

**UNIVERSITY OF MAINE SYSTEM**

**Tenure and Promotion Application Form**

**I. FACE DATA**

**A. NAME:** Sharon J.W. Klein

**B. PRESENT RANK:** Assistant Professor

**C. COLLEGE/DEPARTMENT:** College of Natural Sciences, Forestry and Agriculture;  
School of Economics

**D. PROFESSIONAL EXPERIENCE**

<b>YEAR(S)</b>	<b>EMPLOYER(S)</b>	<b>POSITION(S)</b>
2011-present	School of Economics, University of Maine	Assistant Professor
2007-2011	Department of Engineering and Public Policy, Carnegie Mellon University	Graduate Research Assistant
2005-2007	Colegio Americano de Quito, Ecuador	International Baccalaureate Science Teacher (8 <sup>th</sup> , 11 <sup>th</sup> , 12 <sup>th</sup> grade)
2002-2005	King/Chavez Academy, San Diego, CA	Science Teacher (7 <sup>th</sup> & 8 <sup>th</sup> grade)
2000-2002	Hargrave Environmental Consulting, San Diego, CA	Environmental Technician
1999-2000	Americorps National Civilian Community Corps, Southeast Region	Corps Member

**E. EDUCATIONAL BACKGROUND**

<b>YEAR(S)</b>	<b>INSTITUTION(S)</b>	<b>FIELD</b>	<b>DEGREE</b>
2009-2011	Carnegie Mellon University	Engineering and Public Policy	Ph.D.
2007-2009	Carnegie Mellon University	Engineering and Public Policy	M.S.
2002-2004	National University	Secondary Single Subject Education (Chemistry)	Teaching Certificate
1996-1999	University of Massachusetts, Amherst	Environmental Science	B.S.

**II. RECORD OF ACTIONS**

**A. INITIAL PROBATIONARY APPOINTMENT**

1. **Effective Date:** August 1, 2011
2. **Length of Initial Tenure-Track Appointment:** 1 year & 1 month
3. **Prior Experience Credited toward Tenure:** None
4. **Rank:** Assistant Professor

**B. REAPPOINTMENTS**

DATE(S)	LENGTH
Sept. 1, 2012	1 year
Sept. 1, 2013*	1 year
Sept. 1, 2014	1 year
Sept. 1, 2015	1 year
Sept. 1, 2016	1 year

*\*I stopped the clock on August 16, 2013, for the 2013-2014 academic year, due to exceptional life circumstances associated with a difficult pregnancy and 2 miscarriages (see Appendix G).*

**C. PROMOTION(S)**

EFFECTIVE DATE(S)	TO RANK
Not Applicable	Not Applicable

**D. RECOMMENDATIONS FOR: N/A**

RECOMMENDING BODY	RECOMMENDATION (YES/NO/NO ACTION)	SIGNATURE	DATE
Peer Committee			
Director (SOE)			
Dean (NSFA)			
Provost/VPAA			
President			

**E. EXCEPTIONS TO BOARD OF TRUSTEES POLICY**

None

**F. TRANSMITTAL LETTERS**

1. President
2. Provost/VPAA
3. Dean
4. Director

### III. CANDIDATE'S PROFILE

#### A. DOCUMENTATION OF TEACHING

Teaching Appointment:

34% (2014-present)

45% (2012-2014)

50% (2011-2012)

#### Teaching Responsibility

My teaching responsibilities are allocated with the School of Economics, but support the Ecology and Environmental Sciences Program, the three campus-wide Renewable Energy Minors, the sustainability science mission of the Senator George J. Mitchell Center for Sustainability Solutions, and the public service and community engagement mission of the Margaret Chase Smith Policy Center. I introduce students to sustainable energy issues, alternatives, and solutions through a multi-disciplinary lens in my introductory undergraduate course ECO 180 Citizens, Energy, and Sustainability. In my mixed undergraduate/graduate course, ECO 405/590 Sustainable Energy Economics and Policy, I engage students in quantifying and evaluating the economic, environmental, and social implications of energy supply, distribution, and use in the context of transitioning toward a sustainable energy future. Both courses include a service-learning component. I also piloted a service-learning immersion course, ECO 370 Building Sustainable Energy Communities through Service-Learning, and have offered several independent studies courses to graduate and undergraduate students.

#### Teaching Philosophy

My personal interest in teaching stems from the long-held belief that education is vital to the creation of a more sustainable and aware society. Experience and research have shown me that effective education incorporates a set of best practices that apply to all age levels: 1) **clear and consistent expectations**; 2) **active learning** (e.g., discussions, debates, projects, reflection, etc); 3) **fair and comprehensive assessments**; and 4) respect and understanding of **diverse student motivations and learning styles**. Developing a meaningful course requires time and experimentation; it is an iterative process in which instructional tools are refined and improved based on instructor and student reflection & evaluation each time the course is taught. As my students learn from me, I also learn from them and become a better educator and researcher as a result. In addition, I feel fortunate to teach courses that have an indelible connection to my research. I continuously update my teaching material based on my research, and my courses often inform new approaches and ideas for my research. I strive to achieve teaching-research-service integration because each component of this triad enriches and advances the others. This philosophy extends into how I advise students in research and independent course work.

### **Multiculturalism, gender and international issues**

When I discuss specific energy trends in each major energy sector, I try to always include data for the U.S., the world, Maine, and at least one other country, state or region, in order to give students a multi-cultural and international perspective. We evaluate energy poverty issues and discuss how and why these issues often affect women and minorities the most. The strategies, innovations, and special efforts described below are consistent with a conscious effort on my part to move toward an active learning classroom design with a service learning component, which has more flexibility for enhancing learning for a wider variety of student learning styles than a traditional lecture setting and has been shown to more actively engage female and minority students, who have been traditionally underrepresented in the field of Economics (for more information, see: Maureen J. Lage , Glenn J. Platt & Michael Treglia (2000) *Inverting the Classroom: A Gateway to Creating an Inclusive Learning Environment*, The Journal of Economic Education, 31:1, 30-43). In courses that teach about citizen engagement in creating a more sustainable energy future, I find this more active learning environment to be more appropriate than traditional lecture style and consistent with the University goal to become the most distinctively student-centered of the American Universities.

### **Service-Learning and Community Engagement**

Service-learning is a “teaching method which combines community service with academic instruction as it focuses on critical, reflective thinking and civic responsibility. Service-learning programs involve students in organized community service that addresses local needs, while developing their academic skills, sense of civic responsibility, and commitment to the community” (<http://umaine.edu/volunteer/service-learning/>). Community service related to sustainable energy is a required component of my courses because it helps students better understand their own role in achieving a sustainable energy future and provides a way for their hard work to facilitate lasting, tangible, positive change for the environment and the lives of people in local communities. Through community engagement, students learn about the people and issues beyond the campus property, and local communities learn about how the University can and is helping to promote sustainable use of Maine’s natural resources and improving the quality of life for people in Maine (part of the University’s mission as a Land and Sea Grant institution). Service-learning and community engagement help to lower the barriers between the classroom and the “real world”, providing tangible improvements for communities and lasting experience for students.

### **K-12 Educational Outreach**

As a former middle school and high school teacher, I value the unique perspectives, experiences and intellectual meaning K-12 students bring to higher education, as well as the enrichment universities can provide for their learning. For two years in a row (2015 and 2016), I have prepared and taught workshops on Sustainable Energy for the UMaine Expanding Horizons Program for local middle school girls in STEM. In the summer of 2016, I mentored a sophomore student, Alex Moreira, from Old Town High School on a research project (A Review of the Costs of Solar Policy to Society and Utility Ratepayers) through the Maine EPSCoR High School Summer Research Program. Alex’s poster for this work won first place in the High

School division for poster presentations at the Maine Sustainability & Water Conference in March 2017. In Fall 2015, I mentored a student in my ECO 370 service learning class in preparing and delivering a presentation to an Environmental Science class at Brewer High School to educate students about and garner support for our community window insert build. Three students from that high school class ended up building window inserts alongside my college students at our student-run community window insert build in November 2015. In 2013 and 2014, I mentored one of my undergraduate students (Sabrina Vivian) and one of my graduate students (Stephanie Whalley) in developing and implementing, respectively, new biofuel curriculum for the UMaine Forest Bioproducts Research Institute's Sustainable Energy Leaders of the Future (SELF) camp for high school sophomore girls.

**Table 1 – Summary of Courses Taught<sup>a</sup>**

Course Number	Course Title	Average Number of Students	Total Number of Students	Teach Regularly?	Developed or Restructured
ECO 180	Citizens, Energy, and Sustainability	79	472	Yes	Restructured
ECO 405/590	Sustainable Energy Economics & Policy	27/4	107/14	Yes	Restructured (405)/ Developed (590)
ECO 370	Building Sustainable Energy Communities through Service Learning	9	9	No	Developed
ECO 470	Independent Study in Economics	1	2	No	Developed
INT 489	Introduction to Renewable Energy Engineering	5	5	No	Developed
ECO 497	Independent Study in Economics	1	1	No	Developed
ECO 597	Independent Study in Economics	1	2	No	Developed

<sup>a</sup>Course syllabi are presented in Appendix E.

### Summary List of Teaching Strategies and Innovations

The teaching strategies and innovations I have employed during the pre-tenure period are listed below in chronological order based on when I first implemented them. Most of these are explained in more detail in the following section.

- Spring 2012    Lecture with visual Powerpoint slides  
                  Co-teaching  
                  Blackboard and FirstClass course management software  
                  Minimal active learning: debates, whole class discussion
- Spring 2013    Top Hat interactive course software  
                  Online discussions & quizzes  
                  More active learning: small group discussions, jigsaw discussions  
                  Collaborative problem-solving  
                  Creative final project  
                  End-of-semester student survey  
                  Student co-authored journal article  
                  Guest lectures
- Spring 2014    Web-based course  
                  Mid-semester student survey
- Spring 2015    Flipped classroom  
                  Collaborative service-learning project  
                  Collaborative poster presentations judged by community members  
                  On-campus field trips
- Fall 2015        Pilot service-learning immersion course  
                  Overnight team- and skill-building weekend retreat  
                  Collaborative integrated research-service project  
                  Collaborative public presentation  
                  Off-campus field trips  
                  Google Classroom
- Fall 2016        Multiple collaborative integrated research-service projects
- Fall 2017        Interactive online mapping research activity

### Discussion of Teaching Effectiveness, Strategies, and Innovations

*\*Specific strategies and innovations from the previous list are identified in **bold-face** type*

Consistent with my stated teaching philosophy, I view courses not as static objects but as dynamic systems that grow and change with each new repetition based on mutual learning between student and teacher. Incorporating innovative and effective teaching strategies is a time-consuming endeavor that requires substantial preparation and several iterations to implement successfully. I am constantly evaluating and working to make my teaching as effective as possible, as can be seen by the substantial alterations I have made to my courses over the years. This section describes the iterative transformation in my teaching style over time to become more focused on active-, collaborative-, and service-learning that engages students in ongoing research projects – many of whom have continued their work as research assistants and in independent studies under my mentorship.

In Spring 2012, I began with **lecture-based** courses because that was the predominant pedagogy I had experienced at the university level and what my co-teaching colleagues were using. **Co-teaching** is an innovation that, to be effective, requires regular communication between instructors and co-development of instructional materials. I sat in as many of my co-instructors' lectures as I could and consulted with them for syllabus development, content delivery, and exam preparation. I made my Powerpoint slides as visual as possible and encouraged student participation by stopping to ask questions of the class and encouraging students to ask questions as they arose. For course management software, I used **Blackboard** in ECO 180 and **FirstClass** in ECO 405/590 because that is what my co-teaching colleagues were using. I also facilitated structured **debates** and some informal **whole class discussions** to enhance student learning around controversial energy issues.

In Spring 2013, I co-taught ECO 180 again and taught ECO 405/590 alone for the first time. I adopted Blackboard for both courses to streamline content delivery and accelerate my own mastery of the course management software in order to deliver course content more effectively. My co-instructor for ECO 180 and I also implemented **Top Hat** (<https://tophat.com/about>) to encourage more active participation during class time and **online discussions** through Blackboard to encourage more **student collaboration** in understanding course materials outside of the class. Top Hat allows students to respond in real-time to questions posed during lecture through cell phones, computers, tablets, or any other network-connected device students may have with them, without requiring an iClicker. This intentional transition toward a more **active learning**-based environment was based on a large body of evidence of the educational benefits of active learning (including improved interpersonal communication, peer-to-peer, and peer-to-instructor relationships, attendance, critical thinking, student perception of self/learning as well as actual learning outcomes<sup>1</sup>). I also adopted a new textbook for ECO 405/590 and developed new **online quizzes** to ensure students come prepared to class having done the readings. I added a new **final project** to ECO 405/590: a 2-min commercial (video or audio) in which students lay out their vision for a sustainable energy future and a call to action to the general public as to what they must do to help achieve this vision. The ECO 590 students

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<sup>1</sup> M. Prince, "Does Active Learning Work? A Review of the Research," *J. Eng. Educ.*, vol. 93, no. 3, pp. 223–231, Jul. 2004.

also wrote a journal-length paper about their commercial. One graduate student (Stephanie Whalley) did such a good job on this assignment that we collaborated on a **student co-authored journal article** based on her final paper<sup>2</sup>. In Spring 2013, I also added a brief end-of-semester **student survey** to both classes that targeted more course-specific suggestions for improvement than University course evaluations. Sixty-five percent of 20 respondents to an end-of-semester survey recommended using Top Hat again the following year, and 70% of respondents indicated that the tool was useful to very useful. The Top Hat experiment was so successful that the Faculty Development Center worked to officially integrate Top Hat with Blackboard and began to include it in their faculty trainings in 2013. I have continued to use this tool in ECO 180 through present day.

In Spring 2014, I only taught one **web-based** course (ECO 180) because I was on maternity leave. I worked closely with e-learning specialists from the University of Maine System to create an innovative web-based design for the course, with a weekly mixture of readings, videos and recorded mini-lectures centered around each main course topic. Unfortunately, the University lost my course evaluations for 2014 (see Appendix B), but my internal mid-semester student survey showed positive student evaluations of the course (see Section IV.A.2).

In Spring 2015, I applied the new materials I created for the web-based ECO 180 to make the live version of ECO 180 follow a more **“flipped” classroom** approach in order to increase opportunities for collaborative and active learning. A flipped classroom is different from the traditional lecture-style approach because students spend most of their class time actively engaging in problem solving, discussions, debates and other in-class assignments usually in small groups while I listen to them and provide guidance, feedback and mini-lectures on topics that help them be successful in the activities. They access lecture content online before they come to class, and I deliver any in-class lectures in shorter chunks than traditional lectures. I submitted a successful proposal in 2014 to be able to start teaching ECO 180 in a new active learning classroom (Estabrooke 130) to better support the flipped classroom approach. I also eliminated online discussions in ECO 180, based on the Spring 2013 student survey results. The course evaluations for Spring 2015 demonstrate two areas of effectiveness related to the new flipped classroom format for ECO 180: 23% improvement in the mean “rating of instructor” (first time this value was greater than 4 for this course) and 11% improvement in the mean “overall rating of course”, compared to the average of all lecture-based sections in Spring 2012 & 2013 (see Section IV.A.1). In addition, in April 2015, I participated in the University Classroom Observation Program – allowed 2 local high school teachers to observe me teaching ECO 180 and completed an online follow-up survey. The full results of this observation are included in Appendix C and demonstrate a positive evaluation of the active learning approaches (namely “jigsaw discussion”) used that day in class. It would have been helpful to compare the student course evaluations from Spring 2015 with the web-based predecessor in Spring 2014, but unfortunately the University lost my course evaluations for 2014 (see Appendix B). In Fall 2015, I essentially replicated the Spring 2015 format of ECO 180 and had similarly positive course evaluations and internal end-of-semester surveys.

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<sup>2</sup> Klein, S.J.W., Whalley, S., 2015, Comparing the sustainability of U.S. electricity options through multi-criteria decision analysis (MCDA), *Energy Policy*, 79, 127-149

In Spring 2015, I eliminated Top Hat in ECO 405/590 because it was not worthwhile for such a small class. I also made substantial additional changes to ECO 405/590 based on the Spring 2013 end-of-semester surveys: 1) eliminated the textbooks, which were expensive, too technical, and strongly disliked by the students; 2) added more active learning strategies in the classroom (e.g., more debates, hands-on quantitative problem sets, quiz and scenario games, in response to student requests for more hands-on, real-life experiences; and 3) adopted my first **collaborative service-learning project** (sustainable energy license plate). The addition of service-learning was motivated by personal experience (as an Americorps volunteer and former student in an undergraduate service learning course) as well as by evidence of the effectiveness of service learning at developing academic skills, civic responsibility, and community commitment through critical, reflective thinking<sup>3</sup>, resulting in improved attitudes toward school/self and deeper understanding of course content<sup>4</sup>. I also added a collaborative group work element and more research to the project in response to faculty meeting discussions and my own observations about the need to give students more practice with group work and research, as well as pedagogical evidence of the benefits of collaborative learning for advancing critical thinking<sup>5</sup>. The project was to create a design and plan for a sustainability license plate and funding program in Maine, in collaboration with local community partners, including a local business owner and a State Representative. Students made **collaborative poster presentations**, judged by members of the Maine community. One student (Garrett Raymond) continued the project beyond the course timeline as a Margaret Chase Smith Public Affairs Scholarship for the 2015-2016 school year, for which I was his advisor. He then went on to become my graduate research assistant in the 2016-2017 school year. Course evaluations from Spring 2015 show a 5% improvement (compared to Spring 2013) in the rating of the instructor and 5% decrease in the mean overall rating of the course. Internal end-of-semester survey results indicate that students were inspired to do real-life work that made a difference for the local community but the project resulted in too much work and the instructions/expectations were not clear enough.

I used this feedback to help structure the **pilot service learning immersion course**, ECO 370, that temporarily replaced ECO 405/590 in Fall 2015. ECO 370 immersed students in the service project, with course content designed around the service project, rather than the way ECO 405/590 had been in Spring 2015 with the service project added on to existing course content. My goal with ECO 370 was to fully integrate teaching-research-service, with students collaboratively designing and implementing a service project with tangible meaningful results to local communities and to energy sustainability, while also conducting original research on the service project, and meeting many of the same learning outcomes as ECO 405. I took students on an **overnight retreat** to an off-grid homestead in Lowell, Maine that runs on renewable energy, to facilitate team development and teach students how to build window inserts (pine frames, wrapped in 2 layers of plastic with weatherstripping around the perimeter, which are

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<sup>3</sup> "Service Learning | The Bodwell Center for Service and Volunteerism | University of Maine." [Online]. Available: <http://umaine.edu/volunteer/service-learning/>. [Accessed: 17-Jul-2015].

<sup>4</sup> Christine I. Cielo, Joseph Durlak, and Allison Dymnicki, "A meta-analysis of the impact of service-learning on students," *J. Exp. Educ.*, vol. 34, no. 2, pp. 164–181, 2011.

<sup>5</sup> A. A. Gokhale, "Collaborative Learning Enhances Critical Thinking," *Journal of Technology Education*, vol. 7, no. 1, 1995.

placed in interior window sills to reduce heat loss and save energy). Over the rest of the semester, students recruited people to order window inserts for their homes and businesses; measured customer windows; recruited volunteers to help build inserts; led a 2-week community window insert build at a local church in Bangor, where more than 40 volunteers came together to build 375 window inserts; and prepared a collaborative research project, which included evaluating the energy and monetary savings associated with window inserts as well as the social perceptions and acceptability. They made a **collaborative public presentation** and produced a written paper. The whole project was conducted in collaboration with community partners: WindowDressers in Rockland, the Unitarian Universalist Society of Bangor (UUSB), and the Rotary Club of Old Town. Student and community member reflections, surveys, and discussions revealed that the service project was very effective in teaching students new skills; expanding student awareness of people and issues beyond the campus; improving student understanding of local sustainable energy issues; identifying ways students could take action to solve sustainable energy problems; inspiring students; improving student confidence; teaching research skills; improving/expanding relationships between community members and the university; enriching professional relationships between students, faculty, and community members; and producing a collaborative research presentation and paper relevant and important to local community groups as well as to ongoing research. However, it was not effective in reaching the number of learning outcomes from ECO 405 originally planned for the course, and it required much more work and time than other courses (both for students and faculty). Course evaluations reflect student recognition that the positives outweighed the negatives (22% improvement in overall rating of course compared to average of previous versions of ECO 405).

Inspired by the success of the **collaborative research-service project** in ECO 370, I tried again in Fall 2016 to integrate a collaborative research-service project in ECO 405 and also tried for the first time to add a collaborative research-service project to ECO 180. However, by this point, I had several requests from community partners to engage my students in service-learning projects with their organizations. So, instead of having the whole class focus on one project, collaborative student groups were allowed to pick among **6 different project possibilities**. Collaborative student teams conducted literature review, performed a minimum of four hours of direct community service, and presented a research paper and presentation to community partners. While this process may have inspired students to be more interested and engaged in the project because they had choice and were directly interacting with community members, it became very difficult to effectively manage and advise all of the different groups and projects across 116 students. Despite many efforts to make instructions clear and deadlines manageable, it became clear that the research-service project was confusing to students and too much work for the students and instructor, especially for ECO 180. In the end, course evaluations reflected the resulting student confusion and anxiety about the service-research projects that demanded too much of their time and energy (8% decrease in mean overall rating of course for ECO 405 and 9% for ECO 180, compared with the average ratings from previous versions of these courses). However, the complexity and diversity of projects encouraged stronger student-instructor relationships, which led to me hiring 4 undergraduate students as research assistants and teaching two independent studies between Fall 2016 and now, and also helped me to learn nearly all of the 116 students' names across both classes. In addition, three

student groups traveled to the City of Bangor to give presentations in front of the City Council, enriching student-community relationships and even making the local news<sup>6</sup>.

As I prepare for the Fall 2017 semester, in which I will be teaching ECO 180 and 405/590 again, I am making several changes to reduce student confusion and student/instructor workload, while maintaining the benefits of active-, cooperative-, and service-learning: 1) I am returning to the 2015 overall course structure for both courses (which had higher overall student satisfaction and strong learning outcomes and included active- and collaborative-learning strategies) but maintaining a clear service component not tied to a complicated research project; 2) in an effort to more slowly introduce research in a 100-level class, I am working with the Center for Innovation in Teaching and Learning (CITL) to expand an existing ECO 180 course activity (that has received positive student feedback) to include an **interactive mapping research component** that students will accomplish over time and include collaborative and individual efforts; 3) I am focusing on a single service project for ECO 405/590 (similar to the ECO 370 and 2015 ECO 405 approaches) and working with CITL to make instructions clearer, slow the pace of the course, and reduce the number of topics I try to cover over the course of the semester; and 4) I am implementing pre- and post-assessments of learning outcomes to more accurately capture the effectiveness of specific learning strategies on meeting specific learning outcomes. I am confident that the Fall 2017 will result in higher student satisfaction, lower instructor workload, and stronger learning outcomes. At the end of the semester, I plan to compare student evaluations and test/quiz scores between 2015, 2016, and 2017, to evaluate if further changes are needed in these courses in the future. Pedagogical studies show that the effectiveness of service-learning and active-learning courses improve when the projects and activities are repeated so they can be improved upon. Now that I have built the integrated active-, collaborative-, service-learning infrastructure, I can refine specific approaches, activities, instructions, and rubrics to improve teaching effectiveness over time.

In addition, I requested a teacher observation of ECO 405/590 from Erin Vinson, Campus Programs and Professional Development Coordinator Maine Center for Research in STEM Education (RiSE Center), to help evaluate the changes to this course. That observation was completed on 9/26/17, and the results are included in Appendix C – in short, the results are a positive reflection of the changes I have made the course thus far in the semester.

### **Additional Activities to Improve Teaching Effectiveness**

- |                  |                                                                                                                   |
|------------------|-------------------------------------------------------------------------------------------------------------------|
| October 25, 2011 | <i>Information Technologies Videoconferencing Open House</i> , University of Maine                                |
| October 28, 2011 | <i>Campus Presentation Seminar</i> , Center for Excellence in Teaching and Assessment (CETA), University of Maine |
| November 2, 2011 | <i>Teaching Toolbox Seminar</i> , CETA, University of Maine                                                       |

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<sup>6</sup>The BDN Editorial Board, "Making Bangor walkable will help residents, visitors — and homeowners, too," *The Bangor Daily News*, January 2, 2017, <http://bangordailynews.com/2017/01/02/opinion/editorials/making-bangor-walkable-will-help-residents-visitors-and-homeowners-too/>.

January 4, 2012	<i>Blackboard Workshop Parts 1 &amp; 2</i> , Faculty Development Center, University of Maine
January 5, 2012	<i>First Class Workshop</i> , Faculty Development Center, University of Maine
May 10, 2012	<i>A Workshop for Addressing the Broader Impacts with Scientist-Teacher-Student Partnerships</i> , University of Maine
September 27, 2012	<i>Faculty Technology Fair</i> , University of Maine
October 3, 2012	<i>One Journey to Better Multiple-Choice Testing</i> , CETA, University of Maine
February 7, 2013	<i>Engaging Public and Decision-Makers on Climate Change</i> , University of Maine
April 11, 2013	<i>Keynote iPad Workshop</i> , Faculty Development Center, University of Maine
May 14-15, 2013	<i>Short Course on Engaging the Public and Policymakers</i> , University of Maine
August 7, 2013	<i>Secrets to Online Teaching</i> , University of Maine (followed by multiple individual coaching sessions and course content development over 5 months with an e-learning specialist to develop the web-based version of ECO 180 for Spring 2014)
April 25, 2014	<i>Active Learning and the Flipped Classroom</i> by Bryan Blakely (from Boston College), sponsored by UMaine Psychology Department, IT Faculty Development, the Division of Lifelong Learning, and CETA, University of Maine
June 4-5, 2015	<i>Campus Compact Campuses for Environmental Stewardship Faculty Development Institute</i> , University of Southern Maine, Portland, Maine
August 25, 2016	<i>Teaching Panel Discussion</i> , New Faculty Orientation, University of Maine
September 30, 2016	<i>Campuses for Environmental Stewardship Best Practices Showcase</i> , University of New England, Biddeford, Maine
June 2017-present	Regular meetings with Center for Innovation in Teaching and Learning (CITL) staff to design a new interactive Google maps-based semester long activity for my ECO 180 and 405 students.

### **Special teaching assignments and activities**

Fall 2011	Guest lecture, ECO 117 Issues and Opportunities in Economics
Spring 2012	INT 489 Introduction to Renewable Energy Engineering, a seminar course that is a core requirement for the Renewable Energy Engineering Minor (taught 2 classes)
Fall 2012	Guest lecture, ECO 117 Issues and Opportunities in Economics

- Guest lecture, Sustainable Energy, ECO 381, Sustainable Development Principles and Policy
- ECO 597 Graduate Independent Study in Economics, Life Cycle Costing for Biofuels
- Fall 2014 Guest lecture, ECO 117 Issues and Opportunities in Economics
- Spring 2015 ECO 470 Undergraduate Independent Study in Economics, Economic and Environmental Life Cycle Assessment of Forest-Based Cellulosic Drop-in Diesel for University of Maine Vehicles
- Fall 2015 Guest lecture, Sustainable Energy, ECO 377 Introduction to Natural Resource Economics & Policy
- Collaborating faculty on Campuses for Environmental Stewardship Service Learning Program
- ECO 597 Graduate Independent Study in Economics, Evaluating the Social and Economic Benefits and Costs of Community-Built Window Inserts
- Spring 2016 Guest lecture, Community Solar Database, SIE 557 Database System Applications
- Advised SIE 557 students on their final project, which focused on my US Community Solar Database
- Developed/implemented 2 workshops on sustainable energy for the Expanding Horizons Program in STEM for middle school girls, University of Maine
- Summer 2016 Instructor for 2 energy sessions of Mandela Washington Fellowship (MWF) Institute, University of Maine
- Led MWF participants on a field trip to the Maine Solar Energy Association, Jonesport, Maine, to build solar phone chargers
- Spring 2017 Developed/implemented 1 workshop on sustainable energy for the Expanding Horizons Program in STEM for middle school girls, University of Maine
- ECO 470 Undergraduate Independent Study in Benefits, Costs, and Best Practices of the EnergySmart Bangor Residential Rebate Program
- Summer 2017 ECO 497 Undergraduate Independent Study in Community Window Insert Research
- Instructor for 2 energy sessions of Mandela Washington Fellowship (MWF) Institute, University of Maine
- Coordinated a field trip for MWF participants to a local residence with multiple renewable energy installations and developed and led a solar phone charger-building workshop at UMaine for MWF participants

## **Undergraduate Advising**

Since 2013, I have been the primary academic advisor to between 6 and 16 undergraduate students per year in Economics and Ecology & Environmental Sciences. I have also served on 1 Honors Thesis Committee and advised 3 undergraduate independent study courses, 1 Margaret Chase Smith Public Affairs Scholarship, and 12 undergraduate research assistantships.

### Number of Academic Advisees by Academic Year

2011-2012: 0  
2012-2013: 0  
2013-2014: 6  
2014-2015: 7  
2015-2016: 12  
2016-2017: 16

### List of Undergraduate Research Projects & Honors Committees by Academic Year

2011-2012 Caitlin Howland, Economics, *Honors Thesis Committee* (member)

2012-2013 Hollie Smith, Communications, advisor on her interview protocol about alternative energy for Maine policymakers

2014-2015 Ashley Crane, Economics, *Research Assistantship: National Science Foundation Sustainable Energy Pathway Biofuels Research*  
Ashley Crane, Economics, *ECO 470 Independent Study: Life Cycle Analysis of Forest-Based Cellulosic Drop-in Diesel*

2015-2016 Garrett Raymond, Economics, *Margaret Chase Smith Public Affairs Scholarship and Center for Undergraduate Research Poster Presentation: Should Maine Fund Sustainability by Selling License Plates?*  
Cameron Goodwin, Economics, *Mitchell Center for Sustainability Solutions Community Energy Research Assistantship: Community Solar Trends, Costs, and Benefits*  
Jacob Archer, Economics, *Research Assistantship (work study): Multi-Criteria Decision Analysis in Dam Decision-Making in New England*  
Elena Smith, Economics *Research Assistantship (work study): Performance and Cost of Different Residential Heating Options and Different Hydropower Options*  
Erica Sturrock, Economics, *Mitchell Center for Sustainability Solutions Community Energy Research Assistantship: Knowledge and Perception of Energy Savings from Interior Window Inserts*  
Allison Brakey, International Affairs, *Mitchell Center for Sustainability Solutions Community Energy Research Assistantship: Knowledge and Perception of Energy Savings from Interior Window Inserts*

- 2016-2017    Angela Hallowell, Economics, *Mitchell Center for Sustainability Solutions Community Energy Research Assistantship: Community Solar Survey Data Cleaning*
- Katrina Stinson, Computer Science, *Mitchell Center for Sustainability Solutions Community Energy Research Assistantship: Development of a US Community Energy Website*
- Kaitlyn Raffier, Ecology & Environmental Science, *National Science Foundation Future of Dams Research Assistantship: The Role of Hydropower and Multi-Criteria Decision Analysis in Dam Decision-Making in New England*
- Rafael Mata, Economics, *Mitchell Center for Sustainability Solutions Community Energy Research Assistantship: Community Solar and Window Insert Research*
- Kayla Michaud, Economics, *ECO 470 Independent Study: Benefits, Costs, and Best Practices of the EnergySmart Bangor Residential Rebate Program*
- Racquel Bozzelli, Economics, *Mitchell Center for Sustainability Solutions Community Energy Research Assistantship: Technical Report on Community Solar Survey Results*
- Briana Littlefield, Economics *Mitchell Center for Sustainability Solutions Community Energy Research Assistantship: Data Analysis for Community Solar, Window Insert, and EnergySmart Projects*
- Briana Littlefield, Economics *ECO 497 Independent Study Community Window Insert Research*

My approach to academic advising is to offer students the flexibility to discuss course selections, degree requirements, professional goals, and other concerns/questions via email, over the phone or in person. I usually encourage at least one face-to-face meeting when the student is initially assigned to me. To make sure everyone is on track, once a semester prior to registration, I send an email to all of my academic advisees alerting them that registration is coming up and that they need to review their Degree Progress Reports and submit their course Wish List for my approval. It is important for students be in control of their own academic and professional plans, so I require students to explain to me (in person or via email) how their course selections meet their degree requirements and/or professional/personal goals. I document all emails and take notes at all meetings to ensure continuity from semester to semester. At a typical academic advising meeting, I ask the advisee for an update on his/her progress and level of satisfaction with their course work. I check their course wish list against their degree progress report and graduation timeline to ensure they are staying on track with their degree requirements and discuss any discrepancies I find. I answer any questions they have about courses or other concerns, and if I am unable to answer a question they have, I track down the answer in a timely fashion and follow-up with them after the meeting. Although most of my academic advising has centered on course selections and degree requirements, there have been students who have needed support of a more personal nature. I have referred two students to the University of Maine Counseling Center due to traumatic personal issues discussed during our meetings. In these cases, I have followed up afterward to ensure students have received the support they needed.

Due to the time and energy involved in advising independent studies, I am selective about only agreeing to projects that benefit my current research program, will be conducted by top students from my classes, and/or serve a specific and crucial need for a student's academic or professional development. My approach to independent studies is to have the student submit a written proposal to me in the semester preceding the independent study semester. From there, we develop a syllabus and timeline together. During the independent study semester, we meet on average every other week and communicate through an assignment list in Google Drive and via email. One purpose of the independent study is usually to fulfill the capstone and/or writing intensive in major degree requirement. Therefore, the final project is typically an economic analysis with an interdisciplinary energy component, delivered through a final paper that has undergone several draft revisions and includes an annotated bibliography.

I am similarly selective about hiring undergraduate research assistants. My approach in advising these projects is to communicate my expectations about quality of work, timeliness, communication, and deadlines up front with an Undergraduate Research Assistantship document I have created. We mainly communicate via a task list in Google Drive and via email, meeting at least once a month to check-in, or more frequently as needed. To help develop student cohorts and encourage cross-project learning and graduate-undergraduate mentoring, in addition to regular biweekly individual meetings, I meet once a month with all of my undergraduate and graduate research assistants and independent study students together at the same time. In these meetings, we discuss best practices for data collection & analysis; development of posters, papers, and presentations; and academic/professional questions about different degree programs, internships, job opportunities. This is also a space for students to get peer feedback on ongoing work by sharing drafts and practicing presentations. Starting in 2016-2017, I require all of my undergraduate and graduate research advisees to do a poster or oral presentation at the UMaine Student Research Symposium. In 2016-2017, my undergraduate research assistants and independent study students had a combined total of 6 poster presentations at the UMaine Student Research Symposium and Maine Sustainability & Water Conference related to research activities started in my Fall 2016 courses (Window Inserts, Community Solar, and EnergySmart Bangor).

My undergraduate research assistants have expressed their enthusiasm for their positions and their gratitude for what they have learned. Here is a quote from an email one student (Cameron Goodwin) sent after he left to pursue law school: *"I'll be sad to have to stop, the experience and knowledge I've gained from this work has been invaluable."* Another undergraduate student (Erica Sturrock), who was a student in all three of my energy classes (ECO 180, 307, and 405) and worked as a research assistant for me, was so moved by her experience that she made a presentation at the *Campuses for Environmental Stewardship Best Practices Showcase*, University of New England in September 2016 about her positive experiences and wrote a letter of support for my tenure application (see Appendix D).

#### Undergraduate Student Professional Development Support

When postings for jobs, internships, grants, new courses & workshops, etc. come my way, I forward them to my advisees and students in my courses via email. I also write letters of recommendation to support my advisees and students in applying for scholarships, programs,

and jobs. Since 2014, I have written more than 20 of these letters. The following undergraduate students were successful in achievements I supported through letters of recommendation (others may have been as well but these are the ones I know about):

#### 2015-2016

- Garrett Raymond (advisee): Margaret Chase Smith Public Affairs Scholarship and acceptance to School of Economics Graduate Program for Fall 2016
- Nathan Sprangers (student in ECO 180): admitted as full-time student to UMaine after probation period
- Stanley Peterson (student in ECO 370): Mitchell Center for Sustainability Solutions Outstanding Undergraduate Student Contribution to Sustainability Research
- Cameron Goodwin (student in ECO 405, research assistant): law school acceptance
- Abigail Sennick (advisee, student in ECO 180 & ECO 405, ECO 180 teaching assistant): US Department of Homeland Security summer 2016 internship
- Erica Sturrock (student in ECO 180, ECO 370, ECO 405, research assistant): Non-Traditional Student Scholarship, 2016

#### 2016-2017

- Kaitlyn Raffier (student in ECO 180, research assistant): Research Reinvestment Fund Undergraduate Assistantship for 2017-2018
- Erica Sturrock (student in ECO 180, ECO 370, ECO 405, research assistant): Executive Assistant, UMaine Alumni Association (post-graduation job)

### **Graduate Advising**

Since 2012, I have chaired 5 completed Masters student (Economics or Ecology & Environmental Science) theses, 1 completed PhD dissertation (Ecology & Environmental Science), and served on 3 graduate student thesis committees. I am currently advising 1 in-progress Masters student and 2 PhD students. Graduate students are central to my research program. I treat graduate students with professional respect, acting as their advocate and coach, as they are collaborators in training. With my graduate research assistants, I have co-authored 4 published peer-reviewed journal articles, 1 book chapter, 2 completed technical reports, and 28 professional poster or oral presentations. I also have 8 student co-authored peer-review publications in preparation, and 1 upcoming presentation (abstract accepted).

I typically meet with graduate advisees (where I chair their thesis committee) every other week, unless a student needs more guidance – in which case, we meet once a week. We discuss their progress on thesis work and research assistantship responsibilities, as well as course work, career plans, and other questions/concerns. As much as possible, I try to encourage students to work independently and take ownership of their work. I find this increases their interest in and dedication to the research and also helps better prepare them for life after graduation. However, I do instruct them on proper methods and offer suggestions for next steps as needed. I keep my own notes on what was accomplished in each meeting and what is expected by the time of the

next meeting. Sometimes I need to remind students that they should be making more progress and set specific deadlines for certain components of a research project. I encourage my students to lead each meeting, including an update on research progress and a list of questions for how to proceed. When two or more students are working on the same project, I will sometimes schedule meetings with all students at the same time to discuss collective progress toward research goals, and then I will also meet individually with each student to discuss their portion of the research more specifically. Many of my graduate advisees are funded on external research grants, and therefore we need to coordinate not only own their own progress, but also research they are completing as a component of the larger research team. Sometimes, this involves additional meetings with other faculty and students on the grant. In between meetings, I communicate with students over email and/or phone to answer questions and check in. I also encourage students to work regular hours in Winslow Hall so we can have impromptu meetings as necessary and to build student cohorts and collaboration in the School of Economics.

