

MICHIGAN STATE UNIVERSITY

March 21, 2024

Phil Roos

Director

Michigan Department of Environment, Great Lakes, and Energy

525 West Allegan Street

Lansing, MI 48933

Subject: Michigan State University's Support the State of Michigan's CPRG Coalition Proposal for the Midwest Industrial Decarbonization Challenge, (Award Number EPA-R-OAR-CPRGI-23-07)

Dear Director Roos,

We, Michigan State University, affirm our commitment to work with the State of Michigan in its partnership with states of Illinois, Minnesota, Ohio, and Wisconsin to carry out a regional effort to reduce industrial emissions in response to EPA-R-OAR-CPRGI-23-07. We are pleased to endorse the Midwest Industrial Decarbonization Challenge objective to reduce greenhouse gas (GHG) emissions from the region's top polluting, hard-to-decarbonize industries.

We have read the grant application and understand the rules the application contemplates we will play as a center. We are ready, willing and able to carry out the roles and responsibilities contemplated should we enter into a contract with the State of Michigan in the event EPA awards the grant for the Midwest Industrial Decarbonization Challenge. Through the Midwest Industrial Decarbonization Challenge program period, we anticipate collaborating with the State to deliver incentives programs to reduce industrial GHG emissions, including but not limited to industrial energy efficiency, fuel-switching, and innovative technologies. Our commitment extends to supporting program development and implementation of industrial emission reduction strategies.

The proposed GHG reduction measures will achieve significant cumulative GHG reductions, provide substantial community benefits in low-income and disadvantaged communities, and complement other funding sources to maximize both GHG reductions and community benefits. Because many industrial facilities are located in or upwind of low-income and disadvantaged communities (LIDAC), improvements to the environmental performance of industrial facilities in the region will bring benefits to LIDAC communities. We understand that the states in the coalition are committed to achieving such benefits.

We understand industrial decarbonization because we work with industrial facilities in Michigan to provide technical and analytical support, including assessments of measures that can be undertaken at those facilities to reduce the use of fossil fuels and otherwise reduce emissions, often saving money in the process. Over the past 2.5 years we have worked with over 65 companies and/or organizations within the Michigan area in this capacity. The role anticipated for us under the Midwest Industrial



COLLEGE OF
ENGINEERING

Department of Civil and
Environmental Engineering

Michigan State University
Engineering Building
428 S. Shaw Lane, Room 3546
East Lansing, Michigan
48824

Phone: 517/355-5107

Fax: 517/432-1827

E-Mail: cee@egr.msu.edu

Website: www.egr.msu.edu/cee

Decarbonization Challenge is a natural scaling-up of the work we are already doing.

We have considerable expertise in this area. We are attaching to this letter the CVs of our leadership and principal staff.

We are enthusiastic about partnering with the State of Michigan to advance the goals of the U.S. Environmental Protection Agency through this pivotal program.

Sincerely,

A handwritten signature in black ink, appearing to read 'Kristen Cetin', with a stylized, cursive script.

Kristen S. Cetin

Director | MSU Industrial Assessment Center

Associate Professor | Department of Civil and Environmental Engineering

Michigan State University

cetinkri@msu.edu

CURRICULUM VITAE

Kristen Cetin, PhD, P.E., LEED AP BD+C
Michigan State University
484 S Shaw Ln
East Lansing, MI 48824

office: (517) 353-2345
cell: (240) 723-6354
cetinkri@msu.edu

ACADEMIC POSITIONS

Director , MSU Industrial Assessment Center	2021-present
Associate Chair for Faculty and Academic Staff Development , Michigan State University	2023-present
Associate Professor , Michigan State University	2022-present
Assistant Professor , Michigan State University	2019-2022
Assistant Professor , Iowa State University	2016-2019
Adjunct Professor , University of Georgia	2015

EDUCATION

Ph.D. Civil, Architectural & Environmental Engineering , University of Texas at Austin	2012 - 2015
M.S. Civil & Environmental Engineering , University of Maryland	2009 - 2010
B.S. Civil & Environmental Engineering , University of Maryland	2005 - 2009

