ANNICK ANCTIL PH.D.

Assistant Professor, Department of Civil & Environmental Engineering
Michigan State University
1449 Engineering Research Ct- A132
East Lansing MI 48824
517-432-4692
anctilan@egr.msu.edu
http://aanctil.com

RESEARCH INTERESTS

- Proactive sustainability assessment to reduce the environmental impact of energy technologies
- Process-based life-cycle assessment and design for the environment with an emphasis on energy systems
- Nanomaterials synthesis for energy applications
- Sustainable engineering education

ACADEMIC POSITIONS AND RESEARCH EXPERIENCE

2014 -	Assistant Professor, Department of Civil and Environmental Engineering Affiliated faculty, Environmental and Policy Program Michigan State University, East Lansing, MI
2012-2014	Assistant Professor, Department of Environmental Engineering and Earth Sciences, Clemson SC
2011-2012	Research Associate, National Photovoltaics Environmental Research Center, Brookhaven National Laboratory, Upton NY
2006-2011	Research Assistant, NanoPower Research Laboratory, Rochester Institute of Technology, Rochester NY
2009	Research Assistant, United Nations Headquarter- DESA, Division for Sustainable Development, New York NY

EDUCATION

2011	Ph.D. Sustainability, Rochester Institute of Technology, Rochester NY Dissertation: "Fabrication and life cycle assessment of organic photovoltaics" Advisors: Dr. RP Raffaelle and Dr. BJ Landi
2007	MS Materials Science and Engineering, Rochester Institute of Technology, Rochester NY Thesis: "Nanomaterials for Organic Solar Cells" Advisor: Dr. RP Raffaelle
2005	BS Materials Engineering, École Polytechnique de Montréal, Montréal, Canada

SPONSORED RESEARCH – PRINCIPAL INVESTIGATOR $ 1.1M

National Science Foundation CBET: Environmental Sustainability **2018-2021**
Sustainable energy transition: Beyond material analysis, $302,035

Ford Motor Company **2018-2020**
Interactive Decision Analysis Tool to Guide Life Battery Energy Storage System Options, $197,773

MSU Infrastructures Planning and Facilities **2019-2020**
Life cycle carbon footprint project for MSU Infrastructure Planning and Facilities, $10,097

MSU DFI **2017-2019**
Sustainable nanomaterials: pyrolysis for large scale manufacturing of fullerenes, $48,566

Ford Motor Company **2016-2018**
Second Life Potential and Environmental Benefit of EV Batteries in Photovoltaic Applications, $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, $299,894

United Nations Headquarter – DESA Division for Sustainable Development **2013-2014**
Creation of web interface on integrated sustainable tourism development planning, $10,000

SPONSORED RESEARCH – CO-PI OR SENIOR PERSONNEL $ 5.9M

National Science Foundation: EFRI EP3 **2020-2024**
Reincarnation of Polymers for the Circular Economy, PI John Dorgan, $2,000,000

National Science Foundation: REU Site **2020-2023**
SocioMobility, PI Peter Savolainen, $349,954

REMADE Institute (DOE) **2020-2022**
CombiClean: Facilitating Contaminant Removal from Recycled Plastics, PI John Dorgan, $750,000

Michigan Environment, Great Lakes & Energy (EGLE) **2020-2021**
New applications for scrap tire-derived materials for building thermal insulation, PI Cetin, $130,000

USDA - National Institute of Food and Agriculture INFEWS **2018-2023**
Developing Pathways Toward Sustainable Irrigation across the United States Using Process-based Systems Models (SIRUS), PI: Hyndman, $2,473,700

MSU ESPP- Interdisciplinary Team Building Initiative (ITBI), **2018-2019**
Examining the impacts of and improving decision-making processes for offshore wind development in the U.S. Great Lakes, PI Bessette, $10,000

Center for Gender in Global Context & Advanced Study of International Development **2018**
Workshop: Intersectoral Collaboration to Support Lilongwe's Small-scale Food Sector, PI White, $13,132

Michigan Department of Environmental Quality (MDEQ) **2017-2018**
Field and Laboratory Evaluation of Polymer Coated Rubber (PCR) Modifier Asphalt, PI Kutay, $77,524

Michigan Applied Public Policy Research Program **2017-2018**
Understanding Public Opinion on Energy Transitions in Michigan, PI Moore, $25,000

MSU Science + Society @ State (S3) **2017**
Societal Perception about On-Road Wireless Charging for Electric Vehicles: Considering Mobility and Environmental Impacts, PI Ghamami, $10,000

MSU Science + Society @ State (S3) **2016-2017**
Linking Engineering and Science Studies to Support a Transition to Sustainable Energy, PI Moore, $10,000

Clemson Transformative Initiative for Generating Extramural Research (TIGER) **2014-2015**
Life-Cycle Assessment of Li-ion Batteries: Increasing Accuracy and Decreasing Bias within Battery Environmental Impact Predictions, PI Kennedy, $20,000

HONORS AND AWARDS

- Withrow Teaching Award – Civil & Environmental Engineering - MSU 2020
- Michigan Clean Energy Leaders – 2018
- Academy for Global Engagement Fellow - MSU 2017-2018
- Fonds québécois de la recherche sur la nature et les technologies (FQRNT) Fellowship (2007-2010)
- Best student presentation Area 10: 35th IEEE Photovoltaic Specialists Conference (2010)