I also try to arrange opportunities for graduate students to mentor undergraduate and other students whenever possible. To date, 5 of my graduate research assistants have been involved in formal mentoring of other students on projects related to their own thesis/dissertation research (4 mentoring undergraduate students; 1 mentoring other graduate students; and 1 mentoring a high school student). In 2016-2017, I also started to implement monthly research meetings with all of my graduate and undergraduate research assistants, which provides another opportunity for graduate students to mentor each other and undergraduate students. Furthermore, I usually ask my graduate research assistants to give a guest lecture in my energy courses about their research. Two of my former graduate students (Stephanie Coffey and Robert Langton) express their satisfaction with my advising approach in letters of support (Appendix D).

**Ph.D. Committees** (total: 6, co-chair: 1, chair: 2)

1. Melanie Blumentritt, Ph.D., Forest Resources, *A Holistic Optimization Approach for Wood Composite Production in a Forest-Based Biorefinery*, **Chair:** S. Shaler (*I was on Melanie's thesis committee 2011-2012, advising on life cycle assessment, but then her research went in a different direction*).
2. Nana Bortsiaryee, Ph.D, Forest Resources, *Integrated and Life Cycle Sustainability of the Biofuel Supply Chain: Towards an Improved Line of Wood Derived "Drop-in" Biofuels*, **Chair:** S. Shaler (*I was on Nana's thesis committee 2011-2013, advising on life cycle assessment, but then he left the University before obtaining his degree*).
3. Binod Neupane, Ph.D., Ecology & Environmental Sciences, *Integrated Life Cycle Sustainability Assessment of Forest Based Drop-In Biofuel*. **Co-Chair:** S. Klein and J. Rubin. **Graduated:** December 2015, \*\*Accepted post-doctoral research fellowship at Lawrence Berkeley National Laboratory, starting January 2016.
4. Chelsea Liddell, Ph.D., Ecology and Environmental Sciences, *Sustainability Impacts of Hydropower and Dam Decision-Making*. **Chair:** S. Klein. (*I advised Chelsea on her graduate research January to August 2016, when she decided to pursue a Masters degree with a different research focus*).

5. Emma Fox, Ph.D., Ecology and Environmental Sciences, *Sustainability Impacts of Hydropower and Dam Decision-Making*. **Chair: S. Klein**. Expected Graduation: August 2019.
6. Nabil Nader, Ph.D., Ecology and Environmental Sciences, **Chair: S. Klein**. Expected Graduation: May 2021.

**Masters Committees (Total: 8, chair: 6)**

1. Stephanie Whalley, M.S., Ecology and Environmental Sciences, *Evaluating Options for a Sustainable Energy Future: Biofuels and Electricity*. **Chair: S. Klein. Graduated:** August 2014. \*\*Accepted energy analyst position with DNV-GL in Wisconsin, starting August 2014.
2. Steven Dutra, M.S. Resource Economics and Policy, *Economics and Benefits of Distributed Solar Water Heat in Maine*. **Chair: S. Klein. Graduated:** December 2014. \*\*Accepted energy analyst position with Emera Maine, starting December 2014.
3. Robert Leighton, M.S. Resource Economics and Policy. *Waste Management*. **Chair: G. Criner.** (*I was on Robert's committee 2012-2013, but then his research went in a different direction*).
4. Benjamin Brown, M.S. Resource Economics and Policy. *The Energy Futures of Deep Water Offshore Wind and Natural Gas in ISO-New England*. **Chair: G. Hunt,** (*I was on Benjamin's committee in 2013, but then his research went in a different direction*).
5. Stephanie Coffey, M.A. Economics, *Financial and Social Implications of Community Solar in New England*. **Chair: S. Klein. Graduated:** August 2016. \*\*Began PhD program in Economics at Syracuse University in Fall 2016.
6. Robert Langton, M.S. Resource Economics and Policy, *A Techno-Economic Analysis of the Acid Hydrolysis Dehydration Process (AHDH) for the Production of Drop-In Biodiesel* **Chair: S. Klein. Graduated:** December 2016. \*\*Accepted energy analyst position with DNV-GL in Portland, Maine, starting January 2017.
7. Daniel Mistro, M.S. Resource Economics and Policy, *Economic Analysis of Community Energy Efficiency Projects*. **Chair: S. Klein. Graduated:** August 2017.
8. Garrett Raymond, M.A. Economics, *Multi-Criteria Decision Analysis for Sustainable Biofuels*. **Chair: S. Klein.** Expected Graduation: August 2018.

**Graduate Student Awards (nominated: 10; awarded: 6)**

1. Binod Neupane, Ph.D. student, **awarded** Third Place in Innovative Research for Bringing Together Science/Technology, Policy, and Entrepreneurship to Solve the Energy Challenges of Today at the Summer Institute on Sustainability in Chicago, IL, (2013)
2. Stephanie Whalley, M.S. student, **awarded** First Place in Innovative Research for Bringing Together Science/Technology, Policy, and Entrepreneurship to Solve the Energy Challenges of Today at the Summer Institute on Sustainability in Chicago, IL, (2013)

3. Binod Neupane, Ph.D. student, **awarded** Climate Change Institute's Climate Change Innovation Award (2015)
4. Binod Neupane, Ph.D. student, **awarded** University of Maine Graduate School Summer Dissertation Writing Fellowship (2015)
5. Stephanie Coffey, M.A. student, **awarded** Mitchell Center for Sustainability Solutions Outstanding Graduate Student Contribution to Sustainability Research (2015)
6. Stephanie Coffey, M.A. student, nominated for the College of Natural Sciences, Forestry, and Agriculture Graduate Student Research Award (2016)
7. Stephanie Coffey, M.A. student, nominated for the University of Maine Graduate Student Employee of the Year Award (2016)
8. Daniel Mistro, M.S. student, nominated for the College of Natural Sciences, Forestry, and Agriculture Outstanding Service Award (2016)
9. Binod Neupane, Ph.D. student, **awarded** College of Natural Sciences, Forestry, and Agriculture Edith M. Patch Outstanding Ph.D. Award (2016)
10. Daniel Mistro, M.S. student, nominated for Mitchell Center for Sustainability Solutions Outstanding Graduate Student Contribution to Sustainability Research (2016)

In addition to these awards, I have helped 2 graduate research assistants secure internships during their program of study: Robert Langton, paid internship with Maine Public Utilities Commission, Summer 2016; Dan Mistro, unpaid internship with Island Institute, academic year 2016-2017.

### **Other Advising**

#### Short-term Graduate Research Projects

Summer 2015	Yilan Liu, Economics graduate student, Community Solar Survey
Summer 2015	Shirly Stephen, Computer Science graduate student, Development of a US Community Solar Database

#### Undergraduate Mentoring

2016-2017	Pian Pian Chen, Civil Engineering, University of Maine, <i>Maine NEW Leadership Mentoring Program</i>
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#### Advising young researchers

Summer 2016	Alex Moreira, Student, Old Town High School, <i>Maine EPSCoR High School Summer Research Program</i> , A Review of the Costs of Solar Policy to Society and Utility Ratepayers.
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NOTE: Alex's poster for this work won first place in the High School division for poster presentations at the Maine Sustainability & Water

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Conference in March 2017, <https://umaine.edu/mitchellcenter/2017-conference/poster-session/>.

## B. DOCUMENTATION OF SCHOLARSHIP AND PROFESSIONAL ACTIVITY

### Research Appointment:

66% (2014-present)

55% (2012-2014)

50% (2011-2012)

\* *Maine Agricultural and Forest Experiment Station appointment 2012-2017 and 2017-2022*

### 1. Publications and Creative Works

*Note: I changed my last name from Wagner to Klein in January 2013*

\**Graduate student coauthor*

§*Undergraduate student coauthor*

#### Peer-Reviewed Journal Publications

- 1) Klein, S.J.W., Noblet, C.L., Exploring Sustainable Energy Economics: Net Metering, Rate Designs and Consumer Behavior, *Curr Sustainable Renewable Energy Rep*, vol. 4, no. 2, pp. 23–32, Jun. 2017.
- 2) Whalley\*, S., Klein, S.J.W., Benjamin, J., Economic analysis of woody biomass supply chain in Maine, *Biomass & Bioenergy*, vol. 96, pp. 38–49, Jan. 2017.
- 3) Klein, S.J.W., Coffey\*, S., 2016, Building a sustainable energy future, one community at a time, *Renewable and Sustainable Energy Reviews*, vol. 60, pp. 867–880, doi: 10.1016/j.rser.2016.01.129.
- 4) Rubin, J., Neupane\*, B., Whalley\*, S., Klein, S., 2015. Woody Biomass Supply, Economics, and Biofuel Policy. *Transportation Research Record: Journal of the Transportation Research Board* 2502, 108–115. doi:10.3141/2502-13
- 5) Klein, S.J.W., Whalley\*, S., 2015, Comparing the sustainability of U.S. electricity options through multi-criteria decision analysis (MCDA), *Energy Policy*, 79, 127-149.
- 6) Anderson, M., Teisl, M., Noblet, C., Klein, S., 2014, The incompatibility of benefit-cost analysis with sustainability science, *Sustainability Science*, September, 1-9. doi:10.1007/s11625-014-0266-4.
- 7) Wagner, S., Rubin, E., 2014, Economic implications of thermal energy storage for concentrated solar thermal power, *Renewable Energy*, 61C, 81-95, [http://dx.doi.org.prxy4.ursus.maine.edu/10.1016/j.545\\_renene.2012.08.013](http://dx.doi.org.prxy4.ursus.maine.edu/10.1016/j.545_renene.2012.08.013).

- 8) Teisl, M.F., McCoy, S., Marrinan\*, S., Noblet, C.L., Johnson, T., Wibberly\*, M., Roper, R., and **Klein, S.** 2014, Will offshore energy face 'fair winds and following seas'? Understanding the factors influencing offshore wind acceptance. *Estuaries and Coasts*. published online February 6, 2014, DOI 10.1007/s12237-014-9777-6.
- 9) **Klein, S.J.W.** 2013, A multi-criteria decision analysis of concentrated solar power with thermal energy storage and dry cooling, *Environmental Science & Technology*, 47, 13925-13933, <http://dx.doi.org/10.1021/es403553u>.
- 10) **Klein, S.J.W.**, Rubin, E.S. 2013, Life cycle assessment of greenhouse gas emissions, water and land use for concentrated solar power plants with different energy backup systems, *Energy Policy*, 63, 935-950, DOI: 10.1016/j.enpol.2013.08.057.

### Chapters in Books/Conference Papers

(<sup>†</sup>peer-reviewed)

- 1) <sup>†</sup>**Klein, S.J.W.** and Coffey\*, S., 2017, United States Community Energy. *Handbook on Energy Transition and Participation* Springer VS, Wiesbaden; Lars Holstenkamp and Jörg Radtke, editors. ISBN: 9783658094157. **(INVITED)**
- 2) **Klein, S.J.W.**, Mistro\*, D., 2016 Community energy for a sustainable future: window insert builds in Maine. Second International Sustainable Consumption Research and Action Initiative (SCORAI) Conference "Transitions Beyond a Consumer Society", June 15-17, 2016, Wells Conference Center, University of Maine, Orono, ME.
- 3) <sup>†</sup>Rubin, J., Neupane\*, B., Whalley\*, S., and **Klein, S.**, 2015, Woody Biomass Supply, Economics, Biofuel Policy: Maine and Northeastern Forests, Transportation Research Board 2015 Annual Meeting, Washington D.C., January 11-15, 2015.
- 4) <sup>†</sup>**Wagner, S.**, Rubin, E., 2012. Evaluating renewable energy systems along the hybrid spectrum: concentrated solar power, *International Conference on Clean Energy (ICCE)*. Quebec, Canada.

### Published Abstracts

(<sup>†</sup>peer-reviewed)

- 1) <sup>†</sup>Roy, S., McGreavy, B., Quiring\*, T., Uchida, E., Wilson, K.A., **Klein, S.**, Fox\*, E., Zydlewski, J., Jansujwicz, J., deSouza, S., Hart, D., Gardner, K., Opportunities for resilient communities, ecosystems, and infrastructure by optimizing management of New England dams. Resilience Conference, Stockholm, Sweden, August 20-23, 2017, [http://media.resilience2017.org/2017/08/Resilience-2017\\_Final-pdf-program.pdf](http://media.resilience2017.org/2017/08/Resilience-2017_Final-pdf-program.pdf).
- 2) <sup>†</sup>McGreavy, B., Quiring\*, T., Roy, S., Wilson, K.A., deSouza, S., Hart, D., Gardner, K., Gottschalk Druschke, C., Ashcraft, C.A., Fultineer, S., Jansujwicz, J., **Klein, S.**, Mo, W., Vogler, E., Gold, A., Uchida, E. How do we decide what to do with dams? Dynamic Design Planning (DDP) to shape collaboration for sustainability science. Resilience Conference, Stockholm, Sweden, August 20-23, 2017, [http://media.resilience2017.org/2017/08/Resilience-2017\\_Final-pdf-program.pdf](http://media.resilience2017.org/2017/08/Resilience-2017_Final-pdf-program.pdf).

- 3) †Song\*, C., Mo, W., Gardner, K., **Klein, S.J.W.**, Pereira Souza, S., Understanding the Cradle-to-Grave Greenhouse Gas Emissions of Dams, Association of Environmental Engineers and Science Professors (AEESP) Research and Education Conference, University of Michigan, Ann Arbor, Michigan, June 21-22, 2017, [https://aeesp2017.com/program\\_list.php?sid=S20#a491](https://aeesp2017.com/program_list.php?sid=S20#a491).
- 4) †Mistro\*, D., **Klein, S.J.W.**, Window Inserts and the Communities Adopting Them, Canadian Economics Association 2017 Conference, St. Francis Xavier University, Nova Scotia, Canada, June 2, 2017, <https://economics.ca/2017/en/program.php>.
- 5) †**Klein, S.J.W.**, What are the financial and social costs and benefits of different community solar approaches? Behavior, Energy, and Climate Change Conference (BECC), Baltimore, Maryland, October 20-22, 2016, [http://beccconference.org/wp-content/uploads/2016/09/2016-BECC-Abstracts\\_Alpha-by-Last-Name.pdf](http://beccconference.org/wp-content/uploads/2016/09/2016-BECC-Abstracts_Alpha-by-Last-Name.pdf).
- 6) †Langton\*, R., **Klein, S.** Biofuels from Trees: A New Process to Produce Drop-in Biofuels from Woody Biomass, International Conference on Environment and Renewable Energy. Sheraton Munich Westpark Hotel. Munich, Germany, May 26, 2016, [http://energy.conference-site.com/archive/2016/proceedings/proceedings\\_ICERE\\_2016.pdf](http://energy.conference-site.com/archive/2016/proceedings/proceedings_ICERE_2016.pdf).
- 7) †Langton\*, R., **Klein, S.** Biofuels from Trees: A New Process to Produce Drop-in Biofuels from Woody Biomass. Maine Sustainability & Water Conference, Augusta Civic Center, Augusta, Maine, March 29, 2016, <https://umaine.edu/mitchellcenter/news/maine-water-conference/2016-maine-sustainability-water-conference/2016-concurrent-sessions/#energy>.
- 8) †Coffey\*, S., **Klein, S.** Does Community Solar Have a Future in New England? Maine Sustainability & Water Conference, Augusta Civic Center, Augusta, Maine, March 29, 2016, <https://umaine.edu/mitchellcenter/news/maine-water-conference/2016-maine-sustainability-water-conference/2016-concurrent-sessions/#energy>.
- 9) †**Klein, S.** Renewable Energy Solutions. 33rd United States Association for Energy Economics/IAEE North American Conference, Pittsburgh, PA, [http://www.usaee.org/usaee2015/program\\_concurrent.aspx](http://www.usaee.org/usaee2015/program_concurrent.aspx), October 25-28, 2015.
- 10) †Neupane\*, B., **Klein, S.**, Wheeler, C., Rubin, J., Life Cycle Energy and Greenhouse Gases Emissions Assessment of Forest-based Drop-in Biofuel Production in Maine. American Center for Life Cycle Assessment Annual Meeting XV, Vancouver, British Columbia, October 6-8, 2015, <http://www.aclca.org/lca-xv/biofuels-3/>.
- 11) †Whalley\*, S., Neupane\*, B., **Klein, S.**, Rubin, J., Sustainability Assessment of Drop-In Biofuels in Maine. 20th Maine Sustainability & Water Conference. Augusta Civic Center, Augusta, Maine, April 1, 2014, <https://umaine.edu/mitchellcenter/mwc-2014/concurrent-sessions/session-g/#whalley>.

### Research Reports, Technical Papers, and Websites

- 1) **Klein, S.**, Criner, G., Allen, T., Mid-Coast Solid Waste Corp Landfill Project Phase 2 Report. *Technical Report*, November 13, 2013.
- 2) Criner, G., **Klein, S.**, Allen, T., Leighton\*, R., Mid-Coast Solid Waste Corp Landfill Project Phase 1 Report, *Technical Report*. September 24, 2013.
- 3) Whalley\*, S., Neupane\*, B., **Klein, S.**, Rubin, J., Woody Biomass Supply in Maine, *Technical Report*. June 2, 2013.
- 4) **Klein, S.** Report on Gender Income Disparity in Maine. Prepared for Maine Development Foundation. April 2016.
- 5) **Klein, S.**, Coffey\*, S., Nittel, S., Stinson<sup>§</sup>, S., US Community Energy Website, published online April 2017, <https://www.communityenergyus.net>.

### Popular Media Publications

- 1) **Klein, S.** "5 myths people hold about solar power in Maine." Bangor Daily News [Online] April 28, 2016 Published: <http://bangordailynews.com/2016/04/28/opinion/5-myths-people-hold-about-solar-power-in-maine/>.
- 2) Neiman, E., **Klein, S.** "One site ranks Maine 4th best for women, but there's more to the story | BDN Maine." Bangor Daily News [Online] April 1, 2016 Published: <http://bangordailynews.com/2016/04/01/the-point/one-site-ranks-maine-4th-best-for-women-but-theres-more-to-the-story/>.
- 3) **Wagner, S.**, Serving the United States Through AmeriCorps, White House Champions of Change Blog, August 17, 2012, <https://obamawhitehouse.archives.gov/blog/2012/08/17/serving-united-states-through-ameri-corps>.

## 2. Scholarly and Creative Work in Progress

### Peer-Reviewed Journal Articles, Submitted

- 1) Gunukula, S., **Klein, S.**, Pendse, H., DeSisto, W., Wheeler, M. C., Analysis of Thermal Deoxygenation Based Biorefineries for the Coproduction of Renewable Fuels and Platform Chemicals, *Applied Energy* (**submitted**).
- 2) Song\*, C., Gardner, K., **Klein, S.J.W.**, Pereira Souza, S., Mo, W., Moving beyond hydropower: life cycle greenhouse gas emissions from dams, *Renewable & Sustainable Energy Reviews* (**revised & resubmitted 9/28/17**).

### Journal Articles in Preparation (full manuscript)

- 1) Fox\*, E., **Klein, S.J.W.**, Dam(n) information: tailoring small hydropower project models for use in New England communities. *for: Renewable and Sustainable Energy Reviews*
- 2) Fox\*, E., **Klein, S.J.W.**, Liddell\*, C., Raffier\*, K., Eliciting preferences from people who give a dam(n): group participatory multi-criteria decision analysis in a dam decision context. *for: Renewable and Sustainable Energy Reviews*
- 3) **Klein, S.J.W.**, Mistro\*, D. Energy savings and participant benefits from community-built window inserts, *for: Journal of Cleaner Production.*
- 4) **Klein, S.J.W.**, Coffey\*, S., Motivations and behavior of community solar participants in New England, *for: Energy Policy.*
- 5) **Klein, S.J.W.**, Langton\*, R.B.W., Hunt, G., The cost of producing drop-in biodiesel from woody biomass residues in the Northeast United States, *for: Biomass & Bioenergy*
- 6) Neupane\*, B., **Klein, S.**, Wheeler, C., Life cycle assessment of energy and greenhouse gas emissions from drop-in diesel from forest biomass in Maine. *for: Journal of Industrial Ecology*
- 7) **Klein, S.J.W.**, Coffey\*, S., Comparing community solar policies in three New England states. *for: Energy Policy*
- 8) **Klein, S.J.W.**, Coffey\*, S., Costs and benefits of different community-based solar approaches in the United States. *for: Energy Policy*
- 9) **Klein, S.J.W.**, Dutra\*, S. Costs and benefits of solar water heating in Maine. *for: Renewable Energy*

### Articles in development

- 1) Lowden\*, S., Isenhour, C., **Klein, S.J.W.**, McGreavy, B., De Urioste-Stone, S., Sullivan, C., Dixon, D., Silka, L., Teaching environmental stewardship: community engagement versus service learning. *for: Journal of Community Engagement and Higher Education*
- 2) **Klein, S.J.W.**, Hunt, G. Benefit-cost analysis of alternatives to fuel oil heating. *for: Maine Policy Review*
- 3) **Klein, S.J.W.**, Coffey\*, S., Noblet, C.L., Isenhour, C., Power to the people? Grassroots versus top-down approaches to community solar.

### 3. Professional Presentations

*NOTE: I changed my last name from Wagner to Klein in January 2013*

*\*Graduate student coauthor*

*§Undergraduate student coauthor*

‡High school student coauthor

†peer-reviewed

Presenter in **Bold**

### **Presentations at Professional Conferences and Meetings**

*NOTE: includes Conference Papers and Published Abstracts listed in Section III.B.2*

- 1) †**Klein, S.J.W.**, Nittel, S., Stinson<sup>§</sup>, K., Noblet, C.L., Isenhour, C., Coffey\*, S., Oral Presentation. Communities taking solar into their own hands: a social science look at the growing community solar movement, American Solar Energy Society's 46<sup>th</sup> National Solar Conference, University of Colorado, Denver, Colorado, October 9-12, 2017 (*abstract accepted*).
- 2) †**Raymond\*, G.**, Klein, S.J.W., Poster Presentation. Integrated Sustainability Assessment Model for Renewable Diesel Production in Maine and Multi-Criteria Decision Analysis (MCDA) Tool for Biofuel Pathway Comparison, 6<sup>th</sup> International Conference & Exhibition on Clean Energy (ICCE), Toronto, Canada, August 21-23, 2017, <http://icce2017.iaemm.com/documents/ICCE2017ProgramDetail.pdf>.
- 3) †**Roy, S.**, McGreavy, B., Quiring\*, T., Uchida, E., Wilson, K.A., Klein, S., Fox\*, E., Zydlewski, J., Jansujwicz, J., deSouza, S., Hart, D., Gardner, K., Poster Presentation. Opportunities for resilient communities, ecosystems, and infrastructure by optimizing management of New England dams. Resilience Conference, Stockholm, Sweden, August 20-23, 2017, [http://media.resilience2017.org/2017/08/Resilience-2017\\_Final-pdf-program.pdf](http://media.resilience2017.org/2017/08/Resilience-2017_Final-pdf-program.pdf).
- 4) †**McGreavy, B.**, Quiring\*, T., Roy, S., Wilson, K.A., deSouza, S., Hart, D., Gardner, K., Gottschalk Druschke, C., Ashcraft, C.A., Fultineer, S., Jansujwicz, J., Klein, S., Mo, W., Vogler, E., Gold, A., Uchida, E. Oral Presentation. How do we decide what to do with dams? Dynamic Design Planning (DDP) to shape collaboration for sustainability science. Resilience Conference, Stockholm, Sweden, August 20-23, 2017, [http://media.resilience2017.org/2017/08/Resilience-2017\\_Final-pdf-program.pdf](http://media.resilience2017.org/2017/08/Resilience-2017_Final-pdf-program.pdf).
- 5) †**Song\*, C.**, Mo, W., Gardner, K., Klein, S.J.W., Pereira Souza, S., Oral Presentation. Understanding the Cradle-to-Grave Greenhouse Gas Emissions of Dams, Association of Environmental Engineers and Science Professors (AEESP) Research and Education Conference, University of Michigan, Ann Arbor, Michigan, June 21-22, 2017, [https://aeesp2017.com/program\\_list.php?sid=S20#a491](https://aeesp2017.com/program_list.php?sid=S20#a491).
- 6) †**Mistro\*, D.**, Klein, S.J.W., Oral Presentation. Window Inserts and the Communities Adopting Them, Canadian Economics Association 2017 Conference, St. Francis Xavier University, Nova Scotia, Canada, June 2, 2017, <https://economics.ca/2017/en/program.php>.
- 7) †**Fox\*, E.**, Klein, S.J.W., Raffier<sup>§</sup>, K., Poster Presentation. Participatory Group MCDA in a Dam Decision Context, Maine Sustainability & Water Conference, Augusta Civic Center, Augusta, Maine, March 30, 2017.

- 8) †**Moreira, A<sup>‡</sup>**, Klein, S.J.W., Mistro\*, D. Poster Presentation. A Review of the Costs of Solar Policy to Society and Utility Rate Payers, Maine Sustainability & Water Conference, Augusta Civic Center, Augusta, Maine, March 30, 2017, <https://umaine.edu/mitchellcenter/2017-conference/poster-session/>.
- 9) †**Raffier<sup>§</sup>, K.**, Klein, S.J.W., Fox\*, E. Poster Presentation. Analysis of Dams through Fact Sheet Creation to Aid in Future Dam Decision-Making, Maine Sustainability & Water Conference, Augusta Civic Center, Augusta, Maine, March 30, 2017.
- 10) **Klein, S.J.W.**, Oral Presentation (**Invited**). The Power of the People: socio-economic dimensions of community-based energy initiatives in the United States, Conference on the Practical Engagements and the Social-Spatial Dimensions of the Post-Petroleum Future, Le Studium, Tours, France, November 7-9, 2016.
- 11) †**Klein, S.J.W.**, Oral Presentation. What are the financial and social costs and benefits of different community solar approaches? Behavior, Energy, and Climate Change Conference (BECC), Baltimore, Maryland, October 20-22, 2016, [http://beccconference.org/wp-content/uploads/2016/09/2016-BECC-Abstracts\\_Alpha-by-Last-Name.pdf](http://beccconference.org/wp-content/uploads/2016/09/2016-BECC-Abstracts_Alpha-by-Last-Name.pdf).
- 12) †**Silka, L.**, Sullivan, C., Blais, J., de Urioste-Stone, S. Dixon, D., Hart, D., Isenhour, C., Klein, S., McGreavy, B., Oral Presentation. How to inspire students, energize faculty and serve your community. 17<sup>th</sup> Annual Engagement Scholarship Consortium Conference, University of Nebraska, Omaha, Nebraska, October 12, 2016, <https://engagementscholarship.org/conference/past-conferences/esc-2016-meeting/schedule>.
- 13) †**Klein, S.J.W.**, Coffey\*, S. Oral Presentation. A comparison of community solar policy incentives in three New England states. Northeastern Agricultural and Resource Economics Association (NAREA) Annual Meeting, Bar Harbor Regency, Bar Harbor, Maine, June 19-21, 2016, [http://www.narea.org/2016/conference/NAREA\\_2016\\_Detailed\\_Program\\_J1.pdf](http://www.narea.org/2016/conference/NAREA_2016_Detailed_Program_J1.pdf).
- 14) †**Klein, S.J.W.**, Mistro\*, D. Oral Presentation. Community energy for a sustainable future: window insert builds in Maine. Second International Sustainable Consumption Research and Action Initiative (SCORAI) Conference “Transitions Beyond a Consumer Society”, Wells Conference Center, University of Maine, Orono, Maine, June 15-17, 2016, [http://www.confmanager.com//communities/c2865/files/ConferenceProgram\\_FINAL.pdf](http://www.confmanager.com//communities/c2865/files/ConferenceProgram_FINAL.pdf).
- 15) **Klein, S.J.W.**, Greco, V. Oral Presentation (**Invited**). Community solar decision support tool. National Community Solar Partnership Regional Workshop, US Environmental Protection Agency Region 1 Headquarters, Boston, MA, June 9, 2016.
- 16) †**Langton\*, R.**, Klein, S. Oral Presentation. Biofuels from Trees: A New Process to Produce Drop-in Biofuels from Woody Biomass, International Conference on Environment and Renewable Energy. Sheraton Munich Westpark Hotel. Munich,

Germany, May 26, 2016, [http://energy.conference-site.com/archive/2016/proceedings/proceedings\\_ICERE\\_2016.pdf](http://energy.conference-site.com/archive/2016/proceedings/proceedings_ICERE_2016.pdf).

- 17) †**Mistro\***, D., Klein, S. Poster Presentation. Window Inserts and the Communities Adopting Them. Maine Sustainability & Water Conference, Augusta Civic Center, Augusta, Maine, March 29, 2016.
- 18) †**Langton\***, R., Klein, S. Oral Presentation. Biofuels from Trees: A New Process to Produce Drop-in Biofuels from Woody Biomass. Maine Sustainability & Water Conference, Augusta Civic Center, Augusta, Maine, March 29, 2016, <https://umaine.edu/mitchellcenter/news/maine-water-conference/2016-maine-sustainability-water-conference/2016-concurrent-sessions/#energy>.
- 19) †**Coffey\***, S., Klein, S. Oral Presentation. Does Community Solar Have a Future in New England? Maine Sustainability & Water Conference, Augusta Civic Center, Augusta, Maine, March 29, 2016, <https://umaine.edu/mitchellcenter/news/maine-water-conference/2016-maine-sustainability-water-conference/2016-concurrent-sessions/#energy>.
- 20) †**Klein, S.** Oral Presentation. Renewable Energy Solutions. 33<sup>rd</sup> United States Association for Energy Economics/IAEE North American Conference, Pittsburgh, PA, [http://www.usaee.org/usaee2015/program\\_concurrent.aspx](http://www.usaee.org/usaee2015/program_concurrent.aspx), October 25-28, 2015.
- 21) †**Neupane\***, B., Klein, S., Wheeler, C., Rubin, J., Oral Presentation. Life Cycle Energy and Greenhouse Gases Emissions Assessment of Forest-based Drop-in Biofuel Production in Maine. American Center for Life Cycle Assessment Annual Meeting XV, Vancouver, British Columbia, October 6-8, 2015, <http://www.aclca.org/lca-xv/biofuels-3/>.
- 22) †**Dutra\***, S., Klein, S., Poster Presentation. Economic Feasibility of Distributed Solar Water Heat in Maine. Maine Economics Conference, Colby College, Waterville, Maine, April 26, 2014, <http://www.colby.edu/econ/2014/04/02/2014-maine-economics-conference-student-researchers/>.
- 23) †**Whalley\***, S., Neupane\*, B., Klein, S., Rubin, J., Oral Presentation. Sustainability Assessment of Drop-In Biofuels in Maine. 20th Maine Sustainability & Water Conference. Augusta Civic Center, Augusta, Maine, April 1, 2014, <https://umaine.edu/mitchellcenter/mwc-2014/concurrent-sessions/session-g/#whalley>.
- 24) **Pendse, H., Klein, S., (Invited)** Poster Presentation. Integrated national framework for cellulosic drop-in fuels. National Science Foundation Sustainable Energy Pathways Meeting, Westin Arlington Gateway, Arlington, Virginia, June 6, 2013.
- 25) †Teisl, M., McCoy, S., **Marrinan\***, S., Noblet, C., Johnson, T., Wibberly\*, M., Roper, R., Klein, S., Oral Presentation. Will offshore energy face fair winds and following seas?: Understanding what influences offshore wind acceptance. Maine Economics Conference, Bates College, April 27, 2013, <http://www.bates.edu/economics/files/2013/04/Maine-Economics-Conference.pdf>.

- 26) **Wagner, S.**, Oral Presentation (**Invited**). Energy-related solutions to climate change. Maine EPSCoR Conference, Breakout Session 3A “Research Frontiers in Sustainability”, University of Maine, Orono, Maine, September 26, 2011.

### **Invited Presentations**

*NOTE: includes 4 presentations professional conferences/meetings from the previous list*

- 1) **Klein, S.J.W.**, Panelist. Teaching Panel Discussion, University of Maine Faculty Orientation, Wells Conference Center, Orono, Maine, August 24, 2017.
- 2) **Klein, S.J.W.**, Mistro\*, D., Oral Presentation. Window Insert Research, WindowDressers Annual Local Coordinators Meeting, St Francis of Assisi Church, Belfast, Maine, March 17, 2017.
- 3) **Klein, S.J.W.**, Oral Presentation. The Power of the People: socio-economic dimensions of community-based energy initiatives in the United States, Conference on the Practical Engagements and the Social-Spatial Dimensions of the Post-Petroleum Future, Le Studium, Tours, France, November 7-9, 2016.
- 4) **Klein, S.J.W.**, Panelist. Teaching Panel Discussion, University of Maine Faculty Orientation, Wells Conference Center, Orono, Maine, August 25, 2016.
- 5) **Klein, S.J.W.**, Oral Presentation and Moderator. Economics of Solar in Maine, Bangor Solar Forum, Eastern Maine Community College, Bangor, Maine, June 28, 2016.
- 6) **Klein, S.J.W.**, Greco, V. Oral Presentation. Community solar decision support tool. National Community Solar Partnership Regional Workshop, US Environmental Protection Agency Region 1 Headquarters, Boston, MA, June 9, 2016.
- 7) **Klein, S.** Oral Presentation. Update on a New Decision Support Tool for Diverse Community Solar Stakeholders, National Community Solar Partnership Community Building Working Group Monthly Webinar Series, April 12, 2016.
- 8) **Mistro\*, D., Klein, S., Brannigan<sup>§</sup>, J., Cormier<sup>§</sup>, N., Cushing<sup>§</sup>, T., Gillis<sup>§</sup>, O., Lemmler<sup>§</sup>, S., Masi<sup>§</sup>, M., Noble<sup>§</sup>, W., Peterson<sup>§</sup>, S., Sturrock<sup>§</sup>, E.** Oral Presentation. Window Insert Project. Campuses for Environmental Stewardship Presentations, Orono, Maine, December 10, 2015.
- 9) **Klein, S.**, Coffey\*, S. Oral Presentation. Community Solar: Harnessing the Power of the People. Mitchell Center for Sustainability Solutions Fall 2015 Seminar Series, Orono, Maine, <http://umaine.edu/mitchellcenter/news/multimedia/video-on-demand/#fall15>, November 30, 2015.
- 10) **Klein, S.**, Oral Presentation. Multi-Criteria Decision Analysis. Future of Dams Kickoff Meeting, University of New Hampshire, November 20, 2015.
- 11) **Klein, S.**, Oral Presentation. Multi-Criteria Decision Analysis. Future of Dams Knowledge Systems Meeting, webinar, November 13, 2015.

- 12) **Sullivan, C., Dixon, D.,** Isenhour, C., DeUrioste-Stone, McGreavy, B., Klein, S. Oral Presentation. Where Service Learning Meets Sustainability: Connecting Classrooms with Communities for Stewardship and Civic Engagement. Mitchell Center for Sustainability Solutions Fall 2015 Seminar Series, Orono, Maine  
<http://umaine.edu/mitchellcenter/news/multimedia/video-on-demand/#fall15>, October 26, 2015.
- 13) **Klein, S.,** Rubin, J., Neupane\*, B., Langton\*, R., Whalley\*, S. Oral Presentation. Integrated Sustainability Assessment of Forest-based Drop-In Biofuel in Maine. FBRI Board Meeting, University of Maine, Orono, Maine, October 9, 2015.
- 14) **Klein, S.,** Oral Presentation. Comparing Sustainable Energy Tradeoffs. University of Massachusetts Mechanical and Industrial Engineering Seminar Series, Amherst, MA, <https://mie.umass.edu/event/comparing-sustainable-energy-tradeoffs>, September 21, 2015.
- 15) **Brannigan<sup>§</sup>, J.,** Klein, S., Oral Presentation. Building Sustainable Energy Communities. Old Town Rotary Club Meeting, Black Bear Inn, Orono, Maine, September 10, 2015.
- 16) **Klein, S.,** Oral Presentation. Solar Energy in Maine. Environment Maine Lighting the Way Press Event, University of Maine, Orono, Maine, September 3, 2015.
- 17) **Klein, S.,** Oral Presentation. Community Window Insert Build Fall 2015. Old Town Rotary Club Meeting, Black Bear Inn, Orono, Maine, May 21, 2015.
- 18) **Klein, S.,** Oral Presentation. Community Solar Trends and Opportunities, Solar Powering Your Community Workshop, Bangor, Maine, May 2, 2015.
- 19) **Klein, S.** Oral Presentation. Climate Change Solutions: Carbon Pricing and Community Energy, Earth Week Seminar, University of Maine, Orono, Maine, April 20, 2015.
- 20) **Klein, S.,** Criner, G., Allen, T., Oral Presentation. Jacobs Quarry Development: Economic Analysis Phase 2. Mid-Coast Solid Waste Corporation Meeting. Rockport Town Hall, Rockport, Maine, November 13, 2013.
- 21) **Pendse, H., Klein, S.,** Poster Presentation. Integrated national framework for cellulosic drop-in fuels. National Science Foundation Sustainable Energy Pathways Meeting, Westin Arlington Gateway, Arlington, Virginia, June 6, 2013.
- 22) **Criner, G.,** Klein, S., Allen, T., Leighton\*, R., Oral Presentation. Jacobs Quarry North: Economic analysis phase 1, Rockport Town Meeting, Rockport, Maine, May 20, 2013.
- 23) **Wagner, S.,** Oral Presentation. Sustainable solar power, School of Economics Seminar Series, University of Maine, Orono, Maine, March 16, 2012.
- 24) **Klein, S.** Panel Discussion. White House Champions of Change Panel Discussion, Americorps Alums Day at the White House, Washington, D.C., August 17, 2012.

- 25) **Wagner, S.**, Oral Presentation and Panel Discussion. Energy-related solutions to climate change. Maine EPSCoR Conference, Breakout Session 3A “Research Frontiers in Sustainability”, University of Maine, Orono, Maine, September 26, 2011.