FELLOWSHIPS & AWARDS

Excellence in Diversity, Equity and Inclusion Award , Michigan State University	2024
Honorable Mention, Best Technical Paper Award , American Society of Civil Engineers <i>ASCE Journal of Civil Engineering Education</i>	2023
Outstanding Reviewer , American Society of Civil Engineers (ASCE) <i>ASCE Journal of Civil Engineering Education</i>	2023
Withrow Excellence in Diversity Award , Michigan State University, College of Engineering <i>Emerging Accomplishments</i>	2023
NSF CAREER Award , National Science Foundation	2022
Withrow Junior Distinguished Scholar , Michigan State University, College of Engineering	2022
ASCE Journal of Civil Engineering Education - Editors Choice <i>Investigating Problem-Solving Processes of Students, Faculty, and Practicing Engrs in Civil Engr</i>	2022
ASCE ExCEED New Faculty Excellence in Teaching Award , ASCE	2021
Stephen J. Ressler Best Paper Award , ASCE, Civil Engr. Division, ASEE <i>Engineering Faculty's Beliefs About Teaching and Solving Ill-structured Problems</i>	2021
ASCE ExCEED, Fellow, Assistant Mentor , ASCE	2016 - 2019
ASHRAE College of Fellows Award , ASHRAE	2014 - 2015

PUBLICATIONS, PROCEEDINGS & PRESENTATIONS (primary student advisees are underlined)

1. Roxas, A., Naik, A., Cetin, K., Anctil, A., Berghorn, G. (2024) Industrial Energy Efficiency and Decarbonization: Identifying Motivations and Barriers for Midwest Manufacturers. *2024 ASHRAE Winter Conference*, January 20-24, 2024
2. Kula, B., Roxas, A., Cetin, K.S., Anctil, A., Berghorn, G. (2023) Developing and Evaluating a Virtual Training Process for Energy Assessment Education *2023 American Society of Engineering Education Annual Conference & Exposition*. June 25-28, 2023
3. Kawka, E., Mahmud, R., Cetin, K. (2024) Data-Driven Residential Electric Vehicle Charging Behavior and Load Profile Modeling for Demand Response in the MISO Region *ASCE Journal of Architectural Engineering*, DOI: 10.1061/JAEIED.AEENG-1537
4. Dong, H., Vanage, S., Cetin, K. (2024) Sensitivity Analysis of Sensor Placement in Energy-Efficient, Grid-Interactive Ready Small Office Buildings with Dynamic Shading and Lighting Control. *Science and Technology of the Built Environment*, DOI: 10.1080/23744731.2023.2299175

5. Vanage, S., Dong, H., Cetin, K. (2023) Visual comfort and energy use reduction comparison for different for shading and lighting control strategies in a small office building *Solar Energy*, 265, 112086 DOI: 10.1016/j.solener.2023.112086
6. Chu, Y., Guillante, P., Mitra, D., Mahmud, R., Cetin, K. (2023) Typical Academic Building Energy Model Development and Energy Saving Evaluation Using Occupant-Based Control. *Journal of Building Engineering*, 79, 107818 DOI: 10.1016/j.jobee.2023.107818
7. Santos, C., Cetin, K.S., Salehi, H (2022) Energy-efficient technology retrofit investment behaviors of Midwest households in lower and higher income regions. *Sustainable Cities and Society* DOI: 10.1016/j.scs.2022.104141
8. Chu, Y., Mitra, D., O'Neill, Z., Cetin, K.S. (2022) Influential variables impacting the reliability of building occupancy sensor systems: a systematic review and expert survey. *Science and Technology of the Built Environment* DOI: 10.1080/23744731.2021.1993672
9. Akinci-Ceylan, S., Cetin, K.S., Ahn, B., Surovek, A., Cetin, B. (2021) Investigating Problem Solving Steps of Students, Faculty, and Practicing Engineers in Civil Engineering. *Journal of Civil Engineering Education*. 148 (1), 04021014. DOI: 10.1061/(ASCE)EI.2643-9115.0000054

RESEARCH EXPERIENCE (Selected)

Building Training and Assessment Center (BTAC) 2024-2027

PI: Kristen Cetin

Funding Agency: U.S. Department of Energy

Total Budget: \$900,000

Responding to Energy Insecurity in Arctic Housing Using a Community-Based Participatory Research 2023-2027

PI: Kristen Cetin

Funding Agency: National Science Foundation

Total Budget: \$2.8 million

CAREER: Improving the Participation of Diverse Residential Buildings in Demand Side Management 2022-2027