- Excellence in Science National Grand Prize Quebec (2004)
- American Society for Materials (ASM) school chapter annual prize (2004)

REFEREED JOURNAL PUBLICATIONS

Primary Student Advisees underlined

Articles in Preparation:

Farina A, Kutay E, Anctil A, "Environmental assessment of asphalt mixtures modified with polymer coated rubber from scrap tires"

Kilgo K, Anctil A, Kennedy M, Powell B, "Metal Leaching from Lithium-ion and Nickel Hybrid Batteries and PV modules in simulated landfill leachates and municipal solid waste materials"

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"

Anctil A "Life cycle assessment of mono-crystalline silicon modules production in the US"

Heidari M, Lee E, Cecil BJ, Anctil A, "Environmental, cost and chemical hazard of C_{60} purification with current and alternative green solvents"

Challa R, Kamath D, Anctil A, "Carbon Footprint of the Use-Phase of Electric Versus Combustion Vehicles over Time in the US"

Stid JT, Rapp J, Shukla S, Anctil A, Kendall AD, Hyndman DW, "Automated spatiotemporal identification of ground mounted solar photovoltaic array installations in the Central Valley"

Shuklas S, Kamath D, Arsenault R, Kim HC, Anctil A, "Economic and Environmental Impacts of Photovoltaics and Second Life Batteries in US Residential Microgrids"

Submitted:

Kamath D, **Anctil A**, "Life-Cycle Assessment of In-Situ Leaching for Uranium Extraction in the US" (Submitted June 2020)

McCarthy B, Anex R, Wang Y, Kendall A, **Anctil A**, Haacker E, Hyndman D, "Trends in Water, Energy, and Carbon Emissions from Irrigation: Role of Shifting Technologies and Energy Sources" (Submitted May 2020)

Ahangharnejhad RH, Becker W, Jones J, **Anctil A**, Song Z, Phillips A, Heben M, Celik I, "Environmental Impact per Energy Yield for Bifacial Single Junction and Tandem Perovskite Solar Cells" (Submitted July 2020)

Moore S, Kamath D, **Anctil A**, "Public opinion and anticipated adoption of second-life, remanufactured battery systems for residential energy storage" (Submitted July 2020)

Accepted/Published:

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) https://doi.org/10.1016/j.wasman.2020.05.034

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), https://doi.org/10.1021/acs.est.9b05883

Heidari SM, **Anctil A**, "Identifying Alternative Solvents for C_{60} Manufacturing Using Singular and Combined Toxicity Assessments", Journal of Hazardous Materials, 122337 (2020), https://doi.org/10.1016/j.jhazmat.2020.122337

Anctil A., Lee E, Lunt RR, "Net environmental and cost benefit of transparent organic solar cells in building-integrated applications". Applied Energy 261, 114429 (2020),

https://doi.org/10.1016/j.apenergy.2019.114429

Wang X, **Anctil A**, Masten JM. "Energy consumption and environmental impact of ozonation catalytic membrane filtration system and comparison with hollow fiber membrane for water treatment". Environmental Engineering Science, 36 (2), 149-157 (2019), https://doi.org/10.1089/ees.2018.0270

Lee E, Andrews JC, **Anctil A**. "An iterative approach for fine chemicals manufacturing: an example from chloroaluminum phthalocyanine for photovoltaic applications". ACS Sustainable Chemistry & Engineering, 6(7): 8230-8237 (2018), https://doi.org/10.1021/acssuschemeng.7b04947

Şener ŞE, Sharp JL, **Anctil A**. "Factors impacting diverging paths of renewable energy: A review". Renewable and Sustainable Energy Reviews. 81 (P2) 2335-2342 (2018), https://doi.org/10.1016/j.rser.2017.06.042

Collins MK, **Anctil A.** "Implications for current regulatory waste toxicity characterisation methods from analysing metal and metalloid leaching from photovoltaic modules". International Journal of Sustainable Energy, 36(6), 531-544 (2017), https://doi.org/10.1080/14786451.2015.1053392

Traverse CJ, Young M, Suddard-Bangsund J, Patrick T, Bates M, Chen P, Wingate B, Lunt SY, **Anctil A**, and Lunt RR. "Anions for Near-Infrared Selective Organic Salt Photovoltaics." Scientific reports 7, no. 1 16399. (2017), https://doi.org/10.1038/s41598-017-16539-3

Lee YB, Lee WH, Worman JJ, **Anctil A**, Landi B, Bae C. Synthesis and property of polyimines containing 2, 2, 4, 4-tetramethyl-1, 3-cyclobutadiimine moiety. Macromolecular Research.;25(6):578-83 (2017), https://doi.org/10.1007/s13233-017-5119-4

Anctil A, Le Blanc D, "An Educational Simulation Tool for Integrated Coastal Tourism Development in Developing Countries", Journal of Sustainable Tourism 24, (5), 783-798 (2016), https://doi.org/10.1080/09669582.2015.1091463

Yilmaz O, **Anctil A**, Karanfil T, "LCA as a Decision Support Tool for Evaluation of Best Available Techniques (BATs) for Cleaner Production", Journal of Cleaner Production, 105, 337-347 (2015), https://doi.org/10.1016/j.jclepro.2014.02.022