#### Other Presentations

- 1) **Mistro\*, D.**, Klein, S.J.W., Oral Presentation. A Window on Energy Savings, Senator George J. Mitchell Center for Sustainability Solutions Student Lightning Talks, University of Maine, November 15, 2016, <https://umaine.edu/mitchellcenter/2016/11/15/so-much-to-say-so-little-time/>.
- 2) **Raymond\*, G.**, Klein, S.J.W., Poster Presentation. Using Multi-Criteria Decision Analysis to Compare Fuel Production Processes, UMaine Student Symposium: Research & Creative Activity, Cross Insurance Center, Bangor, Maine, April 24, 2017, <https://umaine.edu/research/wp-content/uploads/sites/48/2017/04/UMSS17Program.pdf>.
- 3) **Mistro\*, D.**, Klein, S.J.W., Oral Presentation. Window Inserts and the Communities Adopting Them, UMaine Student Symposium: Research & Creative Activity, Cross Insurance Center, Bangor, Maine, April 24, 2017 <https://umaine.edu/research/wp-content/uploads/sites/48/2017/04/UMSS17Program.pdf>.
- 4) **Raffier<sup>§</sup>, K.**, Klein, S.J.W., Fox\*, E., Poster Presentation. Analysis of Dams through Fact Sheet Creation to Aid in Future Dam Decision Making, UMaine Student Symposium: Research & Creative Activity, Cross Insurance Center, Bangor, Maine, April 24, 2017 <https://umaine.edu/research/wp-content/uploads/sites/48/2017/04/UMSS17Program.pdf>.
- 5) **Fox\*, E.**, Klein, S.J.W., Raffier<sup>§</sup>, K., Poster Presentation. Group Participatory Multi-Criteria Decision Analysis (PMCDA) and Dam Decisions, UMaine Student Symposium: Research & Creative Activity, Cross Insurance Center, Bangor, Maine, April 24, 2017 <https://umaine.edu/research/wp-content/uploads/sites/48/2017/04/UMSS17Program.pdf>.
- 6) **Mata\*, R.**, Klein, S.J.W., Poster Presentation. Developing Best Practice Methods by Using Survey Data, UMaine Student Symposium: Research & Creative Activity, Cross Insurance Center, Bangor, Maine, April 24, 2017 <https://umaine.edu/research/wp-content/uploads/sites/48/2017/04/UMSS17Program.pdf>.
- 7) **Michaud<sup>§</sup>, K.**, Klein, S.J.W., Poster Presentation. EnergySmart Bangor Residential Rebate Program Presentation, UMaine Student Symposium: Research & Creative Activity, Cross Insurance Center, Bangor, Maine, April 24, 2017 <https://umaine.edu/research/wp-content/uploads/sites/48/2017/04/UMSS17Program.pdf>.
- 8) **Raymond<sup>§</sup>, G.**, Klein, S. Poster Presentation. Should Maine fund sustainability by selling license plates? UMaine Student Research Symposium, Cross Insurance Center, Bangor, Maine, April 27, 2016.
- 9) **Neupane\*, B.**, Klein, S., Wheeler, C. Oral Presentation. Environmental Life Cycle Assessment of Drop-in Biofuel Production in Maine. GradExpo, University of Maine, Orono, Maine, April 3, 2015.

- 10) **Coffey\*, S.**, Klein, S. Poster Presentation. What is Community Energy?, GradExpo, University of Maine, Orono, Maine, April 2, 2015.
- 11) **Klein, S.**, Oral Presentation. Creating a Sustainable Energy Future One Community at a Time, School of Economics Seminar Series, University of Maine, Orono, Maine, November 14, 2014.
- 12) **Whalley\*, S.**, Klein, S., Oral Presentation. Toward a Sustainable Energy Future: A Multi-Criteria Decision Analysis of Electricity Options for the United States. TED<sup>x</sup> UMaine: The Student Experience. University of Maine, Orono, Maine, April 5, 2014.
- 13) **Whalley\*, S.**, Klein, S., Rubin, J., Oral Presentation. An Estimation of the Cost to Harvest and Deliver Biomass Chips in Maine. University of Maine Graduate Academic Exposition, University of Maine, Orono, Maine, April 3, 2014.

#### 4. Other Scholarly Activity

##### Association Memberships

- American Solar Energy Society (ASES) (2015-present)
- Environmental and Energy Technology Council of Maine (E2Tech) (2017)
- International Association for Energy Economics (IAEE) (2015-present)
- Northeastern Agricultural and Resource Economics Association (NAREA) (2016)
- Sustainable Consumption Research and Action Initiative (SCORAI) (2016)
- United States Association for Energy Economics (USAEE) (2015-present)

##### Committee/Board Memberships

- National Community Solar Partnership (NCSP), Community Working Group (2015-2016)
- Greater Bangor Solarize Advisory Board Member (2016-present)
- Window Dressers Board of Directors (2017-present)
- Collaborating Faculty with Margaret Chase Smith Policy Center (2016-present)
- Collaborating Faculty with Senator George J. Mitchell Center for Sustainability Solutions (2016-present)

##### Sessions Chaired, Workshops Led

- 1) Organizer/Facilitator, *Solar Phone Charger Building Workshop*, Mandela Washington Fellowship Program, University of Maine, Orono, Maine, July 6, 2017.

- 2) Moderator (**Invited**), *Greater Bangor Solarize Kickoff event*, Bangor Public Library, Bangor, Maine, July 19, 2017.
- 3) Facilitator, *Future of Dams All-Team Meeting Model, Stakeholder Engagement, and Integrative Synthesis working groups*, University of New Hampshire, Durham, New Hampshire, June 5-6, 2017.
- 4) Chair (Invited), *Session III – Urban and Local, Materiality and Social Spaces in the Energy Transition*, Conference on the Practical Engagements and the Social-Spatial Dimensions of the Post-Petroleum Future, Le Studium, Tours, France, November 8, 2017.
- 5) Moderator, *Solar Phone Charger Building Workshop for Mandela Washington Fellowship Program*, Maine Solar Energy Association, Jonesport, Maine, July 6, 2016.
- 6) Moderator (**Invited**), *Bangor Solar Forum*, Eastern Maine Community College, Bangor, Maine, June 28, 2016.
- 7) Chair (**Invited**), *Maine's Energy Future*. Maine Sustainability & Water Conference, Augusta Civic Center, Augusta, Maine, March 29, 2016.
- 8) Organizer/Facilitator, *NSF Career Grant Writing Workshop*, University of Maine, June 3, 2015.
- 9) Moderator (**Invited**), *Alternative Energy*, Maine Science Festival, Bangor, Maine, March 21, 2015.
- 10) Moderator (**Invited**), *Science Bound: The Path Less Traveled*, Maine Science Festival, Bangor, Maine, March 22, 2015.
- 11) Discussant (**Invited**): *Energy Project Planning Workshop*, Island Energy Conference, Island Institute, Portland, Maine, November 7, 2014.

## Meetings Attended

### International

November 7-9, 2016	<i>Conference on the Practical Engagements and the Social-Spatial Dimensions of the Post-Petroleum Future</i> , Le Studium, Tours, France.
June 15-17, 2016	<i>Second International Sustainable Consumption Research and Action Initiative (SCORAI) Conference "Transitions Beyond a Consumer Society"</i> , Wells Conference Center, University of Maine, Orono, Maine.
October 24-25, 2014	<i>ESTIA The International EcoPeace Community's 11<sup>th</sup> Annual Conference, Building Sustainable Communities: International</i> ,

September 10-13, 2012 *National, and Local Perspectives*, Wells Conference Center, University of Maine, Orono, Maine.  
*International Conference on Clean Energy*, Quebec City, Quebec, Canada.

National

2017 National Science Foundation Review Panel, Arlington, Virginia.  
October 20-22, 2016 *Behavior, Energy, and Climate Change Conference*, Baltimore, Maryland.  
October 25-28, 2015 *33<sup>rd</sup> United States Association for Energy Economics/IAEE North American Conference*, Pittsburgh, Pennsylvania.  
December 7-10, 2014 *Behavior, Energy and Climate Change Conference*, Washington D.C.  
June 6, 2013 *National Science Foundation Sustainable Energy Pathways Meeting*, Westin Arlington Gateway, Arlington, Virginia.  
August 17, 2012 *Americorps Alums Day at the White House*, Washington, D.C.

Regional, State, and Local

September 26-27, 2017 *Future of Dams All-Team Meeting*, University of Rhode Island, Kingston, Rhode Island  
September 13-15, 2017 *Leadership Maine Opening Retreat*, Jefferson, Maine  
June 16, 2017 *Leadership Maine Orientation*, Augusta, Maine  
June 5-6, 2017 *Future of Dams All-Team Meeting*, University of New Hampshire, Durham, New Hampshire  
April 24, 2017 *UMaine Student Symposium: Research & Creative Activity*, Cross Insurance Center, Bangor, Maine  
March 17, 2017 *WindowDressers Annual Local Coordinators Meeting*, St Francis of Assisi Church, Belfast, Maine.  
January 18, 2017 *Senator George J. Mitchell Center for Sustainability Solutions Member Meeting*, Orono, Maine.  
September 30, 2016 *Campuses for Environmental Stewardship Best Practices Showcase*, University of New England, Biddeford, Maine  
September 16, 2016 *Future of Dams All-Team Meeting*, University of New Hampshire, Durham, New Hampshire  
July 6, 2016 *Maine Solar Energy Association Do-It-Yourself Solar Workshop for Mandela Washington Fellows*, Jonesport, Maine.

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June 28, 2016	<i>Bangor Solar Forum</i> , Eastern Maine Community College, Bangor, Maine.
June 19-21, 2016	<i>Northeastern Agricultural and Resource Economics Association Annual Meeting</i> , Bar Harbor Regency, Bar Harbor, Maine.
June 12, 2016	<i>Maine's Economy &amp; Climate Change: Challenges and Opportunities</i> , Envision Maine, Brunswick, Maine.
June 9, 2016	<i>National Community Solar Partnership Regional Workshop and Site Visit to Greentowne Labs</i> , United States Environmental Protection Agency Region 1 Headquarters, Boston, Massachusetts.
April 27, 2016	<i>UMaine Student Research Symposium</i> , Cross Insurance Center, Bangor, Maine
March 29, 2016	<i>Maine Sustainability &amp; Water Conference</i> , Augusta Civic Center, Augusta, Maine.
March 15, 2016	<i>Atlantic Salmon Recovery Meeting</i> , Hutchinson Center, Belfast, Maine.
December 9, 2015	<i>Maine Public Utilities Commission Solar Stakeholder Workshop</i> , Hallowell, Maine.
October 9, 2015	<i>Forest Bioproducts Research Institute Board Meeting</i> , University of Maine, Orono, Maine.
September 21, 2015	<i>University of Massachusetts Mechanical and Industrial Engineering Seminar Series</i> , Amherst, Massachusetts
September 10, 2015	<i>Old Town Rotary Club Meeting</i> , Black Bear Inn, Orono, Maine
September 3, 2015	<i>Environment Maine Lighting the Way Press Event</i> , University of Maine, Orono, Maine
June 4-5, 2015	<i>Campus Compact Campuses for Environmental Stewardship Faculty Development Institute</i> , University of Southern Maine, Portland, Maine
May 21, 2015	Old Town Rotary Club Meeting, Black Bear Inn, Orono, Maine
May 2, 2015	<i>Solar Powering Your Community Workshop</i> , Cross Insurance Center, Bangor, Maine.
April 2-3, 2015	<i>Graduate Academic Exposition</i> , University of Maine, Orono, Maine.
November 7-8, 2014	<i>Island Energy Conference</i> , Portland, Maine.
October 3, 2014	<i>Forest Bioproducts Research Institute Board Meeting</i> , University of Maine, Orono, Maine.
September 12, 2014	<i>E2Tech Heat of the Moment: Plans from State Officials, Energy Companies, and Maine's Next Governor</i> , University of Southern Maine, Portland, Maine.

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September 12, 2014	<i>Alternative Energy Expo</i> , Portland, Maine.
April 3, 2014	<i>Graduate Academic Exposition</i> , University of Maine, Orono, Maine.
April 1, 2014	<i>Maine Sustainability &amp; Water Conference</i> . Augusta Civic Center, Augusta, Maine.
November 13, 2013	<i>Mid-Coast Solid Waste Corporation Meeting</i> . Rockport Town Hall, Rockport, Maine.
May 31, 2013	<i>University of Maine Advanced Structures and Composites Center's launch of VoltumUS 1:8</i> , Brewer, Maine.
May 20, 2013	<i>Rockport Town Meeting</i> , Rockport, Maine
March 21, 2013	<i>E2Tech: Maine Energy &amp; Environmental Policy: Priorities for the 126<sup>th</sup> Legislature</i> , Augusta, Maine.
June 14, 2012	<i>ECO Maine Annual Meeting</i> , Portland, Maine.
May 4, 2012	<i>Engaged Scholarship Think Tank – Boundary Spanning</i> , University of Maine, Orono, Maine.
April 12, 2012	<i>Application of Statistical and Research Techniques to the Evaluation of Energy Efficiency Programs</i> , University of Maine, Orono, Maine.
October 26, 2011	<i>E2Tech Wind Energy Forum</i> , University of Maine, Orono, Maine.
October 14-16, 2011	<i>Maine Solar Energy Association Do-It-Yourself Solar Workshop</i> , Jonesport, Maine.
September 26, 2011	<i>2011 Maine EPSCoR Conference</i> , University of Maine, Orono, Maine

### Peer Reviews of Research Grant Proposals

2017	National Science Foundation Grant Review Panelist for \$multi-million award; reviewed 11 proposals (lead on 3)
March 20, 2017	Ralph E Powe Junior Faculty Awards, Oak Ridge Associated Universities, \$5,000 per award; reviewed 6 proposals

### Peer Reviews of Scientific Journal Articles

<i>Energy Policy</i> (5)	October 1, 2013; November 4, 2014; March 27, 2015; June 3, 2015; April 14, 2017
<i>Journal of Renewable and Sustainable Energy</i> (2)	August 7, 2014; November 10, 2014;
<i>Renewable &amp; Sustainable Energy Reviews</i> (2)	August 8, 2016; March 3, 2017
<i>Earthscan Publications</i> (1 book proposal)	December 5, 2012

**Other**

Question Writer for National Science Bowl Regional Middle School Competition for the Energy Topic Area, June 10, 2017

**Other Professional Development for Research & Creative Activity**

- 2017-2018 Participant *Leadership Maine Program Silver Class*, Maine Development Foundation.
- 2015-2017 Participant, University of Maine *Faculty Fellows Program*.
- May 18, 2016 Attended Senator George J. Mitchell Center for Sustainability Solutions Seminar, "Engaging in Sustainability Debates: The Role of Universities, Experts, and Journalists in Promoting Collaboration and Innovation", University of Maine.
- Spring 2016 Attended multiple meetings of SIE 557: Database Systems Applications and completed several homework assignments to learn more about database design, University of Maine
- 2015-2016 Attended multiple National Community Solar Partnership, Community Building Workgroup Monthly Webinars
- October 15, 2015 Attended Senator George J. Mitchell Lecture on Sustainability: When Science Meets Politics: Symphony or Slugfest?, University of Maine
- October 15, 2014 Attended Amazon's Mechanical Turk (AMT) for Research, Faculty Development Center, University of Maine
- October 2, 2014 Attended Senator George J. Mitchell Lecture on Sustainability: Mobilizing Knowledge to Shape a Sustainable Future, University of Maine
- October 2, 2014 Participated in Discussion: What The World Needs From A Center For Sustainability Solutions with Professor Bill Clark from Harvard University, University of Maine
- February 3, 2014 Attended Wordpress 101 Workshop, University of Maine
- June 20, 2013 Attended National Science Foundation Grant Development Webinar, online
- October 3, 2011 Attended National Solar Tour, Orono, Maine
- October 15-16, 2011 Participated in Solar Panel Building Workshop, Maine Solar Energy Association, Jonesport, Maine

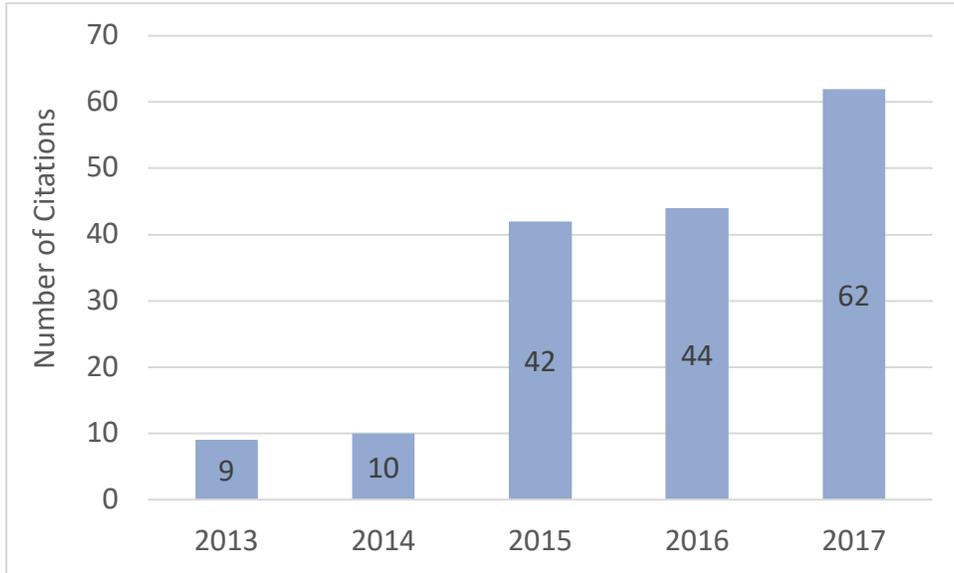
September 22, 2011 Attended Panel Discussion: How to run a large collaborative research project, University of Maine

**5. Statement on the Status of Candidate's Scholarly and Creative Work**

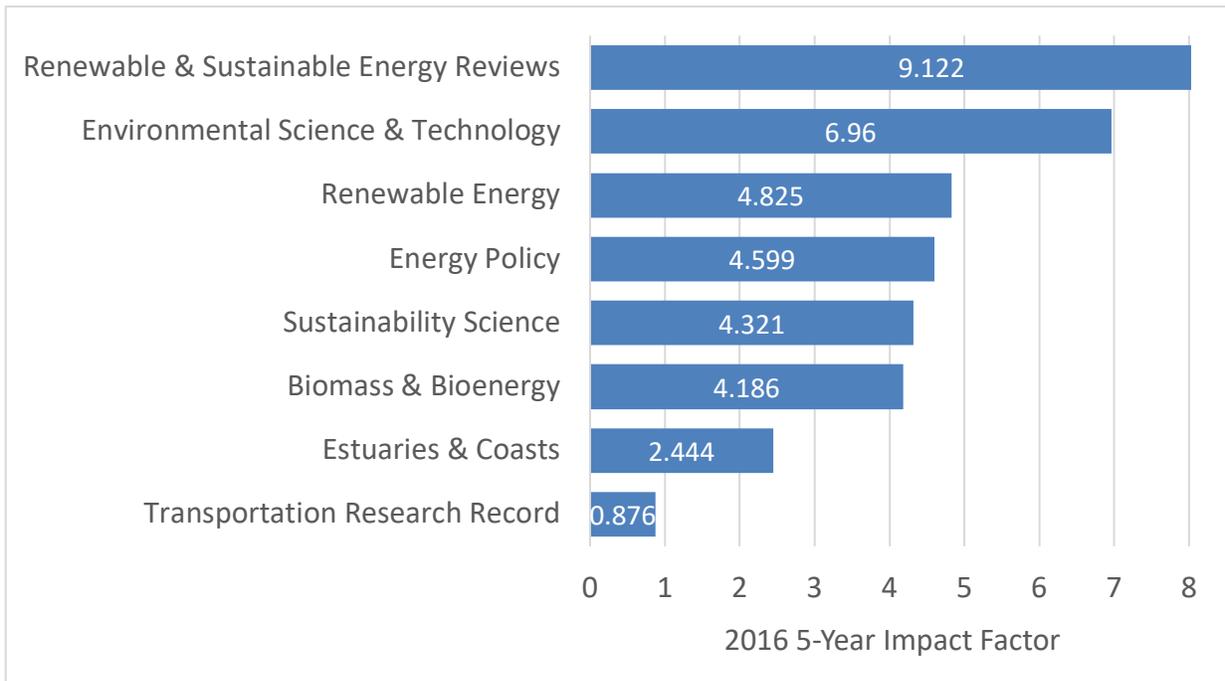
As documented in this package, I have published 10 articles in peer-reviewed journals since 2011, including 1 sole-authored and 5 first-author publications (4 of which list one of my students or my PhD advisor as second author). These journals are national and international in scope and of high caliber. According to Google Scholar and Research Gate, my articles have a total of 164 citations and 320 reads, respectively (Table 2). My articles have been cited in high impact journals such as *Applied Energy*, *Renewable & Sustainable Energy Reviews*, *Energy Policy*, *Energy*, *Solar Energy*, *Renewable Energy*, *Solar Energy Materials & Solar Cells*, *Energy Conversion & Management*, *Journal of Industrial Ecology*, *Journal of Cleaner Production*, *Sustainability*, *Environmental Progress & Sustainable Energy*, *Ecological Economics*, *Conservation Biology*, *Sustainability Science*, and others. My total citations have increased steadily since 2013, with nearly 7 times more citations in 2017 (as of August) than in 2013 (Figure 1). Furthermore, the 8 journals in which my articles have been published are high quality, with most having 5-year impact factors between 2 and 9 (Figure 2).

**Table 2 – Published Peer-Reviewed Journal Article Citations (as of August 22, 2017)**

Article	Citations (Google Scholar)	Reads (Research Gate)
Economic Implications of Thermal Energy Storage for Concentrated Solar Thermal Power (2014)	57	26
Life cycle assessment of greenhouse gas emissions, water, and land use for concentrated solar power plants with different energy backup systems (2013)	30	20
Comparing the sustainability of U.S. electricity options through multi-criteria decision analysis (2015)	26	45
Building a sustainable energy future, one community at a time (2016)	19	67
Will Offshore Energy Face “Fair Winds and Following Seas”? : Understanding the Factors Influencing Offshore Wind Acceptance (2014)	11	25
The incompatibility of benefit–cost analysis with sustainability science (2015)	9	67
A Multi-Criteria Decision Analysis of Concentrated Solar Power with Thermal Energy Storage and Dry Cooling (2013)	6	40
Economic analysis of woody biomass supply chain in Maine (2017)	3	27
Woody Biomass Supply, Economics, and Biofuel Policy: Maine and Northeastern Forests (2015)	3	3
<b>TOTAL</b>	<b>164</b>	<b>320</b>



**Figure 1 – Peer-Reviewed Journal Article Citations Over Time**



**Figure 2 – Journal Impact Factors**  
(from: <https://jcr-incites-thomsonreuters-com>)

As an interdisciplinary energy researcher, evaluating the relative impact of these journals within my field is not as straightforward as it would be for a more disciplinary-focused researcher. In the category of “Energy & Fuels”, three of the journals in which I have published rank in quartile 1 (Q1) by 5-year impact factor (#4 Renewable & Sustainable Energy Reviews; #16 Renewable Energy; #21 Energy Policy) and one in Q2 (#30 Biomass & Bioenergy), out of a total of 46 journals in Q1-2. In the combined categories of “Economics” and “Energy & Fuels”, the three journals from the Energy & Fuels Q1 remain in Q1 for the combined category at respective ranks of #6, #31, #37, out of 109 total journals in Q1. When the categories of Environmental Science and Environmental Studies are included in the combined category selection, these three journals remain in Q1 at ranks #11, #69, #80, respectively, and Environmental Science & Technology and Sustainability Science move to Q1 at #26 and #92, respectively, out of 187 journals total (see Appendix F).

In addition to these 10 peer-reviewed journal articles, I have published one book chapter (in press), 3 conference papers, 11 abstracts, 3 popular media articles, 1 interactive website, and have completed 4 technical reports. I have also chaired 1 completed PhD and 5 completed Masters theses and been a presenter or co-author on 60 presentations, including 26 at professional conferences/meetings and 26 invited presentations. I am currently advising 2 PhD and 1 Masters student theses in progress and have 9 full manuscripts in development from completed theses and in progress research. I have also been PI, co-PI or Senior Personnel on 17 grants, totaling more than \$4 million, and have two additional grant proposals in review, totaling nearly \$1 million. I also hold a 5-year Maine Agricultural and Forest Experiment Station (MAFES) appointment for studying Renewable Energy in Maine and was recently awarded a new 5-year MAFES appointment to expand this work through 2022. These scholarly products represent a multi-disciplinary approach to studying a variety of sustainable energy alternatives, including concentrated solar power, thermal energy storage, biofuels, hydropower, solar water heating, community solar, community energy efficiency, and electricity policy, examined using benefit-cost analysis, levelized cost of energy, environmental life cycle assessment, policy analysis, and multi-criteria decision analysis methods.

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### C. DOCUMENTATION OF RESEARCH/TRAINING GRANTS

I have helped organized and been actively involved in coordinating several large multi-disciplinary grant proposals and other projects. In 2011-2012, I initiated and coordinated the \$12 million National Science Foundation Sustainable Research Networks (SRN) proposal “*New England Research in Sustainable Energy (NERSE) Network*”, which was a collaborative effort between 15 academic, government, industry, NGO, and international institutions, with the University of Maine leading the charge. We were successful in the pre-proposal stage but not successful in the full proposal, although we received many positive reviews. One of the co-PIs on the grant, Habib Dagher, wrote in an email to me after we submitted the proposal: “*You are to be highly commended for originating the idea for this exciting NSF proposal, and for assembling and leading the team. Your ability to bring together peers at UMaine and from many other institutions have been light-years ahead of what is normally expected from a first-year faculty. The resulting proposal is extremely well written, thanks to your tireless efforts. It has been a great pleasure interacting with you.*” (see Appendix H). In addition, the connections and work we did on that proposal set the stage for us to be successful in the 2012 National Science Foundation Sustainable Energy Pathways (SEP) proposal for “*SEP Integrated National Framework for Cellulosic Drop In Fuels*”, \$2 million. The success of this proposal and related work prompted leaders in the NSF Future of Dams grant (*RII Track-2 FEC: Food Energy Water Nexus in Northern New England: How will Local Foods and Distributed Energy Systems Impact Regional Water Resources?*) to invite me to participate. I have recently been successful in securing funding for my growing community energy research program as well and have a US Environmental Protection Agency grant currently in review to further grow that program. I have also written two successful Maine Agricultural and Forest Experiment Station proposals (*Advancing Renewable Energy and Energy Efficiency in Maine 2017-2022; Renewable Energy in Maine 2012-2017*), securing a combined 10 years of funding for my 66% research appointment.

#### Awarded Research Grants

(Total: \$ 4,033,155; External to UMaine: \$3,879,183)

- 1) *Advancing Renewable Energy and Energy Efficiency in Maine*. Principal Investigator: **S. Klein** (100%). Sponsor: USDA National Institute of Food and Agriculture. Hatch-1013178, Project Dates: October 1, 2017-September 30, 2022.
- 2) *Stakeholder-Engaged Hydropower Decision-Making*, Principal Investigator: **S. Klein** (80%), B. McGreavy (20%). Sponsor: University of Maine Research Reinvestment Fund. June 2017-May 2018. Amount: **\$7,000**.
- 3) *Travel Support to Present at Behavior, Energy and Climate Change Conference (BECC)*, Principal Investigator: **S. Klein** (100%). Sponsors: Bangor Savings Bank Faculty Development Fund, Lyndon Paul LoRusso Memorial Faculty Development Fund. October 2016. Amount: **\$1,500**.
- 4) *Community-Based Sustainable Energy Solutions*, Principal Investigator: **S. Klein** (100%). Sponsor: Senator George J. Mitchell Center for Sustainability Solutions, University of Maine. July 2016-June 2017. Amount: **\$49,971**.

- 5) *Mandela Washington Fellowship Public Management Institute*, Principal Investigators: J. Hecker, C. Kim, D. Dixon, J. Rubin. Senior Personnel: **S. Klein** (1%), others. Sponsor: IREX and US Department of State. June-August 2016. Amount: **\$145,000**.
- 6) *RII Track-2 FEC: Strengthening the scientific basis for decision-making about dams: Multi-scale, coupled-systems research on ecological, social, and economic trade-offs*, Principal Investigators: D. Hart, J. Zydlewski, B. Mcgreavy, **S. Klein** (20%), S. Smith. Sponsor: National Science Foundation EPSCoR. September 2015-August 2019. Amount: **\$1,800,000**.
- 7) *Community-Based Sustainable Energy Solutions*, Principal Investigator: **S. Klein** (100%). Sponsor: Senator George J. Mitchell Center for Sustainability Solutions, University of Maine. July 2015-June 2016. Amount: **\$49,939**.
- 8) *Campuses for Environmental Stewardship*, Principal Investigators: C. Sullivan, D. Dixon, **S. Klein** (13%), C. Isenhour, S. De Urioste-Stone, B. McGreavy. Sponsor: Campus Compact Coalition. April 2015-May 2016. Amount: **\$4,000**.
- 9) *NSF CAREER Grant Development*, Principal Investigator: **S. Klein** (100%). Sponsor: Margaret Chase Smith Policy Center. June 2015. Amount: **\$4,000**.
- 10) *NSF CAREER Grant Writing Workshop*, Principal Investigator: **S. Klein** (100%). Sponsor: ADVANCE Rising Tide Center. June 2015. Amount: **\$6,148**.
- 11) *Mid-Coast Solid Waste Landfill Project Phase II*, Principal Investigators: **S. Klein** (85%) and G. Criner. Sponsor: Mid-Coast Solid Waste Corporation. August 2013 - June 2014. Amount: **\$17,330**.
- 12) *Pretenure Research and Creativity Fellowship*, Principal Investigator: **S. Klein** (100%). Sponsor: PRE-VUE grant supported by President's Office University of Maine. 2013-2014. Amount: **\$24,914**.
- 13) *Mid-Coast Solid Waste Landfill Project*, Principal Investigators: **S. Klein** (85%) and G. Criner. Sponsor: Mid-Coast Solid Waste Corporation. January-June 2013. Amount: **\$17,330**.
- 14) *SEP Integrated National Framework for Cellulosic Drop In Fuels*, Principal Investigators: H. Pendse, J. Rubin, L. Silka, C. Wheeler, I. Fernandez, P. van Walsum, J. Leahy, **S. Klein** (5% - note: although this is the % in PARS, my actual contribution to the grant has been more on the order of 25-30% or more (see letter from H. Pendse)), G. Hunt, M. Teisl, C. Noblet. Sponsor: National Science Foundation – Sustainable Energy Pathways. 2012-2016, extended to 2017. Amount: **\$1,895,523**.
- 15) *Renewable Energy in Maine*. Principal Investigator: **S. Klein** (100%). Sponsor: USDA National Institute of Food and Agriculture, 230040 [Maine Agricultural and Forest Experiment Station ME0-H-3-00526-13]. Project Dates: October 1, 2012-September 30, 2017.

- 16) *Assessment of the economic, environmental, and social implications of solar water heating in Maine*, Principal Investigator: **S. Klein** (100%). Sponsor: Faculty Research Funds Committee, University of Maine. July 2012. Amount: **\$7,500**.

#### **Research Grants Under Review**

(Total: \$935,966; all external to UMaine)

- 1) *Addressing the mess: developing evaluative methods for group participatory decision support in riverine systems*. Principal Investigators: **S. Klein** (60%), B. McGreavy, A. Strong. Sponsor: US Geological Survey 104b Water Resources Sustainability Research Grant. Amount: \$32,477. Submitted October 3, 2017.
- 2) *Community solar approaches, behaviors, and decision tools for deep decarbonization*. Principal Investigator: **S. Klein** (55%), C. Noblet, C. Isenhour, S. Nittel. Sponsor: United States Environmental Protection Agency. Amount: \$899,059. Submitted February 9, 2017, pending federal budget approval.

#### **Unfunded Research Grant Proposals**

(Total: \$44,619,375)

- 1) *Building models for hydropower production analysis and stakeholder MCDA decision support*. Principal Investigator: K. Raffier (student). Faculty Advisor: **S. Klein** (100%). Sponsor: University of Maine Center for Undergraduate Research. May 2017-April 2018. Amount: **\$3,000**.
- 2) *Understanding and evaluating tradeoffs to advance municipal and state policy for the economic development and ecological sustainability of Maine's shellfishery*. Principal Investigator: B. McGreavy, B. Beal, D. Brady. Senior Personnel: **S. Klein** (5%), K. Evans. Sponsor: University of Maine Research Reinvestment Fund. Submitted January 28, 2017. Amount: \$98,196.
- 3) *RII Track-2 FEC: Food Energy Water Nexus in Northern New England: How will Local Foods and Distributed Energy Systems Impact Regional Water Resources?* Principal Investigators: J. Rubin, **S. Klein** (25%), B. Nayak, C. Isenhour. Sponsor: National Science Foundation EPSCoR. Submitted February 2016. Amount: \$1,419,159.
- 4) *Measuring and Modelling the Value of Reuse Economies: Toward Sustainable Consumption, Waste Reduction and Resilient Local Economics?* Principal Investigators: C. Isenhour, L. Silka, J. Rubin, C. Noblet, **S. Klein** (15%). Sponsor: National Science Foundation – Interdisciplinary Behavioral and Social Sciences. Submitted November 2015. Amount: \$779,719.
- 5) *Concept Paper: Accelerating Solar Energy Diffusion through Student-Engaged Community Solar*. Principal Investigator: **S. Klein** (100%). Sponsor: US Department of Energy Solar Energy Evolution & Diffusion Studies (SEEDS) II. Submitted March 2016. Amount: \$1,400,000.

- 6) *CAREER: Community Solar – A Socio-Technical Innovation to Advance Sustainable Energy*, Principal Investigator: **S. Klein** (100%). Sponsor: National Science Foundation. Submitted July 2015. Amount: \$638,833.
- 7) *CAREER: Evaluating the role of community energy decision-making in advancing a sustainable energy future*, Principal Investigator: **S. Klein** (100%). Sponsor: National Science Foundation. Submitted July 2014. Amount: \$660,975.
- 8) *Assessing the Sustainability Impacts of New Regulations for Unconventional Oil & Gas Development*, Principal Investigator: **S. Klein** (100%). Sponsor: University of Colorado Boulder AirWaterGas Project through the National Science Foundation. Submitted October 2014 Amount: \$134,714.
- 9) *Initiative for Sustainable Energy Advancement*, Principal Investigators: Jonathan Rubin, Robert Wagner, Hemant Pendse. Senior Personnel: **S. Klein** (10%), along with several others. Sponsor: National Science Foundation EPSCoR – MIEAB Internal Pre-Proposal Competition. 2013. Amount: \$20,000,000.
- 10) *POWER ERC*, Principal Investigators: E. Baker, **S. Klein** (15%), and others. Sponsor: National Science Foundation ERC Pre-proposal. 2013.
- 11) *IGERT Advancing renewable energy solutions by linking knowledge with action*, Principal Investigators: K. Bell, D. Hart. Senior Personnel: **S. Klein** (2%), along with 18 others. Sponsor: National Science Foundation. 2012. Amount: \$3,441,304.
- 12) *New England Research in Sustainable Energy (NERSE) Network*, Principal Investigators: J. Rubin, M. Teisl, H. Dagher. Senior Personnel: **S. Klein** (20%), along with 33 others. Sponsor: National Science Foundation. 2012. Amount: \$12,000,000.
- 13) *Bangor Savings Bank/Lyndon Paul LoRusso Memorial Faculty Development Award*, Principal Investigator: **S. Klein** (100%). Sponsor: Bangor Savings Bank. 2012. Amount: \$1,500.
- 14) *Community-Based Renewable Energy Solutions to Rural Energy Poverty*, Principal Investigators: **S. Klein** (50%) and J. Middleton. Sponsor: PRE-VUE grant supported by President's Office University of Maine. 2012. Amount: \$24,975.
- 15) *PIRE: Integrated Approaches to Securing a Sustainable Future for Tidal Energy*, Principal Investigator: H. Xue; Senior Personnel: **S. Klein** (5%), along with 14 others. Sponsor: National Science Foundation. 2011. Amount: \$4,000,000.
- 16) *Preparation of NSF Career Grant Proposal*, Principal Investigator: **S. Klein** (100%). Sponsor: ADVANCE Rising Tide Center University of Maine. 2011. Amount: \$10,000.
- 17) *The Hiring Process and New Faculty Experience*, Principal Investigators: **S. Klein** (50%) and C. Noblet. Sponsor: ADVANCE Rising Tide Center University of Maine. 2011. Amount: \$10,000.