PI: Kristen Cetin

Funding Agency: National Science Foundation

Total Budget: \$508,515

Industrial Assessment Center at Michigan State University 2021-2026

PI: Kristen Cetin

Funding Agency: U.S. Department of Energy

Total Budget: \$2.25 million

Simulation, Challenge Testing & Validation of Occupancy Recognition & CO₂ Technologies 2018 - 2022

PI: Kristen Cetin

Funding Agency: ARPA-E (U.S. DOE)

Total Budget: \$736,210

TEACHING EXPERIENCE

Michigan State University, East Lansing, MI

Design and Operation of Smart and Sustainable Buildings F23, F22, S20

Energy and Sustainability Assessments of Industrial and Commercial Buildings S24, S23, S22

Sustainable Civil and Environmental Engineering Systems F23, S23, F22, F21

Sustainable Building Envelope Systems S21

Iowa State University, Ames, IA

Research Methods in Civil Engineering F18

Contractor Organization and Management of Construction S18, S19

Modeling and Evaluation of Energy Performance of Buildings & Communities S16, S17, S18

Senior Design/Capstone: Mechanical Design Technical Advisor F16, S17, F17, S18, S19

Annick Anctil, PhD, Michigan State University
Department of Civil & Environmental Engineering, Michigan State University
East Lansing, MI; anctilan@msu.edu 517-432-4692

Professional Preparation

<i>Institution</i>	<i>Major/Area</i>	<i>Degree</i>	<i>Year</i>
Ecole Polytechnique Montreal	Materials Engineering	B.E.	2005
Rochester Institute of Technology	Materials Science & Engineering	M.S.	2007
Rochester Institute of Technology	Sustainability	Ph.D.	2011
Brookhaven National Laboratory	Environmental Engineering	Postdoc	2011-2012

Professional Experience

Associate Professor of Civil & Environmental Engineering Michigan State University 2021-present
Affiliated Faculty, AgBio research institute, Michigan State University 2022- present
Assistant Professor of Civil & Environmental Engineering Michigan State University 2014-2021
Assistant Professor, Environmental Engineering and Earth Sciences, Clemson University 2012-2014
Research Associate, National Photovoltaic Environmental Research Center, Brookhaven National Laboratory 2011-2012

Relevant Ongoing or Previous Grants

Received funding for more than 25 different projects for more than 12 million dollars from various funding sources, including NSF, USDA, Ford, Michigan EGLE, and DOE.

- *DOE- Energywerx (DOE-MESC)* 2024, Project last mile: US solar supply chain, PI Anctil, \$100,000
- *Minnesota Department of Transportation (MnDOT)* (2022-2024) Evaluation of Gravel Stabilizer Used on Gravel Roads and Gravel Shoulders, PI Bora Cetin, \$193,687
- *Ford Motor Company* (2022-2024), Circular Economy for EV battery, PI Annick Anctil, \$200,000
- *DOE Industrial Assessment Center (DOE-IAC)* (2021-2026) Industrial Assessment Center at Michigan State University, PI Kristen Cetin, \$ 1,750,000
- *National Science Foundation CAREER CBET: Environmental Sustainability* (2021-2026) Environmental Sustainability of Photovoltaics in the US, PI Annick Anctil, \$435,911
- *Michigan Environment, Great Lake & Energy (EGLE)*, Analyzing the benefits and challenges of 2nd-life batteries as storage systems for DCFC stations, PI Mehrnaz Ghamami, \$120,000
- *National Science Foundation CBET: Environmental Sustainability* (2018-2021) Sustainable energy transition: Beyond material analysis, PI Annick Anctil, \$302,035
- *Michigan Environment, Great Lakes & Energy (EGLE)* (2020-2021) Energy Storage Roadmap. PI Michigan Institute for Energy Innovation, \$199,901
- *National Science Foundation: EFRI EP3* (2020-2024) Reincarnation of Polymers for the Circular Economy, PI John Dorgan, \$2,000,000
- *USDA: Developing Pathways Toward Sustainable Irrigation across the United States Using Process-based Systems Models (SIRUS)*, PI David Hyndman, \$2,473,700