Steele M, **Anctil A**, Ladner D. "Integrating algaculture into small wastewater treatment plants: Process flow options and life cycle impacts", Environmental Science: Processes & Impacts 16 (6), 1387-1399 (2014), https://doi.org/10.1039/C3EM00685A

Ganter M, Landi B, Babbitt C, **Anctil A**, Gaustad G, "Refunctionalization as a Lithium Ion Battery Recycling Alternative", Journal of Power Sources,256, 274-280 (2014), https://doi.org/10.1016/j.jpowsour.2014.01.078

Anctil A, Fthenakis V, "Critical metals in strategic photovoltaic technologies: abundance versus recyclability", Progress in Photovoltaics: Research and Applications, 21 (6), 1253–1259 (2013). https://doi.org/10.1002/pip.2308

Fthenakis V, **Anctil, A**, "Direct Te mining Resource availability and impact on cumulative energy demand of CdTe PV life-cycles", IEEE Journal of Photovoltaics, 3 (1) 433 - 438 (2013), https://doi.org/10.1109/JPHOTOV.2012.2216860

Anctil A, Babbitt CW, Landi BJ, Raffaelle RP, "Cumulative Energy Demand for Small Molecule and Polymer Photovoltaics", Progress in Photovoltaics: Research and Applications, 21 (7) 1541-1554 (2013). https://doi.org/10.1002/pip.2226

Anctil A, Babbitt CW, Landi BJ, Raffaelle RP, "Material and Energy Intensity of Fullerene Production", Environmental Science & Technology. 45 (6), 2353-2359 (2011), https://doi.org/10.1021/es103860a

REFEREED CONFERENCE PROCEEDINGS

* Presenter

Warren E, **Anctil A**, Pelaez SA, Berry JJ, McMillon-Brown L, Fioretti A, Grassman TJ, Mikofski M, Perna A,

Smith B, "The Value of Diversity in the Renewable Energy Industry and Research Community". Photovoltaic Specialists Conference, Virtual Meeting June 15-August 21, 2020

Farina A*, Kutay EM, **Anctil A,** "A comparative cradle-to-gate environmental analysis of asphalt mixtures modified with different technologies of crumb rubber from scrap tires". International Symposium on Pavement, Roadway, and Bridge Life Cycle Assessment Conference, San Diego, CA, 2020 (Postponed due to COVID-19 to 2021 – proceeding published June 2020)

Kamath D*, Shukla S, **Anctil A**, "An Economic and Environmental Assessment of Residential Rooftop Photovoltaics with Second Life Batteries in the US". 46th IEEE Photovoltaics Specialists Conference (PVSC 46), Chicago, Il, June 2019. https://doi.org/10.1109/PVSC40753.2019.8981132

Shukla S *, Lee E, Lunt RR, **Anctil A**. "Evaluating the electricity production and energy saving from transparent photovoltaics for windows in commercial buildings". 46th IEEE Photovoltaics Specialists Conference (PVSC 46), Chicago, Il, June 2019. https://doi.org/10.1109/PVSC40753.2019.8980609

Kamath D* and **Anctil A**, "Powering India's villages sustainably: A case study of Bihar". In Emerging Trends In Engineering, Science and Technology for Society, Energy and Environment: Proceedings of the International Conference in Emerging Trends in Engineering, Science and Technology (ICETEST 2018), Thrissur, Kerala, India. January 18–20, 2018. P.213 CRC Press (2018)

Anctil A, Lee E, Stephan J, Munasinghe A, Traverse C, Lunt RR," Life cycle assessment of transparent organic photovoltaic for window applications", 44th IEEE Photovoltaics Specialists Conference, Washington, DC, June 2017, https://doi.org/10.1109/PVSC.2017.8366142

Lee E, Traverse CJ, Young M, Lunt RR, **Anctil A***, "Evaluation of ClAlPc synthesis methods for transparent organic photovoltaic," 43rd IEEE Photovoltaics Specialists Conference, Portland, OR, June 2016, https://doi.org/10.1109/PVSC.2016.7749902

Collins MK*, Powell B, **Anctil A**, "Life cycle assessment of silicon solar panels manufacturing in the United States", 42nd IEEE Photovoltaic Specialists Conference, New Orleans, June 2015, 1-4, https://doi.org/10.1109/PVSC.2015.7356393

Tisza K, Brame S, **Anctil A*,** "GIS based multi-criteria decision analysis for photovoltaic panel deployment in the Southeast United States" *40th IEEE Photovoltaic Specialists Conference*, Denver, CO, June 2014. 1001 – 1004, https://doi.org/10.1109/PVSC.2014.6925083

Collins MK*, **Anctil A**, **"**Photovoltaic Waste Characterization with Environmental Considerations" *40th IEEE Photovoltaic Specialists Conference*, Denver, CO, June 2014, 1419-1423, https://doi.org/10.1109/PVSC.2014.6925183

Anctil A*, Fthenakis V, "Greenhouse gases emissions and energy payback of large photovoltaic power plants in the northeast United States", *38th IEEE Photovoltaic Specialists Conference*, Austin, TX, June 2012. http://doi.org/10.1109/PVSC.2012.6317714

