Sheets](#). June 18, 2019.
- C. Callahan** and A. Chamberlin. Hygienic Design for Produce Farms. [Blog Post](#) and [Fact Sheet](#). May 30, 2019.
- C. Callahan**. [Backflow Prevention for Produce Farms](#). [Blog Post](#). May 20, 2019.
- C. Callahan**. Hygienic Design Checklist - On-Farm Equipment and Buildings Used for Handling and Washing Produce. [Excel based checklist](#). April 28, 2019.
- A. Chamberlin & **C. Callahan**. [Last Resort Farm Not Stalled by Dairy Barn Conversion for Produce](#). [PDF Case Study](#). April 25, 2019.
- A. Chamberlin & **C. Callahan**. [Last Resort Farm Not Stalled by Dairy Barn Conversion for Produce](#). [Blog Post](#). April 25, 2019.
- C. Callahan** & A. Chamberlin. [Staying Ahead in the Packshed: Postharvest Topics, Sources of Information, and Ideas from Growers](#). [Blog Post](#), [Survey Summary](#). March 13, 2019.
- C. Callahan**. [Getting Started with Growth Chambers](#). [Blog Post](#). March 12, 2019.
- A. Chamberlin & **C. Callahan**. [Vegetable Wash Sinks, Tanks, Tubs and Basins: Upgrades for Efficiency and Ergonomics](#). [Blog Post](#). February 21, 2019.
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- A. Chamberlin & **C. Callahan**. [Cooler Construction Options – Walls and Panels](#). Blog Post. January 24, 2019.
- C. Callahan** & A. Chamberlin. [Hanging Hoses](#). Blog Post. January 23, 2019.
- A. Chamberlin & **C. Callahan**. [Bins, Buckets, Baskets & Totes](#). Blog Post. January 23, 2019.
- A. Chamberlin & **C. Callahan**. [Last Resort Farm: Post Harvest Case Study \(Video Series\)](#). Video Case Study. January 9, 2019.
- 2018 A. Chamberlin & **C. Callahan**. [The BarnHouse: Optimized for Modern Day Vegetable Farming at Footprint Farm](#). Video Case Study. December 21, 2018.
- A. Chamberlin & **C. Callahan**. [The BarnHouse: Optimized for Modern Day Vegetable Farming at Footprint Farm](#). PDF Fact Sheet Case Study. December 21, 2018.
- A. Chamberlin & **C. Callahan**. [The BarnHouse: Optimized for Modern Day Vegetable Farming at Footprint Farm](#). Blog Post. December 21, 2018.
- A. Chamberlin & **C. Callahan**. [Mighty Clean and Comfortable – A New Wash and Pack Shed at Mighty Food Farm](#). Video Case Study. December 21, 2018.
- C. Callahan**. [Mighty Clean and Comfortable – A New Wash and Pack Shed at Mighty Food Farm](#). PDF Fact Sheet Case Study. December 21, 2018.
- C. Callahan**. [Mighty Clean and Comfortable – A New Wash and Pack Shed at Mighty Food Farm](#). Blog Post. December 21, 2018.
- C. Callahan**. [Briquetting a Better, Burnable Cow Patty](#). Blog Post. December 9, 2018.
- C. Callahan**. [Storing the Bounty: Handling and Storage of Produce after Harvest](#). Blog Post for High Mowing Organic Seeds Blog. November 10, 2018.
- C. Callahan**. [Lessons in Ergonomics from My Grandmother](#). Blog Post and Audio Recording. October 28, 2018.
- C. Callahan** and A. Chamberlin. [Forced Air Cooler: Pallet Model](#). Build Plans. October 5, 2018.
- C. Callahan** and A. Chamberlin. [Forced Air Cooler: Countertop Model](#). Build Plans. October 5, 2018.
- C. Callahan** and A. Chamberlin. [Forced Air Cooling on the Farm](#). Blog Post and Fact Sheet. October 5, 2018.
- C. Callahan**. [Simple Ergonomics and Lean Thinking at Chewonki Farm](#). Blog Post. September 22, 2018.
- C. Callahan** and A. Chamberlin. [Greens Spinners for Farm Use](#). Blog Post and Fact Sheet. July 21, 2018.
- C. Callahan** and A. Chamberlin. [Floor Design for Vegetable Wash, Pack and Storage Areas](#). Blog Post and Fact Sheet. May 21, 2018.
- C. Callahan**. [Taking the PSR with You](#). Blog Post. March 28, 2018.
- E. Newbold, P. Land, and **C. Callahan**. [NECAFS Clearinghouse](#). Website. March 1, 2018.
- A. Chamberlin, T. Chamberlin, D. Paulk, W. Reed, and **C. Callahan**. [Innovation in Small Scale Vegetable Wash Equipment](#). Blog Post and Video Series. February 7, 2018.
- 2017 **C. Callahan**, M Stenta, M. Kilpatrick, and S. Ward. [Produce Tracking and Traceability](#). Webpage. November 22, 2017.
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- C. Callahan** and A. Chamberlin. [Rats \(and Other Rodents\)](#). Fact sheet. Updated from earlier Blog Post. October 9, 2017.
- C. Callahan** and A. Chamberlin. [Smooth and Cleanable Surfaces](#). Fact sheet. Updated from an earlier Blog Post. September 29, 2017.
- C. Callahan**. [Farm Cooler Checklist](#). Ag Engineering Blog Post. April 17, 2017.
- C. Callahan**. [Improved Ventilation for High Tunnels](#). Ag Engineering Blog Post. March 24, 2017.
- 2016 **C. Callahan**. [Rats \(and Other Rodents\)](#). Ag Engineering Blog Post. October 14, 2016.
- V. Grubinger, **C. Callahan**, J. Faulkner, R. Achilles, and J. Buckley. [Guidance on Wash Water Discharge from Vegetable Pack Sheds - Advice on System Design](#). UVM Extension with Vermont Agency of Agriculture, Food and Markets. May 16, 2016.
- C. Callahan**. [Pumps and Pipes](#). Ag Engineering Blog Post. May 13, 2016.
- C. Callahan**. [Thermostats for Agriculture](#). Ag Engineering Blog Post. May 3, 2016.
- C. Callahan**. [Vermont Farmers Food Center Heats with Biomass](#). Ag Engineering Blog Post. May 1, 2016.
- C. Callahan**. [Grass and “Ag Biomass” Competitive with Wood Chips](#). Ag Engineering Blog Post. May 1, 2016.
- C. Callahan**. [Finish Surfaces for Produce and Food Areas](#). Ag Engineering Blog Post. April 29, 2016.
- C. Callahan**. [Outside Air Exchange](#). Fact Sheet. January 21, 2016.
- 2015 **C. Callahan**. [Sanitizer Dosing Systems and DIY Doser Build Instructions](#). Fact Sheet. October 21, 2015.
- C. Callahan**. [Heating Greenhouses with Biomass](#). Ag Engineering Blog Post. September 14, 2015.
- C. Callahan**. [Increasing Supply and Quality of Local Storage Vegetables](#). Ag Engineering Blog Post. September 14, 2015.
- C. Callahan**. [Doser for Small Scale Vegetable Washing with Sanitizer](#). Ag Engineering Blog Post. June 16, 2015.
- C. Callahan**. [Farm Building Plans](#). Ag Engineering Blog Post. June 15, 2015.
- C. Callahan**. [Calculating Greenhouse and High Tunnel Heat Loss](#). Ag Engineering Blog Post. April 1, 2015.
- V. Grubinger & **C. Callahan**. [Farm Resilience Checklist](#). UVM Extension. March 1, 2015.
- C. Callahan**. [LED Lights – Status, Cost/Benefit and Pro’s and Con’s](#). Ag Engineering Blog Post. February 25, 2015.
- C. Callahan**. [Energy on the Farm – On-Farm Heating with Biomass](#). Cornell Small Farms Quarterly. January 12, 2015. p.19.
- 2014 **C. Callahan**. [Hop Harvesting and Beyond](#). Ag Engineering Blog Post. December 7, 2014.
- C. Callahan**. [Simple DIY Outside Air Exchange](#). Ag Engineering Blog Post. November 2, 2014.