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**D. DOCUMENTATION OF DEPARTMENT/CAMPUS/COLLEGE SERVICE**

**Service to the Department (School of Economics)**

*Committees and Appointments*

2017-present	Faculty Advisor, Women in Economics, student-run organization
2015-present	Graduate Committee (member)
2015-present	Safety Coordinator
May 2013	Hiring Committee for Production Economics/Agricultural Finance Assistant Professor position (member)

*Other Activities*

2016-present	Organize social events and peer-learning meetings for SOE assistant professors
2015-present	Mentor for new SOE faculty (open-door approach to answering questions, providing guidance)
March 2017	Supported nomination of Karen Moffett for Classified Employee of the Year Award
December 2016	Nominated SOE graduate student (Dan Mistro) and undergraduate student (Erica Sturrock) for Mitchell Center Research Awards
October 2016	Staff Paper Review for C. Noblet
April 2016	Wrote report for Maine Development Foundation on Gender Income Inequality in Maine to foster partnership with MDF and SOE
February 2016	Nominated SOE undergraduate student (Cameron Goodwin) and graduate student (Stephanie Coffey) for Student Employee of the Year Award
February 2016	Nominated SOE undergraduate student (Erica Sturrock) for Non-Traditional Student Scholarship
February 2016	Nominated SOE graduate student (Dan Mistro) for NSFA Graduate Student Service Award
February 2016	Participated in meetings, seminars, reviewed application materials, and provided feedback for candidate site visits for Health Economics Assistant Professor position
January 2016	Nominated SOE graduate student (Robert Langton) for Maine Public Utilities Commission Summer Internship
January 2016	Nominated SOE undergraduate student (Abigail Sennick) for US Department of Homeland Security Summer Internship
December 2015	Nominated SOE graduate student (Stephanie Coffey) for NSFA Graduate Student Research Award

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November 2015	Nominated SOE graduate student (Stephanie Coffey) for Mitchell Center Research Award
August 2015	Participated in meetings, seminars, reviewed application materials, and provided feedback for candidate site visits for Economic Development Assistant Professor position
May 2015	Nominated SOE undergraduate student (Abigail Sennick) for EPA Greater Research Opportunities Fellowship
April 2015	Nominated SOE faculty member (Jonathan Rubin) for Excellence in Faculty Mentoring Award
2014	Nominated SOE undergraduate student (Garrett Raymond) for Margaret Chase Smith Public Affairs Scholarship
October 2013	Nominated SOE undergraduate student (Ashley Crane) for Annie P. Norton Scholarship
September 2013	Staff Paper Review for T. Gabe
May 2013	Staff Paper Review for C. Noblet and T. Gabe
April 15, 2013	Undergraduate Recruitment at Open House and Accepted Student Day
February 18, 2013	Undergraduate Recruitment at Open House and Accepted Student Day

**Service to the Department (Ecology & Environmental Sciences)**

2016-present	Graduate Council (member)
March 2017	Submitted Commitment Letter for EES undergraduate student (Kaitlyn Raffier) CUGR Summer Fellowship
January 2017	Nominated EES undergraduate student (Kaitlyn Raffier) for NEW Leadership Program
February 2016	Nominated EES graduate (Binod Neupane) for Edith M. Patch Outstanding Ph.D. Student Award
March 2015	Nominated EES graduate student (Binod Neupane) for Climate Change Innovation Award
December 2014	Nominated EES graduate student (Binod Neupane) for NSFA Graduate Research Award
May 2013	Nominated EES graduate student (Binod Neupane) for EES Correll Fellowship
March 2013	Nominated EES undergraduate student (Sabrina Vivian) for DeepCWind Consortium, Summer Internship
2011-present	Undergraduate and Graduate Student Advising

**Service to the College (Natural Sciences, Forestry, & Agriculture)**

Spring 2016	Participated in meetings, seminars, reviewed application materials, and provided feedback for candidate site visits for Dean of NSFA search
2016-2017	Mentor, New Faculty in NSFA (Carly Sponarski; 2 lunch meetings, 2 dinner meetings, several emails)
March 2017	Responded to interview questions from WLE 470 students
2015-2016	NSFA Graduate Student Awards Committee (member)

**Service to the University of Maine**

*Committees and Official Roles*

2017-2018	Maine Development Foundation Leadership Maine Silver Class Participant
2015-present	University of Maine Faculty Fellow
2015-present	Represented the University of Maine as the only active academic institution in the National Community Solar Partnership, led by the U.S. Department of Energy
2011-present	Graduate Faculty, University of Maine
August 24, 2017	Presenter, Teaching Roundtable at UMaine New Faculty Orientation
April 24, 2017	Judge for Education Oral Presentations, UMaine Student Research Symposium
March 2017	General Education Assessment Committee: Population & Environment (member)
March 16, 2017	Developed/implemented 1 workshop on sustainable energy for the Expanding Horizons Program for local middle school girls in STEM
2016-2017	Mentor, NEW Leadership Program for Pian Pian Chen, Civil Engineering
Summer 2016	Mentor, <i>Maine EPSCoR High School Summer Research Program</i> , Alex Moriera, Student, Old Town High School, <i>A Review of the Costs of Solar Policy to Society and Utility Ratepayers</i>
August 25, 2016	Panelist, Teaching Panel Discussion, UMaine New Faculty Orientation
July 2016	Instructor for Mandela Washington Fellowship Institute (2 classes and 1 full day field trip)
March 17, 2016	Developed/implemented 2 workshops on sustainable energy for the Expanding Horizons Program for local middle school girls in STEM
June 2015	Developed and Coordinated the University of Maine NSF CAREER Grant Writing Workshop
April 3, 2015	Judge for Physical Sciences Oral Presentations, GradExpo

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March 2014	Mentored EES graduate student and research assistant Stephanie Whalley in revising and implementing the Biofuels Module curriculum for the Sustainable Energy Leaders of the Future (SELF) camp for high school sophomore girls.
2011-2013	Renewable Energy Curriculum Committee (member)
July 2013	Mentored undergraduate EES student Sabrina Vivian in developing the Biofuels Module curriculum for the Sustainable Energy Leaders of the Future (SELF) camp for high school sophomore girls.
January 24, 2012	Reviewed Margaret Chase Smith Policy Center Staff Paper, Energy in Maine by C. Dickerson
<i>Other Activities</i>	
April 27, 2017	Provided guidance to researcher at Advanced Structures & Composites Center regarding calculating emissions saved by offshore wind
April 20, 2017	Participant in Campus Discussion on the Design and Function of Future UMaine Classrooms, led by Peter Schilling, Center for Innovation in Teaching and Learning (CITL)
2015-present	Provide feedback to Faculty Development Center and Center for Innovation in Teaching and Learning about my experiences teaching in Active Learning Classroom (Estabrooke 130)
2013-present	Provide advice/guidance to Renewable Energy Minors
March 2017	Wrote letter of support for Computer Science student departmental award (Katrina Stinson)
January 18, 2017	Attendee, Senator George J. Mitchell Center for Sustainability Solutions Annual Member Meeting
January 11, 2017	Attendee, Maine Development Foundation Policy Leaders Academy Legislative Bus Tour Dinner
April 27, 2016	Attendee, UMaine Student Research Symposium, Cross Insurance Center, Bangor, Maine
2015-2016	Participated in meetings, seminars, reviewed application materials, and provided feedback for candidate site visits for new post-doc hire for Senator George J. Mitchell Center for Sustainability Solutions
2015-2016	Collaborated on Campuses for Environmental Stewardship (CES) proposal and award activities to grow capacity at the University for service learning
Fall 2015	Provided feedback on development of new Engaged Black Bear Digital Badge, recruited students for pilot program
October 2015	Attendee, University of Maine President's lunch for Senator George J.

Mitchell Lecturer on Sustainability, Roger Pielke

April 2015 Provided guidance on UMaine Childcare to potential new faculty hire in Communications and Journalism Department

October 2, 2014 Participant in Discussion on What The World Needs From A Center For Sustainability Solutions with Professor Bill Clark from Harvard University, Senator George J. Mitchell Center for Sustainability Solutions

April 3, 2014 Attendee, Graduate Academic Exposition, University of Maine

September 16, 2013 NSF ADVANCE Rising Tide Center's third year site visit meeting

May 31, 2013 Attendee, University of Maine Advanced Structures and Composites Center's launch of VoltumUS 1:8, Brewer, ME

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**E. DOCUMENTATION OF PUBLIC SERVICE**

0% public service appointment

*\*All public service is uncompensated, pro-bono work.*

**2017**

- Spring-Fall 2017      Local Coordinator for Bangor Fall 2017 Community Window Insert Build (Build dates: October 21-29, 2017), in collaboration with WindowDressers (Rockland), the Unitarian Universalist Society of Bangor, and the Rotary Club of Old Town
- July 19, 2017        Moderator at Greater Bangor Solarize Kickoff Event, Bangor Public Library, 7/19/17
- March 17, 2017      Presentation to WindowDressers Local Coordinators Meeting about Window Insert research,
- March 16, 2017      Developed/implemented 1-hour workshop on sustainable energy for the Expanding Horizons Program for local middle school girls in STEM
- February 17, 2017    Responded to local high school student questions about solar energy in response to my previously published BDN article on the 5 myths of solar energy in Maine

**2016**

- December 14, 2016    Meeting with Maine Interfaith Power & Light (MEIPL) President to discuss vision for Grants to Green program – served as advisor in 2-hr discussion about how to re-envision MEIPL mission as a grant-making institution serving community energy projects in Maine
- October 4, 2016      Maine Science Festival Programming Meeting
- Fall Semester 2016    Engaged more than 100 students in my ECO 180 and 405/590 classes in service-learning research and action related to 6 local projects: Maine net metering policy, Community Solar, Window Insert Program, EnergySmart Bangor, Making Bangor a more Walkable City, and student-directed ideas. Three groups of students made presentations at Bangor City Council meetings about their research, and all other students made presentations during the final exam period, which were attended by WindowDressers and City of Bangor representatives
- Spring-Fall 2016      Local Coordinator for Bangor Fall 2016 Community Window Insert Build (Build dates: October 28-November 6, 2016), in collaboration with WindowDressers (Rockland), the Unitarian Universalist Society of Bangor, and the Rotary Club of Old Town
- Spring-Fall 2016      Technical advisor for EnergySmart Bangor Program for City of Bangor

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Summer 2016	Mentored a high school student from Old Town High School in EPSCoR summer research mentorship program
Summer 2016	Developed and implemented a paper survey of Bangor Energy Expo attendees (August 2016); currently analyzing results from this survey and developing a technical report for the City of Bangor
June 29, 2016	Planning meeting for EnergySmart Bangor– helping City of Bangor publicize new energy efficiency program and collect data on program effectiveness
June 28, 2016	Moderated Bangor Solar Forum, Eastern Maine Community College
April 2016	Wrote research-based Bangor Daily News Op-Ed about pending solar legislation
April 24, 2016	Responded high school student (Arizona College Preparatory in Chandler, AZ) electronic interview about renewable energy
April 4, 2016	Attended the 2016 WindowDressers annual local coordinators meeting, April 4, 2016
April 11, 2016	Testified at Bangor City Council Meeting in support of 1 community energy Resolve (16-149 Supporting the Greater Bangor Solarize Project) and 1 community energy Order (16-150 Authorizing the Transfer of \$140,000 in FY 2016 Savings to Fund a Bangor Efficiency Pilot Program).
April, 2016	Wrote quarterly report on gender income disparity in Maine for Maine Development Foundation
March 28, 2016	Met with Bangor City Mayor Sean Faircloth and wrote letter of support to Bangor City Council for Energy Efficiency program
March 18-20, 2016	Volunteer, Maine Science Festival
March 17, 2016	Developed/implemented (2) 1-hour workshops on sustainability for the Expanding Horizons Program for local middle school girls in STEM
March 11, 2016	Met with community group from Mount Desert Island, A Climate To Thrive, to explore ways my research could benefit their efforts to help Mount Desert Island achieve net zero greenhouse gas emissions
Throughout 2016	Provided advice (via phone, email, or in person) to at least 6 Maine communities about community solar
Throughout 2016	Technical advisor to local community members on Solarize Bangor campaign development

**2015**

December 9, 2015	Participated in Maine Public Utilities Commission Solar Stakeholder Workshop, Hallowell, Maine
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- September 19, 2015 Mentored ECO 370 student, Dan Mistro, in community collaboration at Habitat for Humanity neighborhood event in Bangor to explore the possibility of partnerships with the Bangor 2015 Window Insert Build; I attended the event with Dan
- September 18, 2015 Mentored ECO 370 student, Erica Sturrock, in designing and delivering a presentation to Brewer High School Environmental Science class to recruit for the community Window Insert Build; 3 students from that class ended up volunteering for the build; I attended Erica's presentation
- September 10, 2015 Mentored ECO 370 student, Jack Brannigan, in designing and delivering a presentation to the Rotary Club of Old Town's monthly meeting to recruit for the community Window Insert Build; I attended Jack's presentation
- August 9, 2015 Provided advice to reporter for an article for the Portland Press Herald, *Sea Change: Hasten the transition to renewable power*
- Spring-Fall 2015 Local Coordinator for Bangor Fall 2015 Community Window Insert Build (Build dates: November 7-21, 2015), in collaboration with WindowDressers (Rockland), the Unitarian Universalist Society of Bangor, the Rotary Club of Old Town, and students in ECO 370
- July 12, 2015 Responded to expert survey to assist in published research: *Kassem, A., Al-Haddad, K., Komljenovic, D., Schiffauerova, A., 2016, A value tree for identification of evaluation criteria for solar thermal power technologies in developing countries, Sustainable Energy Technologies and Assessments 16 (pp. 18-32).*
- June 23, 2015 Provided technical advice on developing a community solar farm at Sierra Club Portland Climate Action Team (CAT) meeting in Portland, Maine
- June 2015 Prepared video and responded to interview for Climate Table Messaging program
- May 21, 2015 Presented at meeting of Rotary Club of Old Town to recruit members to volunteer and order inserts for Bangor Fall 2015 Window Insert Build
- May 6, 2015 Press interview with reporter for Business & Employment News (BEN) Network (<http://www.bennetwork.com/>) regarding proposed Rockland natural gas power plant
- May 2, 2015 Presented at Solar Powering Your Community Workshop in Bangor, ME
- April 2015 Participated in University Classroom Observation Program – allowed 2 local high school teachers to observe me teaching ECO 180 and completed online follow-up survey
- March 20-22, 2015 Volunteer & sponsor for Maine Science Festival
- Throughout 2015 Technical advisor for Bangor Solarize campaign (initial planning stages)
- Throughout 2015 Technical advisor for Isle au Haut Power Cooperative community solar initiative

## 2014

August 20, 2014 Wrote letter to Today Show in response to inaccuracies about concentrated solar power reported in their California Solar Bird story (<http://www.today.com/video/today/55902143#55902143>)

## 2013

June 19, 2013 Responded to hour-long in-person interview by a graduate student from University of Massachusetts Boston regarding “Pre-Tenure Faculty’s Experience with Their Work Environment”

## 2012

April 12, 2012 Responded to hour-long phone interview by MIT SENSEable City Lab regarding thermal energy storage for concentrated solar power for a report on renewable energy options they were preparing for the King of Saudi Arabia

April 9, 2012 Responded to television interview - ABC Fox News Bangor regarding gasoline prices

## Public Media Coverage of my Research, Teaching, and Service Activities

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- The BDN Editorial Board, “Making Bangor walkable will help residents, visitors — and homeowners, too,” *The Bangor Daily News*, January 2, 2017, <http://bangordailynews.com/2017/01/02/opinion/editorials/making-bangor-walkable-will-help-residents-visitors-and-homeowners-too/>.
- “Service Learning: Engaging Students for Real-World Problem Solving - Senator George J. Mitchell Center for Sustainability Solutions - University of Maine,” *Senator George J. Mitchell Center for Sustainability Solutions*, <https://umaine.edu/mitchellcenter/news/news-2/service-learning-engaging-students-for-real-world-problem-solving/>.
- “U-Maine Students Stay Energy Efficient While Helping Others | WABI TV5,” accessed January 24, 2017, <http://wabi.tv/2016/10/29/u-maine-students-stay-energy-efficient-while-helping-others/>.
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- Elizabeth Neiman and Sharon Klein, “One Site Ranks Maine 4th Best for Women, but There’s More to the Story | BDN Maine,” *Bangor Daily News*, April 1, 2016, <http://bangordailynews.com/2016/04/01/the-point/one-site-ranks-maine-4th-best-for-women-but-theres-more-to-the-story/>.
- Sun for All, All for Sun: UMaine’s Sharon Klein tracks the rise of community solar, <https://umaine.edu/mitchellcenter/news/news-2/sun-for-all-all-for-sun/>, May 2016.
- “FACT SHEET: Obama Administration Announces Clean Energy Savings for All Americans Initiative,” *whitehouse.gov*, 19-Jul-2016. [Online]. Available: <https://www.whitehouse.gov/the-press-office/2016/07/19/fact-sheet-obama-administration-announces-clean-energy-savings-all>. [Accessed: 21-Jul-2016].
- Maine’s Energy Future: What the Research Suggests | GreenEnergyMaine.com. (n.d.). Retrieved April 1, 2016, from <http://www.greenenergymaine.com/blog/biological-power-posts/maines-energy-future-what-research-suggests>
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- McCrea, N., & Staff, B. D. N. (n.d.). Report: Maine's solar capacity growing, but lagging behind rest of region. Retrieved from <http://bangordailynews.com/2015/09/03/news/state/report-maines-solar-capacity-growing-but-lagging-behind-rest-of-region/>
- UMaine professor honored at White House for AmeriCorps service. (n.d.). Retrieved from <http://bangordailynews.com/2012/08/17/education/umaine-professor-honored-at-white-house-for-ameriacorps-service/>

**F. DOCUMENTATION OF SPECIAL RECOGNITION/AWARDS**

- Awarded fellowship from UMaine Faculty Fellows program to represent UMaine in the Maine Development Foundation Leadership Maine Silver Class 2017-2018
- Nominated for Who's Who in America
- Nominated by University of Maine President Susan J. Hunter for the Donald Harward Faculty Award for Service-Learning Excellence, Maine Campus Compact, February 2017 (not awarded)
- World Renewable Energy Congress Best Paper Award in Solar Thermal Applications, 2011
- Americorps Alum White House Champion of Change, 2012

**IV. EVALUATIONS OF TEACHING**

**A. STUDENT EVALUATIONS OF TEACHING**

This summary has been verified by:

Signature: \_\_\_\_\_

Title \_\_\_\_\_

Date \_\_\_\_\_

**1. Summary of quantitative student evaluations**

**Table 3 – Quantitative student evaluations**

Term & Year	Course	Cr. F, D, or R <sup>a</sup>	Enrollment	Mean Evaluation & N <sup>b</sup>										Remarks
				#1	#3	#4	#5	#11	#12	#13	#22	N <sup>b</sup>		
S2012	ECO 180-0001	3 F, R	73	4.22	4.20	3.78	3.93	4.07	3.61	3.61	3.62	41	Co-taught with C. Noblet	
	ECO 180-0869	3 F, R	28	4.38	4.31	3.54	4.08	4.31	3.85	3.77	3.69	13	Co-taught with C. Noblet	
	ECO 405	3 F, R	23	3.87	4.14	3.40	3.93	3.50	3.73	3.33	3.29	17	Co-taught with G. Hunt	
	ECO 590	3 F, D	4	3.67	5.00	4.33	4.00	4.33	3.67	4.00	4.00	3	Co-taught with G. Hunt	
	INT 489	3 F, D	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	Co-taught with 7 other instructors	
F2012	ECO 597	3 F, D	1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	Independent Study	
S2013	ECO 180	3	78	3.76	4.64	3.60	4.00	4.24	3.73	3.51	3.28	55	Co-taught with C. Noblet	
	ECO 405	3 R	22	3.87	4.53	3.47	3.60	3.47	3.47	3.14	3.21	15	First time taught alone	
	ECO 590	3 R	4	4.50	5.00	4.25	4.75	5.00	4.25	4.00	4.25	4	First time taught alone	
S2014 <sup>c</sup>	ECO 180	3 R	70	***	***	***	***	***	***	***	***	***	First time taught alone; Web-based course (maternity leave)	
S2015	ECO 180	3 R	62	4.53	4.78	4.31	4.40	4.71	4.33	4.47	3.91	45	Switched to active learning classroom	
	ECO 405	3 R	28	4.00	4.60	3.00	4.00	4.20	3.95	3.30	3.05	20	Added service learning project	
	ECO 590	3 R	1	5.00	5.00	4.00	4.00	5.00	4.00	5.00	4.00	1	Added service learning project	
	ECO 470	3 F, D	1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	Independent Study	
F2015	ECO 180	3	84	4.51	4.73	4.17	4.42	4.45	3.98	4.13	3.74	58		
	ECO 370	3 D	9	3.67	4.78	3.56	4.44	4.11	3.78	3.33	3.89	9	Immersion service learning course	
	ECO 597	3 F, D	1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	Independent Study	
F2016	ECO 180	3 R	77	3.97	4.41	3.47	3.98	4.32	3.80	3.71	3.14	66	Added service-learning projects	
	ECO 405	3 R	34	4.15	4.62	3.04	4.42	4.27	3.69	3.46	2.92	26	New service learning projects	
	ECO 590	3 R	5	4	4.67	2	4.00	3.33	3.33	3	2	3	New service learning projects	
	ECO 470	3 F, D	1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	Independent Study	

<sup>a</sup> F= taught for first time; D= developed course; R= restructured course

<sup>b</sup> # of respondents

<sup>c</sup> I did not teach ECO 405/590 because I was on maternity leave

\*\*\*University lost the evaluations - see documentation in Appendix

- #1 How prepared was the instructor for class?
- #3 How enthusiastic was the instructor about the subject?
- #4 How clearly did the instructor present ideas and theories?
- #5 How much were students encouraged to think for themselves?
- #11 Did the instructor inspire confidence in his or her knowledge of the subject?
- #12 How genuinely concerned was the instructor with student's progress?
- #13 Overall, how would you rate the instructor?
- #22 What is your overall rating of the course?

Although I have taught ECO 180 and ECO 405 six and four times, respectively, each time they have been different courses. This is partly due to the original course structure (developed before I arrived) based on co-teaching, which is necessarily going to be a different approach than a course taught by a single instructor. It is also due to my dedication to incorporating proven pedagogical strategies (e.g., active learning, service learning) to deepen student understanding of course material, enhance critical thinking, develop practical skills, and improve student confidence in solving sustainability issues (see Section III.A). Transforming a lecture-based course to an active- and service-learning based course requires incremental changes over time and can result in student dissatisfaction in earlier implementations, especially where students do not have a lot of prior experience with these pedagogical approaches and associated workload. With each iteration of these courses, I have used student evaluations to help me reflect on the effectiveness in previous versions of the course and to inform changes to future versions. For example, compared to the average of S2012 and S2013 (lecture-based), the mean student responses to Q22 and Q13 for ECO 180 in S2015 (flipped classroom) increased 11% and 23%, respectively. These results, along with qualitative student responses, provided positive support for the new active learning approach in that class. Therefore, after administering a nearly identical approach in F2015, I made another incremental change to ECO 180 in F2016 – adding the research-service-learning project. Student responses to Q22 and Q13 in F2016 were 16% and 10% lower, respectively, than F2015. These results, along with qualitative responses, indicate that the research-service-learning project was too much work and too confusing at the 100-level. In response, in F2017, I will be returning to an approach more similar to F2015, and scaling back the service project to be simpler and less demanding. For a more in-depth discussion of these quantitative evaluations in the context of teaching effectiveness, see Section III.A. Teaching Effectiveness.

Although student evaluations help instructors understand student perceptions of their own learning and satisfaction with the course, they have been criticized widely in academic literature for not being a reliable measure of teaching quality, especially where female teachers, innovative teaching strategies, and interdisciplinary course content are concerned<sup>7</sup>. Going forward, I plan to supplement student evaluations with pre- and post-assessments of student

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<sup>7</sup> Mohammad Alauddin and Temesgen Kifle, “Does the Student Evaluation of Teaching Instrument Really Measure Instructors’ Teaching Effectiveness? An Econometric Analysis of Students’ Perceptions in Economics Courses,” *Economic Analysis and Policy* 44, no. 2 (July 2014): 156–68, doi:10.1016/j.eap.2014.05.009.

<sup>7</sup> Michela Braga, Marco Paccagnella, and Michele Pellizzari, “Evaluating Students’ Evaluations of Professors,” *Economics of Education Review* 41 (August 2014): 71–88, doi:10.1016/j.econedurev.2014.04.002.

<sup>7</sup> David Kember and Anthony Wong, “Implications for Evaluation from a Study of Students’ Perceptions of Good and Poor Teaching,” *Higher Education* 40, no. 1 (July 1, 2000): 69–97, doi:10.1023/A:1004068500314.

<sup>7</sup> Wilbert J. McKeachie, “Student Ratings: The Validity of Use,” *American Psychologist* 52, no. 11 (1997): 1218–25, doi:10.1037/0003-066X.52.11.1218.

<sup>7</sup> Paul Roodin, Laura Hess Brown, and Dorothy Shedlock, “Intergenerational Service-Learning: A Review of Recent Literature and Directions for the Future,” *Gerontology & Geriatrics Education* 34, no. 1 (January 1, 2013): 3–25.

<sup>7</sup> Robert Sproule, “The Underdetermination of Instructor Performance by Data from the Student Evaluation of Teaching,” *Economics of Education Review* 21, no. 3 (June 2002): 287–94, doi:10.1016/S0272-7757(01)00025-5.

<sup>7</sup> Philip Stark and Richard Freishtat, “An Evaluation of Course Evaluations,” *ScienceOpen Research*, September 29, 2014, doi:10.14293/S2199-1006.1.SOR-EDU.AOFRQA.v1.

knowledge related to course content. In addition, the strength of the professional relationship between student and instructor can be another measure of teaching quality. Starting in S2015 (first major round of active-learning changes in both classes) I am able to learn nearly all of my 100-115 student names each semester; I have hired 8 top students in my courses as undergraduate research assistants or mentored them in independent studies; and I have written several letters of recommendation for scholarships, jobs, and other opportunities.

## 2. Summary of qualitative student evaluations

### ECO 180 Citizens, Energy, and Sustainability (undergraduate):

- “I enjoyed the course very much but the final paper was too much for a 100 level course. Work was harder than my 300 levels.” (F2016)
- “I really enjoyed the offshore wind test facility. The window insert build was a nice way to give back to the community and help out in that way. The in class discussions and presentations are a good idea. It breaks people out of their shells and gets them involved.” (F2016)
- “Enjoyed class very much.” (F2016)
- “Mrs. Klein was a great professor and is really knowledgeable in her field. I enjoyed how passionate she was and the in-class activities.” (F2016)
- “I really enjoyed the table/group focused work. I really am impressed by how passionate Professor Klein was about her work. This made me really want to learn. The course overall was a good start for my time in the School of Economics and the diversity of topics gave me a broad base.” (F2016)
- “The final projects were a lot of fun and tough ta boot but since it was tough it pushed me to do better.” (F2016)
- “Overall, the course was very well balanced.” (F2016)
- “Great class; Class was hard for a 100-level class.” (F2016)
- “You did well at teaching me about energy and how it is used” (F2016)
- “She’s awesome ☺” (F2015)
- “Flipped classroom was great!” (F2015)
- “For a class this size, I was very impressed with how organized Prof. Klein was. It was a lot of material but I learned so much and as always I am very grateful for the opportunity to learn from such a knowledgeable person. Thank you!” (F2015)
- “Great teacher always on task and prepared.” (F2015)
- “Enjoyable class – homework really helped with exams. Liked that homework and class work is worth more than the tests and exams.” (F2015)
- “Thorough intro to the economy of resource scarcity.” (F2015)
- “The classes when we did the activities and “active learning” were the best.” (F2015)
- “This class is perfect. Nothing needs to be changed.” (F2015)
- “I thought the flipped classroom was refreshing & beneficial to my learning. Her approach and slideshows and guest speakers kept the class very interesting & even inspired me to pursue a minor in renewable energy!” (F2015)
- “This course was extremely interesting! I learned a lot about the kind of technology I want to work with. It was a lot harder than I thought and requires deep thinking which is great! Instructor presented material very well. I loved this course!” (F2015)

- “Excellent course that brought energy matters into every day life.” (F2015)
- “Professor Klein applied principles of education in addition to her knowledge of the subject matter to ensure students learned what she taught. I especially appreciated that she taught how groups should work together. It was a well structured class with many valuable class discussions.” (F2015)
- “This was a very interesting class. I feel better versed in Economics.” (F2015)
- “Interesting and important information presented in a way that was easy and enjoyable to learn. Inspiring!” (Sp2015)
- “This course was very informative, beneficial, explained and explored lots of alternative options, what we as individuals can do.” (Sp2015)
- “Really well thought out course. Fun and engaging! Split classroom setting was very efficient.” (Sp2015)
- “Prof. Klein is an amazing teacher and person. I would love to take another class of hers.” (Sp2015)
- “Sharon was awesome! Very knowledgeable, accommodating and open minded. I really enjoyed the course and working with her. She really brought a great attitude to the class. So definitely keep her!!” (Sp2015)
- “I found this course to be great. Professor Klein was always enthusiastic everyday. She is extremely passionate about teaching and it made class more enjoyable.” (Sp2015)
- “Great class” (Sp2015)
- “Professor Klein is a wonderful person.” (Sp2015)
- “Excellent teacher” (Sp2015)
- “Professor Klein is wonderful! Thanks for all the effort you put into this class.” (Sp2015)
- “I really liked Sharon Klein as an instructor.” (Sp2015)
- “Very informative and beneficial course” (Sp2015)
- “She is wonderful!” (Sp2015)
- “I honestly loved this class and Prof. Klein is an amazing professor!” (Sp2015)
- “Really well thought out course. Fun and engaging!” (Sp2015)
- “I thought the course was awesome. I thoroughly enjoyed the class and thought Professor Klein did a great job!” (Sp2013)
- “Great class experience and subject matter, very interesting lectures and materials, enjoyable overall experience” (Sp2012)
- “Excellent lectures and materials, interesting, enthusiastic, awesome” (Sp2012)
- “Lovely teacher, very kind and respectful.” (Sp2012)

ECO 405: Sustainable Energy Economics and Policy (undergraduate)

- “Prof. Klein was genuinely concerned about students and wanted everyone to understand and succeed.” (Sp2015)
- “I was very glad that I ended up taking this course. Its clear that Sharon is very enthusiastic about the subjects she taught and that kept it interesting. Sharon is a very friendly, relatable and passionate professor.” (Sp2013)
- “Professor Klein cares very much for her students and is a great professor” (Sp2013)
- “Great class experience and subject matter, very interesting lectures and materials, enjoyable overall experience” (Sp2012)

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ECO 370: Building Sustainable Energy Communities through Service Learning (undergraduate)

- "I feel honored to have had the opportunity to learn from such a knowledgeable professor. It has been a great time. Thank you!" (F2015)
- "Amazing instructor! A+" (F2015)
- "The content of the course and the service learning components were a lot of fun" (F2015)
- "Sharon works very hard for this class. She is willing to give freely of her time." (F2015)
- "She was very enthusiastic about energy which made it actually interesting." (F2015)
- "She is a really good teacher who did a good job teaching a pilot course." (F2015)
- "Thank you for giving us the opportunity to get involved in the community, learn about the different complexities of sustainability, and all the other cool things we got to do this semester! And I think our presentations came together very well -- couldn't have been done without your help, of course!" (F2015)

ECO 590: Sustainable Energy Economics and Policy (graduate)

- "Great!" (Sp2015)
- "I learned a lot in the class & thought it was very much a worthwhile class to take." (Sp2013)
- "This course was very interesting and informative. I enjoyed it very much. Pro. Klein is a very good teacher." (Sp2013)
- "The instructor is excellent." (Sp2013)
- "Highly benefitted by her research work and other materials around her research in MIT, Stanford, etc. Passionate, confident, and expert in her area. Very inclusive among students to make them involved in active learning." (Sp2012)

Although the University College lost the teaching evaluations for the online version of ECO 180 in Spring 2014, in March 2014, I administered a mid-semester survey of that course to collect feedback on student experiences with the overall course design and specific components of the new web-based version of ECO 180 I was teaching. In response to the prompt, "*When it comes to this course, I really like...*", students responded:

*"The information that we are learning. Energy issues are so relevant for our generation so there is no doubt that all the course material is valuable. I enjoy learning more about energy sources and sustainability each week, and I am excited to come away with a solid base understanding of the energy at the end of the course."*

*"I really like the content and how it is set up. The information is concise and relevant. I like that we all get to talk to each other and respond to everyone else's work."*

*"I really like how the weekly units are set up. I like how all of the learning material are all on one page."*

*"I like that we do cross- group responses, because I have noticed that my group tends to agree on most of the subjects but a few times the other group takes the opposite stance and I like debating these topics."*

*"The direction of course assignments and provided materials. Thorough and guided."*

*"I really like the Switch energy videos, I think I learn the most from them compared to all the other readings and videos. They are really well done."*

*"I like the topics that we are reviewing each week. I like to be able to read what my group mates write about that weeks topic."*

*"The weekly assignments, our groups, and the timelines we are given for doing these assignments."*

*"I enjoy the SWITCH videos (along with some others such as TED talks) as they are extremely informative without being overall time-consuming. They are also quite easy to understand."*

*"The consistent due dates each week".*

*"I really enjoy the coarse content! Even though some of the work can be tedious overall I find it more interesting then my other classes."*

*"The videos. They're short, sweet and to the point."*

*"The videos that are presented are very imformative and help make the generalized concepts more specific. The switch videos are especially helpful. The format of the course and how discussions work also help better understand the material."*

*"Being able to learn about energy in a way that I get to research it on my own with guidance from a professor."*

*"I like having deadlines towards the end of the week. This allows me to take my time to review the material and develop a well thought out post through out the week rather than being stressed and hurrying to get my work done at the beginning of the week. This allows me to manage my time well and work around my schedule during each week."*

*"The variety of reading materials we are given"*

*"The content and materials provided. The resources are valuable and interesting and continue to provoke interest in the overall subject matter."*

*"I like multiple choice exams and individual posts."*

*"that I was very lucky to get a great group where everyone makes an effort and contributes to the group."*

*"Being exposed to new ideas and explanations of varying energy sources and systems that I might not have come across on my own."*

*"All the new information I'm learning about on alternative energies."*

*"I really like the readings and videos. Usually there is a good amount of both. I also like that the tests are mutiple choice."*

*“the videos are usually really helpful and interesting and a lot easier to understand than some of the readings and overall I find these topics very interesting”*

*“The different perspectives that we have to look at in the content provided for us”*

*“It seems awesome so far. I am a mechE, so the concepts of using our technology to regain harmony with nature are incredibly relevant to my philosophy. Thank you for teaching this course.”*

*“I really like how there is a mix of videos and reading material. As a visual learner, the videos are very helpful and I find I am more likely to commit the information I learn from them to memory than I am with many of the readings.”*

*“All in all I really like this course! I love learning about energy sustainability, I wish I had taken more classes like this earlier in my college career!”*

*“Overall, I really enjoy this course. I am actually considering switching majors to be able to focus more on energy and sustainability!”*

## B. OTHER EVALUATIONS OF TEACHING

### 1. Peer evaluations of teaching

- “It was really inspiring to see your students connect with critical projects in their community. It’s clear they enjoyed the service-learning aspects of the classes and their mentors seemed to really appreciate their contributions. What a success.”

*Joline Blais, Associate Professor of New Media, December 2015  
(email, after attending ECO 370 Final Presentation)*

- “I admired how you interacted with him and spent time with him later. Your teaching experience shows and I’m glad you were there and in control.”

*Guest Lecturer Jeff Jones, Emera Maine, April January 2015  
(email, in reference to a challenging student in class)*

- “The SOE Peer Committee praises Dr. Klein for the steps she took to improve her teaching effectiveness and to innovate her instructional approaches over the last year. We acknowledge and value the tremendous investment she put into developing state-of-the-art e-learning methods and sharing her insights about these methods and other instruction technology (e.g., Top Hat) with the faculty in the School of Economics, University of Maine, and University of Maine System. We recognize the efforts she has extended to enhance her teaching effectiveness and to enrich her teaching efforts (i.e., multiple Faculty Development IT Center/University College Workshops), and are excited to see these efforts re-shaping the student experiences in Dr. Klein’s recent course offerings.””

*Peer Committee letter, April 2014*

- “Good balance between lecture and active learning... Topic engaging, interesting to see from a business stand point, not just science.”

*Local High School Teacher, University Classroom Observation Program April 2015,  
Classroom Observation of ECO 180 (see Appendix C)*

- “I really enjoyed your class on Tuesday - thank you! I love the format of your class and how you have students discussing in groups, not just about answers - but also their opinions. Your students all seem very engaged and interested in the material.”

*Erin Vinson, Campus Programs and Professional Development Coordinator  
Maine Center for Research in STEM Education (RiSE Center), Classroom Observation of ECO  
405/590 September 2017 (see Appendix C)*

- See Appendix D for letters from former students

2. Teaching awards

Nominated by University of Maine President Susan J. Hunter for the Donald Harward Faculty Award for Service-Learning Excellence, Maine Campus Compact, February 2017 (not awarded)

3. Teaching of graduate students in the classroom and thesis advising

→ *See section III.A for Graduate Advising. Additionally, qualitative and quantitative student evaluations include graduate student courses.*

**V. DEPARTMENTAL PEER COMMITTEE EVALUATION**

**A. EVALUATION LETTER**

1. Evaluation of Teaching
2. Evaluation of Scholarship
3. Evaluation of Service

**B. RECOMMENDATION/RECOMMENDED ACTION**

## VI. LETTERS OF REVIEW

### A. LETTERS INTERNAL TO THE UNIVERSITY OF MAINE

(letters with an \* should be forwarded to Board of Trustees)

**Dr. Dan Dixon**, Director, Office of Sustainability; Research Assistant Professor, Climate Change Institute

- Co-PI on Mandela Washington Fellowship Program 2016 and 2017, in which Klein participated as an instructor and field trip/workshop leader (helped Klein develop and implement solar phone charger-building workshop for fellows)
- Co-coordinator for 2 Bangor community window insert builds (Klein's service-learning and research projects in 2016 and 2017)
- Collaborator on additional campus and local service-learning projects for students in Klein's courses
- Co-PI on campus-wide and regional grant, Campuses for Environmental Stewardship, for which Klein was a co-PI, 2015-2016 academic year

**\*Dr. David Hart**, Director, Senator George J. Mitchell Center for Sustainability Solutions; Professor, School of Biology and Ecology

- Lead PI on NSF-funded 4-yr Future of Dams grant, for which Klein is a co-PI (*RII Track-2 FEC: Strengthening the scientific basis for decision-making about dams: Multi-scale, coupled-systems research on ecological, social, and economic trade-offs*, September 2015-August 2019).
- Mentor to Klein on research involving sustainability solutions since 2014
- Director of center that funded 2 years worth of Klein's community energy research (*Community-Based Sustainable Energy Solutions, 2015-2017*)

**Dr. Hemant Pendse**, Director, Forest Bioproducts Research Institute; Professor and Department Chair, Chemical and Biological Engineering

- Lead PI on NSF-funded Sustainable Biofuel Pathway grant, for which Klein has worked as a co-PI (*SEP Integrated National Framework for Cellulosic Drop In Fuels, 2012-2016 with no-cost extension until 2018*)
- Worked with Klein on multidisciplinary, multi-state, multi-institution, \$12 million unfunded NSF grant proposal that Klein led in 2012 (*New England Research in Sustainable Energy (NERSE) Network*)

**\*Dr. Claire Sullivan**, Associate Dean of Community Engagement, College of Liberal Arts and Sciences; Associate Professor, Communication and Journalism

- Mentor to Klein on incorporating service-learning into courses, since 2014
- Lead PI on campus-wide and regional grant, Campuses for Environmental Stewardship, for which Klein was a co-PI, 2015-2016 academic year

**\*Jake Ward**, Vice President, Innovation & Economic Development

- Mentor to Klein for Faculty Fellows Program 2016-2017
- Interacted through Strategic Investment Funded Renewable Energy Minor program and other renewable energy-related activities since 2011

**B. LETTERS INTERNAL TO THE UNIVERSITY OF MAINE SYSTEM, BUT EXTERNAL TO THE UNIVERSITY OF MAINE**

**\*Sally Slovenski**

Executive Director, Maine Campus Compact,

- Funding agency for the Campuses for Environmental Stewardship, for which Klein was a co-PI, 2015-2016 academic year.
- Funding agency for the Maine Partnership for Environmental Stewardship Americorps grant for which Klein advised during proposal development and is now mentoring an Americorps volunteer on campus.