Anctil A*, Babbitt CW, Landi BJ, Raffaelle RP, "Life-cycle Assessment of Organic Solar Cell Technologies", *35th IEEE Photovoltaic Specialists Conference*, Honolulu, HI, June 20-25, 2010. (Best student presentation) http://doi.org/10.1109/PVSC.2010.5617085

Anctil A*, Landi BJ, Raffaelle RP, "Multi-junction Polymer Solar Cells", 34th IEEE Photovoltaic Specialists Conference, Philadelphia, PA, June 7-12 2009. http://doi.org/10.1109/PVSC.2009.5411271

Raffaelle RP*, **Anctil A**, Merrill A, Landi BJ, "Dye-Sensitized Bulk Heterojunction Polymer Solar Cell", 33rd IEEE Photovoltaic Specialists Conference, San Diego, CA, May 11-16 2008. http://doi.org/10.1109/PVSC.2008.4922624

Anctil A*, Merrill A, Cress CD, Landi BJ, Raffaelle RP, "Environmental Passivation and Temperature Cycling of PCBM - Polymer Solar Cells" Materials Research Society Fall Meeting, Boston, MA, November 26-30 2007, Paper H9.54

OTHER PUBLICATIONS

Book Chapter

Anctil A, Fthenakis V, "Life-cycle Assessment of Organic Photovoltaics", in Third generation Photovoltaics, V Fthenakis, Editor (2011)

Reports

Anctil A, Arsenault R, Kamath D, "Second Life Potential and Environmental Benefit of EV Batteries in Photovoltaic and Grid Applications", Ford Technical Report (2019)

Moore S, **Anctil A**, "Michigan's energy future: expert and public opinion on energy transition in Michigan", Michigan Applied Public Policy Briefs, Institute for Public Policy and Social research Michigan (2018), available at: http://ippsr.msu.edu/sites/default/files/MAPPR/FINAL Michigan%27s Energy Future.pdf

The Solar Foundation, "Michigan Solar Jobs Census 2015", available at www.TSFcensus.org and SolarStates.org (2016)

Contributor to: Frischknecht R, Heath G, Raugei M, Sinha P, De Wild-Scholten M, Fthenakis V, Kim HC, Alsema E, Held M. "Methodology Guidelines on Life Cycle Assessment of Photovoltaic Electricity, 3rd edition, IEA PVPS Task 12, International Energy Agency Photovoltaic Power Systems Programme. Report IEA-PVPS T12-06:2016, ISBN 978-3-906042-38-1" available at https://iea-pvps.org/key-topics/task-12-methodology-guidelines-on-life-cycle-assessment-of-photovoltaic-electricity-3rd-edition/

Fact Sheet

Anctil A, PFAS in Photovoltaics – Risk or Rumor?

INVITED PRESENTATIONS

"Design for the environment in energy applications", Rochester Institute of Technology, March 2017

"Introduction to sustainable energy" Greener together, Michigan State University, November 2016

"Design for the environment: application to photovoltaic and wastewater treatment", presentation at the UM's Sustainable Systems Forum, University of Michigan, November 2016

"Design for the environment in solar energy", presentation to the MSU Physics society, November 2016

"Reducing the environmental impact of solar technologies", presentation at the University of Wisconsin-Madison, October 2016

"Reducing the environmental impact of emerging PV technologies", presentation at the International Symposium on Sustainable Systems and Technology (ISSST) panel on Photovoltaics and the Environment, May 2016

"Introduction to sustainability and life cycle assessment", guest lecture at Michigan State University for the Environmental Science & Policy Program, Fall 2014

"Sustainability." Keynote Speaker for the EcoRep conference at the University of South Carolina, March 2014

"Life-Cycle Assessment of Nanomaterials and fine chemicals for Power application", guest lecture for Case Western PIRE: Sustainability Life Cycle Analysis Course, June 2013

"Introduction to Life Cycle Assessment", Invited guest lecture at Clemson Univeristy for the Sustainability Leadership undergraduate course, Fall 2012 and Spring 2014

"Introduction to Photovoltaics", guest lecture at Clemson University for the Renewable Energy Undergraduate course, Fall 2012

"From national lab to academia." Invited presentation, Brookhaven National Laboratory, DOE Office of Science Graduate Fellowship annual meeting August 2012

PRESENTATIONS AND POSTERS WITH STUDENTS

Challa R, Kamath D, Anctil A, "Forecasting the Carbon Footprint of Electric Versus Combustion Vehicles in the US". Mid-Michigan Symposium for Undergraduate Research Experiences (Mid-SURE) 2020 Virtual Conference. August 4th-10th 2020

Heidari SM, Lee E, **Anctil A**, "Reducing the Environmental Impacts of Fullerenes Using an Iterative Approach Combining Life Cycle assessment and green Chemistry Metrics" Society of Environmental Toxicology and Chemistry (SETAC) 40th Annual Meeting Toronto, Canada, November 3-7 2019. (Poster)

Shukla S, Lee E, Lunt RR, **Anctil A***, "Evaluation of new solar cell technologies for transparent photovoltaics in the United States", Society of Environmental Toxicology and Chemistry (SETAC) 40th Annual Meeting, Toronto, Canada, November 3-7, 2019.