- C. Callahan** & H. Harwood with H. Darby, R. Elias, D. Schaufler. [Small-Scale Oilseed Presses: An Evaluation of Six Commercially-Available Designs](#). March 3, 2014. Associated YouTube Video, with L. Madden.
- C. Callahan**, S. Sawyer, J. Vandette, A. DePillis, S. Galbraith. [Farm Energy Success Stories. Dairy Farm Energy Efficiency, Dairy Processor Energy Efficiency, Heating with Biomass, Solar PV, Wind Power, Biodiesel & Digesters](#). Vermont Sustainable Jobs Fund – Farm to Plate Network – Energy Cross Cutting Team. January 27, 2014.
- 2013 **C. Callahan** & G. Mason. [Crop Storage Resources: An Online Clearinghouse](#).
- C. Callahan**, L. Prim, and G. Stevens. [Greenhouse and High Tunnel Tour Video Series](#). Video archive developed jointly with NOFA-VT for broad distribution via YouTube.
- V. Nickerson, L. Blevins, & **C. Callahan**. [Fact Sheet “Produce Safety: Storing Produce with Food Safety and Quality in Mind”](#) – UVM Extension
- D. Schaufler, R. Elias, H. Darby, **C. Callahan**, H. Harwood. [Small Scale Processing of Locally Produced Edible Oils](#). Northeast Agricultural and Biological Engineering Conference (NABEC). June 16-19, 2013. Altoona, PA.
- C. Callahan**. (Revised 2013). [“Design Documents: The UVM Mobile Hops Harvester and Modular Oast.”](#) – UVM Extension
- 2012 **C. Callahan**. [Mobile Hops Harvester](#). Fact Sheet. UVM Extension. July 30, 2012.
- C. Callahan**. [Modular Hops Oast](#). Fact Sheet. UVM Extension. July 30, 2012.
- C. Callahan** & B. Waterman. [“Solar Water Pumping Basics”](#). Blog post on UVM New Farmer Project Website. June 14, 2012.
- Vermont Bioenergy Initiative of the Vermont Sustainable Jobs Fund**. [BioEnergy Now! Video Series](#). Featured in several videos in this series of films documenting the people, feedstocks, and fuels of the Vermont Bioenergy Initiative.
- 2011 Darby, H. and **C. Callahan**. 2011. [Video: The Mobile Hops Harvester](#). University of Vermont Extension Northwest Crops and Soils Program.
- 2010 **C. Callahan** & V. Grubinger. [“Biomass Furnaces for Greenhouse Vegetable Growers.”](#) – UVM Extension by sub-contract.

REPRINTS IN OTHER EXTENSION PUBLICATIONS

- 2021 [Repairing Cracks and Pits in Concrete](#). University of Massachusetts VegNotes. Vol. 33:23. September 23, 2021.
- 2020 [Improving Handwashing Stations](#). University of Massachusetts VegNotes. Vol. 32:13. June 18, 2020.
- [Drains for Produce Farms](#). University of Massachusetts VegNotes. Vol. 32:8. May 7, 2020.
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- A. Elansari (Editor). E. Yahia, D. Fenton, and **C. Callahan**. Chapter 7: Precooling in [Postharvest Technology of Perishable Horticultural Commodities](#). Edited by Elhadi M. Yahia. Elsevier. July 17, 2019.
- A. Elansari (Editor). **C. Callahan**, E. Yahia, and D. Fenton. Chapter 8: Psychrometrics in [Postharvest Technology of Perishable Horticultural Commodities](#). Edited by Elhadi M. Yahia. Elsevier. July 17, 2019.
- 2017 **C. Callahan** with M. Bess Dicklow and Lisa McKeag, editors. New England Vegetable Management Guide. Sections on [Postharvest Handling and Storage](#). 2017 Edition.
- 2014 H. Darby and **C. Callahan**. Chapter: “On-farm Oil-based Biodiesel Production” in Biomass to Biofuels. A. Dahiya, editor. 2015. Elsevier.

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- 2014 Electrochemical Cell. United States Patent [#8715871](#). May 6, 2014.
- 2013 Electrochemical Cell. United States Patent [#8506787](#). August 13, 2013.
- 2012 Apparatus for Supporting a Person Having Enhanced Portability and Method of Using Same. United States Patent [#8332971](#). December 18, 2012.
- 2006 Controlling fuel cell fuel purge in response to recycle fuel blower operating conditions. United States Patent [#20060003204](#). January 5, 2006.
- 2004 Shut-down procedure for fuel cell fuel processing system. United States Patent [#6828048](#). December 7, 2004.
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- 2023 H. Doyle, **C. Callahan**, & E. Newbold. On-Farm Produce Safety: A Review of Needs Assessments of Small- and Medium-Sized Growers in the United States. *Food Protection Trends*, 43(1), 8–22.
- 2021 **C. Callahan**, A. Chamberlin, W. Mitchell. Beat the Heat in Postharvest Handling. *Growing for Market Magazine*. Volume 30. Number 6. June/July 2021. (8-14).
S. Brown, E. Newbold, **C. Callahan**, J. Kovacevic. The Peer Review Process for Add-on Content. 2021 NECAFS Annual Meeting. February 16, 2021. Poster. Virtual.
- 2020 **C. Callahan**. Hygienic Design for Produce Growers. 2020 NECAFS Annual Meeting. February 11, 2020. Philadelphia, PA. Poster.
A. Chamberlin and **C. Callahan**. Supporting Safer Salad Spinners: Applying Hygienic Design to Washing Machine Derived Greens Spinners. 2020 NECAFS Annual Meeting. February 11, 2020. Philadelphia, PA. Poster.
- 2019 **C. Callahan**, E. Newbold, & P. Land. The Food Safety Clearinghouse: A One-stop Shop for FSMA PSR and PCHFR Resources. 2019 NASDA National Consortium. March 7, 2019. Orlando, FL. Poster.
- 2018 **C. Callahan**. Food Storage Curriculum for Farmers and Processors. National SARE Conference. April 4, 2018. St. Louis, MO. Poster.
- 2016 Sawyer, S., Garza, E., DePillis, A., Vandette, J., & **Callahan, C.** 2016. [Vermont Farm to Plate Strategic Plan: Chapter 4. Section 6. Food System Energy Issues.](#) Vermont Sustainable Jobs Fund.
C. Callahan. Social Sustainability in Agriculture through Engineering. Highlights of USDA NE-SARE Projects Advancing Agriculture with Farmer-Oriented Technical Solutions. Northeast SARE Advisory Council Meeting. July 26, 2016. Burlington, VT. Poster.
- 2015 **C. Callahan**. Advanced Electronic Psychrometer for Improved Measurement and Control of Humidity in Real-Time. 2015 ASABE Annual Meeting. New Orleans, LA. July 2015.
C. Callahan. On-Farm Biodiesel in Vermont: A Decade of Learning. (A Techno-Economic Model). 2015 ASABE Annual Meeting. New Orleans, LA. July 2015.
- 2014 **C. Callahan** and H. Darby. A Mobile Hops Harvester: User-based, Public Domain Design and Shared Infrastructure in an Emerging Agricultural Sector. 2014 ASABE Annual Meeting. Montreal, QC. July 2014.
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- 2009 Collins, S. and **Callahan, C.** (2009), Cultural Differences in Systems Engineering: What They Are, What They Aren't, and How to Measure Them. Nineteenth Annual International Symposium of the International Council on Systems Engineering (INCOSE), Singapore, July 19 – 23.
- 2008 **C. Callahan**. How and Why a Small Digester Works. 2008 USDA SARE National Meeting. Kansas City, MO. March 2008.

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- 2017 ANSI/ASABE Standard: X475.2 Design and Management of Storages for Bulk, Fall-Crop, Irish Potatoes. Standard Revision Committee.
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2005 Standard SAE J2615: Testing Performance of Fuel Cell Systems for Automotive Applications. Society of Automotive Engineers. Fuel Cell Standards Committee.