**\* J. Stephen Shaw**

Member, Board of Directors, WindowDressers

- Mentor to Klein on developing her pilot course and associated service project (community window insert build) in Fall 2015 ECO 370 Building Sustainable Energy Communities through Service Learning
- Co-coordinator for Bangor 2015 window insert build with Klein
- Interacted with Klein frequently since 2015 at WindowDressers meetings and activities

**\*Dr. Karen Wilson**

Associate Research Professor, Department of Environmental Science and Policy,  
University of Southern Maine

- Co-PI on NSF-funded 4-yr Future of Dams grant, for which Klein is a co-PI (*RII Track-2 FEC: Strengthening the scientific basis for decision-making about dams: Multi-scale, coupled-systems research on ecological, social, and economic trade-offs*, September 2015-August 2019).

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**C. LETTERS EXTERNAL TO THE UNIVERSITY OF MAINE SYSTEM AND THE UNIVERSITY OF MAINE**

(letters with an \* should be forwarded to Board of Trustees)

**Dr. Damian Adams**, Associate Professor, Natural Resource Economics & Policy  
School of Forest Resources & Conservation, University of Florida

- Member of NSF grant review panel with Klein in 2017

**Dr. Inês Azevedo**, Professor, Department of Engineering and Public Policy,  
Carnegie Mellon University

- Worked with Klein on multidisciplinary, multi-state, multi-institution, \$12 million unfunded NSF grant proposal that Klein led in 2012 (*New England Research in Sustainable Energy (NERSE) Network*)
- Azevedo was a post-doc and graduate student in Engineering and Public Policy at Carnegie Mellon University at the same time Klein was a graduate student there (2007-2011)

**\*Dr. Erin Baker**, Professor, Department of Mechanical and Industrial Engineering  
University of Massachusetts, Amherst

- Lead PI on an unfunded NSF grant proposal in 2013 (*POWER ERC*)
- Invited speaker at NSF CAREER Grant-Writing Workshop Klein coordinated at UMaine in June 2015
- Invited Klein to speak at University of Massachusetts Mechanical and Industrial Engineering Seminar Series in September 2015
- Explored mutual research interests via email communication in Fall 2015

**\*Dr. Elena Irwin**, Professor, Environmental and Development Economics; Faculty  
Director, Sustainable and Resilient Economy Program  
The Ohio State University

- Member of NSF grant review panel with Klein in 2017

**\*Dr. Jill McClusky**, Distinguished Professor of Sustainability  
School of Economic Sciences, Washington State University

- Met at NSF Sustainable Energy Pathways grantees meeting in 2013 and discussed shared research interests (*listed in Invited Presentations as: Poster Presentation. Integrated national framework for cellulosic drop-in fuels. National Science Foundation Sustainable Energy Pathways Meeting, Westin Arlington Gateway, Arlington, Virginia, June 6, 2013*)

**Dr. Emi Uchida**, Associate Professor, Department of Environmental and Natural  
Resource Economics, The University of Rhode Island

- Co-PI on NSF-funded 4-yr Future of Dams grant, for which Klein is a co-PI (*RII Track-2 FEC: Strengthening the scientific basis for decision-making about dams: Multi-scale, coupled-systems research on ecological, social, and economic trade-offs, September 2015-August 2019*).

**Appendices**

APPENDIX A: Curriculum Vitae

APPENDIX B: ECO 180 Spring 2014 Letter of Explanation for Missing Evaluations

APPENDIX C: Teaching Observations

APPENDIX D: Letters of Support from Former Students

APPENDIX E: Course Syllabi

APPENDIX F: Journal Rankings

APPENDIX G: Stop the Clock Letters

APPENDIX H: Email from Dr. Habib Dagher about NSF SRN Grant Proposal

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**APPENDIX A: CURRICULUM VITAE**

**SHARON J.W. KLEIN**

sharon.klein@maine.edu

207-581-3174

Winslow Hall, Room 305

School of Economics, University of Maine

Orono, ME 04469

<http://umaine.edu/soe/faculty-and-staff/klein/>

**EDUCATION**

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2011	<i>Ph.D., Engineering and Public Policy, Carnegie Mellon University</i>
2009	<i>M.S., Engineering and Public Policy, Carnegie Mellon University</i>
2004	<i>California Teaching Credential (Chemistry), National University</i>
1999	<i>B.S., Environmental Science, Cum Laude, University of Massachusetts, Amherst</i>

**EMPLOYMENT**

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2011-present	<b>Assistant Professor</b> , School of Economics, University of Maine, Orono, ME
2006-2007	<b>Teacher</b> , <i>Physical Science and Astronomy (Eighth Grade)</i> , Colegio Americano, Quito, Ecuador
2005-2007	<b>Teacher</b> , <i>International Baccalaureate Environmental Systems (Eleventh and Twelfth Grade)</i> , Colegio Americano, Quito, Ecuador
2005-2006	<b>Teacher</b> , <i>International Baccalaureate Theory of Knowledge (Eleventh and Twelfth Grade)</i> , Colegio Americano, Quito, Ecuador
2002-2005	<b>Teacher</b> , <i>Physical Sciences (Eighth Grade)</i> , King/Chavez Academy, San Diego, CA
2002-2005	<b>Teacher</b> , <i>Natural Sciences (Seventh Grade)</i> , King/Chavez Academy, San Diego, CA
2000-2002	<b>Environmental Technician</b> , Hargrave Environmental Consulting, Inc., San Diego, CA
1999-2000	<b>Corps Member</b> , Americorps National Civilian Community Corps, Southeast Region

**HONORS**

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2017-2018	MDF Leadership Maine Silver Class Participant
2015-2017	University of Maine Faculty Fellow
2012	White House Champion for Change - Americorps Alums: <a href="http://www.whitehouse.gov/champions/amicorps-alums/dr.-sharon-wagner">http://www.whitehouse.gov/champions/amicorps-alums/dr.-sharon-wagner</a>
2011	World Renewable Energy Congress Best Paper Award in Solar Thermal Applications

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2010	Graduate Student Assembly/Provost Conference Fund Award
2010	Neuwirth Scholarship Travel Grant, Carnegie Mellon University
2009-present	National Science Foundation Graduate Research Fellowship
2008-2009	Steinbrenner Graduate Fellowship, Carnegie Mellon University
2007	Carnegie Institute of Technology Dean's Fellowship Engineering Award
1999	Commonwealth Honors, University of Massachusetts Amherst
1996-1999	Golden Key National Honor Society, University of Massachusetts Amherst
1996-1999	Phi Kappa Phi Honors Fraternity, University of Massachusetts Amherst
1998	William F. Field Alumni Scholar, University of Massachusetts Amherst

## RESEARCH & TEACHING INTERESTS

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1. Technical, economic, environmental and social tradeoffs inherent in the production, distribution, and use of sustainable energy options
2. Grassroots community renewable energy and energy efficiency
3. Engineering-economic analysis
4. Environmental life cycle assessment
5. Social benefit-cost analysis
6. Multi-criteria decision analysis
7. Tradeoffs associated with a variety of environmental issues: water, waste, pollution, climate change, ecosystems, biodiversity

## PUBLICATIONS

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*Note: I changed my last name from Wagner to Klein in January 2013*

*\*Graduate student coauthor*

*§Undergraduate student coauthor*

### Peer-Reviewed Journal Articles

- 1) **Klein, S.J.W.**, Noblet, C.L., Exploring Sustainable Energy Economics: Net Metering, Rate Designs and Consumer Behavior, *Curr Sustainable Renewable Energy Rep*, vol. 4, no. 2, pp. 23–32, Jun. 2017.
- 2) Whalley\*, S., **Klein, S.J.W.**, Benjamin, J., Economic analysis of woody biomass supply chain in Maine, *Biomass & Bioenergy*, vol. 96, pp. 38–49, Jan. 2017.
- 3) **Klein, S.J.W.**, Coffey\*, S., 2016, Building a sustainable energy future, one community at a time, *Renewable and Sustainable Energy Reviews*, vol. 60, pp. 867–880, doi: 10.1016/j.rser.2016.01.129.
- 4) Rubin, J., Neupane\*, B., Whalley\*, S., **Klein, S.**, 2015. Woody Biomass Supply, Economics, and Biofuel Policy. *Transportation Research Record: Journal of the Transportation Research Board 2502*, 108–115. doi:10.3141/2502-13
- 5) **Klein, S.J.W.**, Whalley\*, S., 2015, Comparing the sustainability of U.S. electricity options through multi-criteria decision analysis (MCDA), *Energy Policy*, 79, 127-149.

- 6) Anderson, M., Teisl, M., Noblet, C., **Klein, S.**, 2014, The incompatibility of benefit-cost analysis with sustainability science, *Sustainability Science*, September, 1-9. doi:10.1007/s11625-014-0266-4.
- 7) **Wagner, S.**, Rubin, E., 2014, Economic implications of thermal energy storage for concentrated solar thermal power, *Renewable Energy*, 61C, 81-95, [http://dx.doi.org.prxy4.ursus.maine.edu/10.1016/j.545\\_renene.2012.08.013](http://dx.doi.org.prxy4.ursus.maine.edu/10.1016/j.545_renene.2012.08.013).
- 8) Teisl, M.F., McCoy, S., Marrinan\*, S., Noblet, C.L., Johnson, T., Wibberly\*, M., Roper, R., and **Klein, S.** 2014, Will offshore energy face 'fair winds and following seas'? Understanding the factors influencing offshore wind acceptance. *Estuaries and Coasts*. published online February 6, 2014, DOI 10.1007/s12237-014-9777-6.
- 9) **Klein, S.J.W.** 2013, A multi-criteria decision analysis of concentrated solar power with thermal energy storage and dry cooling, *Environmental Science & Technology*, 47, 13925-13933, <http://dx.doi.org/10.1021/es403553u>.
- 10) **Klein, S.J.W.**, Rubin, E.S. 2013, Life cycle assessment of greenhouse gas emissions, water and land use for concentrated solar power plants with different energy backup systems, *Energy Policy*, 63, 935-950, DOI: 10.1016/j.enpol.2013.08.057.

#### Journal Articles in Review

- 1) Gunukula, S., **Klein, S.**, Pendse, H., DeSisto, W., Wheeler, M. C., Analysis of Thermal Deoxygenation Based Biorefineries for the Coproduction of Renewable Fuels and Platform Chemicals, *Applied Energy* (**submitted**).
- 2) Song\*, C., Gardner, K., **Klein, S.J.W.**, Pereira Souza, S., Mo, W., Moving beyond hydropower: life cycle greenhouse gas emissions from dams, *Renewable & Sustainable Energy Reviews* (**submitted**).

#### Journal Articles in Preparation

- 1) Fox\*, E., **Klein, S.J.W.**, Dam(n) information: tailoring small hydropower project models for use in New England communities. *for: Renewable and Sustainable Energy Reviews*
- 2) Fox\*, E., **Klein, S.J.W.**, Liddell\*, C., Raffier\*, K., Eliciting preferences from people who give a dam(n): group participatory multi-criteria decision analysis in a dam decision context. *for: Renewable and Sustainable Energy Reviews*
- 3) **Klein, S.J.W.**, Mistro\*, D. Energy savings and participant benefits from community-built window inserts, *for: Journal of Cleaner Production*.
- 4) **Klein, S.J.W.**, Coffey\*, S., Motivations and behavior of community solar participants in New England, *for: Energy Policy*.
- 5) **Klein, S.J.W.**, Langton\*, R.B.W., Hunt, G., The cost of producing drop-in biodiesel from woody biomass residues in the Northeast United States, *for: Biomass & Bioenergy*

- 6) Neupane\*, B., **Klein, S.**, Wheeler, C., Life cycle assessment of energy and greenhouse gas emissions from drop-in diesel from forest biomass in Maine. *for: Journal of Industrial Ecology*
- 7) **Klein, S.J.W.**, Coffey\*, S., Comparing community solar policies in three New England states. *for: Energy Policy*
- 8) **Klein, S.J.W.**, Coffey\*, S., Costs and benefits of different community-based solar approaches in the United States. *for: Energy Policy*
- 9) **Klein, S.J.W.**, Dutra\*, S. Costs and benefits of solar water heating in Maine. *for: Renewable Energy*
- 10) Lowden\*, S., Isenhour, C., **Klein, S.J.W.**, McGreavy, B., De Urioste-Stone, S., Sullivan, C., Dixon, D., Silka, L., Teaching environmental stewardship: community engagement versus service learning. *for: Journal of Community Engagement and Higher Education*
- 11) **Klein, S.J.W.**, Hunt, G. Benefit-cost analysis of alternatives to fuel oil heating. *for: Maine Policy Review*
- 12) **Klein, S.J.W.**, Coffey\*, S., Noblet, C.L., Isenhour, C., Power to the people? Grassroots versus top-down approaches to community solar.

#### Chapters in Books/Conference Papers

(<sup>†</sup>peer-reviewed)

- 1) <sup>†</sup>**Klein, S.J.W.** and Coffey\*, S., 2017, United States Community Energy. *Handbook on Energy Transition and Participation* Springer VS, Wiesbaden; Lars Holstenkamp and Jörg Radtke, editors. ISBN: 9783658094157. **(INVITED)**
- 2) **Klein, S.J.W.**, Mistro\*, D., 2016 Community energy for a sustainable future: window insert builds in Maine. Second International Sustainable Consumption Research and Action Initiative (SCORAI) Conference “Transitions Beyond a Consumer Society”, June 15-17, 2016, Wells Conference Center, University of Maine, Orono, ME.
- 3) <sup>†</sup>Rubin, J., Neupane\*, B., Whalley\*, S., and **Klein, S.**, 2015, Woody Biomass Supply, Economics, Biofuel Policy: Maine and Northeastern Forests, Transportation Research Board 2015 Annual Meeting, Washington D.C., January 11-15, 2015.
- 4) <sup>†</sup>**Wagner, S.**, Rubin, E., 2012. Evaluating renewable energy systems along the hybrid spectrum: concentrated solar power, *International Conference on Clean Energy (ICCE)*. Quebec, Canada.

#### Published Abstracts

(<sup>†</sup>peer-reviewed)

- 1) <sup>†</sup>Roy, S., McGreavy, B., Quiring\*, T., Uchida, E., Wilson, K.A., **Klein, S.**, Fox\*, E., Zydlewski, J., Jansujwicz, J., deSouza, S., Hart, D., Gardner, K., Opportunities for resilient communities, ecosystems, and infrastructure by optimizing management of New

- England dams. Resilience Conference, Stockholm, Sweden, August 20-23, 2017, [http://media.resilience2017.org/2017/08/Resilience-2017\\_Final-pdf-program.pdf](http://media.resilience2017.org/2017/08/Resilience-2017_Final-pdf-program.pdf).
- 2) †McGreavy, B., Quiring\*, T., Roy, S., Wilson, K.A., deSouza, S., Hart, D., Gardner, K., Gottschalk Druschke, C., Ashcraft, C.A., Fultineer, S., Jansujwicz, J., **Klein, S.**, Mo, W., Vogler, E., Gold, A., Uchida, E. How do we decide what to do with dams? Dynamic Design Planning (DDP) to shape collaboration for sustainability science. Resilience Conference, Stockholm, Sweden, August 20-23, 2017, [http://media.resilience2017.org/2017/08/Resilience-2017\\_Final-pdf-program.pdf](http://media.resilience2017.org/2017/08/Resilience-2017_Final-pdf-program.pdf).
  - 3) †Song\*, C., Mo, W., Gardner, K., **Klein, S.J.W.**, Pereira Souza, S., Understanding the Cradle-to-Grave Greenhouse Gas Emissions of Dams, Association of Environmental Engineers and Science Professors (AEESP) Research and Education Conference, University of Michigan, Ann Arbor, Michigan, June 21-22, 2017, [https://aeesp2017.com/program\\_list.php?sid=S20#a491](https://aeesp2017.com/program_list.php?sid=S20#a491).
  - 4) †Mistro\*, D., **Klein, S.J.W.**, Window Inserts and the Communities Adopting Them, Canadian Economics Association 2017 Conference, St. Francis Xavier University, Nova Scotia, Canada, June 2, 2017, <https://economics.ca/2017/en/program.php>.
  - 5) †**Klein, S.J.W.**, What are the financial and social costs and benefits of different community solar approaches? Behavior, Energy, and Climate Change Conference (BECC), Baltimore, Maryland, October 20-22, 2016, [http://beccconference.org/wp-content/uploads/2016/09/2016-BECC-Abstracts\\_Alpha-by-Last-Name.pdf](http://beccconference.org/wp-content/uploads/2016/09/2016-BECC-Abstracts_Alpha-by-Last-Name.pdf).
  - 6) †Langton\*, R., **Klein, S.** Biofuels from Trees: A New Process to Produce Drop-in Biofuels from Woody Biomass, International Conference on Environment and Renewable Energy. Sheraton Munich Westpark Hotel. Munich, Germany, May 26, 2016, [http://energy.conference-site.com/archive/2016/proceedings/proceedings\\_ICERE\\_2016.pdf](http://energy.conference-site.com/archive/2016/proceedings/proceedings_ICERE_2016.pdf).
  - 7) †Langton\*, R., **Klein, S.** Biofuels from Trees: A New Process to Produce Drop-in Biofuels from Woody Biomass. Maine Sustainability & Water Conference, Augusta Civic Center, Augusta, Maine, March 29, 2016, <https://umaine.edu/mitchellcenter/news/maine-water-conference/2016-maine-sustainability-water-conference/2016-concurrent-sessions/#energy>.
  - 8) †Coffey\*, S., **Klein, S.** Does Community Solar Have a Future in New England? Maine Sustainability & Water Conference, Augusta Civic Center, Augusta, Maine, March 29, 2016, <https://umaine.edu/mitchellcenter/news/maine-water-conference/2016-maine-sustainability-water-conference/2016-concurrent-sessions/#energy>.
  - 9) †**Klein, S.** Renewable Energy Solutions. 33rd United States Association for Energy Economics/IAEE North American Conference, Pittsburgh, PA, [http://www.usaee.org/usaee2015/program\\_concurrent.aspx](http://www.usaee.org/usaee2015/program_concurrent.aspx), October 25-28, 2015.
  - 10) †Neupane\*, B., **Klein, S.**, Wheeler, C., Rubin, J., Life Cycle Energy and Greenhouse Gases Emissions Assessment of Forest-based Drop-in Biofuel Production in Maine. American Center for Life Cycle Assessment Annual Meeting XV, Vancouver, British Columbia, October 6-8, 2015, <http://www.aclca.org/lca-xv/biofuels-3/>.

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- 11) <sup>†</sup>Whalley\*, S., Neupane\*, B., **Klein, S.**, Rubin, J., Sustainability Assessment of Drop-In Biofuels in Maine. 20th Maine Sustainability & Water Conference. Augusta Civic Center, Augusta, Maine, April 1, 2014, <https://umaine.edu/mitchellcenter/mwc-2014/concurrent-sessions/session-g/#whalley>.

### Research Reports, Technical Papers, Websites

- 1) **Klein, S.**, Criner, G., Allen, T., Mid-Coast Solid Waste Corp Landfill Project Phase 2 Report. *Technical Report*, November 13, 2013.
- 2) Criner, G., **Klein, S.**, Allen, T., Leighton\*, R., Mid-Coast Solid Waste Corp Landfill Project Phase 1 Report, *Technical Report*. September 24, 2013.
- 3) Whalley\*, S., Neupane\*, B., **Klein, S.**, Rubin, J., Woody Biomass Supply in Maine, *Technical Report*. June 2, 2013.
- 4) **Klein, S.** Report on Gender Income Disparity in Maine. Prepared for Maine Development Foundation. April 2016.
- 5) **Klein, S.**, Coffey\*, S., Nittel, S., Stinson<sup>§</sup>, S., US Community Energy Website, published online April 2017, <https://www.communityenergyus.net>.

### Popular Media Publications

- 1) **Klein, S.** "5 myths people hold about solar power in Maine." Bangor Daily News [Online] April 28, 2016 Published: <http://bangordailynews.com/2016/04/28/opinion/5-myths-people-hold-about-solar-power-in-maine/>.
- 2) Neiman, E., **Klein, S.** "One site ranks Maine 4th best for women, but there's more to the story | BDN Maine." Bangor Daily News [Online] April 1, 2016 Published: <http://bangordailynews.com/2016/04/01/the-point/one-site-ranks-maine-4th-best-for-women-but-theres-more-to-the-story/>.
- 3) **Wagner, S.**, Serving the United States Through AmeriCorps, White House Champions of Change Blog, August 17, 2012, <http://www.whitehouse.gov/champions/blog?page=12>.

### RESEARCH GRANTS

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#### Awarded Research Grants

(Total: \$ 4,033,155)

- 1) *Advancing Renewable Energy and Energy Efficiency in Maine*. Principal Investigator: **S. Klein**. Sponsor: USDA National Institute of Food and Agriculture. Hatch-1013178, Project Dates: October 1, 2017-September 30, 2022.
- 2) *Building models for hydropower production analysis and stakeholder MCDA decision support*. Principal Investigator: K. Raffier (student). Faculty Advisor: **S. Klein**. Sponsor: University of Maine Center for Undergraduate Research. May 2017-April 2018. Amount: **\$3,000**.

- 3) *Stakeholder-Engaged Hydropower Decision-Making*, Principal Investigator: **S. Klein**. Sponsor: University of Maine Research Reinvestment Fund. June 2017-May 2018. Amount: **\$7,000**.
- 4) *Travel Support to Present at Behavior, Energy and Climate Change Conference (BECC)*, Principal Investigator: **S. Klein**. Sponsors: Bangor Savings Bank Faculty Development Fund, Lyndon Paul LoRusso Memorial Faculty Development Fund. October 2016. Amount: **\$1,500**.
- 5) *Community-Based Sustainable Energy Solutions*, Principal Investigator: **S. Klein**. Sponsor: Senator George J. Mitchell Center for Sustainability Solutions, University of Maine. July 2016-June 2017. Amount: **\$49,971**.
- 6) *Mandela Washington Fellowship Public Management Institute*, Principal Investigators: J. Hecker, C. Kim, D. Dixon, J. Rubin. Senior Personnel: **S. Klein**, others. Sponsor: IREX and US Department of State. June-August 2016. Amount: **\$145,000**.
- 7) *RII Track-2 FEC: Strengthening the scientific basis for decision-making about dams: Multi-scale, coupled-systems research on ecological, social, and economic trade-offs*, Principal Investigators: D. Hart, J. Zydlewski, B. Mcgreavy, **S. Klein**, S. Smith. Sponsor: National Science Foundation EPSCoR. September 2015-August 2019. Amount: **\$1,800,000**.
- 8) *Community-Based Sustainable Energy Solutions*, Principal Investigator: **S. Klein**. Sponsor: Senator George J. Mitchell Center for Sustainability Solutions, University of Maine. July 2015-June 2016. Amount: **\$49,939**.
- 9) *Campuses for Environmental Stewardship*, Principal Investigators: C. Sullivan, D. Dixon, **S. Klein**, C. Isenhour, S. De Urioste-Stone, B. McGreavy. Sponsor: Campus Compact Coalition. April 2015-May 2016. Amount: **\$4,000**.
- 10) *NSF CAREER Grant Development*, Principal Investigator: **S. Klein**. Sponsor: Margaret Chase Smith Policy Center. June 2015. Amount: **\$4,000**.
- 11) *NSF CAREER Grant Writing Workshop*, Principal Investigator: **S. Klein**. Sponsor: ADVANCE Rising Tide Center. June 2015. Amount: **\$6,148**.
- 12) *Mid-Coast Solid Waste Landfill Project Phase II*, Principal Investigators: **S. Klein** and G. Criner. Sponsor: Mid-Coast Solid Waste Corporation. August 2013 - June 2014. Amount: **\$17,330**.
- 13) *Pretenure Research and Creativity Fellowship*, Principal Investigator: **S. Klein**. Sponsor: PRE-VUE grant supported by President's Office University of Maine. 2013-2014. Amount: **\$24,914**.
- 14) *Mid-Coast Solid Waste Landfill Project*, Principal Investigators: **S. Klein** and G. Criner. Sponsor: Mid-Coast Solid Waste Corporation. January-June 2013. Amount: **\$17,330**.
- 15) *SEP Integrated National Framework for Cellulosic Drop In Fuels*, Principal Investigators: H. Pendse, J. Rubin, L. Silka, C. Wheeler, I. Fernandez; Senior Personnel: **Sharon**

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**Klein**, along with eight others. Sponsor: National Science Foundation – Sustainable Energy Pathways. 2012-2016, extended to 2017. Amount: **\$1,895,523**.

16) *Renewable Energy in Maine*. Principal Investigator: **S. Klein**. Sponsor: USDA National Institute of Food and Agriculture, 230040 [Maine Agricultural and Forest Experiment Station ME0-H-3-00526-13]. Project Dates: October 1, 2012-September 30, 2017.

17) *Assessment of the economic, environmental, and social implications of solar water heating in Maine*, Principal Investigator: **S. Klein**. Sponsor: Faculty Research Funds Committee, University of Maine. July 2012. Amount: **\$7,500**.

## PROFESSIONAL PRESENTATIONS (since 2011)

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*NOTE: I changed my last name from Wagner to Klein in January 2013*

\*Graduate student coauthor

§Undergraduate student coauthor

‡High school student coauthor

†peer-reviewed

### Presentations at Professional Conferences and Meetings

*NOTE: includes Conference Papers and Published Abstracts listed above*

- 1) †**Klein, S.J.W.**, Nittel, S., Stinson<sup>§</sup>, K., Noblet, C.L., Isenhour, C., Coffey\*, S., Oral Presentation. Communities taking solar into their own hands: a social science look at the growing community solar movement, American Solar Energy Society's 46<sup>th</sup> National Solar Conference, University of Colorado, Denver, Colorado, October 9-12, 2017 (*abstract accepted*).
- 2) †**Raymond\*, G.**, Klein, S.J.W., Poster Presentation. Using Multi-Criteria Decision Analysis to Compare Fuel Production Processes, International Conference & Exhibition on Clean Energy (ICCE), Toronto, Canada, August 21-23, 2017, <http://icce2017.iaemm.com/documents/ICCE2017ProgramDetail.pdf>.
- 3) †**Roy, S.**, McGreavy, B., Quiring\*, T., Uchida, E., Wilson, K.A., Klein, S., Fox\*, E., Zydlewski, J., Jansujwicz, J., deSouza, S., Hart, D., Gardner, K., Poster Presentation. Opportunities for resilient communities, ecosystems, and infrastructure by optimizing management of New England dams. Resilience Conference, Stockholm, Sweden, August 20-23, 2017, [http://media.resilience2017.org/2017/08/Resilience-2017\\_Final-pdf-program.pdf](http://media.resilience2017.org/2017/08/Resilience-2017_Final-pdf-program.pdf).
- 4) †**McGreavy, B.**, Quiring\*, T., Roy, S., Wilson, K.A., deSouza, S., Hart, D., Gardner, K., Gottschalk Druschke, C., Ashcraft, C.A., Fultineer, S., Jansujwicz, J., Klein, S., Mo, W., Vogler, E., Gold, A., Uchida, E. Oral Presentation. How do we decide what to do with dams? Dynamic Design Planning (DDP) to shape collaboration for sustainability science. Resilience Conference, Stockholm, Sweden, August 20-23, 2017, [http://media.resilience2017.org/2017/08/Resilience-2017\\_Final-pdf-program.pdf](http://media.resilience2017.org/2017/08/Resilience-2017_Final-pdf-program.pdf).

- 5) <sup>†</sup>**Song\***, C., Mo, W., Gardner, K., Klein, S.J.W., Pereira Souza, S., Oral Presentation. Understanding the Cradle-to-Grave Greenhouse Gas Emissions of Dams, Association of Environmental Engineers and Science Professors (AEESP) Research and Education Conference, University of Michigan, Ann Arbor, Michigan, June 21-22, 2017, [https://aeesp2017.com/program\\_list.php?sid=S20#a491](https://aeesp2017.com/program_list.php?sid=S20#a491).
- 6) <sup>†</sup>**Mistro\***, D., Klein, S.J.W., Oral Presentation. Window Inserts and the Communities Adopting Them, Canadian Economics Association 2017 Conference, St. Francis Xavier University, Nova Scotia, Canada, June 2, 2017, <https://economics.ca/2017/en/program.php>.
- 7) <sup>†</sup>**Fox\***, E., Klein, S.J.W., Raffier<sup>§</sup>, K., Poster Presentation. Participatory Group MCDA in a Dam Decision Context, Maine Sustainability & Water Conference, Augusta Civic Center, Augusta, Maine, March 30, 2017.
- 8) <sup>†</sup>**Moreira, A<sup>‡</sup>**, Klein, S.J.W., Mistro\*, D. Poster Presentation. A Review of the Costs of Solar Policy to Society and Utility Rate Payers, Maine Sustainability & Water Conference, Augusta Civic Center, Augusta, Maine, March 30, 2017, <https://umaine.edu/mitchellcenter/2017-conference/poster-session/>.
- 9) <sup>†</sup>**Raffier<sup>§</sup>**, K., Klein, S.J.W., Fox\*, E. Poster Presentation. Analysis of Dams through Fact Sheet Creation to Aid in Future Dam Decision-Making, Maine Sustainability & Water Conference, Augusta Civic Center, Augusta, Maine, March 30, 2017.
- 10) **Klein, S.J.W.**, Oral Presentation (**Invited**). The Power of the People: socio-economic dimensions of community-based energy initiatives in the United States, Conference on the Practical Engagements and the Social-Spatial Dimensions of the Post-Petroleum Future, Le Studium, Tours, France, November 7-9, 2016.
- 11) <sup>†</sup>**Klein, S.J.W.**, Oral Presentation. What are the financial and social costs and benefits of different community solar approaches? Behavior, Energy, and Climate Change Conference (BECC), Baltimore, Maryland, October 20-22, 2016, [http://beccconference.org/wp-content/uploads/2016/09/2016-BECC-Abstracts\\_Alpha-by-Last-Name.pdf](http://beccconference.org/wp-content/uploads/2016/09/2016-BECC-Abstracts_Alpha-by-Last-Name.pdf).
- 12) <sup>†</sup>**Silka, L.**, Sullivan, C., Blais, J., de Urioste-Stone, S. Dixon, D., Hart, D., Isenhour, C., Klein, S., McGreavy, B., Oral Presentation. How to inspire students, energize faculty and serve your community. 17<sup>th</sup> Annual Engagement Scholarship Consortium Conference, University of Nebraska, Omaha, Nebraska, October 12, 2016, <https://engagementscholarship.org/conference/past-conferences/esc-2016-meeting/schedule>.
- 13) <sup>†</sup>**Klein, S.J.W.**, Coffey\*, S. Oral Presentation. A comparison of community solar policy incentives in three New England states. Northeastern Agricultural and Resource Economics Association (NAREA) Annual Meeting, Bar Harbor Regency, Bar Harbor, Maine, June 19-21, 2016, [http://www.narea.org/2016/conference/NAREA\\_2016\\_Detailed\\_Program\\_J1.pdf](http://www.narea.org/2016/conference/NAREA_2016_Detailed_Program_J1.pdf).
- 14) <sup>†</sup>**Klein, S.J.W.**, Mistro\*, D. Oral Presentation. Community energy for a sustainable future: window insert builds in Maine. Second International Sustainable Consumption

Research and Action Initiative (SCORAI) Conference “Transitions Beyond a Consumer Society”, Wells Conference Center, University of Maine, Orono, Maine, June 15-17, 2016,  
[http://www.confmanager.com//communities/c2865/files/ConferenceProgram\\_FINAL.pdf](http://www.confmanager.com//communities/c2865/files/ConferenceProgram_FINAL.pdf).

- 15) **Klein, S.J.W.**, Greco, V. Oral Presentation (**Invited**). Community solar decision support tool. National Community Solar Partnership Regional Workshop, US Environmental Protection Agency Region 1 Headquarters, Boston, MA, June 9, 2016.
- 16) <sup>†</sup>**Langton\***, **R.**, Klein, S. Oral Presentation. Biofuels from Trees: A New Process to Produce Drop-in Biofuels from Woody Biomass, International Conference on Environment and Renewable Energy. Sheraton Munich Westpark Hotel. Munich, Germany, May 26, 2016, [http://energy.conference-site.com/archive/2016/proceedings/proceedings\\_ICERE\\_2016.pdf](http://energy.conference-site.com/archive/2016/proceedings/proceedings_ICERE_2016.pdf).
- 17) <sup>†</sup>**Mistro\***, **D.**, Klein, S. Poster Presentation. Window Inserts and the Communities Adopting Them. Maine Sustainability & Water Conference, Augusta Civic Center, Augusta, Maine, March 29, 2016.
- 18) <sup>†</sup>**Langton\***, **R.**, Klein, S. Oral Presentation. Biofuels from Trees: A New Process to Produce Drop-in Biofuels from Woody Biomass. Maine Sustainability & Water Conference, Augusta Civic Center, Augusta, Maine, March 29, 2016, <https://umaine.edu/mitchellcenter/news/maine-water-conference/2016-maine-sustainability-water-conference/2016-concurrent-sessions/#energy>.
- 19) <sup>†</sup>**Coffey\***, **S.**, Klein, S. Oral Presentation. Does Community Solar Have a Future in New England? Maine Sustainability & Water Conference, Augusta Civic Center, Augusta, Maine, March 29, 2016, <https://umaine.edu/mitchellcenter/news/maine-water-conference/2016-maine-sustainability-water-conference/2016-concurrent-sessions/#energy>.
- 20) <sup>†</sup>**Klein, S.** Oral Presentation. Renewable Energy Solutions. 33<sup>rd</sup> United States Association for Energy Economics/IAEE North American Conference, Pittsburgh, PA, [http://www.usaee.org/usaee2015/program\\_concurrent.aspx](http://www.usaee.org/usaee2015/program_concurrent.aspx), October 25-28, 2015.
- 21) <sup>†</sup>**Neupane\***, **B.**, Klein, S., Wheeler, C., Rubin, J., Oral Presentation. Life Cycle Energy and Greenhouse Gases Emissions Assessment of Forest-based Drop-in Biofuel Production in Maine. American Center for Life Cycle Assessment Annual Meeting XV, Vancouver, British Columbia, October 6-8, 2015, <http://www.aclca.org/lca-xv/biofuels-3/>.
- 22) <sup>†</sup>**Dutra\***, **S.**, Klein, S., Poster Presentation. Economic Feasibility of Distributed Solar Water Heat in Maine. Maine Economics Conference, Colby College, Waterville, Maine, April 26, 2014, <http://www.colby.edu/econ/2014/04/02/2014-maine-economics-conference-student-researchers/>.
- 23) <sup>†</sup>**Whalley\***, **S.**, Neupane\*, B., Klein, S., Rubin, J., Oral Presentation. Sustainability Assessment of Drop-In Biofuels in Maine. 20th Maine Sustainability & Water Conference. Augusta Civic Center, Augusta, Maine, April 1, 2014, <https://umaine.edu/mitchellcenter/mwc-2014/concurrent-sessions/session-g/#whalley>.

- 24) **Pendse, H., Klein, S., (Invited)** Poster Presentation. Integrated national framework for cellulosic drop-in fuels. National Science Foundation Sustainable Energy Pathways Meeting, Westin Arlington Gateway, Arlington, Virginia, June 6, 2013.
- 25) <sup>†</sup>Teisl, M., McCoy, S., **Marrinan\*, S.**, Noblet, C., Johnson, T., Wibberly\*, M., Roper, R., Klein, S., Oral Presentation. Will offshore energy face fair winds and following seas?: Understanding what influences offshore wind acceptance. Maine Economics Conference, Bates College, April 27, 2013, <http://www.bates.edu/economics/files/2013/04/Maine-Economics-Conference.pdf>.
- 26) **Wagner, S.**, Oral Presentation (**Invited**). Energy-related solutions to climate change. Maine EPSCoR Conference, Breakout Session 3A "Research Frontiers in Sustainability", University of Maine, Orono, Maine, September 26, 2011.

### **Invited Presentations**

*NOTE: includes 4 presentations professional conferences/meetings from the previous list*

- 1) **Klein, S.J.W.**, Panelist. Teaching Panel Discussion, University of Maine Faculty Orientation, Wells Conference Center, Orono, Maine, August 24, 2017.
- 2) **Klein, S.J.W.**, Mistro\*, D., Oral Presentation. Window Insert Research, WindowDressers Annual Local Coordinators Meeting, St Francis of Assisi Church, Belfast, Maine, March 17, 2017.
- 3) **Klein, S.J.W.**, Oral Presentation. The Power of the People: socio-economic dimensions of community-based energy initiatives in the United States, Conference on the Practical Engagements and the Social-Spatial Dimensions of the Post-Petroleum Future, Le Studium, Tours, France, November 7-9, 2016.
- 4) **Klein, S.J.W.**, Panelist. Teaching Panel Discussion, University of Maine Faculty Orientation, Wells Conference Center, Orono, Maine, August 25, 2016.
- 5) **Klein, S.J.W.**, Oral Presentation and Moderator. Economics of Solar in Maine, Bangor Solar Forum, Eastern Maine Community College, Bangor, Maine, June 28, 2016.
- 6) **Klein, S.J.W.**, Greco, V. Oral Presentation. Community solar decision support tool. National Community Solar Partnership Regional Workshop, US Environmental Protection Agency Region 1 Headquarters, Boston, MA, June 9, 2016.
- 7) **Klein, S.** Oral Presentation. Update on a New Decision Support Tool for Diverse Community Solar Stakeholders, National Community Solar Partnership Community Building Working Group Monthly Webinar Series, April 12, 2016.
- 8) **Mistro\*, D., Klein, S., Brannigan<sup>§</sup>, J., Cormier<sup>§</sup>, N., Cushing<sup>§</sup>, T., Gillis<sup>§</sup>, O., Lemmler<sup>§</sup>, S., Masi<sup>§</sup>, M., Noble<sup>§</sup>, W., Peterson<sup>§</sup>, S., Sturrock<sup>§</sup>, E.** Oral Presentation. Window Insert Project. Campuses for Environmental Stewardship Presentations, Orono, Maine, December 10, 2015.
- 9) **Klein, S.**, Coffey\*, S. Oral Presentation. Community Solar: Harnessing the Power of the People. Mitchell Center for Sustainability Solutions Fall 2015 Seminar Series, Orono,

Maine, <http://umaine.edu/mitchellcenter/news/multimedia/video-on-demand/#fall15>, November 30, 2015.