- *Ford Motor Company* (2018-2020) Interactive Decision Analysis Tool to Guide Life Battery Energy Storage System Options, PI Annick Anctil, \$197,773
- *Ford Motor Company* (2016-2018) Second Life Potential and Environmental Benefit of EV Batteries in Photovoltaic Applications, PI Annick Anctil, \$191,900
- *National Science Foundation CBET: Energy for Sustainability* (2015-2019) SUSCHEM: A Green Chemistry Approach to Organic and Transparent Photovoltaic Material Synthesis and Device Fabrication, PI Annick Anctil, \$299,894

Refereed Journal Publications

More relevant

1. Yuan L, Nain, Preeti, Kothari M, **Anctil A**, “Material intensity and Life Cycle Impacts of Crystalline Silicon Photovoltaic Modules Over Time”, *Solar Energy*, 269, (2024) 112336
2. **Anctil A.**, Lee E, Lunt RR, “Net energy and cost benefit of transparent organic solar cells in building-integrated applications”. *Applied Energy* 261, 114429 (2020)
3. Shukla S, Lee E, Lunt RR, **Anctil A**, “Comparison of environmental and cost benefit of phtalocyanine and heptametine based transparent organic photovoltaics for windows of commercial buildings in the United States”, *Sustainable Energy Technologies and Assessments*, 53 (2022):102631
4. Kamath D, Shuklas S, Arsenault R, Kim HC, **Anctil A**, "Evaluating the cost and carbon footprint of second-life electric vehicle batteries in residential and utility-level applications ", *Waste Management*, 113, (2020)
5. Kamath D, Arsenault R, Kim HC, **Anctil A**, “Economic and Environmental Feasibility of Second Life Lithium-ion Batteries as Fast Charging Energy Storage”, *Environmental Science and Technology*, 54 (11) (2020)

Other recent publications

1. Farina A, Kutay ME, Anctil A. Environmental assessment of asphalt mixtures modified with polymer-coated rubber from scrap tires. *Journal of Cleaner Production*, 418, 138090. (2023).
2. Heidari M, **Anctil A**, “Country-Specific Carbon Footprint of Metallurgical Grade Silicon Production for Silicon Photovoltaics” *Resources, Conservation and Recycling* 180, 106171(2022)
3. Farina A. & **Anctil A**. “Material consumption and environmental impact of wind turbines in the USA and globally”. *Resources, Conservation and Recycling*, 176, 105938 (2022).
4. Challa R, Kamath D, **Anctil A**, "Well-to-wheel greenhouse gas emissions of electric versus combustion vehicles from 2018 to 2030 in the US." *Journal of Environmental Management* 308 (2022): 114592.
5. Kamath D, Moore S, Arsenault R, Anctil A. A system dynamics model for end-of-life management of electric vehicle batteries in the US: Comparing the cost, carbon, and material requirements of remanufacturing and recycling. *Resources, Conservation and Recycling*. (2023) Sep 1;196:107061.

GEORGE H. BERGHORN, Ph.D., LEED AP, CGP

13095 Farm Lane • DeWitt, MI 48820 • 517.862.7821 • gberghorn@gmail.com

EDUCATION

- Ph.D., Construction Management* 2014
Michigan State University, East Lansing, Michigan, USA
Dissertation Title: “Life Cycle Cost-Based Risk Model for Energy Performance Contracting Retrofits”
Fields of Specialization: Sustainability in the built environment, mass timber construction, construction project management, energy efficiency, life cycle analysis, risk management
- M.S. Construction Management core course requirements completed* 2007-2009
(including undergraduate collateral courses)
Michigan State University, East Lansing, Michigan, USA
- Master of Environmental Studies* 1998
Yale University School of Forestry and Environmental Studies, New Haven, Connecticut, USA
Fields of Specialization: Sustainability, resource policy, watershed forestry
- Bachelor of Science (magna cum laude), Political Science and Earth Science* 1996
SUNY College at Brockport, Brockport, New York, USA