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ANSI/ASABE Standard: S612 Performing On-Farm Energy Audits.

MANUSCRIPTS: WORKS IN PROGRESS

Staying Ahead in the Packshed: A Handbook of Postharvest Handling and Storage for Small and Medium Sized Produce Farms. C. Callahan. In discussion with Chelsea Green Publishing.

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2021 A Review of the Success Factors of a Collaborative Regional Network. E. Newbold & C. Callahan. Journal of Behavioral Science. Revising.

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2018 **C. Callahan**. Review of Meat Curing Room Loads and Capacity. Mad River Food Hub. February 1, 2018.

2017 **C. Callahan**, M. Kilpatrick, M. Stenta, and S. Ward. [Final Report: The Vermont Produce Tracking and Traceability Project](#). November 22, 2017.

C. Callahan and M. Kilpatrick. Interim Report: The Vermont Produce Tracking and Traceability Project. May 5, 2017.

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C. Callahan. [Biomass Boiler Installation at The Vermont Farmers Food Center](#). UVM Extension with Funding from The Vermont Bioenergy Initiative. April 9, 2016.

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V. Grubinger & **C. Callahan**. [Final Report: Improving and Expanding Winter Crop Storage in Vermont](#). Working Lands Service Provider Grant. August 27, 2015.

2014 **C. W. Callahan**. "Tip Sheet: Outside Air Economizers." Massachusetts Farm Energy Project. February 2014.

2013 **C. W. Callahan**. "Side Hill Farm: Feasibility of Outside Air Economizer." Under contract with Massachusetts Farm Energy Project. November 2013

C. W. Callahan. "Summary of NRCS EQUIP Energy Efficiency Measures for Consideration of Federal Approval for Regional Allocations: New England." Under contract with Massachusetts Farm Energy Project. June 2013.

- C. W. Callahan** and N. White. [“Vermont On-Farm Oilseed Enterprises: Production Capacity and Breakeven Economics.”](#)
- 2011 **C. W. Callahan**. [“Oilseed Cost and Profit Calculator.”](#)
- 2010 **C. W. Callahan**, L. Scott, J. Williamson, T. Williamson, A. Baker & N. White. [“Feasibility Analysis: Producing Ethanol for Biodiesel in Vermont.”](#)
- 2009 **C. W. Callahan** & J. Williamson. [“Project Report: State Line Biofuels Safety Review and Engineering Study of an On-Farm Small-Scale Biodiesel Production Facility.”](#) January 15, 2009.
- 2008 **C. W. Callahan**. [“A Feasibility Analysis of a Mobile Unit for Processing Oilseed Crops and Producing Biodiesel in Vermont.”](#)
- C. W. Callahan** & J. Williamson. [“Feasibility Analysis: Solar Seed Dryer and Storage Bin.”](#)

MASS MEDIA

- 2023 The Food Safety Dish. [S01 E07 - Cleaning 101 with Chris Callahan](#). Podcast. National Farmers Union. May 30, 2023.
- [Across the Fence: Post Harvest \(Jericho Settlers Farm\)](#). WCAX-TV (CBS) Channel 3. Burlington, VT. January 19, 2023.
- [Across the Fence: Segments on Burlington City Arborist + Wilcox Ice Cream](#). WCAX-TV (CBS) Channel 3. Burlington, VT. January 11, 2023.
- 2022 [Across the Fence: Post Harvest \(Jericho Settlers Farm\)](#). WCAX-TV (CBS) Channel 3. Burlington, VT. April 20, 2022.
- [Across the Fence: Segments on Spring Labs + Wilcox Ice Cream](#). WCAX-TV (CBS) Channel 3. Burlington, VT. April 2, 2022.
- [Across the Fence: UVM Extension's Ag Engineering Team: Innovative Support for Vermont's Farm Businesses](#). WCAX-TV (CBS) Channel 3. Burlington, VT. February 17, 2022.
- 2021 [Across the Fence: UVM Extension Associate Professor Earns Engineering Award](#). WCAX-TV (CBS) Channel 3. Burlington, VT. July 23, 2021.
- [Across the Fence: “Supporting Farm & Food Businesses During the Pandemic”](#). WCAX-TV (CBS) Channel 3. Burlington, VT. February 15, 2021.
- 2020 [Across the Fence: “Post Harvest 2020 \(Small Axe Farm\)”](#) WCAX-TV (CBS). Burlington, VT. November 23, 2020.
- [Across the Fence: “Wilcox Ice Cream”](#). WCAX-TV (CBS) Channel 3. Burlington, VT. Re-aired June 2, 2020.
- [Across the Fence: “Farmers & the Pandemic: Support from UVM Extension’s Agricultural Engineering Team”](#) WCAX-TV (CBS). Burlington, VT. May 28, 2020.
- [Across the Fence: “Local Food From Local Farms: Farmers’ Markets During the Pandemic”](#) WCAX-TV (CBS). Burlington, VT. May 14, 2020.
- [Across the Fence: “Portable Hand Washing & Guidelines for Community Gardening on 'Across The Fence'.”](#) WCAX-TV (CBS). Burlington, VT. June 11, 2020.
- Bennington Banner [“Hand-washing station makes impression at Farmers Market.](#) Posted Tuesday, June 9, 2020.

- Cleaning, Sanitizing and Disinfecting. Michigan State University Extension. Agrifood Safety. Produce Safety Bites. Podcast. May 11, 2020. With E. Hale.
- Using Hygienic Design Principles to Improve Sanitation Practices on Produce Farms. AFDO NASDA Consortium Educators Podcast. Recorded April 30, 2020, published July 28, 2020. With E. Bihn.
- 2019 “From Spin Cycle to Salad Spinners - RTCC Students Help Farms Build DIY Veggie Driers” The Herald of Randolph. November 21, 2019.
- Across the Fence: “How Vermont Produce Farmers Ensure Food Safety.” WCAX-TV (CBS). Burlington, VT. September 9, 2019.
- “Project planning for post-harvest efficiency, profitability, food safety.” Country Folks Grower. September 3, 2019.
- Across the Fence: “DewRight: Improved Humidity Measurement” WCAX-TV (CBS) Channel 3. Burlington, VT. Re-aired July 31, 2019.
- Across the Fence: “Wilcox Ice Cream”. WCAX-TV (CBS) Channel 3. Burlington, VT. Re-aired June 5, 2019.
- Across the Fence: “Innovative Feats of Agricultural Engineering on Vermont Farms”. WCAX-TV (CBS) Channel 3. Burlington, VT. Re-aired April 1, 2019.
- Across the Fence: “Wilcox Ice Cream”. WCAX-TV (CBS) Channel 3. Burlington, VT. Re-aired January 21, 2019.
- 2018 Across the Fence: “DewRight: Improved Humidity Measurement” WCAX-TV (CBS) Channel 3. Burlington, VT. Re-aired November 30, 2018.
- “Ergonomics Lessons from My Grandma”. WDEV Radio Public Service Announcement. October 28, 2018.
- “Finding a Better Way” USDA SARE Our Farms, Our Future Podcast. Episode 10. August 17, 2018.
- Across the Fence: “DewRight: Improved Humidity Measurement” WCAX-TV (CBS) Channel 3. Burlington, VT. March 23, 2018.
- 2017 Across the Fence: “Wilcox Ice Cream”. WCAX-TV (CBS) Channel 3. Burlington, VT. December 20, 2017.
- Across the Fence: “Innovative Feats of Agricultural Engineering on Vermont Farms”. WCAX-TV (CBS) Channel 3. Burlington, VT. Re-aired July 14, 2017.
- Across the Fence: “Extension Mentors High School Students, and Local Energy at the Vermont Farmers Food Center”. WCAX-TV (CBS) Channel 3. Burlington, VT. February 20, 2017.
- Across the Fence: “Segments on: Expanding Vermont’s Growing Season with Cold Crop Storage and the Proper Pruning of Apple Trees”. WCAX-TV (CBS) Channel 3. Burlington, VT. January 27, 2017.
- 2016 Across the Fence: “Local Food: Expanding VT’s Cold Storage Systems, and Universal Recycling: Food Recovery and Compost”. WCAX-TV (CBS) Channel 3. Burlington, VT. July 29, 2016.
- Across the Fence: “Innovative Feats of Agricultural Engineering on Vermont Farms”. WCAX-TV (CBS) Channel 3. Burlington, VT. June 7, 2016.
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Across the Fence: [“Segments on Local Food, Local Fuel at the VT Farmers Food Center in Rutland, and UVM Students as Volunteers”](#). WCAX-TV (CBS) Channel 3. Burlington, VT. April 26, 2016.