Farina A, **Anctil A**, Kutay EM, A Comparative Cradle-to-Gate Environmental Analysis of Asphalt Mixtures Modified with Different Technologies of Crumb Rubber from Scrap Tires, LCAXIX, Tucson Arizona, September 2019

Tamakloe S, Shukla S, **Anctil A**, "Economic Benefit of Photovoltaics in Michigan Field Crop Farms", Mid-Michigan Symposium for Undergraduate Research Experiences, Michigan State University, July 2019. (Poster)

Lee, J, Kamath D, Shukla, S, **Anctil A**, "Economic and Environmental Assessment of Photovoltaics for Low-Income Households," Housing Education and Research Association Conference, Savanah GA, October 2018

Shukla S, Kamath D, **Anctil A**, "Using second life Li-Ion electric vehicle battery to stabilize power output from residential photovoltaic systems", Engineering Graduate Research Symposium, Michigan State University, East Lansing, MI, March 2018

Lee E*, Traverse CJ.; Lunt RR, **Anctil A "**Environmental benefit of transparent organic photovoltaic in window application for urban area". Engineering Graduate Research Symposium, Michigan State University, East Lansing, MI, March 2018

Farina A*, Anctil A, Kutay E, "Polymer coated rubber (PCR) as a modifier to improve the mechanical performance of hot mix asphalt: laboratory evaluation and sustainability assessment. Engineering Graduate Research Symposium, Michigan State University, East Lansing, MI,March 2018 (Poster)

Heidari SM*, Lee E, **Anctil A**. "A sustainable approach for fullerene purification". Engineering Graduate Research Symposium, Michigan State University, East Lansing, MI,March 2018 (Poster)

Kamath D*, Shukla S, **Anctil A**, "Home charging Electric Vehicles with Second Life EV Batteries: Getting every Lithium-ion out!" Engineering Graduate Research Symposium, East Lansing, MI, March 2018.

Eunsang Lee*, Lunt RR, **Anctil A**. "Life cycle assessment and net environmental benefit of transparent organic photovoltaic in window and skylight application for sub-urban area", Environmental Science and Policy Research symposium, East Lansing, MI, October 2017

Stephen T*, Kamath D, **Anctil A**, "An Economic Analysis of Potential End-of-Life Pathways for Electric Vehicle Batteries," Mid-Michigan Symposium for Undergraduate Research Experiences (Mid-SURE), East Lansing, MI, July 2017. (Poster)

Goss K*, Kamath D, **Anctil A**, "Electric Vehicle Fast Charging Station Daily Power Demand Profile," Mid-Michigan Symposium for Undergraduate Research Experiences (Mid-SURE), East Lansing, MI, July 2017. (Poster)

Xue S*, Kamath D, **Anctil A**, "Environmental Impacts of On-Road Wireless Charging Versus Distributed Charging Stations," Mid-Michigan Symposium for Undergraduate Research Experiences (Mid-SURE), East Lansing, MI, July 2017. (Poster)

Kamath D*, Arsenault R, Kim HC, **Anctil A**, "Second Life Potential and Environmental Benefits of EV batteries as Fast Charging Enablers," ISIE-ISSST 2017, Chicago, IL, June 2017.(Poster)

Lee E*, Andrews C, **Anctil A**, "Methodology to evaluate the impact of fine chemicals manufacturing: an example from organic photovoltaic materials", ISIE-ISSST 2017, Chicago, Il, June 2017.

Anctil A, Stomps J, Claes J, Bieler T, Moore S, "A socio-technical analysis of energy transition to PV and nuclear: a case study on Michigan", AEESP conference, Ann Arbor, MI, June 2017

Kamath D*, Goss K, Christy S, **Anctil A**, "Environmental benefits of second use of EV batteries for Fast Charging: A Life Cycle Assessment Approach," Engineering Graduate Research Symposium, East Lansing, MI, March 2017. (Poster)

Lee E*, Andrews C, **Anctil A**, "Methodology to evaluate the impact of fine chemicals manufacturing: an example from organic photovoltaic materials", Engineering Graduate Research Symposium, East Lansing, MI, March 2017 (Poster)

Goss KL, Regmi U, **Anctil A**, "Second-life battery applications for photovoltaic and electric vehicle charge," Mid-Michigan Symposium for Undergraduate Research Experiences (Mid-SURE), East Lansing MI, July 2016 (Poster)

Regmi U, Goss, KL, **Anctil A**, "Second life use of battery in photovoltaic system for electric vehicle charging", Mid-Michigan Symposium for Undergraduate Research Experiences (Mid-SURE), East Lansing,MI, July 2016 (Poster)

Lee E, Andrews JC, **Anctil A***, "Chloroaluminium phtalocyanine synthesis for transparent organic photovoltaics," 20th Annual Green Chemistry & Engineering Conference, Portland, OR, June 2016

Collins K*, Bosley M, **Anctil A**, Kennedy M, Powell B, "Physical and chemical degradation of lithium ion batteries under landfill disposal conditions", International Symposium on Sustainable Systems and Technology (ISSST), Phoenix, AZ, May 2016