CURRENT PROFESSIONAL APPOINTMENTS

- Michigan State University** East Lansing, Michigan, USA
Assistant Professor of Construction Management August 2015-present
• Tenure Track January 2020-present
• Fixed-Term August 2015-December 2019
Program Director, MS in Construction Management August 2023-present
Research Director, Mass Timber @ MSU November 2021-present
Assistant Director, MSU Industrial Assessment Center (DOE-funded) August 2021-present
Core Faculty, Housing Education and Research Center August 2017-present
Adjunct Assistant Professor of Sustainable Wood Construction October 2018-present
Affiliate Faculty, Environmental Science and Policy Program August 2015-present
- Berghorn Group (Sustainability and CM Consultation)** Lansing, Michigan, USA
Principal September 2014-present (operated under different name since 1999)
- Green Prisons** Lexington, Kentucky, USA
Senior Sustainability Advisor January 2014-present

AWARDS AND HONORS

- Adams Academy Fellow (Michigan State University) 2019-2021
- Coach, 2020 National Champion NAHB Student Competition Team 2020
- Coach, 2019 National Champion NAHB Student Competition Team 2019

AWARDS AND HONORS, *continued*

- National Association of Home Builders 2019 Outstanding Educator 2019
- National Association of Home Builders 2018 Industry Research Subcommittee Presentation Best Submission Award 2018
- Coach, 2017 Champion ASC Region 3 Project Solutions Competition Team 2017
- ORISE Science and Technology Policy Fellowship (*Selected, Declined Offer*) 2014

PAST PROFESSIONAL APPOINTMENTS

Michigan State University East Lansing, Michigan, USA
Post-Doctoral Research Associate August 2014-July 2015
Doctoral Student January 2007-July 2014

- Conducted research related to sustainability and energy efficiency in the built environment.
- Research focused on sustainability related to building deconstruction and materials reuse, to include life cycle assessment and embodied energy.

Kendall College of Art and Design of Ferris State University Grand Rapids, Michigan, USA
Adjunct Graduate Faculty January 2015-May 2015

- Co-developed Building Systems Integration class for M.Arch. students; lead development of sustainability, building science, and energy systems/design with climate modules.
- Provided classroom and laboratory instruction as well as studio critiques.

Lansing Community College Lansing, Michigan, USA
Dean – Technical Careers Division May 2011-March 2014
Chairperson - Environmental, Design & Building Technologies Dept. June 2009-April 2011
Adjunct Professor – Environmental Science and Biology June 2003-May 2005

- Led academic unit with a ~\$10 million budget, over 125 FTE faculty and staff, 4,000 students, and over 50 academic programs.
- Increased unduplicated headcount by 64% through strategic realignment at zero net cost.

Michigan Forest Products Council Lansing, Michigan, USA
Director of Forest Policy July 2005-June 2009

Integrated Technical Services, Inc. Winslow, New Jersey, USA
Construction Project Manager December 2001-January 2003
Construction Site Superintendent September 2001-December 2001

Environmental Strategies Corporation Pittsburgh, Pennsylvania, USA
GIS Analyst and Environmental Scientist (Onsite Remedial October 1998-September 2001
Construction Technician and Site Remediation Technician/Manager)

PROFESSIONAL CERTIFICATIONS

LEED AP, Green Building Certification Institute – August 2009-present.

Certified Green Professional, National Association of Homebuilders – October 2014-present.

RYAN GALLAGHER

4810 W. Taft Rd.
St. Johns, MI 48879

989-534-1269
galla150@msu.edu

PROFESSIONAL SUMMARY

I am a highly motivated & driven professional in the HVACR and energy management fields. I have over 19 years of combined experience in a variety of roles including estimating, project management, energy auditing, facilities operation, building automation, design, fieldwork, teaching, and research.

EDUCATION

- | | |
|---|------|
| Bachelor Degree: HVAC/R Engineering – GPA 3.92 | 2011 |
| Ferris State University, Big Rapids, Michigan | |
| • Summa Cum Laude | |
| Associate Degree: HVAC/R Technology – GPA 3.91 | 2009 |
| Lansing Community College, Lansing, Michigan | |
| • Summa Cum Laude | |
-