Across the Fence: [“Segments on Improving VT’s Cold Crop Storage Systems and Reducing Waste–Food Recovery and Compost”](#). WCAX-TV (CBS) Channel 3. Burlington, VT. February 9, 2016.

Across the Fence: [“Segments on Crop Storage Improvements Developed by UVM Extension, and UVM Apple Specialist Terry Bradshaw Demonstrates Apple Tree Pruning”](#). WCAX-TV (CBS) Channel 3. Burlington, VT. January 6, 2016.

- 2015 [“Vermont Farms Monitor Storage Conditions by Cellphone”](#). Lisa Rathke. Associated Press. March 7, 2015.

Across the Fence: [“Expanding the Growing Season with Improved Crop Storage, and, UVM Apple Specialist Terry Bradshaw on Apple Tree Pruning”](#) WCAX-TV (CBS) Channel 3. Burlington, VT. March 30, 2015.

[“Biomass Heating for Greenhouses”](#). Cornell Small Farms Quarterly. Winter 2014/2015.

- 2014 [Profile: Chris Callahan, Extension Assistant Professor, University of Vermont](#). Biofuels Journal. December 2014. pp 76-77.

Across the Fence: [Solar Heating of Greenhouses at Old Athens Farm in Putney, VT](#). WCAX-TV (CBS) Channel 3. Burlington, VT. May 13, 2014.

Across the Fence: [Biomass Heating of Greenhouses at River Berry Farm in Putney, VT](#). WCAX-TV (CBS) Channel 3. Burlington, VT. May 14, 2014

Across the Fence: [The UVM Mobile Hops Harvester](#). WCAX-TV (CBS) Channel 3. Burlington, VT. February 27, 2014.

- 2013 The Ag Show with Frank Lamb: UVM Extension’s New Agricultural Engineer. WBTN 860 AM. Bennington, VT.

INVITED POLICY BRIEFINGS

- 2018 Panel. Public Meeting to Discuss Draft Guidance for Industry on the Standards for the Growing, Harvesting, Packing and Holding of Produce for Human Consumption. US FDA. Albany, NY. December 11, 2019.

- 2015 Vermont Comprehensive Energy Plan. Contributor to Biomass and Biodiesel Sections. November 2015.

- 2011 Testimony to the U.S. House of Representatives Biomass Caucus. Washington DC. October 13, 2011. Topic: Overview of farm-based sustainable biodiesel production from oilseed crops.

MASTER’S THESIS

- 2003 [C. Callahan. Apples and Oranges: A Guide for Practical Application of Present Theory Regarding Diversity of Culture in Corporate Organizations](#).

GRANTS & CONTRACTS

Grant and Role Summary

Year	Grants	Amount	Role	Number	Award Total
2022	2	\$471,782	PI	32	\$5,636,166
2021	5	\$2,031,445	Co-PI	22	\$4,329,702
2020	9	\$585,445	Sub/KP	8	\$641,557
2019	7	\$2,936,129	Advisor	10	\$3,643,517
2018	5	\$1,300,311	External	4	\$44,628
Avg 2012-2017	4	\$406,142			
Total 2012-2022	49	\$9,761,965			

- 2022 **C. Callahan**, S. Fogarty, E. Newbold, A. Chamberlin, H. Machado, and S. Sirsat. Understanding and Addressing Needs for On-Farm Produce Safety Education in Hydroponics and Aquaponics. \$400,000. 9/1/2022-8/31/2025. PI. Active.
- C. Callahan**, H. Estrin, and A. Chamberlin. Phase III: Integrated Extension Educational Programming in Support of the VAAFM Produce Program. \$71,782. 1/25/2022-6/30/2022. PI. Complete.
- 2021 P. Ackerman-Leist, C. Kimball, W. Cavanaugh, **C. Callahan**, B. Leach, R. Thistlethwaite. Facilitation of the Development of VTC Meat Processing Curricula and Facilities. Awarded through Regen by Design, LLC via Vermont Technical College under prime from USDA Rural Business Development Grant. \$25,000. 7/31/2021-7/22/2022. Key Personnel. Complete.
- E. Newbold & **C. Callahan**. The Northeast Produce Safety Research Consortium. US FDA. \$1,380,523. 10/1/2021-9/30/2026. Co-PI. Active.
- D. Abruzzini, C. Riggs, C. Alexander, M. Fasching, B. Lesnokoski, R. Madden, **C. Callahan**, Aaron Loomis. High Tunnel Gantry System with Transport Cart and Automated Row Cover System to Assist Small Farm Production, Scalability, and Profitability. USDA NE-SARE. ONE21-381. \$29,944. 8/1/2021-3/1/2023. Advisor. Active.
- C. Callahan**, J. Jenkins, K. Griffin. Axes of Awesome: Collaboratively Building the X, Y and Z at BAM. Community Design and Construction of Mobile Make Mesas (M3s). Vermont Academy of Science and Engineering (VASE) Hands on Science and Technology (HOST) Grants. \$952. 4/21/2021-9/1/2021. Non-UVM Award. PI (through Bennington Area Makers). Complete.
- J. Amann, J. Perkins, D. Smith & G. Schimelpfenig. Data-Driven Market Transformation for Controlled Environment Agriculture. USDA CIG. \$595,026. 2/1/2021-1/31/2024. Advisor. Active
- 2020 **C. Callahan** and J. Walker. Enhancing predictive, geo-informed COVID-19 response behavior with push notification outreach to reduce community spread. VT ACCD via UVM OoE COVID Outreach RAPID Grants. \$4,800. 11/15/2020-12/20/2020. Key Personnel. Complete.

L. Chase, W. Wang, **C. Callahan**, H. Estrin, A. Chamberlin. Support for Farm and Food Tourism Businesses Negatively Impacted by COVID-19. VT ACCD via UVM OoE COVID Outreach RAPID Grants. \$15,373. 11/15/2020-12/20/2020. Sub-award. Complete.

E. Newbold and **C. Callahan**. Extension Legal Services Initiative: Food Safety Modernization Act (ELSI:FSMA) – Continuation Funding. Vermont Law School (prime). 10/1/2020-8/30/2021. \$48,696. Co-PI. Complete.

V. Grubinger, **C. Callahan**, H. Estrin, A. Chamberlin, R. Hadad, A. Debovis. Training and Technical Support to Help Small Vegetable Farms Meet the Cleaning and Sanitization Requirements of the Produce Safety Rule. USDA NIDA FSOP. \$442,613. 9/1/2020-8/31/2023. Key Personnel, Co-PI. Active.

C. Callahan and C. Healy. Southshire Community School COVID Education Improvements. COVID Relief Fund. US Federal Emergency Management Agency via Vermont Agency of Education. \$3,676. 9/1/2020-3/31/2020. Non-UVM award. Complete.

C. Callahan and C. Healy. Southshire Community School Ventilation Improvements. Vermont COVID Indoor Air Quality Grant Program. Efficiency Vermont with Vermont Agency of Education. \$25,000. 8/1/2020-3/31/2020. Non-UVM award. Complete.