Lee E*, Andrews JC, **Anctil A**, "Application of Green Chemistry Principles: waste reduction during chloroaluminum phthalocyanine synthesis process for organic photovoltaic" International Symposium on Sustainable Systems and Technology (ISSST), Phoenix, AZ, May 2016 (Poster)

Lee E*, Andrews JC, **Anctil A**, "Chloroaluminium phtalocyanine Synthesis for transparent organic photovoltaics: tracking carbon, water and energy footprints," Fate of the Earth Symposium 2016: Climate-Food-Energy-Water Nexus, East Lansing, MI, April 2016 (Poster)

Lee E*, Andrews JC, **Anctil A**, "Microwave assisted synthesis: chloroaluminium phtalocyanine for transparent organic photovoltaics", 2016 Engineering Graduate Research Symposium, East Lansing, MI, March 2016 (Poster)

Can Sener S*, "Role of Public Policy Instruments in Renewable Energy Development", 87th Annual Conference Southern Political Science Association, San Juan PR, January 7th 2016

Steele M, Sims R, Ladner D, **Anctil A**, "Towards sustainability in wastewater treatment: Comparing life cycle impacts of algaculture and conventional systems", ISSST conference, Dearborne MI, May 18 2015 (*Best Poster winner*)

Collins MK*, **Anctil A**, Kennedy M, Powell B, Physical and Chemical Decomposition of Lithium Ion Batteries and Photovoltaic Modules in Solid Waste Landfills, ISSST conference, Dearborne MI, May 19 2015

Steele M, **Anctil A**, Sims R, Ladner D. Sustainable wastewater treatment in small communities: Comparing life cycle impacts of algaculture and conventional systems. South Carolina Environmental Conference, Myrtle Beach, SC. March 2015.

Steele M, Sims R, Ladner D, **Anctil A**. Algaculture at wastewater treatment plants: feasibility and life cycle impacts. Algal Biomass, Biofuels, and Bioproducts, Santa Fe, NM. June 2014.

Tisza K*, Brame S, **Anctil A**. "GIS Based Environmental Impact Assessment of Photovoltaics in the Southeast Region" ISSST conference, Oakland CA, May 19 2014.

Tisza K, Brame S, **Anctil A***. "Environmental Impact of Photovoltaics in the Southeast Region" SETAC conference, Nashville, TN, November 2013

Collins MK*, **Anctil A**. "Characterization and sustainable management of photovoltaic waste", SETAC conference, Nashville, TN, November 2013 (Poster)

Steele MM*, Ladner DA, **Anctil A.** "Net Environmental Benefit Approach to Life Cycle Assessment for Algaculture Integration at Wastewater Treatment Plants", ACLCA Conference, Orlando FL, October 2013

Yilmaz O*, **Anctil A**, Karanfil T. "LCA as a Decision Support Tool for Evaluation of Best Available Techniques (BATs) for Cleaner Production", ACLCA Conference, Orlando FL, October 2013

Collins MK*, **Anctil A**. "Environmental impacts of photovoltaic solar panels at end-of-life", Fall ACS meeting, Indianapolis, IN, September 8-12, 2013

Steele MM*, Ladner DA, **Anctil A**. "Net environmental benefit LCA: Integrating algae at WWTPs." Algal Biomass Biofuels and Bioproducts conference, Toronto, ON, Canada, June 2013. (Poster)

Steele MM*, **Anctil A**, Ladner DA. "Net Environmental Benefit Approach to Life Cycle Assessment for Algal Integration at Wastewater Treatment Plants." South Carolina Environmental Conference, Myrtle Beach, SC, March 2013 (Poster).

TEACHING

* indicates new course developed *F: Fall, S: Spring.*

Michigan State University (CE: Civil Engineering, ENE: Environmental Engineering)

**CE371: Sustainable Civil and Environmental Engineering Systems* *F16, S17, S18, F18, S19, F19, S20*

Undergraduate requirement CE & ENE– The class introduces sustainability concepts and sustainable engineering design to prepare a new generation of civil & environmental engineers to address complex societal problems. The application of a system approach is presented with real-world applications in civil and environmental systems planning. The class introduces various tools such as life cycle assessment, design for X (DfX), industrial ecology, and multi-criteria decision analysis. A project is used to evaluate students' ability to use these tools and identify a sustainable solution to a given problem.

**ENE492/890: Life-cycle Assessment of Energy Technologies* *S16, S19*

Undergraduate and graduate elective (all engineering – optional for Energy Minor) Life-cycle assessment (LCA) is a well-established methodology commonly used to evaluate the environmental impact of a product throughout all the stages of its life, from cradle-to-grave. The focus of this class is toward using LCA for energy technologies, where it can provide a systematic method to evaluate tradeoffs between various energy options and guide energy choices. The lectures address the environmental impact of energy technologies and life cycle assessment methodology. The computer laboratory is used to learn energy modeling tools for various energy options and life cycle assessment software. A project is used to assess students' ability to apply LCA methodology to evaluate a proposed energy change.

ENE801: Dynamics of Environmental Systems *S15, S18*

Graduate requirement ENE - This course's objective is to understand the principles of mass balance, reaction kinetics, and reactor theory as applied to environmental science and engineering. The focus of this class is on surface water quality modeling. The approach is to understand the physical and chemical principles first and then translate that understanding into the language of mathematics and into working models.