EXPERIENCE

- | | |
|---|--------------------|
| Michigan State University Infrastructure Planning & Facilities
<i>East Lansing, Michigan</i>
HVAC Controls Planner/Inspector/Analyst II/III – Project Services | Aug. 2013-Present |
| <ul style="list-style-type: none">• Estimate, schedule & manage installation of HVAC controls, mechanical & multi-craft projects• Budget, plan & manage demand side energy conservation measure projects• Administer contracts & direct mechanical, electrical & structural contractors on installation• Design energy management control systems for teaching and research setting• Develop & implement optimized sequences (HVAC, chilled water, steam, lighting, etc.)• Strategize & prioritize funding for long term building automation & mechanical system upgrades• Manage/supervise mechanical skilled trades installers & building automation technicians• Prepare technical reports & detailed cost studies• Collaborate & support skilled trades, engineers & administration with technical assistance• Provide excellent customer service to the MSU campus community• Assure compliance with ASHRAE standards, MSU standards and mechanical codes• Communicate, schedule & plan shutdowns of critical electrical and mechanical systems• Apply for energy rebates and work with utility companies on energy related projects | |
| Industrial Assessment Center – Michigan State University
<i>East Lansing, Michigan</i>
Assistant Director/Assessment Leader | Jan. 2022-Present |
| <ul style="list-style-type: none">• Perform one day energy audit of manufacturing facilities and commercial buildings• Generate energy conservation ideas and deliver detailed cost analysis report• Provide oversight and training to engineering graduate and undergraduate students | |
| Lansing Community College HVAC/R Department
<i>Lansing, Michigan</i>
HVAC/R Adjunct Instructor/Adjunct Associate Professor | Aug. 2015-Present |
| <ul style="list-style-type: none">• HVAC 100 – Fundamentals of HVAC• HVAC 130 - Air Conditioning I• HVAC 251 – Fundamentals of Direct Digital Controls• Student mentorship & assist connecting students to industry careers | |
| Michigan State University Infrastructure Planning & Facilities
<i>East Lansing, Michigan</i>
HVAC Controls Planner/Inspector/Analyst I – Building Performance Services | May 2011-Aug. 2013 |
| <ul style="list-style-type: none">• Control, program, monitor, trend, report & troubleshoot HVAC/DDC systems• Customer interface with building occupants on campus HVAC issues• Implement energy conservation measures through DDC | |

Ferris State University Energy Center

Sept. 2010-May 2011

Big Rapids, Michigan

Energy Auditor

- Pre & Post energy audits on new & existing homes
- Energy modeling

Michigan State University Infrastructure Planning & Facilities

May 2010-Aug. 2010

East Lansing, Michigan

HVAC Controls Intern

- Install, retrofit & program HVAC Controls
- Select HVAC control products & modify HVAC control drawings

Ferris State University HVAC/R Department

Sept. 2009-Dec. 2010

Big Rapids, Michigan

HVAC/R Teaching Assistant

- Create & prepare HVAC/R lab projects
- Teaching assistant in the HVAC/R lab

M.D. Refrigeration

Jan. 2008-Oct. 2008

Mt. Pleasant, Michigan

HVAC/R Technician

- Diagnose & repair of commercial HVAC/R equipment
- Manage trouble calls
- Communicate with customers & respond to their HVAC/R issues

Lansing Community College HVAC/R Department

Mar. 2007-Aug 2009

Lansing, Michigan

HVAC/R Lab Technician

- Diagnose, fix & maintain the HVAC/R lab equipment
- Teaching assistant, prepare labs and order lab supplies

Mills Refrigeration

Jun. 2004-Mar. 2007

Lansing, Michigan

Preventative Maintenance Technician

- General HVAC/R preventative maintenance tasks
- Install parts & customer relations follow up

HONORS, CERTIFICATIONS & VOLUNTEER WORK

- 2021 MSU Supplier Diversity Task Force Committee Member
- 2020 LCC Online Teaching Certification
- 2017 Building Efficiency for a Sustainable Tomorrow Member
- 2016 Governor's Energy Excellence Award Honorary Mention
- 2013 Essentials of Project Management Certification
- 2012 – 2014 Michigan Skills USA HVAC/R Volunteer Judge
- 2010 ASHRAE Vice President, Ferris State University Student Chapter
- 2010 Michigan Skills USA HVAC/R Post-Secondary State Champion
- 2010 National Skills USA HVAC/R Post-Secondary National Champion
 - Cover story of The ACHR NEWS, August 2, 2010
 - Featured in RSES Journal, August 2010
- 2010 Light Commercial Refrigeration Industry Competency Exam
- 2009 Light Commercial A/C & Heating Industry Competency Exam
- 2007 EPA 608 Type I, II, 410A Certification

REFERENCES

Available upon request