D. Conner, R. Desrochers, L. Chase, H. Darby, M. Niles, **C. Callahan**, B. Bauerly, H. Blair, N. Cunningham, C. Whitehouse, J. Krueger. Agility in the face of disruption: Food business rapid response to COVID-19. UVM CALSX ARS Rapid Response to COVID-19. \$19,892. June 19, 2020 – June 20, 2021. Key Personnel. Active.

C. Callahan. Lab-Keeper: Cold Storage at Stone Barns Center for Sustainable Agriculture. Tarrytown, NY. \$9,395. 4/1/2020-6/30/2021. PI. Complete.

D. I. Riggs, **C. Callahan**, G. Loeb, L. McDermott. Design, Testing and Construction Education of a Post and Wire Support Structure for Insect Exclusion Netting on Field Grown Berries. USDA NESARE Farmer Grant #FNE20-963-34268. \$15,000. 2/21/2020-2/28/2022. Technical Advisor. Active.

2019 J. Harvey, C. Ross, et al. Increasing Small-Farm Viability and Human Nutrition in the Local Food Systems of the New England States. USDA ARS Research Center at UVM. \$1,350,000. Advisor. Active.

E. Bihn and **C. Callahan**. Cleaning, Sanitizing and Sanitary Design for Small and Medium Scale Specialty Crop Growers. NYSDAM SCBG \$99,900. 10/1/2019-9/29/2022. Sub-Award (\$20,000). Complete.

C. Stewart, C. Hoepting, & **C. Callahan**. Postharvest Handling of Garlic for Control of Pests and Disease. USDA NESARE Professional Partnership Grant #ONE19-351. \$29,968. 8/1/2019-7/31/2022. Co-PI. Complete.

A. Chamberlin and **C. Callahan**. The Ag Engineering Podcast: Tools, Tips, and Techniques for Improving Sustainability on Your Farm. USDA NE SARE Professional Partnership Grant. \$27,280. 8/1/2019-7/31/2021. Key Personnel. Complete.

Sgorbati, S., et al. Bennington County Study to Address Systemic Causes of Food Insecurity. Andrew W. Mellon Foundation to Bennington College. \$1,000,000. 6/1/2019-5/31/22. Advisor. Complete.

C. Callahan, D. Schaffner, E. Bihn, E. Newbold. Decision Support Tool for Grower Adoption of Food Safety Practices. USDA AFRI Critical Agriculture Research and Extension (CARE)

- Grant. \$299,414. 6/1/2019-5/31/2022 - NCE. Award Notification April 23, 2019. PI. Active.
- C. Callahan** & A. Chamberlin. Staying Ahead in the Packshed: Improving Postharvest Equipment and Building Guidance for Fruit and Vegetable Farms. USDA NE SARE Research and Education Grant. LNE19-375. \$129,567. 4/1/2019-3/31/2021. PI. Complete.
- 2018 **C. Callahan**, H. Estrin, and A. Chamberlin. Phase II: Integrated Extension Educational Programming in Support of the VAAFM Produce Program. \$186,005. 12/4/18-4/31/2021. PI. Complete.
- Kinchla, A., D. Lass, J. Fitzsimmons, J. Waite, L. Buxton, J. Benoit. Extending the Season: Freezing Produce for a New Market. USDA NE SARE Innovations Grant. LNE18-370. \$199,524. 10/1/2018-12/31/2020. Advisor. Complete.
- E. Newbold, **C. Callahan**, E. Bihn, A. Kinchla, L. LaBorde. The Northeast Center to Advance Food Safety (NECAFS). USDA NIFA FSOP. 8/1/2018-7/31/2021. \$799,797. Co-PI. Active.
- E. Newbold and **C. Callahan**. Extension Legal Services Initiative: Food Safety Modernization Act (ELSI:FSMA). Vermont Law School (prime). 10/1/2018-9/30/2020. \$99,985. Co-PI. Complete.
- C. Callahan**, J. Griswold, A. Carlucci, J. Goldstone and E. Callahan. Barn Preservation Award for the Sidney Colvin Farm, North Bennington. #07110 BG18-006. Vermont Division for Historic Preservation, Agency of Commerce and Community Development. \$15,000 award on \$51,773 project. PI as volunteer with Southshire Community School. Complete.
- 2017 W. Kuhns, R. Shephard, C. Kuhns, & **C. Callahan**. Technology Commercialization Co-Development Proposal: Improved Humidity Control with the DewRight. Vermont Agency of Commerce through UVM Office of Technology Commercialization in partnership with Vermont Energy Control Systems (VECS). \$52,200. Key Personnel. Active.
- C. Callahan**, H. Estrin, and A. Chamberlin. Integrated Extension Educational Programming in Support of the VAAFM Produce Program. \$100,000. PI. Complete.
- C. Callahan**. Eastern Broccoli Packing House Design for Sanitary Practice. Sub-award from Cornell University on USDA SCRI project. \$39,974. PI. Complete.
- R. Belforti and **C. Callahan**. Livestock manure briquette fuel-making machine: Design and implementation for small farms. USDA NE-SARE Farmer Grant #FNE17-862. \$13,743. Technical Advisor. Complete.
- Kinchla, A., N. Richards, L. Pivarnik. Food Safety Management Training for Small and Emerging Food Businesses: Integrating A Food Safety Culture from Concept to Commercialization. USDA NIFA FSOP. \$398,000. Advisor. Complete.
- 2016 **C. Callahan**. Produce Tracking and Traceability Project. Vermont Agency of Agriculture, Farms and Markets & Vermont Housing and Conservation Board. \$39,967. PI. Complete.
- 2015 **C. Callahan** and R. Hadad. The “In-Between”: Precooling and Curing Fruits & Vegetables for Improved Quality and Profit. USDA NE SARE Research and Education (LNE16-347). Sept 2016. \$127,799. PI. Complete.
- C. Callahan**, E. Bihn, A. Kinchla, L. Laborde, C. Walsh. The Northeast Center to Advance Food Safety (NECAFS). USDA and USDA National Training, Education, Extension, Outreach, and Technical Assistance Competitive Grants Program: Regional Center Grants to Enhance Food Safety. \$949,867. PI. Complete.
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E. Mallory, E. Gallandt, J. Hao, R. Kersbergen, H. Darby, **C. Callahan**, A. Hazelrigg, & D. Heleba. Innovative Sowing, Cultivation, and Rotation Strategies to Address Weed, Fertility, and Disease Challenges in Organic Food and Feed Grains. USDA AFRI Organic Research and Education Initiative. September 30, 2105 – September 30, 2019. \$82,000 sub on \$999,120 award. Key Personnel. Complete.

C. Callahan, D. Grover, D. Cox, RJ Steinhart. Innovative Impact Assessment of Farm & Food Innovations. USDA Northeast Sustainable Agriculture, Research and Education (NE-SARE). Professional Partnership Grant. ONE15-230-29001. April 1, 2015 – April 15, 2017. \$14,999. PI. Complete.

C. Callahan, C. Davis, A. Dantzschler, J. Bootle, S. Bosworth. Densification and Combustion Trials of Solid Grass Biomass Fuels in Vermont. Vermont Bioenergy Initiative. January 1, 2015 – December 31, 2015. \$21,650. PI. Complete.

C. Callahan, G. Cox, R. Steingress, C. Brown. Biomass Boiler for the Vermont Farmer's Food Center (VFFC). Rutland, VT. Combined cash funding from Vermont Bioenergy Initiative (USDOE), Vermont Agency of Agriculture, Food and Markets, and a private anonymous donor with cash and in-kind from VFFC. January 1, 2015 – December 31, 2015. \$109,636. PI. Complete.

2014 **C. Callahan**, A. Kinchla, E. Bihn, L. Pivarnik, D. Hirsch, R. Hadad, V. Nickerson, R. Hazard, V. Grubinger. Toward a Regional Postharvest Research and Extension Center for the Northeast. Planning Grant from Northeast Extension Directors (NEED) and Northeastern Regional Association of State Agricultural Experiment Station Directors (NERA). December 1, 2014 – May 1, 2015. \$3,996. PI. Complete.