ENE272: Civil & Environmental Engineering Analysis – Engineering Economics *F15, S16*

Undergraduate requirement CE & ENE- The course is divided into three independent modules. In the economics module, the students learn about interest, net present worth, benefit-cost analysis, comparison of economic alternatives, and life-cycle costing.

**UGS101: Freshman Seminar: Sustainability Leadership* *S15, S16*

Undergraduate elective non-engineering - Participants learn and apply critical thinking skills to understand economic, social, and environmental sustainability. Students work across disciplinary lines to strengthen their critical thinking skills to become agents of change in the university and the broader community.

Clemson University (EES: Environmental Engineering & Earth Sciences)

EES8200: Environmental Systems Engineering *F12, S14*

Graduate elective - Decision-making in environmental engineering can be a complex process due to conflicting objectives of various stakeholders. The course introduces students to fundamental optimization theories required to address complex multi-objective problems encountered in environmental sciences. Multi-criteria decision methods are discussed since they provide a mathematical methodology to incorporate the values of various stakeholders and technical information to select the best solution for a particular problem.

**EES4860, 6860: Pollution Prevention and Industrial Ecology* *F13*

Undergraduate requirement and graduate elective - Topics include pollution prevention technology, the role of pollution prevention within a corporation, source reduction and recycling, pollution prevention assessments, treatment to reduce disposal, life-cycle assessment, design for environment and industrial ecology.

**EES8830-4: Applied Life Cycle Assessment* *S13*

Graduate elective - Life-cycle assessment (LCA) is a well-established methodology used to evaluate the environmental impact of a product throughout all the stages of its life, from cradle-to grave. In addition to the most common process LCA methodology, other methods such as input-output, economic and social LCA are introduced.

EES4900-4: Using Serious GAMES in Environmental Decision Making *S13,F13*

Undergraduate elective – Creative Inquiry: Team-based investigations are led by a faculty mentor and typically span two to four semesters. Students take ownership of their projects and take the risks necessary to solve problems and get answers.

STUDENT ADVISING

Primary Advisor for Ph.D.:

Graduated:

Steele, Muriel (Ph.D. EE&S Clemson): "Quantifying Sustainability in Wastewater Treatment: Examples in Algaculture", co-advisor with David Ladner, June 2016

NSF Graduate Research Fellowship Winner

Serife, Elif Can-Sener (Ph.D. Policy Studies Clemson), "Understanding transition barriers to renewable energy", co-advisor with Julia Sharp, August 2017

Collins, Mary Kayla (Ph.D. EE&S Clemson): "Environmental impact predictions for disposal of emerging energy technologies in solid waste landfills: application to lithium ion batteries and photovoltaics modules", co-advisor with Brian Powell May 2018

Lee, Eunsang (Ph.D. ENE Michigan State University), "Environmental impact of transparent photovoltaics", December 2018

Current:

Kamath, Dipti (Ph.D. ENE and Environmental Science and Policy Program (ESPP) Michigan State University), "Potential for second life battery in solar applications" expected graduation December 2020

MSU Environmental Science & Policy (ESPP) Doctoral Fellowship Winner

Shukla, Siddharth (Ph.D. ENE Michigan State University), "Renewable energy planning" expected graduation December 2021

Heidari, Seyed Mohammadreza (Ph.D. ENE Michigan State University), "Environmental impact of nanomaterials synthesis" expected graduation May 2021

Farina, Angela (Ph.D. CE Michigan State University), "Life cycle assessment of pavement alternatives", co-advisor with Emin Kutay expected graduation August 2021

Primary Adviser for MS:

Tisza, Kata (MS EE&S Clemson): "GIS-Based suitability modeling and multi-criteria decision analysis for utility scale solar plants in four states in the southeast United States" May 2014
Currently: Technical Manager at International Solid Waste Association (ISWA)
Fulbright Hungary Winner

Ge, Yuwei, coursework option MSU, December 2017

Cecil, Ben (MS. ENE MSU), "Green chemistry for photovoltaics". Expected graduation Fall 2021

Primary advisor for undergraduate research assistants

Jack Stephan, Engineering Undergraduate Research Experience (EnSURE) (2015) / Fulbright Winner (India-2016)
Stephen Christy, Professional Assistantship (2015-2017)
Cameron J Andrews, Professional Assistantship (2015-2017)
Anjali Munasinghe, Professional Assistantship (2016-2017)
Kelsey Gross, EnSURE (2016- 2017)
Urusha Regmi, Internship in Global Engineering & Advanced Research (InGEAR) – Nepal (2016)
Jordan Stomps, S3 project (2016- 2017)
Taylor Stephen, EnSURE 2017
Siqi Xue, EnSURE 2017
Lucas Michael Hardy, Professional Assistantship (2017- 2019)
Rohan Challa, Professional Assistantship (2018- 2020) Ensure summer 2019
Sedzro Tamakloe, Benefit of solar for farmers in Michigan (SROP - summer 2019)
Cobby Baffour-Awuah, Professional Assistantship (2019-2020)

Primary advisor for high school student

Mingxuan Sun, Potential for solar and wind energy in Michigan 2017
Jinwook Lee, Economic and environmental assessment of solar for-income households 2018