- 10) **Klein, S.**, Oral Presentation. Multi-Criteria Decision Analysis. Future of Dams Kickoff Meeting, University of New Hampshire, November 20, 2015.
- 11) **Klein, S.**, Oral Presentation. Multi-Criteria Decision Analysis. Future of Dams Knowledge Systems Meeting, webinar, November 13, 2015.
- 12) **Sullivan, C., Dixon, D.,** Isenhour, C., DeUrioste-Stone, McGreavy, B., Klein, S. Oral Presentation. Where Service Learning Meets Sustainability: Connecting Classrooms with Communities for Stewardship and Civic Engagement. Mitchell Center for Sustainability Solutions Fall 2015 Seminar Series, Orono, Maine <http://umaine.edu/mitchellcenter/news/multimedia/video-on-demand/#fall15>, October 26, 2015.
- 13) **Klein, S.**, Rubin, J., Neupane\*, B., Langton\*, R., Whalley\*, S. Oral Presentation. Integrated Sustainability Assessment of Forest-based Drop-In Biofuel in Maine. FBRI Board Meeting, University of Maine, Orono, Maine, October 9, 2015.
- 14) **Klein, S.**, Oral Presentation. Comparing Sustainable Energy Tradeoffs. University of Massachusetts Mechanical and Industrial Engineering Seminar Series, Amherst, MA, <https://mie.umass.edu/event/comparing-sustainable-energy-tradeoffs>, September 21, 2015.
- 15) **Brannigan<sup>§</sup>, J.**, Klein, S., Oral Presentation. Building Sustainable Energy Communities. Old Town Rotary Club Meeting, Black Bear Inn, Orono, Maine, September 10, 2015.
- 16) **Klein, S.**, Oral Presentation. Solar Energy in Maine. Environment Maine Lighting the Way Press Event, University of Maine, Orono, Maine, September 3, 2015.
- 17) **Klein, S.**, Oral Presentation. Community Window Insert Build Fall 2015. Old Town Rotary Club Meeting, Black Bear Inn, Orono, Maine, May 21, 2015.
- 18) **Klein, S.**, Oral Presentation. Community Solar Trends and Opportunities, Solar Powering Your Community Workshop, Bangor, Maine, May 2, 2015.
- 19) **Klein, S.** Oral Presentation. Climate Change Solutions: Carbon Pricing and Community Energy, Earth Week Seminar, University of Maine, Orono, Maine, April 20, 2015.
- 20) **Klein, S.**, Criner, G., Allen, T., Oral Presentation. Jacobs Quarry Development: Economic Analysis Phase 2. Mid-Coast Solid Waste Corporation Meeting. Rockport Town Hall, Rockport, Maine, November 13, 2013.
- 21) **Pendse, H., Klein, S.**, Poster Presentation. Integrated national framework for cellulosic drop-in fuels. National Science Foundation Sustainable Energy Pathways Meeting, Westin Arlington Gateway, Arlington, Virginia, June 6, 2013.
- 22) **Criner, G.**, Klein, S., Allen, T., Leighton\*, R., Oral Presentation. Jacobs Quarry North: Economic analysis phase 1, Rockport Town Meeting, Rockport, Maine, May 20, 2013.

- 23) **Wagner, S.**, Oral Presentation. Sustainable solar power, School of Economics Seminar Series, University of Maine, Orono, Maine, March 16, 2012.
- 24) **Klein, S.** Panel Discussion. White House Champions of Change Panel Discussion, Americorps Alums Day at the White House, Washington, D.C., August 17, 2012.
- 25) **Wagner, S.**, Oral Presentation and Panel Discussion. Energy-related solutions to climate change. Maine EPSCoR Conference, Breakout Session 3A "Research Frontiers in Sustainability", University of Maine, Orono, Maine, September 26, 2011.

### Other Presentations

- 1) **Mistro\***, **D.**, Klein, S.J.W., Oral Presentation. A Window on Energy Savings, Senator George J. Mitchell Center for Sustainability Solutions Student Lightning Talks, University of Maine, November 15, 2016, <https://umaine.edu/mitchellcenter/2016/11/15/so-much-to-say-so-little-time/>.
- 2) **Raymond\***, **G.**, Klein, S.J.W., Poster Presentation. Using Multi-Criteria Decision Analysis to Compare Fuel Production Processes, UMaine Student Symposium: Research & Creative Activity, Cross Insurance Center, Bangor, Maine, April 24, 2017, <https://umaine.edu/research/wp-content/uploads/sites/48/2017/04/UMSS17Program.pdf>.
- 3) **Mistro\***, **D.**, Klein, S.J.W., Oral Presentation. Window Inserts and the Communities Adopting Them, UMaine Student Symposium: Research & Creative Activity, Cross Insurance Center, Bangor, Maine, April 24, 2017 <https://umaine.edu/research/wp-content/uploads/sites/48/2017/04/UMSS17Program.pdf>.
- 4) **Raffier<sup>§</sup>**, **K.**, Klein, S.J.W., Fox\*, E., Poster Presentation. Analysis of Dams through Fact Sheet Creation to Aid in Future Dam Decision Making, UMaine Student Symposium: Research & Creative Activity, Cross Insurance Center, Bangor, Maine, April 24, 2017 <https://umaine.edu/research/wp-content/uploads/sites/48/2017/04/UMSS17Program.pdf>.
- 5) **Fox\***, **E.**, Klein, S.J.W., Raffier<sup>§</sup>, K., Poster Presentation. Group Participatory Multi-Criteria Decision Analysis (PMCDA) and Dam Decisions, UMaine Student Symposium: Research & Creative Activity, Cross Insurance Center, Bangor, Maine, April 24, 2017 <https://umaine.edu/research/wp-content/uploads/sites/48/2017/04/UMSS17Program.pdf>.
- 6) **Mata\***, **R.**, Klein, S.J.W., Poster Presentation. Developing Best Practice Methods by Using Survey Data, UMaine Student Symposium: Research & Creative Activity, Cross Insurance Center, Bangor, Maine, April 24, 2017 <https://umaine.edu/research/wp-content/uploads/sites/48/2017/04/UMSS17Program.pdf>.
- 7) **Michaud<sup>§</sup>**, **K.**, Klein, S.J.W., Poster Presentation. EnergySmart Bangor Residential Rebate Program Presentation, UMaine Student Symposium: Research & Creative Activity, Cross Insurance Center, Bangor, Maine, April 24, 2017 <https://umaine.edu/research/wp-content/uploads/sites/48/2017/04/UMSS17Program.pdf>.
- 8) **Raymond<sup>§</sup>**, **G.**, Klein, S. Poster Presentation. Should Maine fund sustainability by selling license plates? UMaine Student Research Symposium, Cross Insurance Center, Bangor, Maine, April 27, 2016.

- 9) **Neupane\***, B., Klein, S., Wheeler, C. Oral Presentation. Environmental Life Cycle Assessment of Drop-in Biofuel Production in Maine. GradExpo, University of Maine, Orono, Maine, April 3, 2015.
- 10) **Coffey\***, S., Klein, S. Poster Presentation. What is Community Energy?, GradExpo, University of Maine, Orono, Maine, April 2, 2015.
- 11) **Klein, S.**, Oral Presentation. Creating a Sustainable Energy Future One Community at a Time, School of Economics Seminar Series, University of Maine, Orono, Maine, November 14, 2014.
- 12) **Whalley\***, S., Klein, S., Oral Presentation. Toward a Sustainable Energy Future: A Multi-Criteria Decision Analysis of Electricity Options for the United States. TED<sup>x</sup> UMaine: The Student Experience. University of Maine, Orono, Maine, April 5, 2014.
- 13) **Whalley\***, S., Klein, S., Rubin, J., Oral Presentation. An Estimation of the Cost to Harvest and Deliver Biomass Chips in Maine. University of Maine Graduate Academic Exposition, University of Maine, Orono, Maine, April 3, 2014.

#### **Sessions Chaired, Workshops Led**

- 1) Organizer/Facilitator, *Solar Phone Charger Building Workshop*, Mandela Washington Fellowship Program, University of Maine, Orono, Maine, July 6, 2017.
- 2) Moderator (**Invited**), *Greater Bangor Solarize Kickoff event*, Bangor Public Library, Bangor, Maine, July 19, 2017.
- 3) Facilitator, *Future of Dams All-Team Meeting Model, Stakeholder Engagement, and Integrative Synthesis working groups*, University of New Hampshire, Durham, New Hampshire, June 5-6, 2017.
- 4) Chair (Invited), *Session III – Urban and Local, Materiality and Social Spaces in the Energy Transition*, Conference on the Practical Engagements and the Social-Spatial Dimensions of the Post-Petroleum Future, Le Studium, Tours, France, November 8, 2017.
- 5) Moderator, *Solar Phone Charger Building Workshop for Mandela Washington Fellowship Program*, Maine Solar Energy Association, Jonesport, Maine, July 6, 2016.
- 6) Moderator (**Invited**), *Bangor Solar Forum*, Eastern Maine Community College, Bangor, Maine, June 28, 2016.
- 7) Chair (**Invited**), *Maine's Energy Future*. Maine Sustainability & Water Conference, Augusta Civic Center, Augusta, Maine, March 29, 2016.
- 8) Organizer/Facilitator, *NSF Career Grant Writing Workshop*, University of Maine, June 3, 2015.
- 9) Moderator (**Invited**), *Alternative Energy*, Maine Science Festival, Bangor, Maine, March 21, 2015.

- 10) Moderator (**Invited**), *Science Bound: The Path Less Traveled*, Maine Science Festival, Bangor, Maine, March 22, 2015.
- 11) Discussant (**Invited**): *Energy Project Planning Workshop*, Island Energy Conference, Island Institute, Portland, Maine, November 7, 2014.

## JOURNAL REVIEWS

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*Renewable & Sustainable Energy Reviews* (2), 2016-2017  
*Journal of Renewable and Sustainable Energy* (2), 2014  
*Energy Policy* (5), 2013-2015, 2017  
*Earthscan Publications* (1 book proposal), 2012  
*Environmental Science and Technology* (2), 2010-2011  
*World Renewable Energy Congress* (1), 2011

## PROFESSIONAL MEMBERSHIPS

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American Solar Energy Society (ASES) (2015-present)  
Environmental and Energy Technology Council of Maine (E2Tech) (2017)  
International Association for Energy Economics (IAEE) (2015-present)  
Northeastern Agricultural and Resource Economics Association (NAREA) (2016)  
Sustainable Consumption Research and Action Initiative (SCORAI) (2016)  
United States Association for Energy Economics (USAEE) (2015-present)

## SELECTED PRESS

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*NOTE: I changed my last name to Klein in January 2013*

- Newsroom. "UMaine Website Catalogs Renewable Projects." Accessed June 15, 2017. <http://www.foxbangor.com/news/item/20201-umaine-website-catalogs-renewable-projects>.
- "UMaine Researchers Create U.S. Community Renewable Energy Website - UMaine News - University of Maine." *UMaine News*, June 2, 2017. <https://umaine.edu/news/blog/2017/06/02/umaine-researchers-create-u-s-community-renewable-energy-website/>.
- The BDN Editorial Board, "Making Bangor walkable will help residents, visitors — and homeowners, too," *The Bangor Daily News*, January 2, 2017, <http://bangordailynews.com/2017/01/02/opinion/editorials/making-bangor-walkable-will-help-residents-visitors-and-homeowners-too/>.
- "Service Learning: Engaging Students for Real-World Problem Solving - Senator George J. Mitchell Center for Sustainability Solutions - University of Maine," *Senator George J. Mitchell Center for Sustainability Solutions*, <https://umaine.edu/mitchellcenter/news/news-2/service-learning-engaging-students-for-real-world-problem-solving/>.

- Zachary Warren, “U-Maine Students Stay Energy Efficient While Helping Others,” *WABI TV5*, October 29, 2016, <http://wabi.tv/2016/10/29/u-maine-students-stay-energy-efficient-while-helping-others/>.
- Sun for All, All for Sun: UMaine’s Sharon Klein tracks the rise of community solar, <https://umaine.edu/mitchellcenter/news/news-2/sun-for-all-all-for-sun/>, May 2016.
- “UMaine commits to National Community Solar Partnership - UMaine News - University of Maine,” *UMaine News*, 18-Nov-2015.
- Students in economics class work with community to keep homes warm - UMaine News - University of Maine. (2015, November 19). Retrieved from <https://umaine.edu/news/blog/2015/11/19/students-in-economics-class-work-with-community-to-keep-homes-warm/>
- *Bangor Daily News*, August 17, 2012, UMaine professor honored at White House for Americorps service, <http://bangordailynews.com/2012/08/17/education/umaine-professor-honored-at-white-house-for-amicorps-service/?ref=regionbangor>

## TEACHING

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**ECO 180 – Citizens, Energy, and Sustainability** (2011-present) introduces students to the technical, economic, environmental, and social implications of energy production and use, providing students with a broad understanding of energy issues. Students learn how citizens play a vital role in determining the direction that the future energy system and policies will take. This course adopts a “flipped” classroom and active learning approach to instruction and includes a service-learning component.

**ECO 405/590 – Sustainable Energy Economics and Policy** (2011-present) is a mixed undergraduate/graduate level course that engages students in quantifying and assessing the technical, economic, environmental, and social implications of energy supply, distribution, and use in the context of transitioning toward a sustainable energy future. Students examine a variety of energy options, including fossil fuels, nuclear power, and renewable energy (solar, wind, biomass, hydro, and geothermal). The effects of energy use on greenhouse gas emissions and climate change, on air and water quality, and on human health are considered alongside policies to mitigate these effects, such as carbon prices, emissions targets, efficiency requirements and investments, and renewable portfolio standards. Alternative future energy paths are developed that are consistent with environmental stewardship, energy security, and sustainable economic growth and development. This course adopts a “flipped” classroom and active learning approach to instruction and includes a service-learning component.

**ECO 370 - Sustainable Community Energy through Service Learning** (pilot course in Fall 2015) taught students about the role of community action in creating a sustainable energy future. Students engaged in service learning – *“a teaching and learning strategy that integrates meaningful community service with instruction and reflection to enrich the learning experience, teach civic responsibility, and strengthen communities”* (see <http://umaine.edu/upcc/files/2014/05/Service-Learning-at-UMaine.pdf>). Students also engaged in original research - preparing a final project that evaluated the costs and benefits of the service learning project. For the service project, we partnered with [WindowDressers](#) and the

[Unitarian Universalist Society of Bangor](#) to do a [window insert build](#), in which we built 375 interior wood-framed, plastic window inserts to reduce heat loss and save energy in old, drafty windows for 33 clients, with 27% of the inserts available to low-income families for a suggested contribution of \$1/insert (up to \$10; regular customers paid \$2/square ft). Another window insert build is planned for Fall 2016, which will be integrated as a service project into the existing ECO 180 and ECO 405/590 courses.

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**APPENDIX B – ECO 180 Spring 2014 Letter of Explanation for Missing Evaluations**

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**Spring ECO 180 course evaluations**

1 message

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**Bonnie Sparks** <sparks@maine.edu>

Thu, Oct 23, 2014 at 4:26 PM

To: sharon.klein@maine.edu

Cc: Heidi McDonald <heidi.mcdonald@maine.edu>, karen.moffett@maine.edu, teisl@maine.edu

Professor Kline,

University of Maine online course evaluations from the spring 2014 semester were copied and mailed to Wanda Westly in the CED office on the Orono Campus on June 4. The evaluations were sent via inter-campus mail in four very large envelopes. On June 5, Wanda called University College reporting that she received two of the four envelopes. We tried to locate the missing envelopes on both campuses but had no success.

On June 18, Wanda put the two envelopes she received (the only copies of the documents as we are not allowed to retain copies of faculty evaluations) back into inter-campus mail to be sent to the UC Learning Services office in Augusta for re-copying and redistribution. The two packages never arrived in Augusta. The efforts of both campus mailrooms to locate the envelopes were not successful.

I apologize. I know this is your loss and I can offer no excuse only the sequence of events as outlined above.

It is our hope that in the near future all UMS campuses will migrate away from the University College online evaluation platform: three of the campuses are already using alternatives and this fall UM is piloting an online evaluation tool. The University College tool is outdated and the process is inefficient but while it remains in use we will do everything possible to avoid a repeat of this situation.

Again, I apologize for this unfortunate sequence of events. I have copied Mariano Teisl on this email and I am happy to explain what occurred to whomever else you might need me to contact.

Please do not hesitate to call or email me to express your concern. Again, I apologize for this situation.

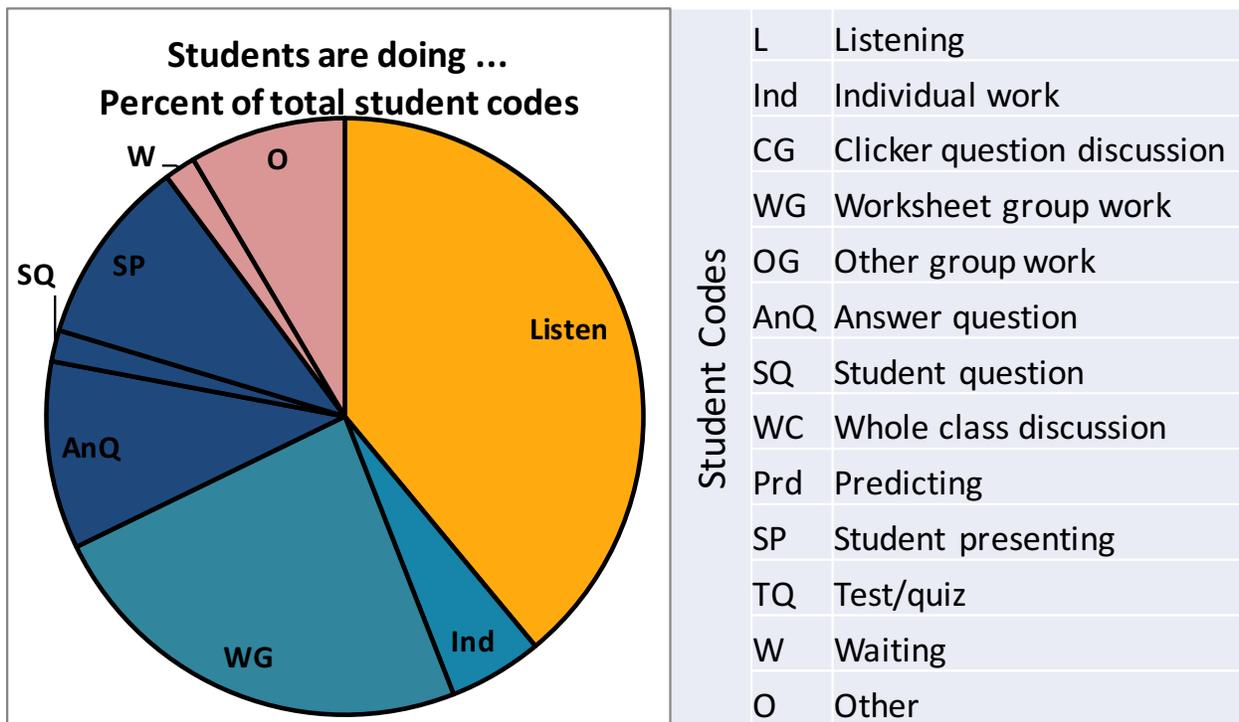
Bonnie Sparks, Executive Director  
University College and Distance Education  
621-3155, 1-800-868-7000



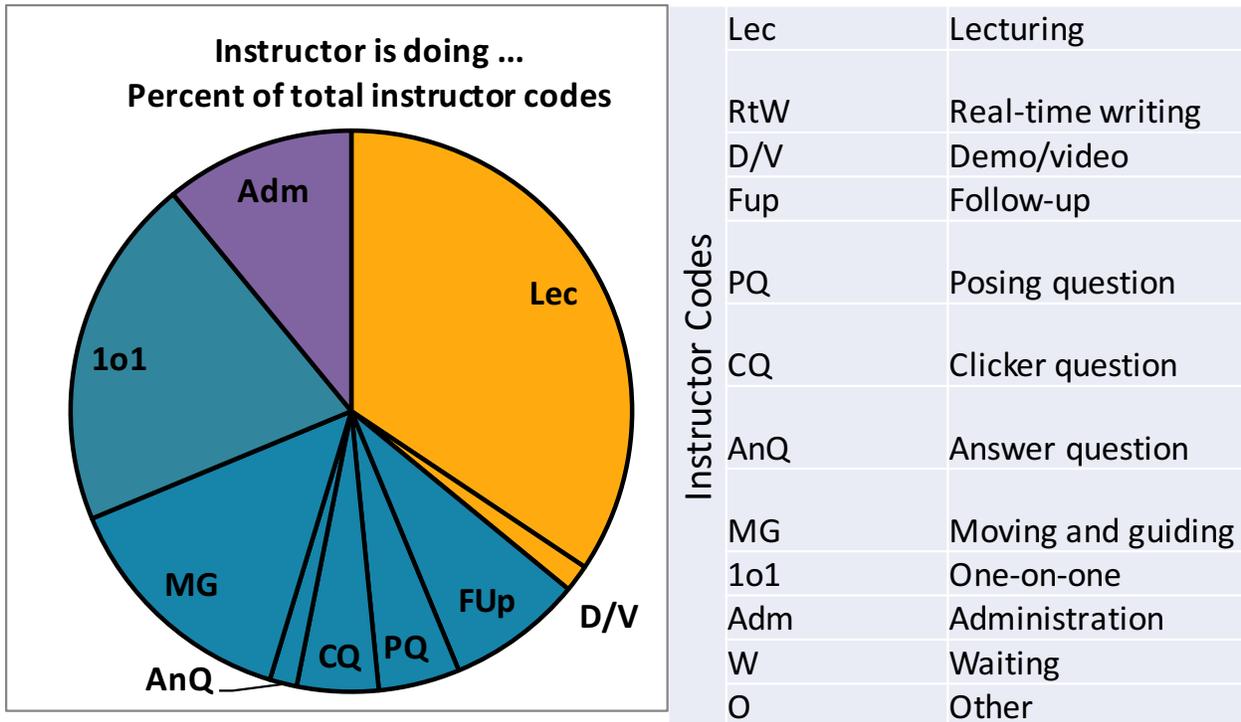
**APPENDIX C: Teaching Observations**

**April 2015 Observation of ECO 180 by local high school teachers**

Two teachers filled out an observation protocol that required them to mark every 2 minutes what I was doing and what the students were doing. They also made comments about what they observed. Then, the program facilitators (led by Erin Vinson, Campus Programs and Professional Development Coordinator Maine Center for Research in STEM Education (RiSE Center)) compared the 2 sets of codes from each of the 2 protocols to see whether there was agreement and presented me with the adjusted results, which are presented here.



**Figure C1** - Percent of total student codes (each time the observer marked something down about what students were doing (e.g., every 2 minutes) reflected by different student activities. The “Other” category was mainly when students were doing group work and writing their answers on the white board, Spring 2015 ECO 180.



**Figure C2** - Percent of total teacher codes (each time the observer marked something down about what I was doing (e.g., every 2 minutes) reflected by different teacher activities, Spring 2015 ECO 180.

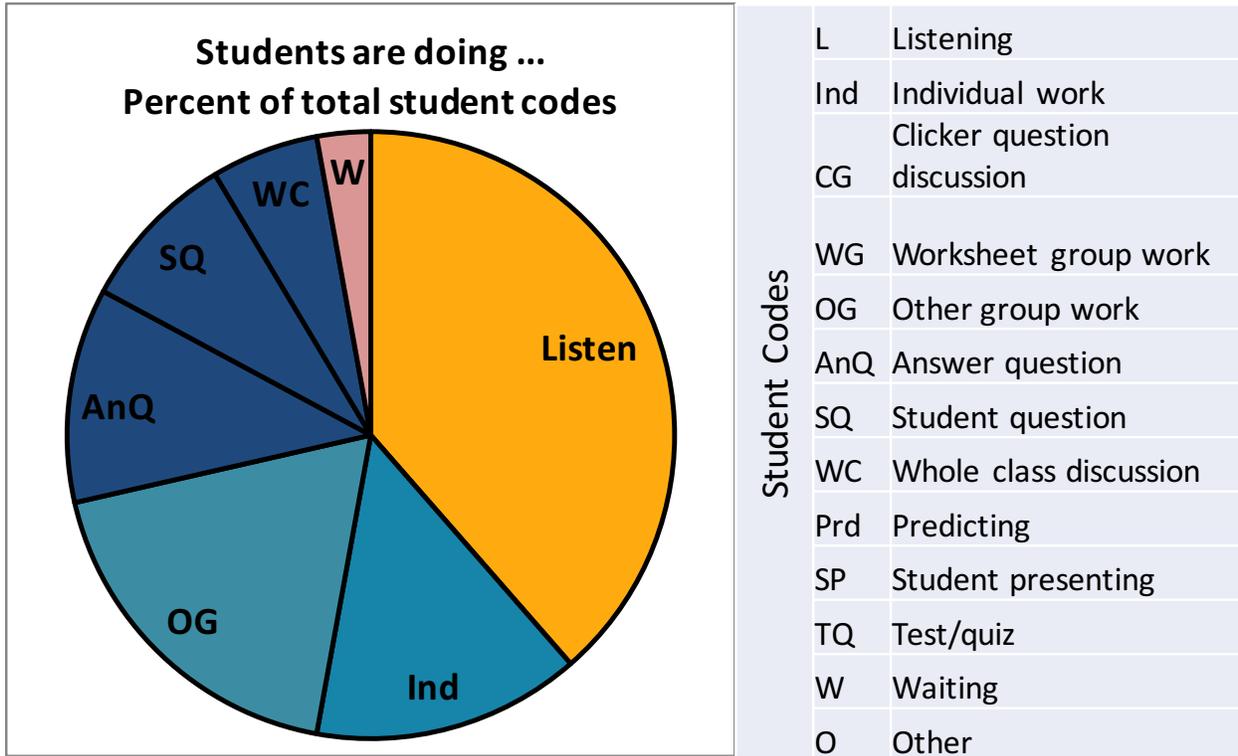
	r	stc	sw	o	p	g	a	o
	39%	22%	29%	10%	36%	53%	11%	0%
<b>Students are doing</b>								
r	receiving (L)							
stc	students talking to class (AnQ, SQ, WC, SP)							
sw	students working (Ind, CG, WG, OG, Prd, TQ)							
o	other (W, O)							
<b>Instructor is doing</b>								
p	presenting (Lec, RtW, D/V)							
g	guiding (Fup, PQ, CQ, AnQ, MG, 1o1)							
a	admin (Adm)							
o	other (W, O)							

**Figure C3** - Percent of total student and instructor codes broken down by a broader set of activity categories, Spring 2015 ECO 180.

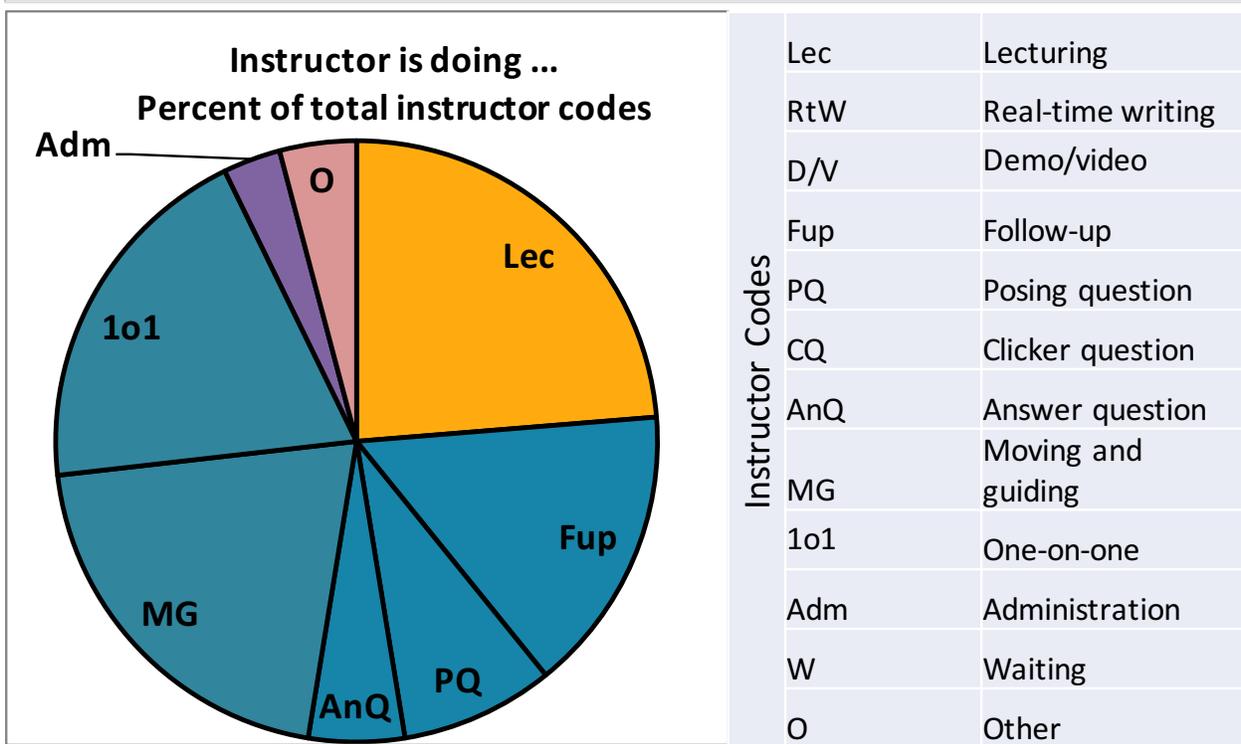
<b>% Presenting Category (Quadrant)</b>	25-50% (2)
<b>Class</b>	ECO180
<b>ObsCode</b>	144A042315
<b>Instructor#</b>	105
<b>1. General Comments</b>	Topic engaging, interesting to see from a business stand point, not just science.
What aspects of instruction were particularly impressive?	Good balance between lecture and active learning. First observed jig saw
<b>2. Did you observe peer discussion?</b>	Yes
Would opportunities for peer discussion have enhanced this class? Explain.	
In what ways could this instructor integrate peer discussion into his or her classroom?	
When did peer discussions occur? Choose all that apply. - during clicker questions, during worksheet activities, during other group work, other (explain)	During worksheet activities. Other (please explain) top hat question at end of class
How would you describe the frequency of peer discussion? Explain.	Just right - Evenly split with lectured, timing good
From what you could hear, were student peer discussions on task and productive? Explain.	Yes - students appeared to be on task most of the time
In what ways, if any, could peer discussions be improved in this class?	n/a
<b>3. Did you observe clickers or some other classroom response system?</b>	Yes
Would asking clicker questions enhance this class? Explain.	
How were clickers used? Choose all that apply. -For attendance, To ask questions about relevant course content, To facilitate peer discussions, Other (explain)	To ask questions about relevant course content
How would you describe the frequency of clicker questions in this class? Explain.	Sufficiently frequent - good fit for the class
In general, how would you describe the type of clicker questions?	Mostly basic knowledge questions (e.g., recall, count, define, label, match or identify questions)
In general, the clicker questions were:	Cannot determine - the instructor did not talk about the class voting results
In general, time given to students to think about and answer clicker questions was:	Too short
In what ways, if any, could the use of clickers be improved? Explain.	give more time
<b>4. Did you observe the instructor verbally pose non-clicker questions to students?</b>	Yes
Would verbally posing questions to students enhance the class? Explain.	
How would you describe the frequency of verbally posed questions? Explain.	Sufficiently frequent - evenly spaced through lecture
How would you describe the instructor's average wait	Just right
In what ways, if any, could this instructor improve his/her questioning practices? Explain.	fine
<b>5. Did you observe lecturing?</b>	Yes
If not lecturing, please describe what the instructor was doing during this class.	
Would adding lecture enhance this class? Explain.	
How would you describe the time dedicated to lecturing? Explain.	Just right - sufficient to give a good intro to the lesson
In what ways, if any, could this instructor improve his/her lecturing practices? Explain.	looked good, we were engaged
<b>6. Did you observe real-time writing on the board, a document projector, or a tablet?</b>	No
Would incorporating real-time writing enhance instruction in the class? Explain.	No - discussion based lesson
How would you describe the frequency of real-time writing in the class? Explain.	
Are there ways in which the use of real-time writing could be enhanced? Explain.	
<b>7. Additional suggestions for how instruction could be enhanced in this class?</b>	nice job

Figure C4 – Results of questionnaire filled out by observers, Spring 2015 ECO 180

September 2017 Observation of ECO 405/590 by Erin Vinson, Campus Programs and Professional Development Coordinator Maine Center for Research in STEM Education (RiSE Center).



**Figure C5** - Percent of total student codes (each time the observer marked something down about what students were doing (e.g., every 2 minutes) reflected by different student activities, Fall 2017 ECO 405/590.



**Figure C6** - Percent of total teacher codes (each time the observer marked something down about what I was doing (e.g., every 2 minutes) reflected by different teacher activities, Fall 2017 ECO 405/590.

	r	stc	sw	o		p	g	a	o
	39	26	33	3		24	69	3	4
<b>Students are doing</b>									
r	receiving (L)								
stc	students talking to class (AnQ, SQ, WC, SP)								
sw	students working (Ind, CG, WG, OG, Prd, TQ)								
o	other (W, O)								
<b>Instructor is doing</b>									
p	presenting (Lec, RtW, D/V)								
g	guiding (Fup, PQ, CQ, AnQ, MG, 1o1)								
a	admin (Adm)								
o	other (W, O)								

**Figure C7** - Percent of total student and instructor codes broken down by a broader set of activity categories, Fall 2017 ECO 405/590.

University of Maine System  
2017 Tenure and Promotion

min	1. Students doing														2. Instructor doing										Comments
	L	Ind	CG	WG	OG	AnQ	SQ	WC	Prd	SP	T/Q	W	O	Lec	RtW	FUP	PQ	CQ	AnQ	MG	1o1	D/V	Adm	W	
0 - 2	1				1															1			1		Partners discuss homework
2					1															1	1				
4					1															1	1				
6					1																1				1 Instructor getting slides, TA
8 - 10					1															1	1				1 is working with students.
10 - 12					1															1	1				
12	1				1									1		1				1			1		
14	1													1		1									
16	1				1									1		1				1	1				
18 - 20					1															1	1				
20 - 22					1															1	1				
22	1				1	1											1	1		1	1				
24	1					1								1		1	1								
26	1					1	1							1		1	1		1						
28 - 30	1					1		1								1	1								Students building on each other's ideas
30 - 32	1					1		1						1		1	1								
32	1					1		1						1		1	1								
34	1						1							1					1						Using research examples
36	1													1					1						Brings in student ideas from the homework
38 - 40	1													1											when going over in class.
40 - 42	1													1		1									Quote from student homework
42	1						1							1		1									Student question about graph/units
44	1						1							1							1				Checking on graph with student
46	1													1		1					1				1
48 - 50	1						1							1					1						
50-52	1													1											
52	1													1											
54	1	1												1						1					1st calculation
56		1																		1	1				
58-60		1																		1	1				
60-62	1	1				1								1		1	1			1	1				
62	1	1												1						1					2nd calculation
64		1																		1	1				
66		1																		1	1				
68-70	1	1				1								1		1	1			1	1				
70-72	1													1		1									
72	1	1				1								1						1	1				Work individually or in groups
74	1	1				1														1	1	1			

**Figure C8** – Raw data and comments from Erin Vinson (she did not fill out a questionnaire like the observers did in Spring 2015), Fall 2017 ECO 405/590.



Sharon Klein <[sharon.klein@maine.edu](mailto:sharon.klein@maine.edu)>

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**Updated COPUS observations**

1 message

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**Erin Vinson** <[erin.vinson@maine.edu](mailto:erin.vinson@maine.edu)>

Thu, Sep 28, 2017 at 9:34 AM

To: "Sharon (Wagner) Klein" <[sharon.klein@maine.edu](mailto:sharon.klein@maine.edu)>

Hi Sharon,

I really enjoyed your class on Tuesday - thank you! I love the format of your class and how you have students discussing in groups, not just about answers - but also their opinions. Your students all seem very engaged and interested in the material. I've updated the COPUS results that we went over last week to include yesterday's ECO405.

With care,

Erin

--

[Erin Vinson](mailto:erin.vinson@maine.edu)

Campus Programs and Professional Development Coordinator

Maine Center for Research in STEM Education (RiSE Center)

and the School of Biology and Ecology

University of Maine

207.581.4666 / [erin.vinson@maine.edu](mailto:erin.vinson@maine.edu)

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 **UCOP\_105.xlsx**  
122K

**Figure C9** – Email from Erin Vinson about classroom observation results, Fall 2017 ECO 405/590.

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**APPENDIX D: Letters of Support from Former Students**

Tuesday, August 22, 2017

To Whom It May Concern,

My name is Erica Sturrock, and I am writing on behalf of my professor and mentor, Dr. Sharon Klein. While a student, I took all three of Dr. Klein's courses: "Citizens, Energy, and Sustainability" (ECO180), "Sustainable Energy Economics & Policy" (ECO 405) and her pilot course, "Building Sustainable Energy Communities Through Service Learning" (ECO370). I also worked for Dr. Klein as a research assistant during the summer of 2016, continuing the research we had started in the service learning course. In September of 2016, I spoke on a student panel at the "Campuses for Environmental Stewardship: Best Practices Showcase" at the University of New England. I answered questions and spoke about my experiences in Dr. Klein's pilot course about how service learning had affected my education.