C. Callahan. Pilot Production of Innovative Electronic Psychrometer. UVM Office of Technology Commercialization. August 6, 2014 – Present. \$9,000. PI. Complete.

2013 **C. Callahan**, E. Kahler, S. Sawyer, A. DePillis, JJ Vandette. "On Farm Energy Success Stories." Vermont Sustainable Jobs Fund – Farm to Plate Network – Energy Cross Cutting Team. Funded by the Northeast Sustainable Dairy Collaborative. April 1, 2013 – January 31, 2014. \$12,000. Co-PI. Complete.

V. Grubinger & **C. Callahan**. Increasing Supply and Quality of Local Storage Vegetables. Vermont Working Lands Enterprise Initiative Service Provider Grant. April 1, 2014 – June 30, 2015. \$40,000. Co-PI. Complete

R. Morris, S. Ward, et al. Vermont Food Safety Task Force: Lot Tracking for Small Scale Food Producers and Processors of Vermont. Vermont Working Lands Enterprise Initiative, Vermont Housing Conservation Board, and Mad River Food Hub. \$15,000. Advisor. Complete.

E. Johnstonbaugh, T. Baugher, A. J. Both, **C. Callahan**, S. Hawkins, Z. Helsel, J. Sikora, T. Manning, G. Musgrave, B. Pollock, G. Roth. USDA Northeast Sustainable Agriculture Research and Education. Professional Development Program Grant. "Farm Energy IQ Training Program." ENE12-128. August 1, 2013 – April 30, 2015. \$145,000. Key Personnel. Complete.

C. Callahan. Vermont Sustainable Jobs Fund / Vermont Bioenergy Initiative. Technical Assistance Grant. Extension Support of Vermont On-Farm, Sustainable Biofuels Commercialization. July 1, 2013 – April 15, 2016. \$88,109. PI. Complete.

- C. Callahan**, J. Satz, D. Marchant, A. Knafel, R. Morris. USDA Northeast Sustainable Agriculture, Research and Education. Professional Partnership Grant. “Food Storage Curriculum for Farmers and Processors” ONE13-176. July 1, 2013 – December 31, 2015. \$14,952. PI. Complete.
- 2012 W. Harper, E. Wonnacott, L. Prim, **C. Callahan**, B. Holtzman, USDA Northeast Sustainable Agriculture, Research and Education. Research and Education Project “Integrated Learning Courses for Organic and Sustainable Vegetable Production.” LNE09-283. \$158,961. Key Personnel. Complete.
- C. Callahan**. UVM Extension Sub-Contract. “Mobile Hops Harvester and Oast Design and Prototype Development.” \$15,000. PI. Complete.
- 2011 D. Schaufler, R. Elias, H. Darby, & **C. Callahan**. USDA Northeast Sustainable Agriculture, Research and Education. Research and Education Grant. “Adding Value to Oilseed Crops by Producing Food Quality Oils.” LNE11-309. \$143,131. Key Personnel. Complete.
- C. Callahan**. Vermont Sustainable Jobs Fund / Vermont Bioenergy Initiative. “A Feasibility Analysis of a Mobile Unit for Processing Oilseed Crops and Producing Biodiesel in Vermont”. \$26,350. PI. Complete.
- C. Callahan**. USDA Northeast Sustainable Agriculture Research and Education. Professional Partnership Grant. “Crop Based Biofuels Feasibility Study for Washington County, New York.” ONE07-069. \$9,443. PI. Complete.
- 2008 **C. Callahan**, M. Freund, & B. Freund. USDA Northeast Sustainable Agriculture Research and Education. Professional Partnership Grant. “Digester Performance Tracking, Analysis and Lessons Learned Review at Freund’s Farm.” - (2006-2008) - ONE06-053. \$9,979. PI. Complete.

PROJECTS IN INDUSTRY

- 2005-Present Private practice consulting engineering focused on systems engineering, agricultural projects and sustainable energy systems. Consulting work scope which included increasing amounts of research and teaching. Publications and other work product generally restricted as client intellectual property.
- 2018 **Callahan, C.** & Marchant, D. Agricultural Energy Management Plan: Riverberry Farm, Fairfax, VT. December 16, 2018.
- 2012 **Callahan, C.** & Zheim, E. Agricultural Audit and Recommendations: Tiashoke Farms, Cambridge, NY. For NYSERDA FlexTech. March 3, 2012.
- 2011 **Callahan, C.**, Rainville, R., Darby, H., L'Etoille, E. Mobile Hops Picker. 2011-2012 (Work started in private practice and transitioned to UVM Extension work plan in 2012.)
- Callahan, C.** & Collins, M. Solar Hot Water for Greenhouse Heating System. Old Athens Farm, Putney, VT. 2011.
- 2010 **Callahan, C.** & Satz, J. Centralized Greenhouse Biomass Boiler. Wood’s Market Garden, Brandon, VT. 2010-2012.
- Callahan, C.** & Marchant, D. Centralized Greenhouse Biomass Boiler. River Berry Farm, Fairfax, VT. 2010-2012.

- Callahan, C.** & Knafel, A. Centralized Greenhouse Biomass Boiler. Clear Brook Farm, Shaftsbury, VT. 2010.
- Callahan, C.** & Betz, P. Centralized Greenhouse Biomass Heating System. Hi Ledge Farm, Woodbury, VT. 2010.
- 2009 **Callahan, C.** Agricultural Audit and Recommendations: Daughters of Sarah Senior Community, Albany, NY. For NYSERDA FlexTech. September 11, 2009.
- 2008 **Callahan, C.** Support of Vermont Bioenergy Initiative (VBI) of the Vermont Sustainable Jobs Fund (VSJF) related to oilseed production, postharvest handling, pressing, and conversion to biodiesel. 2008-2012 (Work started in private practice and transitioned to UVM Extension work plan in 2012.)
- 2007 **Callahan, C.** Energy Model and Summary Findings: Powell House, Old Chatham, NY. July 12, 2007.
- Callahan, C.** Energy Model and Summary Findings: Carletta-Barnett Residence. For Bakker Architects, Shavertown, PA. May 25, 2007.
- 2006 **Callahan, C.** An Audit of Energy and Power Use at Eastern Castings Company, Inc. Cambridge, NY. August 28, 2006.
- Callahan, C.** Energy Model and Summary Findings: Tabachnick Residence, Bridgeport, CT. For Trillium Architects, Norwalk, CT. September 27, 2006.
- Callahan, C.** Energy Model and Summary Findings: Old Chatham Friends Meeting House, Chatham, NY. For Nomad Architecture, Long Island City, NY. January 3, 2006.
- Callahan, C.** Energy Model and Summary Findings: Red Devon Restaurant, Bangall, NY. For Nomad Architecture, Long Island City, NY. January 2, 2006.
- 2005 Smith, W., Meyer, A., McElroy, J., **Callahan, C.** Advanced Passive Water Management Fuel Cell – Infinity Fuel Cell & Hydrogen, LLC. Suffield, CT. 2005-2012.
- Smith, W., Meyer, A., **Callahan, C.** Portable Regenerative Fuel Cell Power Plant. Infinity Fuel Cell & Hydrogen, LLC for the US Naval Air Warfare Center in China Lake, CA. Suffield, CT. 2005-2012.
- 2004-2005 Business development and customer relations for US fuel cell company in pursuit of European R&D and technology development opportunities. Publications and other work product generally restricted as corporate intellectual property.
- 2003-2004 Resident engineer, quality assurance, and technology transfer representative on-site at customer R&D facility (Japan) for US manufacture of pilot production hydrogen fuel cell engines. Publications and other work product generally restricted as corporate intellectual property.
- 2002-2003 Functional team lead on advanced gasoline-fueled fuel cell engine prototype involving multi-cultural, joint-venture dynamics (US-Dutch-Japanese). Activity required management of multiple systems-level design, analysis and requirements
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- definition and communication. Publications and other work product generally restricted as corporate intellectual property.
- 2000-2002 Functional lead on high-paced, high-risk, high-visibility, vehicle integrated, hydrogen fueled, fuel cell engine with direct automotive customer involvement (Korean). Publications and other work product generally restricted as corporate intellectual property.
- 1998-2000 Development of functional and schematic system design for gasoline fueled, reformate fuel cell power plant. Involved integration of multi-disciplinary team in leveraging functional expertise to deliver 50kW gasoline fueled transportation fuel cell engine prototype. Publications and other work product generally restricted as corporate intellectual property.
- 1997-1998 Development of low-NO_x propane and natural gas burner for residential hot water boiler heating plant (90,000-250,000 BTU/hr output). Design, development and documentation of cast iron heat exchangers in a wide range of residential, commercial and industrial boiler systems; some with last revision dating to 100 years prior. Publications and other work product generally restricted as corporate intellectual property.