Dissertation and thesis committee:

Clemson:
Gubbala Satya (MS EE&S) Fall 2012
Aniruddha Sawant (MS EE&S) Spring 2014
MSU:
Charifa Hejase, MS Environmental Engineering, August 2016
Chris Traverse, Ph.D. Materials Science and Engineering December 2017
Xiaoyu Wang, Ph.D. Environmental Engineering, June 2018
Obafemi Elegbede, Ph.D. Community Sustainability, December 2018
Alborz Izadi, Ph.D. Mechanical Engineering, October 2019
Charifa Hejase, Ph.D. Environmental Engineering & ESPP, June 2020
Ben McCarthy, MS Environmental & Earth Sciences, expected December 2020
Gabriela Shirkey, Ph.D. Geography & ESPP, expected December 2021

PROFESSIONAL ACTIVITIES

Service to the field

- Board of Directors, Michigan Institute for Energy Innovation
- Editorial Board,
  - SAE International Journal of Sustainable Transportation, Energy, Environment, & Policy, 2019-
  - Clean Technologies and Environmental Policy, 2020-
- Editorial Advisory Board, Materials Science in Semiconductor Processing, 2011-
- Voting member for
  NSF International standard #457: Sustainability Leadership for Photovoltaic Module, 2015- 2019
  - Member of the Substances of Concern & Materials Task Group
  - Member of the LCA, Energy & Water Task Group

  NSF International standard #487: Electronic Common Criteria Standard, 2019-2020
- Reviewer of methods, results and solar overview for the "Michigan Solar Jobs Census" published by *The Solar Foundation,* 2015-2016
- Reviewer for papers submitted for publication to *Environmental Science and Technology, Materials Science in Semiconductor Processing, Applied Energy, IEEE-Journal of Photovoltaics, Progress in Photovoltaics: Research and Applications, International Journal of Sustainable Energy, RSC Advances,*

Journal of Industrial Ecology, Journal of Cleaner Production, Renewable & Sustainable Energy Reviews, Solar Energy Materials & Solar Cells and others.

- Reviewer for project proposals for
  - National Science Foundation (NSF) (2012-2019)
  - Environmental Protection Agency (EPA) (2013)
  - Department of energy (DOE) (2013)
  - Fonds de recherche Nature et Technologies (FQRNT), Canada (2016-2017)
  - Natural Sciences and Engineering Research Council of Canada (CRSNG) (2019-2020)
- Member of conference organizing committees
  - Member of the IEEE- Photovoltaic Specialists Conference organizing committee (2012-2017) in various roles: Awards chair (2013), Graduate Student Assistant Chair (2014), Sub-area chair (2014,2017), Poster chair (2017)
  - Program Area Chair for the 42nd and 43 IEEE-PVSC Conference: PV deployment and Sustainability (2015-2016, 2021)
  - ISSST conference Proceeding co-editor (2015-2016)
- Reviewer ACLCA (2012-2013) and IEEE-PVSC (2013-2017) conference papers
- Judge for poster competition at the IEEE-PVSC (2012/2014/2016) and ISSST (2012/2014-2017) conferences

Service to the University

MSU

- Department Seminar Coordinator (2016-2020)
- Department UGCC committee (2017- 2019)
- Environmental Science and Policy Program (ESPP) Faculty Advisory Council (2016-2017)
- Advisory board for S3 (Science and Society @ State) (2016-2017)
- College Research Strategic Planning Committee, lead on *Recruitment and retention* sub-group, 2016
- Department representative, College of Engineering Energy Minor, (2015- 2016)
- College of Engineering representative on search committee for
  - James Madison College position in Energy Policy, 2014
  - Materials science position in Organic Electronic Materials, 2017-2018
- Poster judge Graduate symposium (2016-2018)

Clemson

- University representative from the college of Engineering and Sciences on the President's Commission on Sustainability, 2012-2014
- Department representative, College of Engineering and Science International Committee, 2013-2014

Outreach and Community Engagement

- **K-12 Outreach:**
  - Developed and supervised hands-on engineering experience for the MSU High School Engineering Institute Summer Camp on "Solar and the environment" (2016-2018)
  - 4-H Renewable Energy Camp short course on Energy Storage (2019)
- **Women in Engineering**
  - Participation in various events organized by MSU Women in Engineering including student recruitment events (2015-2019), developing hands-on engineering experiences for Introduce a girl to Engineering (2016-18) and for the Women in Engineering Summer Camp on "Solar and sustainability" (2016-18)
  - Co-organizer of the annual luncheon Women in Photovoltaics event at the IEEE-PVSC conference (2014-2016) and main organizer for the 2017 edition

Memberships

Materials Research Society-MRS (2006-), Institute of Electrical and Electronics Engineers-IEEE

(2009-), IEEE Women in Engineering (2012-), American Solar Energy Society (2013-), American Center for Life Cycle Assessment-ACLCA (2011-2016), Society for Environmental Toxicology and Chemistry, SETAC (2013-2015, 2019-2020), Women in Solar Energy-WISE (2014-2017), Association of Environmental Engineering and Science Professors-AEESP (2014-), American Chemical Society- ACS (2016-), Advancing Women in Energy (2016-)