To understand how I was impacted by Dr. Klein, first I must explain my circumstances. I came to the University of Maine as a non-traditional student. I am married and I have a young child, and school felt like a chore. I was entirely new to the field of economics, and I wasn't very excited about it. I was slightly on the defensive, assuming that my education would be tedious and difficult. I was suspicious, if not intrigued, signing up for an Economics class that was service-learning based. I first heard from Dr. Klein during the summer before classes started. She offered her service learning students an opportunity to get a head start on fulfilling our required service hours before the semester began. I took her up on this offer, and our first introduction was in the community instead of the classroom. I began to learn that this is exactly where Dr. Klein's heart lives: as an educator, in the community.

Throughout my time working with Dr. Klein, I always felt the connection she was urging her students to draw between the course content and the real world. It was something she exemplified in our first meeting. The message was: expand your mind through learning, expand your understanding of the world through doing, and expand your community by working to better it.

Dr. Klein's method of teaching, the "flipped classroom" style, puts the value of interaction and discussion in the forefront. In my experience with her classes, our homework would be to get through the readings and the media. Then we could come to class prepared to engage in meaningful discussions with our classmates and with Dr. Klein. This gave the students the sense that our perspective on what we had learned was important, and it allowed us to scaffold off of other students' ideas to build a very robust understanding of the materials.

The flipped classroom approach pertained to Dr. Klein's service learning course as well, but much of the value I garnered from this course came from the connection to my community that I was able to make because of the service we performed. I never expected to experience this connection in an Economics class. Dr. Klein brilliantly understands that learning takes place in the moments when students are applying the best of themselves to a task. Our service learning project was to partner with Window Dressers, a non-profit organization that uses a volunteer model to help provide people with low-cost window inserts to increase their home heating efficiency and reduce heating costs. We interacted with the community, entering their homes to measure their windows. We participated in the "community build", an event that takes place for each locale that participates in a Window Dressers build, where as a class we worked to assemble the inserts themselves alongside other members of the community. We then conducted group research projects to look at how the inserts address the four categories of sustainability (technical, environmental, economic, and social). I walked away from the course with an entirely new understanding of my community and my own abilities. The work was challenging, but when it was done I

Tuesday, August 22, 2017

was filled with a sense of accomplishment that I never felt from any other course in my college career. I felt empowered and inspired. I was empowered by my new understanding of my own capabilities and my new knowledge of energy, sustainability, and community. I was inspired by Dr. Klein, her passion for community energy, her investment in her students, and her dedication to the project.

There is no question in my mind that Dr. Sharon Klein has been the most influential educator in my college career. Because of my experiences in her classes and as a research assistant, I am a better citizen. Her passion ignited my passion. I completed my senior capstone project on the economic impact of window inserts. My world view is broader and my confidence is stronger, and I credit Dr. Klein.

Thank you for your consideration. Please feel free to reach me for any questions or further elaborations.

Sincerely,



Erica Sturrock,

University of Maine Class of 2017

[erica.sturrock@maine.edu](mailto:erica.sturrock@maine.edu)

August 8, 2017

Distinguished Members of the Tenure Committee,

I am writing to express my enthusiastic support for Dr. Sharon Klein in her tenure-review. Dr. Klein served as my master's adviser, and over the course of two years we worked closely together on a research project focused on community renewable energy. As such, I am confident commenting on her approach and abilities as a research mentor.

I entered the Masters in Economics program at UMaine with almost no background in either academic research or, indeed, the field of economics; Dr. Klein did not hesitate to take on the task of training me from the ground up. Despite my inexperience, she was incredibly patient as she trained me to write an effective literature review, develop my own research questions, and construct detailed models to evaluate the cost effectiveness of different types of community solar PV installations in the current policy/incentive environment.

Dr. Klein spent countless hours guiding me as I prepared to give my first research presentation at the Maine Sustainability and Water Conference in 2016; her feedback was invaluable and afforded me the confidence required to face what seemed a fairly daunting task. Despite the high degree of support Dr. Klein offered me as I began my foray into research, she also encouraged me to begin to work more independently as I progressed. Furthermore, she excels in offering critiques that are instructive without being harsh; I always knew that her feedback was meant to ensure that I produced research to the best of my abilities.

Apart from her notable skill as a research mentor, what strikes me most about Dr. Klein is her genuine passion for renewable energy research. It is obvious that she is both excited about the pursuit of knowledge itself, and hopeful that research around renewable energy sources can help policy makers in the monumental task of addressing global climate change. This love of academic research is something that Dr. Klein also fostered in me, and my experience as her master's student encouraged me to pursue a doctorate in economics. She was happy to coach me through the arduous process of Ph.D admissions, and with her guidance I was accepted to and enrolled in the Ph.D program in economics at Syracuse University.

It is difficult to overstate how much I have benefited through my relationship with Dr. Klein. Her mentorship enabled me to develop from someone who knew next to nothing about academic research into someone confident enough to undertake a Ph.D in the hopes of becoming a professor myself someday. It is thus my sincerest hope that Dr. Klein's efforts be rewarded with tenure.

Sincerely,



Stephanie Coffey  
[sgcoffey@syr.edu](mailto:sgcoffey@syr.edu)  
781-640-8782

Sharon Wagner Klein Ph.D.  
University of Maine  
School of Economics  
August 20, 2017

Dear Tenure Committee,

I am writing this letter in support of Sharon Klein Ph.D. as she applies for tenure through the University of Maine School of Economics. Dr. Klein served as my student and research advisor throughout my time in graduate school as I studied Resource Economics & Policy. During this time, I worked closely with Sharon to complete my academic requirements, develop defensible scientific methods for my research project, and to conduct research for my thesis.

As I worked with Dr. Klein I developed a deep appreciation for her on a professional level as a teacher and academic advisor as well as on a personal level as mentor and friend. As an academic researcher, Dr. Klein maintains the highest of standards, working with her students to produce research that exceeds the requirements for the University and advances the field through peer reviewed publications. For example, we are currently working on two potential publications that are the result of our combined effort as an extension of my thesis work. Perhaps the best description of Dr. Klein's academic tenacity I can offer, is to quote a U Maine Professor who described her to me as a "meticulous researcher".

Though Sharon is undeniably an excellent analytical scientist what I appreciated most about her was not her academic savvy but rather her compassion and personal understanding for her students. Like many young professionals making the transition away from the structure of undergraduate education and into the rigors of graduate school I found myself overwhelmed, struggling to maintain balance both in my work and personal life. Sharon was not only professionally supportive during this difficult time for me but she also provided the kind of practical sound advice that, in my mind, is the embodiment of what an advisor should aspire to do for their students.

It is with the utmost respect that I recommend Dr. Sharon Klein for a tenured position at the University of Maine in the School of Economics. As a proud alum, I can say without a shadow of a doubt that Dr. Klein will be exceptional addition to the permanent SOE community both as a scientific investigator and student mentor.

Respectfully yours,

Robert Langton, M.S.  
[Robert.Langton@dnvgl.com](mailto:Robert.Langton@dnvgl.com)  
(207) 380 - 4073

**APPENDIX E – Course Syllabi**

**ECO 180 Citizens, Energy, and Sustainability**  
**Fall 2017 Syllabus**  
Tues/Thurs 12:30-1:45pm  
Estabrooke 130 (Active Learning Classroom)

**COURSE INFORMATION**

ECO 180: Citizens, Energy and Sustainability

3 credits

Course website: <https://classroom.google.com> (*instructions for access will be given on first day of class*)

**Instructor**

**Dr. Sharon Klein**

Assistant Professor

School of Economics

Winslow Hall, Room 305C

207-581-3174

[sharon.klein@maine.edu](mailto:sharon.klein@maine.edu) (*when sending email to this address, please start the subject line with the course designator (e.g., ECO 180)*)

**Office Hours:** TBD

**Prerequisites**

None

**Teaching Assistant (TA)**

**TBD**

School of Economics

Winslow Hall

**Email:**

**Office Hours:** TBD in the Econ Lab.

For more information about the Econ Lab, including location, see: <http://umaine.edu/soe/student-campus-links/economics-lab/>.

**Course Description**

This course introduces students to why they should care about energy issues and what they can do about them. Students will get a broad overview of a variety of technical, economic, environmental, and social implications of energy production and use. The course will focus on current U.S. and global energy use and policies as well as alternative energy options. Students will learn how citizens can play a vital role in determining the direction that the future energy system and policies will take. In the course of our lifetime each of us will be asked to make individual energy decisions, including voting on energy-related issues. This course will give you

a place to start in understanding the complex tradeoffs associated with sustainable energy decision-making. Students will be required to do readings and watch videos prior to class so they can spend most of the class time engaged in active learning (e.g., discussions, debates, problem-solving, games, presentations, etc). Students may be required to participate in field trips.

This course satisfies the General Education requirements for Population and Environment and Social Context and Institutions.

### **Course Goal**

The main goal of this course is to expand student understanding of the current energy system, sustainable energy alternatives, and the citizen's role in achieving a sustainable energy future.

### **Student Learning Outcomes**

Upon successful completion of this course, students will be able to:

1. **Describe energy production and consumption systems using appropriate units and vocabulary.**
2. **Identify existing patterns, policies and targets associated with energy consumption and production.**
3. **Identify options and constraints associated with various methods of alternative energy production, transportation, and use.**
4. **Discuss the role of the citizen in local, state and national energy policy.**
5. **Discuss tradeoffs inherent in the selection of energy options and policy support for these options.**
6. **Evaluate the overall sustainability of energy options.**
7. **Engage in citizen-oriented solutions to energy issues.**
8. Evaluate the role of civic engagement and service learning in creating and implementing sustainable energy solutions.
9. Create a new vision for transitioning to a sustainable energy future.

We will measure these learning outcomes throughout the semester through **homework**, in-class activities, service, exams, and a final **presentation**.

## **INSTRUCTIONAL MATERIALS & METHODS**

### **Required Texts**

There is no required text for this course. All required readings and videos will be available through the course website in Google Classroom (<https://classroom.google.com> (*instructions for access will be given on first day of class*)). There will be a fee for the course management software, Top Hat, however (see below for more information).

### **Google Classroom**

Google Classroom will be our main stop for most course content. This is where I will post weekly readings, videos, and homework assignments, as well as announcements and most grades. You will submit your homework (and occasionally some in-class assignments) through Classroom. You will receive grades for these assignments through Classroom. Classroom also

links to Google Drive (GD) so if you have GD installed on your computer and set up to automatically sync, you can access the Classroom folder for this course directly from your computer's desktop. Alternatively, you can visit your GD through your web browser and find the Classroom folder for this course in there. Downloading and accessing GD through your computer directly (through Finder on Mac or one of your computer file folders on Windows) can sometimes reduce issues associated with accessing GD through a web browser. You can access our course on Classroom here: <https://classroom.google.com>. I will provide the course code on the first day of classes and go through a little tutorial.

### **Top Hat**

Top Hat is great for in-class assignments like mini-quizzes and attendance. It's kind of like iClicker but allows for some more flexibility. I will use Top Hat each class period to ask questions about course content and/or take attendance. Although readings and videos are free, you are required to purchase access to Top Hat (for more information see: <http://www.umaine.edu/it/software/tutorials/TopHat/>). During the first week of classes, **I will send you an invitation through Google Classroom to register for Top Hat.** When you receive my email, click on the link to complete your registration. You can choose to pay \$26 for the semester, \$38 for 12 months, or \$75 for four years (see <https://tophat.com/educational-technology/pricing/>). Please make sure you are registered and have access by the start of the second day of class. It is important that once you pay for your Top Hat account that you register with your full first and last name, student ID and ideally your maine.edu email address. Registering in this way will prevent grading delays later in the semester. Top Hat will allow us to engage more readily in in-class active learning activities, and it is required in order to participate in class activities that earn course credit.

### **Non-Traditional Teaching Methods**

This course uses active, inquiry-based, project-based, service- and collaborative learning methods, as well as a partial "flipped" classroom model to enrich student understanding of the material and help students develop professionally and personally (for more information, see: [https://www.youtube.com/watch?v=MdymI61hLPY&list=PLE8C54256779B374D&index=3&feature=plpp\\_video](https://www.youtube.com/watch?v=MdymI61hLPY&list=PLE8C54256779B374D&index=3&feature=plpp_video)). There will be times we will use a traditional lecture-style approach to class, but most of the time in class, students will be expected and required to actively engage in discussions, debates, problem-solving, and other activities that help improve learning outcomes, problem-solving and critical thinking skills, confidence, retention of information, group collaboration, and many other important aspects of learning. In order to participate fully in these activities, students will need to do readings, watch videos, and complete written assignments outside of class, on time. Students will be graded on each of these important components of learning, in-class and out-of-class.

True to the spirit of inquiry-based learning, I may not always give a direct answer to a question but rather encourage students to find the answers on their own. This may seem frustrating and inefficient at times, but finding answers on their own helps students understand concepts at a deeper level and retain information better. I will provide direct answers when necessary, and I will be open about when I am being indirect and why.

Service-learning is a "teaching method which combines community service with academic instruction as it focuses on critical, reflective thinking and civic responsibility. Service-learning programs involve students in organized community service that addresses local needs, while

developing their academic skills, sense of civic responsibility, and commitment to the community” (<http://umaine.edu/volunteer/service-learning/>). Community service related to sustainable energy is a required component of this course because it helps students better understand their own role in achieving a sustainable energy future.

## GRADING AND COURSE EXPECTATIONS

Components of Final Grade:

Homework Assignments	30%
In-Class Assignments	30%
Final Project	20%
Service	20%

The final semester grade will be the sum of the weighted total In-Class Assignment, Homework, Service, and Final Project grades and will be assigned as follows:

A (90 or above)	B+ (87-89.9)	B (82-86.9)	B- (80-81.9)
C+ (77-79.9)	C (72-76.9)	C- (70-71.9)	D+ (67-69.9)
D (62-66.9)	D- (60-69.9)	F (59.9 or less)	

### **Homework Assignments (30%)**

It is very important for students to come to class ready to actively participate and learn. In many ways, the rest of the class depends on each student doing his/her part in this way. Weekly homework assignments are essential to being prepared. Homework assignments will consist of reading and/or watching videos and writing a reflection; answering specific questions about course material; and/or conducting independent research. Homework assignments will be submitted through the Google Classroom website <https://classroom.google.com> (*instructions for access will be given on first day of class*). The 1 lowest homework assignment grade will be dropped at the end of the semester. Homework assignments may taper off toward the end of the semester as the Final Project component becomes more prominent.

### **In-Class Assignments (30%)**

All students are expected to attend class each day and be prepared with a **calculator** (phone, tablet or computer are acceptable substitutes), **paper, pen and/or pencil, and a device** for use with **Top Hat** (cell phone, tablet or computer). To take advantage of the active learning classroom, it is recommended (but NOT required) that you bring a **computer with HDMI hookup** capability. Students are welcome to take notes on a computer or tablet, but they must also bring paper and pen/pencil.

Students are expected to attend ALL scheduled class meetings and participate in ALL learning activities during class times, which may include group discussions, reflections, debates, games, problem-solving (sometimes involving math – hence the calculator, paper and pencil), individual writing, quizzes, etc. For some of these assignments, you will work collaboratively with people at your **learning table**, which will be identified at the beginning of the semester and may change throughout the semester. In-class assignments will build off of Homework assignments and help students build knowledge to work toward future assignments and the final project. The 1 lowest in-class assignment grade will be dropped at the end of the semester.

Depending on the specific assignment, **problem-solving** assignments usually will be graded on whether the student (or group) obtained the correct answer and/or used the appropriate procedure to arrive at the correct answer. **Discussions, debates, and individual writing assignments** will be graded either based on whether all parts of the assignment were complete or using rubrics posted in Classroom. **Games** will be graded in a similar fashion to a quiz – the grade will depend on getting the correct answer, providing the correct explanation, etc. On average, 1-5 in-class questions each day will require **Top Hat** (see above). Most Top Hat questions will be graded 50% on correct answer and 50% on participation.

### **Final Project (20%)**

The final project will be a 1-min video or audio recording and accompanying 1-2 page fact sheet that expresses your vision for a sustainable energy future, tailored to a specific audience (e.g., President of the United States, Governor of Maine, members of your local community, the UMaine student body, etc). Specific instructions will be posted on Classroom.

### **Service (20%)**

Over the course of the semester, students will engage in a minimum of 10 hours of local community service that helps improve energy sustainability. For example, in the past, students have helped build interior window inserts to reduce heat loss through old drafty residential windows in the Bangor/Orono area, worked with local municipalities to analyze an energy problem they are having, volunteered at an energy or other sustainability-focused fair, etc. Students may also design their own project to improve energy sustainability at the University or in a local community. Students will be graded based on meeting the required number of hours, providing high quality service in a dedicated, caring, and professional manner, and submitting a brief service reflection paper. More information, including a list of potential service opportunities will be posted on Classroom.

### **Course Policies**

#### **Extra Credit**

A limited number of extra credit opportunities will be available at different times throughout the course – I will post these on Classroom as they become available. Students are welcome to propose ideas for extra credit assignments that I have not yet made available. All extra credit assignments must be submitted to Classroom by the last day of classes. Students may earn up to a maximum of 20 extra credit points to be applied to either their Homework OR In-Class Assignment total semester points (the equivalent of 2 additional assignments). Please see “Extra Credit” in Classroom for instructions and a list of acceptable ideas.

### **Late/Missed Assignments**

I understand that life happens, and I don't want to waste your time and mine discussing excuses and/or valid reasons for missed assignments. For this reason, I will drop the 1 lowest Homework assignment and 1 lowest In-Class Assignment at the end of the semester. You also have the opportunity to earn credit for up to 2 additional Homework/In-Class assignments through Extra Credit. Therefore, there will be NO opportunities to makeup missed work, and late assignments will NOT be accepted. The only exception is if the University has granted you a leave from course duties for some reason - in this case, the proper documentation would be required to makeup missed or late assignments within the appropriate timeframe specified on the University documentation. You must arrange a meeting with me (outside of class time) as soon as possible in a situation like this, so we can work out the timeline for makeup work. If you know in advance you are going to miss an assignment due to sporting events, field trips for other classes, or some other official event, you are expected to let me know as soon as you know of the conflict and complete assignments prior to the deadlines if possible or meet with me to schedule new deadlines.

### **Communication Policy & Extra Help**

Check Google Classroom regularly for announcements, assignments and other communication from me.

If you have a question or need extra help, please do the following **in order**:

- 1) Review the course materials on Classroom (i.e., syllabus, instructions, announcements, readings, videos, etc.) and see if there are already answers available in these materials.
- 2) Check the discussion threads surrounding the course materials to see if your question has already been asked and answered.
- 3) If your question has not been asked yet in Classroom, but it may apply to other students, please post your question to Classroom and/or ask your question in class so all students can benefit.
- 4) If your question is more individual in nature and/or you have not found an answer after completing steps 1-3, please email me. There may be time to ask a quick question before or after class, but for some questions – especially where I may need to look something up – email works better. Please send email requests for meetings **at least 48 hours ahead of time** – depending on my travel and research schedule, I may need more time than this.

I expect emails from students to me (and vice versa) to be composed professionally with complete sentences and proper English writing style with no spelling mistakes or cryptic abbreviations (i.e, an email is not a text message), a CLEAR subject line that includes the course designator (e.g., ECO 180) and a clear, concise question. I reserve the right not to respond to emails that don't meet these qualifications.

During the weekdays, I will try to respond to emails within a 36-hour turnaround time. I will try to respond to emails sent on weekends/holidays within 60 hours. I teach other courses, do research, and have a personal life, so please be patient and respectful.

### **University Policies**

#### **Student Accessibility Statement**

If you have a disability for which you may be requesting an accommodation, please contact Student Accessibility Services, 121 East Annex, 581-2319, as early as possible in the term. Students who have already been approved for accommodations by SAS and have a current accommodation letter should meet with me (the instructor of the course) privately as soon as possible.

### **University Academic Honesty Statement**

Academic honesty is very important. It is dishonest to cheat on exams, to copy term papers, to submit papers written by another person, to fake experimental results, or to copy or reword parts of books or articles into your own papers without appropriately citing the source. Students committing or aiding in any of these violations may be given failing grades for an assignment or for an entire course, at the discretion of the instructor. In addition to any academic action taken by an instructor, these violations are also subject to action under the University of Maine Student Conduct Code. The maximum possible sanction under the student conduct code is dismissal from the University.

### **University Sexual Discrimination Reporting Policy**

The University of Maine is committed to making campus a safe place for students. Because of this commitment, if you tell a teacher about an experience of **sexual assault, sexual harassment, stalking, relationship abuse (dating violence and domestic violence), sexual misconduct or any form of gender discrimination** involving members of the campus, **your teacher is required to report** this information to the campus Office of Sexual Assault & Violence Prevention or the Office of Equal Opportunity.

**If you want to talk in confidence** to someone about an experience of sexual discrimination, please contact these resources:

*For confidential resources on campus:* **Counseling Center: 207-581-1392** or **Cutler Health Center: at 207-581-4000.**

*For confidential resources off campus:* **Rape Response Services: 1-800-310-0000** or **Spruce Run: 1-800-863-9909.**

**Other resources:** The resources listed below can offer support but may have to report the incident to others who can help:

*For support services on campus:* **Office of Sexual Assault & Violence Prevention: 207-581-1406, Office of Community Standards: 207-581-1409, University of Maine Police: 207-581-4040 or 911.** Or see the OSVP website for a complete list of services at <http://www.umaine.edu/osavp/>

### **Course Schedule Disclaimer (Disruption Clause)**

In the event of an extended disruption of normal classroom activities, the format for this course may be modified to enable its completion within its programmed time frame. In that event, you will be provided an addendum to the syllabus that will supersede this version.

### **Tentative Course Outline**

This will be posted on Classroom on the first day of classes and is subject to change.

**ECO 405/590 Sustainable Energy Economics and Policy**

**Fall 2017 SYLLABUS**

Tues/Thurs 2:00-3:15pm

Rogers Hall 206

**COURSE INFORMATION**

ECO 405/590: Sustainable Energy Economics and Policy

3 credits

Course website: <https://classroom.google.com> (*instructions for access will be given on first day of class*)

**Instructor**

**Dr. Sharon Klein**

Assistant Professor

School of Economics

Winslow Hall, Room 305C

207-581-3174

[sharon.klein@maine.edu](mailto:sharon.klein@maine.edu) (*when sending email to this address, please start the subject line with the course designator (e.g., ECO 405)*)

**Office Hours:** TBD

**Prerequisites**

ECO 120 and ECO 121, or MAT 126, or permission

**Course Description**

This course examines tradeoffs associated with the technical, economic, environmental, and social implications of energy supply, distribution, and use in the context of transitioning toward a sustainable energy future. Students examine a variety of energy options, with a focus on renewable energy sources (solar, wind, biomass, hydro, and geothermal power), energy efficiency and conservation, nuclear power, and natural gas, alongside policies to mitigate negative effects. The course adopts a systems thinking approach, considering options for electricity, heating and transportation and the interplay between these options. Students assess quantitative and qualitative indicators of sustainability related to greenhouse gas (GHG) emissions and climate change, air and water quality, human health and safety, energy security, economic development, wildlife and the environment, technological efficiency and availability. They examine the effect of policies (e.g., carbon prices, emissions targets, efficiency requirements, renewable portfolio standards, feed-in tariffs) on these indicators and tradeoffs. The course provides a brief introduction to environmental life cycle assessment (LCA), a method for considering the environmental impact of a product or process from the “cradle to the grave”, as well as a more in-depth introduction to social benefit cost analysis (SBCA) and multi-criteria decision analysis (MCDA). Students apply these concepts to a service-learning project in which they engage with people from the surrounding communities to examine tradeoffs associated with real-life energy decisions. This is a service-learning and project-based course. Field trips may be required. Students may not receive credit for both ECO 405 and ECO 590.

This course meets the University of Maine's general education requirement for Population and the Environment.

### **Course Goal**

The main goal of this course is to expand student understanding and reasoning skills related to energy choices, issues, and policies in the context of the varied social, economic and environmental implications of energy production, distribution and use.

### **Student Learning Outcomes**

Upon successful completion of this course, students will be able to:

1. Distinguish between concepts of power and energy, and convert between power and energy units across a wide range of energy resources, technologies and uses.
2. Define sustainability and sustainable energy.
3. Compare current energy trends and markets in Maine, the U.S., and the world, and identify the factors influencing these trends over time and space.
4. Identify and evaluate potential sustainable energy solutions across a diverse array of sustainability indicators, including but not limited to: production efficiency & cost, geographic and temporal availability, air pollution, water pollution, water & land use, social acceptability, human health impacts, and safety.
5. Calculate annual capacity factor, levelized cost of energy, net present value, and payback period for different energy projects.
6. Quantitatively compare sustainability tradeoffs associated with different energy options using life cycle assessment (LCA), benefit-cost analysis (BCA), and multi-criteria decision analysis (MCDA).
7. Assess and compare the implications of current and potential future energy policies (including carbon prices, emissions targets, efficiency requirements, renewable portfolio standards, and feed-in tariffs) on sustainable energy development.
8. Engage in **citizen-oriented solutions to energy issues**.
9. Evaluate the role of civic engagement and service learning in creating and implementing sustainable energy solutions.

We will measure these learning outcomes throughout the semester through **homework, in-class activities, service, and a final project**.

## **INSTRUCTIONAL MATERIALS & METHODS**

### **Required Texts**

There is no required text for this course. All required readings and videos will be available through the course website in Google Classroom (<https://classroom.google.com> (*instructions for access will be given on first day of class*)).

### **Google Classroom**

Google Classroom will be our main stop for most course content. This is where I will post weekly readings, videos, and homework assignments, as well as announcements and most grades. You will submit your homework (and occasionally some in-class assignments) through Classroom. You will receive grades for these assignments through Classroom. Classroom also

links to Google Drive (GD) so if you have GD installed on your computer and set up to automatically sync, you can access the Classroom folder for this course directly from your computer's desktop. Alternatively, you can visit your GD through your web browser and find the Classroom folder for this course in there. Downloading and accessing GD through your computer directly (through Finder on Mac or one of your computer file folders on Windows) can sometimes reduce issues associated with accessing GD through a web browser. You can access our course on Classroom here: <https://classroom.google.com>. I will provide the course code on the first day of classes and go through a little tutorial.

### **Non-Traditional Teaching Methods**

This course uses active, inquiry-based, project-based, service- and collaborative learning methods, as well as a partial “flipped” classroom model to enrich student understanding of the material and help students develop professionally and personally (for more information, see: [https://www.youtube.com/watch?v=MdymI61hLPY&list=PLE8C54256779B374D&index=3&feature=plpp\\_video](https://www.youtube.com/watch?v=MdymI61hLPY&list=PLE8C54256779B374D&index=3&feature=plpp_video)). There will be times we will use a traditional lecture-style approach to class, but most of the time in class, students will be expected and required to actively engage in discussions, debates, problem-solving, and other activities that help improve learning outcomes, problem-solving and critical thinking skills, confidence, retention of information, group collaboration, and many other important aspects of learning. In order to participate fully in these activities, students will need to do readings, watch videos, and complete written assignments outside of class, on time. Students will be graded on each of these important components of learning, in-class and out-of-class.

True to the spirit of inquiry-based learning, I may not always give a direct answer to a question but rather encourage students to find the answers on their own. This may seem frustrating and inefficient at times, but finding answers on their own helps students understand concepts at a deeper level and retain information better. I will provide direct answers when necessary, and I will be open about when I am being indirect and why.

Service-learning is a “teaching method which combines community service with academic instruction as it focuses on critical, reflective thinking and civic responsibility. Service-learning programs involve students in organized community service that addresses local needs, while developing their academic skills, sense of civic responsibility, and commitment to the community” (<http://umaine.edu/volunteer/service-learning/>). Community service related to sustainable energy is a required component of this course because it helps students better understand their own role in achieving a sustainable energy future.

### **GRADING AND COURSE EXPECTATIONS**

Components of Final Grade:

Homework Assignments	30%
In-Class Assignments	20%

Final Project	30%
Service	20%

The final semester grade will be the sum of the weighted total In-Class Assignment, Homework, Service, and Final Project grades and will be assigned as follows:

A (90 or above)	B+ (87-89.9)	B (82-86.9)	B- (80-81.9)
C+ (77-79.9)	C (72-76.9)	C- (70-71.9)	D+ (67-69.9)
D (62-66.9)	D- (60-69.9)	F (59.9 or less)	

### **Homework Assignments (30%)**

It is very important for students to come to class ready to actively participate and learn. In many ways, the rest of the class depends on each student doing his/her part in this way. Weekly homework assignments are essential to being prepared. Homework assignments will consist of reading and/or watching videos and writing a reflection; answering specific questions about course material; and/or conducting independent research. Homework assignments will be submitted through the Google Classroom website <https://classroom.google.com> (*instructions for access will be given on first day of class*). The 1 lowest homework assignment grade will be dropped at the end of the semester. Homework assignments will taper off toward the end of the semester as the Final Project component becomes more prominent.

### **In-Class Assignments (20%)**

All students are expected to attend class each day and be prepared with a **calculator** (phone, tablet or computer are acceptable substitutes), **paper** and **pen/pencil**. Students are welcome to take notes on a computer or tablet, but they must also bring paper and pen/pencil. Students are expected to attend ALL scheduled class meetings and participate in ALL learning activities during class times, which may include group discussions, reflections, debates, games, problem-solving (often involving math – hence the calculator, paper and pencil), individual writing, quizzes, etc. In-class assignments will build off of Homework assignments and help students build knowledge to work toward future assignments and the final project. The 1 lowest in-class assignment grade will be dropped at the end of the semester.

Depending on the specific assignment, **problem-solving** assignments usually will be graded on whether the student (or group) obtained the correct answer and/or used the appropriate procedure to arrive at the correct answer. **Discussions, debates, and individual writing assignments** will be graded either based on whether all parts of the assignment were complete or using rubrics posted in Classroom. **Games** will be graded in a similar fashion to a quiz – the grade will depend on getting the correct answer, providing the correct explanation, etc.

### **Final Project (30%)**

The final project will be a professional poster presentation of an analysis that integrates student learning outcomes and service-learning. The audience for the presentation may include

community partners, students and faculty from other classes, and other interested parties. Students will work collaboratively in groups to complete the final project, but will also be responsible individually for their own unique contributions to the whole. Homework assignments, in-class activities, and service will help students make progress on the final project throughout the semester. The final project grade will include group and individual components. Students will earn individual grades for specific parts of the project they were expected to complete and through self and peer evaluations. There will also be a group final project grade for the presentation. More instructions will be presented during the first month of class.

### **Service (20%)**

Students will be required to participate in a community service-learning project designed to improve local energy sustainability. For example, in the past, students have helped build interior window inserts to reduce heat loss through old drafty residential windows in the Bangor/Orono area. Students may work with a local municipality to analyze an energy problem they are having. Or, they may design their own project to improve energy sustainability at the University or in a local community. Students are expected to contribute a minimum of 20 hours over the course of the semester to activities that serve the community on an energy-related issue. Students will be graded based on meeting the required number of hours, providing high quality service in a dedicated, caring, and professional manner, and submitting a brief service reflection paper. The service project will be integrated into the final project analysis. I will provide more information during the first week of classes.

### **Course Policies**

#### **Extra Credit**

A limited number of extra credit opportunities will be available at different times throughout the course – I will post these on Classroom as they become available. Students are welcome to propose ideas for extra credit assignments that I have not yet made available. All extra credit assignments must be submitted to Classroom by the last day of classes. Students may earn up to a maximum of 20 extra credit points to be applied to either their Homework OR In-Class Assignment total semester points (the equivalent of 2 additional assignments). Please see “Extra Credit” in Classroom for instructions and a list of acceptable ideas.

#### **Late/Missed Assignments**

I understand that life happens, and I don't want to waste your time and mine discussing excuses and/or valid reasons for missed assignments. For this reason, I will drop the 1 lowest Homework assignment and the 1 lowest In-Class Assignment at the end of the semester. You also have the opportunity to earn credit for up to 2 additional Homework/In-Class assignments through Extra Credit. Therefore, there will be NO opportunities to makeup missed work, and late assignments will NOT be accepted. The only exception is if the University has granted you a leave from course duties for some reason - in this case, the proper documentation would be required to makeup missed or late assignments within the appropriate timeframe specified on the University documentation. You must arrange a meeting with me (outside of class time) as soon as possible in a situation like this, so we can work out the timeline for makeup work. If you know in advance you are going to miss an assignment due to sporting events, field trips for other classes, or some other official event, you are expected to let me know as soon as you know of the conflict and complete assignments prior to the deadlines if possible or meet with me to schedule new deadlines.

### **Communication Policy & Extra Help**

Check Google Classroom regularly for announcements, assignments and other communication from me.

If you have a question or need extra help, please do the following **in order**:

- 5) Review the course materials on Classroom (i.e., syllabus, instructions, announcements, readings, videos, etc.) and see if there are already answers available in these materials.
- 6) Check the discussion threads surrounding the course materials to see if your question has already been asked and answered.
- 7) If your question has not been asked yet in Classroom, but it may apply to other students, please post your question to the appropriate course material discussion thread and/or ask your question in class so all students can benefit.
- 8) If your question is more individual in nature and/or you have not found an answer after completing steps 1-3, please email me. There may be time to ask a quick question before or after class, but for some questions – especially where I may need to look something up – email works better. Please send email requests for meetings **at least 48 hours ahead of time** – depending on my travel and research schedule, I may need more time than this.

I expect emails from students to me (and vice versa) to be composed professionally with complete sentences and proper English writing style with no spelling mistakes or cryptic abbreviations (i.e, an email is not a text message), a CLEAR subject line that includes the course designator (e.g., ECO 405) and a clear, concise question. I reserve the right not to respond to emails that don't meet these qualifications.

During the weekdays, I will try to respond to emails within a 36-hour turnaround time. I will try to respond to emails sent on weekends/holidays within 60 hours. I teach other courses, do research, and have a personal life, so please be patient and respectful.

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If you have a disability for which you may be requesting an accommodation, please contact Student Accessibility Services, 121 East Annex, 581-2319, as early as possible in the term. Students who have already been approved for accommodations by SAS and have a current accommodation letter should meet with me (the instructor of the course) privately as soon as possible.

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Academic honesty is very important. It is dishonest to cheat on exams, to copy term papers, to submit papers written by another person, to fake experimental results, or to copy or reword parts of books or articles into your own papers without appropriately citing the source. Students committing or aiding in any of these violations may be given failing grades for an assignment or for an entire course, at the discretion of the instructor. In addition to any academic action taken by an instructor, these violations are also subject to action under the University of Maine Student Conduct Code. The maximum possible sanction under the student conduct code is dismissal from the University.

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The University of Maine is committed to making campus a safe place for students. Because of this commitment, if you tell a teacher about an experience of **sexual assault, sexual harassment, stalking, relationship abuse (dating violence and domestic violence), sexual misconduct or any form of gender discrimination** involving members of the campus, **your teacher is required to report** this information to the campus Office of Sexual Assault & Violence Prevention or the Office of Equal Opportunity.

**If you want to talk in confidence** to someone about an experience of sexual discrimination, please contact these resources:

*For confidential resources on campus:* **Counseling Center: 207-581-1392** or **Cutler Health Center: at 207-581-4000.**

*For confidential resources off campus:* **Rape Response Services: 1-800-310-0000** or **Spruce Run: 1-800-863-9909.**

**Other resources:** The resources listed below can offer support but may have to report the incident to others who can help:

*For support services on campus:* **Office of Sexual Assault & Violence Prevention: 207-581-1406, Office of Community Standards: 207-581-1409, University of Maine Police: 207-581-4040 or 911.** Or see the OSAVP website for a complete list of services at <http://www.umaine.edu/osavp/>

### **Course Schedule Disclaimer (Disruption Clause)**

In the event of an extended disruption of normal classroom activities, the format for this course may be modified to enable its completion within its programmed time frame. In that event, you will be provided an addendum to the syllabus that will supersede this version.

### **Tentative Course Outline**

This will be posted on Classroom on the first day of classes and is subject to change.

### **Additional ECO 590 Requirements**

Students enrolled in ECO 590 will be receiving credit for a graduate level course. Therefore, more will be expected of them in terms of workload and quality of work. The following changes to the information listed above apply to all ECO 590 students:

- 1) ECO 590 students must complete ALL "optional" readings/videos listed on Classroom and may be required to answer additional Homework or In-Class Assignment questions.
- 2) ECO 590 students will be required to participate in bi-weekly meetings (as a group – to be arranged at the beginning of the semester) with me throughout the semester to obtain additional instruction and check in about the status of the final paper.
- 3) ECO 590 students will be required to take a more active role in service projects (e.g., volunteer for an additional shift, recruit additional volunteers, help with logistics and leadership)
- 4) ECO 590 students will be required to write an individual full-length (10-15 page) research paper for their final project **in addition** to the collaborative work.

- a. The paper may use some of the collaborative work, but also must add more detail, greater depth in examining the issues, and include content related to skills and information acquired in bi-weekly ECO 590 meetings.
  - b. In addition, ECO 590 students must identify 3 academic journals, which may be appropriate for submitting this paper for publication, and explain why these journals may be appropriate, with specific references to the journal description and impact factors. ECO 590 students do not actually have to submit their paper for publication, rather this portion of the assignment is included because graduate students need to gain experience in selecting academic journals for publication in a variety of topic areas.
  - c. Further instructions and a grading rubric for the ECO 590 final paper will be available on Classroom in advance of the due date. The ECO 590 final paper will be due at the end of the final exam period as an online submission to Classroom.
- 5) ECO 590 students are expected to take on a leadership role in collaborative group work – supporting and educating undergraduate students in research efforts.
  - 6) ECO 590 students are expected to take initiative on research and course work – rather than waiting to be told what to do, they should anticipate what needs to be done and initiate solutions.

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**ECO 370: BUILDING SUSTAINABLE ENERGY COMMUNITIES THROUGH SERVICE  
LEARNING**

**FALL 2015 SYLLABUS**

Tues/Thurs 3:30-4:45

Aubert Hall 422

**INSTRUCTOR**

**Dr. Sharon Klein**

School of Economics

**Email:** sharon.klein@maine.edu

207-581-3174

**Office Hours:** By appointment

305 Winslow Hall

website: <http://umaine.edu/soe/faculty-and-staff/klein/>

**PREREQUISITES**

None for pilot course in Fall 2015

**REQUIRED TEXTS**

There are no required texts for this course. Readings will be posted online through **Google Classroom**. Instructions will be presented on the first day of class.