OTHER INVENTIONS

- 2020 [Improved Hands-Free Handwashing Station for Areas without Plumbed water](#). Open Source via Ag Eng website. 6/9/2020.
- 2015 [Doser for Small Scale Vegetable Washing with Sanitizer](#). Open Source via FarmHack. 6/16/2015.
- 2014 [Simple DIY Outside Air Exchange](#). Open Source via FarmHack. November 2, 2014.
- 2014 [DIY High Capacity, Auto-Fill Humidifier](#). Open Source via FarmHack. January 12, 2014.
- 2012 [Portable Mechanized Hops Harvester](#). Open Source via FarmHack and Extension. January 3, 2012.

SOFTWARE & CALCULATORS

- 2022 [Wall Thermal Calculator](#). A web application that allows the user to build a multiple layer wall construction and performs a thermal analysis on the construction to determine the heat transfer characteristics of the wall including probable condensation plane location. August 28, 2022.
- [Bean Counter: A Simple Counting App](#). A web app that allows the user to simply tap the screen to count something without looking. This was a suggestion from a grower who often lost track of how many bunches of baby carrots they had put in a container. May 4, 2022.
- [High Tunnel and Greenhouse Heating and Cooling Calculator](#). A web application that estimates heating load, ventilation and circulation requirements, and fuel use based on user inputs. April 19, 2022.
- 2021 [Sanitizer Dose Calculator](#) (web version). An updated version of a previous Excel-based calculator to allow web-based and mobile phone access. January 14, 2022.
- [Heating and Cooling Load Calculator for Coolers and Warm Rooms](#). A web-based calculator to help produce growers estimate the size of heater or refrigeration required for a room of specific size and insulation. November 7, 2021.
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- 2020 [Soil Properties and Steaming Calculator](#). A Google Sheet that consolidates soil thermal properties and provides an estimator for soil steaming practices as weed control. October 26, 2020, revised April 20, 2022.
- 2016 [Pump and Pipe Calculator](#). An Excel based calculator used to help size piping systems and select appropriate pumps for hot water heating systems in greenhouse and for other small-scale farm pumping applications.
- [Herb Drier Sizing Calculator](#). An Excel based calculator that uses the functions of Psychrocalc (below) to assist growers with sizing batch driers for medicinal herbs.
- 2015 [Crop Storage Planning Tool](#). An Excel based crop storage planning tool that allows the user to enter the amount of various crops they plan to store and then groups the crops by common temperature and humidity zones and also estimates storage volume and product respiration load.
- [Psychrocalc Excel Add-in](#). An advancement of the earlier spreadsheet based humidity calculator, this add-in is a series of Excel functions that lets the user perform calculations and look-ups similar to using a psychrometric chart.
- [Sanitizer Dose Calculator for Vegetable Washing](#). This spreadsheet was developed to help food producers do sanitizer dose calculations in dunk tanks and wash sinks.
- 2014 [Humidification Calculator](#). Excel spreadsheet that allows the user to determine relative humidity based on dry-bulb and wet-bulb temperature measurements, and vice versa. This calculator also incorporates a relationship for determining the rate of water vapor evaporation into air based on several design factors in order to allow design of custom humidifiers for cheese aging, meat curing and root vegetable storage.
- 2012 [UVM Hop Harvest Readiness Calculator](#). Web-based and Excel format calculator that allows growers to determine when to harvest their hops for optimal quality. With support from L. Carrasco.
- 2010 [Vermont Oilseed Cost and Profit Calculator](#). Excel based calculator that provides for easier calculation of crop production cost, cleaning/drying cost, pressing cost, and biodiesel conversion cost as well as profit from various products derived from oilseeds based on market pricing.

SERVICE

PROFESSIONAL SERVICE

2022	Review Panel. USDA Small Business Innovation Research (SBIR) Program– Phase I. Plant Production and Protection (Engineering). Fiscal Year 2022. February 7-11, 2022.
2019-Present	Plant Systems Group of the Plant, Animal and Facility Systems Committee (PAFS-30) – American Society of Agricultural and Biological Engineers (ASABE). Observing Member, Liaison for ES-300.
2015-Present	Specialty Crop Engineering Committee (MS-48) – American Society of Agricultural and Biological Engineers (ASABE).
2015-Present	Electrical Utilization & Energy Application Committee (ES-300) – American Society of Agricultural and Biological Engineers (ASABE). Secretary 2015-2017, Vice Chair 2018-2020. Chair 2020-2022.
2016-2017	ANSI/ASABE Standard: X475.2 Design and Management of Storages for Bulk, Fall-Crop, Irish Potatoes. Standard Revision Committee.
2015-Present	ANSI/ASABE Standard: S612 Performing On-farm Energy Audits. Standard Revision Committee. Vice Chair (2018-2020) and Chair (2020-2022)
2014-2021	ASABE Technical Session Moderator: Techno-Economic Modeling of Food, Coproduct, Byproduct and Waste Systems. Recurring session at ASABE Annual Meeting.
2013-Present	Engineering Licensure Committee (EOPD-414, formerly ED-414) – American Society of Agricultural and Biological Engineers (ASABE) and The National Council of Examiners for Engineering and Surveying (NCEES) ABE Exam Development Chair 2015-2017 Examination for Professional Engineers (EPE) Committee Agricultural and Biological Engineering (ABE) Exam Representative – National Council of Examiners for Engineering and Surveying (NCEES) / American Society of Agricultural and Biological Engineers (ASABE). Seneca, SC. January 25-26, 2019 Atlanta, GA. October 18-20, 2018 Seneca, SC. January 4-6, 2018 Seneca, SC. January 6-7, 2017 Exam Development Sub-Committee – National Council of Examiners for Engineering and Surveying (NCEES) / American Society of Agricultural and Biological Engineers (ASABE). Greenville, SC. September 12-13, 2022 Boston, MA. July 2019 Seneca, SC. February 10-11, 2019 Seneca, SC. October 8-9, 2018 Seneca, SC. February 4-6, 2018 Spokane, WA. July 2017 (Chair)

Seneca, SC. February 6-8, 2017 (Chair)

Orlando, FL. July 17, 2016 (Chair)

Seneca, SC. February 16-17, 2016 (Chair)

Seneca, SC. February 3-5, 2014

Cut Score Panel – National Council of Examiners for Engineering and Surveying (NCEES) / American Society of Agricultural and Biological Engineers (ASABE).

Atlanta, GA. May 14-15, 2015

Professional Activities and Knowledge/Skills Study (PAKS) Test Specification Committee – Project of The National Council of Examiners for Engineering and Surveying (NCEES) / American Society of Agricultural and Biological Engineers (ASABE).

Dallas, TX. October 28-29, 2019

Chicago, IL. November 6-7, 2013

2012-Present FarmHack Network – Contributor & Organizer

2006-Present American Society of Agricultural and Biological Engineers (ASABE). Member.

2005-2010 National Society of Professional Engineers – Young Engineers Committee.

2000-2005 Society of Automotive Engineers - Fuel Cell Standards Committee – Coordinating Author of Standard J2615: Testing Performance of Fuel Cell Systems for Automotive Applications.

DEPARTMENT & UNIVERSITY SERVICE

2023 Planning Committee. UVM Venture Summit 2023. Faculty representative.

2023 UVM Extension Search Committee. Extension Assistant Professor of Community and Economic Development - Chair

2022 NECAFS Research Specialist Search Committee (Successful)

2019 UVM CALS ARS Center Research Manager Search Committee (Successful)

2021- Present UVM Extension Diversity, Equity, and Inclusion Committee

2020 NECAFS Research Specialist Search Committee (Successful)

2019 UVM CALS Dean Search Committee (Successful)

2019 UVM CALS Interim Dean Advisory Committee (Successful)

2018-2019 UVM CALS Dean Search Committee (Failed Search)

2017-2019 UVM Extension – Extension Professional Improvement Conference Planning (EPIC) Committee

2017-2019 CALS and Extension Administrative Transition Team.

2017-2019 UVM Faculty Senate: Ad Hoc Committee on Process and Procedures.

2017 UVM Extension Search Committee. Agricultural Engineering Technician. Chair and Hiring Manager. (Successful)

2017 UVM Extension Search Committee. Produce Safety Specialist. (Successful)

2016-2023 UVM Faculty Senate. Extension Representative.

2016	UVM Extension / NECAFS Search Committee – Center Administrator / Outreach Professional Senior. Chair and Hiring Manager. (Successful)
2015	UVM Extension Search Committee – Data Management Specialist – Evaluation (Successful)
2015	UVM Extension Strategic Directions Initiative: Program Quality
2015	UVM Extension Search Committee – Business Support Generalist / Departmental Business Manager. (Successful)
2014/2015	UVM Extension Joint Faculty Search Committee – Two Positions: Food Safety and Community Food and Nutrition. (One Failed, One Successful)
2013-2016	UVM FarmHackers Club. Advisor.
2013-2016	UVM Extension Program Committee. Member.
2012-2016	UVM Extension Faculty Organization. Vice Chair.

STATE, REGIONAL & NATIONAL SERVICE

2023-Present	Southwest Vermont Regional Technical School District. Adult Education Advisory Board. Member.
2022-Present	FIRST in Vermont (Youth Robotics). Board Member.
2022-Present	Salvation Farms. Board Member.
2021-2023	BAM First Lego League (FLL) 4-H Youth Robotics Team – Founding Coach / Mentor.
2022	Maine Produce Safety Improvement Grant Program – Review Board.
2021- Present	Bennington County Regional Commission - Entrepreneurial Support Committee Meeting – Member.
2021	Maine Produce Safety Improvement Grant Program – Review Board.
2020-Present	BAM First Tech Challenge (FTC) 4-H Robotics Teams - Coach / Mentor.
2019-Present	Vermont Produce Safety Improvement Grant Program – Review Board.
2019-Present	The Bennington Area Makerspace (BAM). Founding Board Member.
2019-2021	The Lightning Jar. Bennington Co-Working Space and Business Incubator. Operational Committee Member.
2016-Present	The Northeast Center to Advance Food Safety (NECAFS). Founding Director.
2014-2021	Vermont Equipment Access Program for Value Added Processors. Advisor and Board Member.
2013-2019	Vermont Farm to Plate – Technology Task Force (Member)
2012-Present	Vermont Farm to Plate – Technical Assistance Working Group (Member)
2012-2018	Vermont Farm to Plate – Energy Cross Cutting Team (Chair 2012-2015)

OTHER VOLUNTEER & RELATED EXPERIENCE

2022-Present	Bennington Bike Hub. Founding Board Member. President (2023), Vice President (2022).
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2015-Present	<u>Southshire Community School</u> , Board of Directors. North Bennington, VT Treasurer (2016-). Search Committees - Chair (two, 2019). Search Committee – Chair (2020). Search Committee – Member (2021).
2009-Present	<u>Battenkill Books</u> . Cambridge, NY. Co-Owner of a general interest independent bookstore.
2007-2014	<u>The Cambridge Valley Rescue Squad, Inc.</u> Cambridge, NY. Volunteer emergency medical services (EMS) provider & President (2010-2014) of a mixed paid/volunteer rural emergency medical services agency. Currently Life Member with inactive provider status. Highest credential: NYS-AEMT-CC.
2010-2011	Village of Cambridge, NY – Deputy Mayor
2008-Present	Cambridge Sewage Transport Corporation – President. Shared septic system for a mixed-use district in an urban/rural community.
2008-2010	Village of Cambridge, NY – Trustee
2006-2008	Village of Cambridge, NY – Zoning Board of Appeals
1998-2000	American Lung Association – Clean Air Commission – Springfield, MA – Member
1998-2000	City of Westfield Conversation Commission – Westfield, MA – Member
1997-2000	Westfield River Watershed Association – Westfield, MA – Board Member

OTHER ACCOMPLISHMENTS

PROFESSIONAL DEVELOPMENT

2022	Uprooting Racism in the Food System. Soul Fire Farm (Virtual). November 30, 2022.
2021	Gender and Leadership. S. Mell. UVM Women's and Gender Equity Center. February 25, 2021.
2019	PSA Lead Trainer. #1086. Cornell University & Produce Safety Alliance. US FDA Food Safety Modernization Act Produce Safety Alliance Curriculum. Geneva, NY. March 7, 2019.
2018	Psychometrics 101. Pearson VUE / NCEES. Atlanta, GA. October 18, 2019.
2018	Hygienic Design. Course focused on design of food facilities with hygienic practices. Commercial Food Sanitation - Food Sanitation Institute. New Orleans, LA.
2016	Food Safety Preventive Controls for Human Foods (FSPCA-HF) Alliance Qualified Individual (QI) Training. Three-day training related to US FDA Food Safety Modernization Act FSPCA-HF Curriculum. Amherst, MA.
2016	Produce Safety Alliance Train the Trainer. Cornell University & Produce Safety Alliance. Two-day integrated training related to US FDA Food Safety Modernization Act Produce Safety Alliance Curriculum. Geneva, NY.
2014	<u>Postharvest Technology Short Course</u> . University of California at Davis. Two-week intensive course focused on postharvest technology as applied to fruit and vegetable production and distribution systems. Davis, CA.
2014	<u>Fundamentals of Food Science</u> . University of Pennsylvania. One-week short course designed to education non-food scientists in food science basics. State College, PA.
2013-2014	<u>LEAD21 Class IX</u> – Year-long professional development program run by University of Georgia on behalf of the Land Grant University System. Targeted core competencies include communicating effectively, managing conflict, fostering collaboration and leading change. Minneapolis, MN, Kansas City, MO, Washington, DC.
2013	Facilitative Leadership – One-day intensive facilitative leadership class by <u>Interaction Institute for Social Change</u> focused on improving dynamic collaboration of stakeholder group, inspiring shared vision, and focus on results, process and relationships to improve performance. Montpelier, VT.

MEMBERSHIPS & SOCIETIES

2006-Present	American Society of Agricultural and Biological Engineers (ASABE)
2005-2010	National Society of Professional Engineers (NSPE)
1997-2005	American Society of Mechanical Engineers (ASME)
2000-2005	Society of Automotive Engineers (SAE)

AWARDS

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| 2021 | Professional Engineering of the Year. American Society of Agricultural and Biological Engineers (ASABE). |
| 2019 | University of Vermont Inventor Hall of Fame. |
| 2015 | Vermont Working Lands Enterprise Board (WLEB) Service Provider Grant of the Year Award. Featured in Annual Report. |
| 2011 | R&D100 Award. R&D Magazine. <u>Non-Flow-Through Fuel Cell Power System</u> . Ken Burke and Mark Hoberecht (NASA GRC), Alfred Meyer and William Smith (Infinity Fuel Cell and Hydrogen, Inc.), James McElroy (McElroy PEM Technologies, LLC), Christopher Callahan (Callahan Engineering, PLLC), and Ian Jakupca (Qinetiq North America). |
| 2010 | Legislative Citation – New York State Assembly. In recognition of service to the community as Village Trustee and Deputy Mayor in the Village of Cambridge, NY. May 15, 2010. Sponsored by Assemblyman Tony Jordan. |