**COURSE DESCRIPTION**

This course explores community energy as a possible solution to a complex set of technical, economic, environmental, and social issues associated with energy supply, distribution and use. The course begins with a broad overview of a variety of sustainability issues associated with energy. Students will examine the need to challenge existing paradigms that perpetuate these issues. They will learn the importance of civic engagement, community building, and service learning in creating lasting solutions. Students will acquire hands-on learning about sustainable energy issues, options, policies, and tradeoffs by actively designing and participating in community projects. They will apply tested methods for civic engagement, community building, and service learning to help solve energy issues. They will conduct quantitative and qualitative assessments of potential sustainable energy solutions across technical, economic, environmental, and social criteria, employing assessment tools such as life cycle assessment (LCA), social benefit cost analysis (SBCA), and multi-criteria decision analysis (MCDA). Students will evaluate policy options for encouraging community sustainable energy development. This is a project-oriented course that may require field trips.

**COURSE LEARNING OBJECTIVES:**

1. Develop analytical models of tradeoffs between technical, economic, environmental, and social implications of different sustainable energy solutions at the community/residential level.
2. Communicate and collaborate with community partners to advance sustainable energy solutions.
3. Develop a sense of personal identity and purpose related to sustainable energy, and take civic action consistent with this sense of identity and purpose.

4. Develop a sense of community identity and role of self in the community related to sustainable energy, and take civic action consistent with this sense of identity and purpose.
5. Critique existing societal paradigms related to sustainable energy and develop new policy solutions based on these critiques.

## **COURSE LEARNING OUTCOMES**

Upon successful completion of this course, students will be able to:

1. Distinguish between concepts of power and energy, and convert between power and energy units across a wide range of energy resources, technologies and uses.
2. Define sustainability and sustainable energy.
3. Define “systems thinking”, and use it to evaluate sustainable energy options.
4. Define the “food-water-energy nexus” and “energy poverty”, and discuss their implications in the context of systems thinking and sustainable energy.
5. Compare current energy paradigms based in centralized generation and top-down incentives with alternatives based in distributed generation, demand-side efficiency and conservation, and bottom-up approaches.
6. Identify challenges associated with using top-down policies to change the behavior of individuals and firms.
7. Define “community energy”, and examine its role in achieving a sustainable energy future.
8. Compare community energy options across quantitative and qualitative sustainability indicators associated with technical, economic, environmental, and social sustainability.
9. Compare sustainability tradeoffs associated with community energy options using LCA, SBCA, and MCDA.
10. Implement and evaluate strategies for promoting civic responsibility and community building.
11. Evaluate the effectiveness of community building, civic engagement, and service learning methods in creating and implementing sustainable energy solutions.
12. Evaluate existing barriers to grassroots community energy development and potential policy options that could reduce these barriers.
13. Create a new vision for a sustainable energy future and propose strategies for achieving it.
14. Build a community to address sustainable energy challenges.

## **“FLIPPED CLASSROOM” AND SERVICE LEARNING**

Implicit to every learning experience you engage in is a goal to develop professionally and personally. Every college course you take is a professional learning/development experience. You are not just learning a topic, *you are learning to learn*. Mastering communication and participation skills, collaborative learning skills, and professional academic discourse, are requirements of every profession in every field. More than ever before, the ability to collaborate and learn with others is fundamental to your ongoing professional and academic success.

In keeping with this implicit goal, this course will follow a “flipped” classroom approach and include a service learning project, to increase opportunities for collaborative and active learning, while providing a positive benefit to the community. A flipped classroom is different from the traditional lecture-style approach because instead of sitting and listening to me lecture to you for 75 minutes, you will be actively engaging in problem solving, discussions, debates and other in-class assignments usually in small groups (but sometimes individually) while I listen to you and provide guidance, feedback and mini-lectures on topics that help you be successful in the

activities. In class, you will apply what you have learned in your homework assignments under my guidance so if you are struggling with understanding some concepts, I will be there to help you understand. Sometimes, I may teach directly to the whole class for a few minutes if it is clear there is a concept that most people are struggling with, but most of the class time will involve you doing the work while I roam the classroom, providing guidance, answering questions, teaching small groups, and listening.

Service-learning is a “teaching method which combines community service with academic instruction as it focuses on critical, reflective thinking and civic responsibility. Service-learning programs involve students in organized community service that addresses local needs, while developing their academic skills, sense of civic responsibility, and commitment to the community” (<http://umaine.edu/volunteer/service-learning/>). Research shows that service learning and other active learning methods improve learning outcomes, problem-solving and critical thinking skills, student confidence, retention of information, group collaboration, and many other important aspects of learning. These approaches are especially appropriate in a course focusing on community energy and sustainability because the main goal is for you to understand the community’s role in achieving a sustainable energy future.

Community Service is an important part of this course. There may be times when you wonder, why are we doing service or why with these particular organizations? And when you wonder you should pose and process your questions with the rest of the class. Here is a question that is commonly posed to you by the people whom (or with whom) you serve: why are you here or why do you do service? So give this some thought ahead of time, so you can respond with a meaningful and articulate answer. (hint: because my course requires it is not a good answer).

## GRADING

Graded Activities & Percentages:

In-Class Assignments	20%
Homework	20%
Exams	20%
Service	20%
Final Project	20%

All students are expected to attend class each day and be prepared with a **calculator** (can use phone, tablet or computer), **paper** and **pen/pencil**.

### **In-Class Assignments (20%)**

Students are expected to attend ALL scheduled class meetings, including the Retreat (see course timeline and more information forthcoming). Students are expected to participate in all learning activities during class times, which may include group discussions, reflections, debates, games, problem-solving (often involving math – hence the calculator), individual writing, quizzes, etc. In-class assignments will build off of Homework assignments and help students complete their final projects.

### **Homework Assignments (20%)**

Students are expected to be prepared each day for active learning. Often, this will require a homework assignment, due at the beginning of the week, consisting of reading and/or watching videos and writing a reflection and/or answering specific questions about the material. These HW assignments will prepare students for in-class activities and help students meet learning outcomes. In addition, some HW assignments will be reflections on service learning activities, a key component to meeting civic engagement learning outcomes.

### **Exams (20%)**

There will be 2 exams during the semester – one at the middle and at the end. Both exams will be administered through Blackboard (<https://www.courses.maine.edu>). Students will have a limited amount of time to complete each exam (1-2 hours depending on exam length). Exams will be available for several days to allow for flexibility in individual student schedules; however, once you start the exam, you must complete it within the 1-2 hour time frame specified. Exams will consist of mainly multiple-choice questions, with the possibility of a few short answer questions.

### **Service (20%)**

Students will be required to complete an average of 4 hours of service per week as part of their service learning project. The service learning project for Fall 2015 will be a Window Insert Build in collaboration with 2 community partners: Rockland Window Dressers (<http://windowdressers.org/>) and the Bangor Unitarian Universalist (UU) Church (<http://uubangor.org/>). Window inserts are pine frames wrapped in transparent plastic that are placed inside existing window frames to help reduce heat loss, save oil and money, and make for a more comfortable living space. They are a cost-effective way for people with old windows to save energy and emissions, especially for low-income people.

Students will work with community partners to help recruit “customers” for window inserts in the communities surrounding the University of Maine, with priority for low-income customers in need. Students will measure windows and send measurements to Rockland Window Dressers (RWD) so RWD can cut the frames to the correct proportions. In November, students will work alongside Bangor UU volunteers to assemble the window inserts and deliver them to the customers. The nature of the service learning project will require students to spend more service hours during the weeks of the Window Insert Build and Retreat (see course Timeline) than during other weeks. Therefore, students will spend an average of 2 hours per week on service (i.e., recruiting customers, measuring windows, etc) during weeks that are not part of the Window Insert Build or the Retreat. Students will document their service on a weekly time sheet that will be signed by their community partners. The time sheets and instructor/community partner observations will contribute to the final Service grade (20% of the final grade).

### **Final Project (20%)**

The final project will be a research project about the effect of service learning and community-based approaches to advancing sustainable energy. Students will administer a survey to window insert customers at the beginning and end of the project to understand customer motivations, attitudes and perceptions of the window inserts. They will be required to complete IRB training in the beginning of the semester in order to administer the surveys. They will also apply course concepts to calculate the amount of energy and emissions projected to be saved by the window inserts. They will create a collaborative final paper and presentation, which will include a literature review, the results of the surveys, calculations, excerpts from their Reflections, and recommendations for future community energy service learning projects. The students will work as a class to complete the final project. More instructions will be presented during the first month of class. Homework assignments, in-class activities, and service will help students make progress on the final project throughout the semester. The final project grade will include group and individual components. Students will earn individual grades for specific parts of the project they were expected to complete and through self and peer evaluations. There will also be a group final project grade for the paper and presentation, as well as the component parts (literature review and calculations).

### **Final Semester Grade**

The final semester grade will be the sum of the weighted total In-Class Assignment, Homework, Service, Exam, and Final Project grades and will be assigned as follows:

A (90 or above)	B+ (87-89.9)	B (82-86.9)	B- (80-81.9)
C+ (77-79.9)	C (72-76.9)	C- (70-71.9)	D+ (67-69.9)
D (62-66.9)	D- (60-69.9)	F (59.9 or less)	

### **Late/Missed Assignments**

At the end of the semester, I will drop the 2 lowest assignments out of the combined homework and in-class assignment categories to account for any life event that may have made it difficult for students to submit assignments on time or attend class. Assignments related to the Retreat and Window Insert Build (including reflections) will not be eligible to be dropped. Due to that policy, there will be NO opportunities to make up missed work, and late assignments will NOT be accepted. The only exception to this rule is if the University has granted a student a leave from course duties for some reason - in this case, the proper documentation would be required to make up missed or late assignments within the appropriate timeframe specified on the University documentation.

### **Extra help**

I am available for extra help as needed and always willing to help students achieve success. Please send email requests for meetings at least 48 hours ahead of time – depending on my travel and research schedule, I may need more time than this. Also, please see the Communication Policy for questions that may be addressed electronically.

### **Communication Policy**

**Check Google Classroom regularly** for announcements, assignments and other communication from me. More instructions to follow. Also, feel free to email me at

[Sharon.klein@maine.edu](mailto:Sharon.klein@maine.edu). Please include in the subject line “ECO 370” before the topic of your email, so I will be able to easily match the course with your inquiry. Also, please make sure your emails are professional and include proper spelling and grammar. Please allow at least 48 hours (more if I am traveling) for a response. I will make every effort to respond sooner than this if possible.

### **Disabilities Policy**

If you have a disability for which you may be requesting an accommodation, please contact Disabilities Services, 121 East Annex, 581-2319 ((TTY) 581-2325), as early as possible in the term.

### **Academic Integrity Policy**

Academic honesty is very important. It is dishonest to cheat on exams, to copy term papers, to submit papers written by another person, to fake experimental results, or to copy or reword parts of books or articles into your own papers without appropriately citing the source. Students committing or aiding in any of these violations may be given failing grades for an assignment or for an entire course, at the discretion of the instructor. In addition to any academic action taken by an instructor, these violations are also subject to action under the University of Maine Student Conduct Code. The maximum possible sanction under the student conduct code is dismissal from the University.

### **University Sexual Discrimination Reporting Policy**

The University of Maine is committed to making campus a safe place for students. Because of this commitment, if you tell a teacher about an experience of **sexual assault, sexual harassment, stalking, relationship abuse (dating violence and domestic violence), sexual misconduct or any form of gender discrimination** involving members of the campus, **your teacher is required to report** this information to the campus Office of Sexual Assault & Violence Prevention or the Office of Equal Opportunity.

**If you want to talk in confidence** to someone about an experience of sexual discrimination, please contact these resources:

*For confidential resources on campus:* **Counseling Center: 207-581-1392 or Cutler Health Center: at 207-581-4000.**

*For confidential resources off campus:* **Rape Response Services: 1-800-310-0000 or Spruce Run: 1-800-863-9909.**

**Other resources:** The resources listed below can offer support but may have to report the incident to others who can help:

*For support services on campus:* **Office of Sexual Assault & Violence Prevention: 207-581-1406, Office of Community Standards: 207-581-1409, University of Maine Police: 207-581-4040 or 911.** Or see the OSAVP website for a complete list of services at <http://www.umaine.edu/osavp/>

### **Course Schedule Disclaimer (Disruption Clause)**

In the event of an extended disruption of normal classroom activities, the format for this course may be modified to enable its completion within its programmed time frame. In that event, you will be provided an addendum to the syllabus that will supersede this version.

**Course Timeline: [see attached](#)**

**ECO 497: Independent Study (Writing Intensive)  
Summer 2017 Syllabus**

**Independent Study:** Community Energy Research

**Course Description:** Three credit course in which the student conducts research and prepares a paper resulting from the research (including multiple drafts throughout the course). Research topics may include energy, cost & emissions savings, as well as other social benefits/costs, associated with window inserts and other residential energy efficiency alternatives.

The instructor and the student will agree upon paper deadlines at the start of the course. Late draft submissions will not be accepted without prior approval from the instructor and only under qualifying circumstances.

**Instructor:** Dr. Sharon Klein

**Course Aims:** As a result of this course, the student will be able to conduct analytical research and prepare a high quality research paper. The student will improve writing ability through multiple drafts and revisions. The student will also be able to describe and compare technical, economic, environmental and social sustainability impacts associated with community energy options.

**Student Learning Objectives**

In this course the student will learn about:

- The potential of window inserts and other residential energy efficiency options as a sustainable option to reduce emissions and improve the environment.
- The potential of community-based energy initiatives to increase social benefits
- Methods used to build inserts, install other energy efficiency technologies and organize a community-based energy project.
- Social and economic effects of reducing heating costs through the use of window inserts and other residential energy efficiency options.
- The problems and questions that still need to be addressed concerning window inserts and residential energy efficiency in Maine.

**Course Requirements**

The student will need to:

- Create and submit a syllabus to the instructor that details the objectives and grading for this course.
- Attend regular meetings with the instructor to gauge process toward the agreed upon objectives.

- Complete all research activities and paper drafts to a standard deemed acceptable by the instructor.

**Grading:** The final grade will be based on the submission of a written paper, with drafts submitted on a regular schedule agreed upon at the beginning of the semester with the instructor (on average every 2-3 weeks). Each draft must demonstrate cumulative learning related to the stated aims and objectives outlined above. The course will result in a 15 - 20 page research paper. These products will incorporate reviews of academic journal articles related to the course topics, along with original research conducted by the student. Drafts of an annotated bibliography will be submitted as part of this process. Grading will be based on the student's ability to express a thorough understanding of research topics outlined above and cumulative improvement in analytical writing over the course of the semester.

The final grade will be based on the following breakdown of points:

Draft Submissions	50%
Final Paper	30%
Annotated Bibliography	<u>20%</u>
	100%

Letter grades will be based on percentage of points earned:

A (90 or above)	B+ (87-89.9)	B (82-86.9)	B- (80-81.9)
C+ (77-79.9)	C (72-76.9)	C- (70-71.9)	D+ (67-69.9)
D (62-66.9)	D- (60-69.9)	F (59.9 or less)	

**ECO 470: Writing Intensive Capstone  
Spring 2017 Syllabus**

**Independent Study:** Community Energy Research

**Course Description:** Three credit course in which the student conducts research and prepares a paper resulting from the research (including multiple drafts throughout the course). Research topics may include energy, cost & emissions savings, as well as other social benefits/costs, associated with window inserts and other residential energy efficiency alternatives.

The instructor and the student will agree upon paper deadlines at the start of the course. Late draft submissions will not be accepted without prior approval from the instructor and only under qualifying circumstances.

**Instructor:** Dr. Sharon Klein

**Course Aims:** As a result of this course, the student will be able to conduct analytical research and prepare a high quality research paper. The student will improve writing ability through multiple drafts and revisions. The student will also be able to describe and compare technical, economic, environmental and social sustainability impacts associated with community energy options.

**Student Learning Objectives**

In this course the student will learn about:

- The potential of window inserts and other residential energy efficiency options as a sustainable option to reduce emissions and improve the environment.
- The potential of community-based energy initiatives to increase social benefits
- Methods used to build inserts, install other energy efficiency technologies and organize a community-based energy project.
- Social and economic effects of reducing heating costs through the use of window inserts and other residential energy efficiency options.
- The problems and questions that still need to be addressed concerning window inserts and residential energy efficiency in Maine.

**Course Requirements**

The student will need to:

- Create and submit a syllabus to the instructor that details the objectives and grading for this course.
- Attend regular meetings with the instructor to gauge process toward the agreed upon objectives.

- Complete all research activities of capstone paper drafts to a standard deemed acceptable by the instructor.

**Grading:** The final grade will be based on the submission of a written paper and poster, with drafts submitted on a regular schedule agreed upon at the beginning of the semester with the instructor (on average every 2-3 weeks). Each draft must demonstrate cumulative learning related to the stated aims and objectives outlined above. The course will result in a 15 - 20 page research paper and a poster presented at the UMaine Undergraduate Research Symposium in April. These products will incorporate reviews of academic journal articles related to the course topics, along with original research conducted by the student. Drafts of an annotated bibliography will be submitted as part of this process. Grading will be based on the student's ability to express a thorough understanding of research topics outlined above and cumulative improvement in analytical writing over the course of the semester.

The final grade will be based on the following breakdown of points:

Draft Submissions	50%	
Final Paper	20%	
Final Poster	20%	
Annotated Bibliography	<u>10%</u>	
	100%	

Letter grades will be based on percentage of points earned:

A (90 or above)	B+ (87-89.9)	B (82-86.9)	B- (80-81.9)
C+ (77-79.9)	C (72-76.9)	C- (70-71.9)	D+ (67-69.9)
D (62-66.9)	D- (60-69.9)	F (59.9 or less)	

**ECO 597: Independent Study  
Community Energy Research  
Fall 2015 Syllabus**

**Course Description:** Three credit course in which the student conducts research, helps coordinate a service project related to the research, and prepares a paper resulting from the research. The research topic will be community energy, and the specific service project will be a window insert build, which is an example of community energy efficiency.

The instructor and the student will agree upon deadlines at the start of the course and throughout the course, as some deadlines will evolve along with the service project and research protocol. Late draft submissions will not be accepted without prior approval from the instructor and only under qualifying circumstances.

**Instructor:** Dr. Sharon Klein

**Course Aims:** As a result of this course, the student will be able to conduct analytical research and prepare a high quality research paper. The student will also be able to describe and compare technical, economic, environmental and social sustainability impacts associated with community energy.

**Student Learning Objectives**

In this course the student will learn about: (see learning objectives and outcomes in ECO 370 syllabus)

**Course Requirements**

The student will need to:

- Attend all class meetings of ECO 370 Building Sustainable Energy Communities through Service Learning
- Meet all requirements specified in the ECO 370 syllabus
- Complete all assignments required of ECO 370 students
- Serve as volunteer coordinator for the Window Insert Build
- Coordinate the window measurement schedule and follow-up for the window insert build
- Attend additional coordination and research meetings related to the project
- Prepare and launch the community energy survey in Qualtrics
- Prepare an additional component of the final project based on experience as coordinator for volunteers, measurement schedule, and follow-up
- Proofread and integrate the component ECO 370 pieces of the final project into a single, coherent voice
- Identify a list of potential journals (at least 5) to which the final project paper may be submitted, and include information on the purpose of the journal, impact factor, and other metrics
- Submit a research plan for beyond the final project to complete the work started by ECO 370. Begin working on any components of this plan that are appropriate prior to the end of the semester

**Grading:** The final grade will be consistent with ECO 370 grading. There will be additional point values for the additional assignments in the representative categories.

**ECO 470: Writing Intensive Capstone  
Spring 2015 Syllabus**

**Independent Study:** Biofuel Sustainable Energy Pathway (SEP) Research

**Course Description:** Three credit course in which the student conducts research and prepares a paper resulting from the research (including multiple drafts throughout the course). Research topics may include production cost, environmental life cycle assessment, whole tree harvesting processes, multi-criteria decision analysis, and the ecological sustainability related to drop-in biofuels produced from woody biomass in the Northeast US.

The instructor and the student will agree upon paper deadlines at the start of the course. Late draft submissions will not be accepted without prior approval from the instructor and only under qualifying circumstances.

**Instructor:** Dr. Sharon Klein

**Course Aims:** As a result of this course, the student will be able to conduct analytical research and prepare a high quality research paper. The student will improve writing ability through multiple drafts and revisions. The student will also be able to describe and compare technical, economic, environmental and social sustainability impacts associated with biofuel development from woody biomass.

**Student Learning Objectives**

In this course the student will learn about:

- The potential of biofuels as a sustainable, alternative option for diesel.
- Whole-Tree Harvesting methods used to obtain woody biomass.
- Environmental effects of rail transportation of biomass to bio refineries.
- The problems and questions that still need to be addressed concerning biomass harvesting and biofuels development in the Northeast.

**Course Requirements**

The student will need to:

- Create and submit a syllabus to the instructor that details the objectives and grading for this course.
- Attend regular meetings with the instructor to gauge process toward the agreed upon objectives.
- Complete all research activities of capstone paper drafts to a standard deemed acceptable by the instructor.

**Grading:** The final grade will be based on the submission of a written draft on a regular schedule agreed upon at the beginning of the semester with the instructor (on average every 2-3 weeks). Each draft must demonstrate cumulative learning related to the stated aims and objectives outlined above. The course will result in a 15 - 20 page research paper, which will incorporate reviews of academic journal articles related to the course topics, along with original research conducted by the student. Drafts of an annotated bibliography will be submitted as part of this process. Grading will be based on the student's ability to express a thorough understanding of research topics outlined above and cumulative improvement in analytical writing over the course of the semester.

The final grade will be based on the following break down of points:

Draft Submissions	60%
Final Paper	30%
Annotated Bibliography	<u>10%</u>
	100%

Letter grades will be based on percentage of points earned:

A (90 or above)	B+ (87-89.9)	B (82-86.9)	B- (80-81.9)
C+ (77-79.9)	C (72-76.9)	C- (70-71.9)	D+ (67-69.9)
D (62-66.9)	D- (60-69.9)	F (59.9 or less)	

**APPENDIX F – Journal Rankings**

**Table E1 – Quartile 1 Journals in Energy & Fuels Category, by 5-yr Impact Factor**



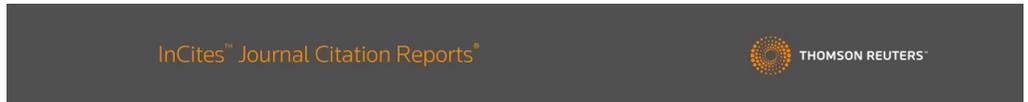
**Journal Data Filtered By: Selected JCR Year: 2016 Selected Editions: SCIE,SSCI Sel  
Categories: 'ENERGY & FUELS' Selected Quartiles: Q1 Selected Category Scheme:**

Rank	Full Journal Title	Total Cites	Journal Impact Factor	5-Year Impact Factor	Eigenfac
1	Energy & Environmental Science	59,187	29.518	24.781	
2	PROGRESS IN ENERGY AND COMBUSTION SCIENCE	9,015	17.382	24.055	
3	Advanced Energy Materials	22,073	16.721	16.457	
4	RENEWABLE & SUSTAINABLE ENERGY REVIEWS	48,590	8.050	9.122	
5	Journal of Materials Chemistry A	67,521	8.867	8.824	
6	APPLIED ENERGY	48,306	7.182	7.500	
7	IEEE Transactions on Sustainable Energy	4,552	4.909	7.082	
8	Biotechnology for Biofuels	6,029	5.203	6.732	
9	PROGRESS IN PHOTOVOLTAICS	7,971	6.726	6.255	
10	JOURNAL OF POWER SOURCES	99,158	6.395	6.117	
11	BIORESOURCE TECHNOLOGY	93,612	5.651	6.102	
12	ENERGY CONVERSION AND MANAGEMENT	34,034	5.589	5.472	
13	Global Change Biology Bioenergy	2,330	4.655	5.434	
14	INTERNATIONAL JOURNAL OF COAL GEOLOGY	8,981	4.783	5.427	
15	ENERGY	40,180	4.520	5.182	
16	RENEWABLE ENERGY	28,532	4.357	4.825	
17	SOLAR ENERGY MATERIALS AND SOLAR CELLS	26,881	4.784	4.799	
18	SOLAR ENERGY	24,226	4.018	4.739	
19	FUEL	45,518	4.601	4.726	
20	IEEE TRANSACTIONS ON ENERGY CONVERSION	10,494	3.808	4.662	
21	ENERGY AND BUILDINGS	25,822	4.067	4.599	
21	ENERGY POLICY	35,244	4.140	4.599	
23	FUEL PROCESSING TECHNOLOGY	15,628	3.752	4.051	

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**Table E2 - Quartile 1 Journals in Economics and Energy & Fuels Categories, by 5-yr Impact Factor (First 52 out of 109 entries shown)**



**Journal Data Filtered By: Selected JCR Year: 2016 Selected Editions: SCIE,SSCI Sel Categories: 'ECONOMICS','ENERGY & FUELS' Selected Quartiles: Q1 Selected Cate Scheme: WoS**

Rank	Full Journal Title	Total Cites	Journal Impact Factor	5-Year Impact Factor	Eigenfac
1	Energy & Environmental Science	59,187	29.518	24.781	
2	PROGRESS IN ENERGY AND COMBUSTION SCIENCE	9,015	17.382	24.055	
3	Advanced Energy Materials	22,073	16.721	16.457	
4	JOURNAL OF ECONOMIC LITERATURE	7,227	5.220	10.147	
5	QUARTERLY JOURNAL OF ECONOMICS	20,930	6.662	9.681	
6	RENEWABLE & SUSTAINABLE ENERGY REVIEWS	48,590	8.050	9.122	
7	JOURNAL OF FINANCE	29,644	6.043	8.960	
8	Journal of Materials Chemistry A	67,521	8.867	8.824	
9	JOURNAL OF ECONOMIC PERSPECTIVES	9,480	5.727	7.982	
10	APPLIED ENERGY	48,306	7.182	7.500	
11	IEEE Transactions on Sustainable Energy	4,552	4.909	7.082	
12	JOURNAL OF FINANCIAL ECONOMICS	24,083	4.505	6.991	
13	Biotechnology for Biofuels	6,029	5.203	6.732	
14	PROGRESS IN PHOTOVOLTAICS	7,971	6.726	6.255	
15	JOURNAL OF POWER SOURCES	99,158	6.395	6.117	
16	BIORESOURCE TECHNOLOGY	93,612	5.651	6.102	
17	ECONOMIC GEOGRAPHY	2,360	5.344	6.085	
18	JOURNAL OF ACCOUNTING & ECONOMICS	7,303	3.839	6.016	
19	JOURNAL OF POLITICAL ECONOMY	19,276	3.923	5.929	
20	AMERICAN ECONOMIC REVIEW	40,031	4.026	5.669	
21	ENERGY CONVERSION AND MANAGEMENT	34,034	5.589	5.472	
22	American Economic Journal-Applied Economics	1,679	3.360	5.434	

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22	Global Change Biology Bioenergy	2,330	4.655	5.434
24	INTERNATIONAL JOURNAL OF COAL GEOLOGY	8,981	4.783	5.427
25	REVIEW OF FINANCIAL STUDIES	11,581	3.689	5.401
26	REVIEW OF ECONOMIC STUDIES	10,451	4.030	5.240
27	ECONOMETRICA	26,737	3.379	5.214
28	ENERGY	40,180	4.520	5.182
29	Review of Environmental Economics and Policy	706	3.862	4.974
30	Economic Systems Research	1,238	2.691	4.864
31	RENEWABLE ENERGY	28,532	4.357	4.825
32	TRANSPORTATION RESEARCH PART B- METHODOLOGICAL	8,518	3.769	4.822
33	SOLAR ENERGY MATERIALS AND SOLAR CELLS	26,881	4.784	4.799
34	SOLAR ENERGY	24,226	4.018	4.739
35	FUEL	45,518	4.601	4.726
36	IEEE TRANSACTIONS ON ENERGY CONVERSION	10,494	3.808	4.662
37	ENERGY AND BUILDINGS	25,822	4.067	4.599
37	ENERGY POLICY	35,244	4.140	4.599
39	Journal of the European Economic Association	2,982	2.758	4.521
40	American Economic Journal- Macroeconomics	1,202	2.909	4.497
41	VALUE IN HEALTH	6,019	4.235	4.491
42	ENERGY ECONOMICS	10,499	3.199	4.410
43	REVIEW OF ECONOMICS AND STATISTICS	12,283	2.926	4.405
44	American Economic Journal- Economic Policy	1,132	3.133	4.253
45	JOURNAL OF ECONOMIC GROWTH	1,934	3.440	4.213
46	JOURNAL OF ECONOMIC GEOGRAPHY	2,728	3.648	4.177
47	ECONOMIC POLICY	1,265	2.844	4.075
48	ECOLOGICAL ECONOMICS	17,659	2.965	4.055
49	FUEL PROCESSING TECHNOLOGY	15,628	3.752	4.051
50	ECONOMIC JOURNAL	10,567	2.608	3.859
51	Annual Review of Economics	803	2.161	3.853
52	Journal of Transport Geography	4,692	2.675	3.848

**Table E3 - Quartile 1 Journals in Economics, Energy & Fuels; Environmental Science; Environmental Studies Categories, by 5-yr Impact Factor (First 96 of 187 entries shown)**



**Journal Data Filtered By: Selected JCR Year: 2016 Selected Editions: SCIE,SSCI  
Selected Categories: 'ECONOMICS','ENERGY & FUELS','ENVIRONMENTAL SCIENCES','ENVIRONMENTAL STUDIES' Selected Quartiles: Q1 Selected Category Scheme: WoS**

Rank	Full Journal Title	Total Cites	Journal Impact Factor	5-Year Impact Factor	Eigenfactor Score
1	Energy & Environmental Science	59,187	29.518	24.781	0.186260
2	PROGRESS IN ENERGY AND COMBUSTION SCIENCE	9,015	17.382	24.055	0.009740
3	Nature Climate Change	13,663	19.304	21.108	0.082180
3	Nature Climate Change	13,663	19.304	21.108	0.082180
5	Advanced Energy Materials	22,073	16.721	16.457	0.075550
6	FRONTIERS IN ECOLOGY AND THE ENVIRONMENT	8,134	8.039	10.841	0.017880
7	JOURNAL OF ECONOMIC LITERATURE	7,227	5.220	10.147	0.018220
8	QUARTERLY JOURNAL OF ECONOMICS	20,930	6.662	9.681	0.051200
9	ENVIRONMENTAL HEALTH PERSPECTIVES	37,319	9.776	9.634	0.044780
10	GLOBAL CHANGE BIOLOGY	31,762	8.502	9.455	0.075720
11	RENEWABLE & SUSTAINABLE ENERGY REVIEWS	48,590	8.050	9.122	0.089810
12	JOURNAL OF FINANCE	29,644	6.043	8.960	0.056700
13	Annual Review of Environment and Resources	3,039	6.268	8.875	0.004600
13	Annual Review of Environment and Resources	3,039	6.268	8.875	0.004600
15	Journal of Materials Chemistry A	67,521	8.867	8.824	0.185220

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16	LAND DEGRADATION & DEVELOPMENT	4,392	9.787	8.734	0.004750
17	GLOBAL ENVIRONMENTAL CHANGE-HUMAN AND POLICY DIMENSIONS	11,449	6.327	7.987	0.026180
17	GLOBAL ENVIRONMENTAL CHANGE-HUMAN AND POLICY DIMENSIONS	11,449	6.327	7.987	0.026180
19	JOURNAL OF ECONOMIC PERSPECTIVES	9,480	5.727	7.982	0.025620
20	ENVIRONMENT INTERNATIONAL	17,043	7.088	7.729	0.026420
21	WATER RESEARCH	73,010	6.942	7.715	0.076220
22	REMOTE SENSING OF ENVIRONMENT	41,043	6.265	7.653	0.046910
23	APPLIED ENERGY	48,306	7.182	7.500	0.088540
24	IEEE Transactions on Sustainable Energy	4,552	4.909	7.082	0.015800
25	JOURNAL OF FINANCIAL ECONOMICS	24,083	4.505	6.991	0.064600
26	ENVIRONMENTAL SCIENCE & TECHNOLOGY	145,022	6.198	6.960	0.191070
27	Biotechnology for Biofuels	6,029	5.203	6.732	0.017450
28	JOURNAL OF HAZARDOUS MATERIALS	84,058	6.065	6.393	0.081920
29	PROGRESS IN PHOTOVOLTAICS	7,971	6.726	6.255	0.016400
30	JOURNAL OF CLEANER PRODUCTION	30,460	5.715	6.207	0.038740
31	JOURNAL OF POWER SOURCES	99,158	6.395	6.117	0.136050
32	BIORESOURCE TECHNOLOGY	93,612	5.651	6.102	0.122280
33	ECONOMIC GEOGRAPHY	2,360	5.344	6.085	0.002350
34	Environmental Science-Nano	793	6.047	6.056	0.002180
35	TOURISM MANAGEMENT	14,256	4.707	6.048	0.011170

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36	JOURNAL OF ACCOUNTING & ECONOMICS	7,303	3.839	6.016	0.010960
37	JOURNAL OF POLITICAL ECONOMY	19,276	3.923	5.929	0.024730
38	JOURNAL OF TOXICOLOGY AND ENVIRONMENTAL HEALTH-PART B-CRITICAL REVIEWS	1,475	5.815	5.878	0.001880
39	Ecosystem Services	1,797	4.072	5.866	0.005230
39	Ecosystem Services	1,797	4.072	5.866	0.005230
41	Environmental Science & Technology Letters	985	5.308	5.763	0.004240
42	Earths Future	443	4.938	5.761	0.002700
43	AMERICAN ECONOMIC REVIEW	40,031	4.026	5.669	0.130380
44	Wiley Interdisciplinary Reviews-Climate Change	1,859	4.571	5.572	0.006890
45	ENVIRONMENTAL POLLUTION	33,949	5.099	5.552	0.040750
46	ENERGY CONVERSION AND MANAGEMENT	34,034	5.589	5.472	0.043690
47	American Economic Journal-Applied Economics	1,679	3.360	5.434	0.022040
47	Global Change Biology Bioenergy	2,330	4.655	5.434	0.006690
49	INTERNATIONAL JOURNAL OF COAL GEOLOGY	8,981	4.783	5.427	0.011660
50	REVIEW OF FINANCIAL STUDIES	11,581	3.689	5.401	0.051860
51	CRITICAL REVIEWS IN ENVIRONMENTAL SCIENCE AND TECHNOLOGY	4,018	5.790	5.288	0.005480
52	REVIEW OF ECONOMIC STUDIES	10,451	4.030	5.240	0.036100
53	Environmental Research Letters	9,605	4.404	5.221	0.041130
54	ECONOMETRICA	26,737	3.379	5.214	0.047170
55	ENERGY	40,180	4.520	5.182	0.066220

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56	GLOBAL BIOGEOCHEMICAL CYCLES	12,840	4.655	5.105	0.016820
57	SCIENCE OF THE TOTAL ENVIRONMENT	60,599	4.900	5.102	0.092970
58	CONSERVATION BIOLOGY	19,131	4.842	5.092	0.019550
59	REVIEWS IN ENVIRONMENTAL SCIENCE AND BIOTECHNOLOGY	1,760	4.400	5.041	0.002390
60	Current Opinion in Environmental Sustainability	2,687	3.954	5.024	0.009510
61	LANDSCAPE AND URBAN PLANNING	11,099	4.563	5.023	0.014070
62	Business Strategy and the Environment	3,086	3.076	4.990	0.002460
63	ENVIRONMENTAL MODELLING & SOFTWARE	10,073	4.404	4.979	0.018280
64	Review of Environmental Economics and Policy	706	3.862	4.974	0.002990
65	ECOLOGICAL APPLICATIONS	19,666	4.314	4.933	0.022380
66	CLIMATIC CHANGE	15,823	3.496	4.907	0.039330
67	Economic Systems Research	1,238	2.691	4.864	0.002710
68	PROGRESS IN PLANNING	626	3.882	4.829	0.000890
69	RENEWABLE ENERGY	28,532	4.357	4.825	0.040560
70	TRANSPORTATION RESEARCH PART B- METHODOLOGICAL	8,518	3.769	4.822	0.012120
71	SOLAR ENERGY MATERIALS AND SOLAR CELLS	26,881	4.784	4.799	0.038180
72	Reviews of Environmental Contamination and Toxicology	1,817	3.930	4.798	0.001660
73	SOLAR ENERGY	24,226	4.018	4.739	0.025360
74	FUEL	45,518	4.601	4.726	0.062510

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75	JOURNAL OF ENVIRONMENTAL MANAGEMENT	23,070	4.010	4.712	0.036250
76	WATER RESOURCES RESEARCH	45,234	4.397	4.703	0.058130
77	AGRICULTURE ECOSYSTEMS & ENVIRONMENT	17,655	4.099	4.678	0.022850
78	WASTE MANAGEMENT	16,603	4.030	4.669	0.018580
79	IEEE TRANSACTIONS ON ENERGY CONVERSION	10,494	3.808	4.662	0.011470
80	ENERGY AND BUILDINGS	25,822	4.067	4.599	0.032430
80	ENERGY POLICY	35,244	4.140	4.599	0.053140
80	ENERGY POLICY	35,244	4.140	4.599	0.053140
83	BIOLOGICAL CONSERVATION	24,858	4.022	4.546	0.035340
84	Journal of the European Economic Association	2,982	2.758	4.521	0.020520
85	CHEMOSPHERE	61,146	4.208	4.506	0.066970
86	American Economic Journal-Macroeconomics	1,202	2.909	4.497	0.016520
87	VALUE IN HEALTH	6,019	4.235	4.491	0.016440
88	JOURNAL OF ENVIRONMENTAL PSYCHOLOGY	6,389	3.494	4.462	0.005460
89	ENERGY ECONOMICS	10,499	3.199	4.410	0.021210
90	REVIEW OF ECONOMICS AND STATISTICS	12,283	2.926	4.405	0.032560
91	APPLIED CATALYSIS A-GENERAL	37,073	4.339	4.354	0.031650
92	Sustainability Science	1,126	3.429	4.321	0.002380
93	ENVIRONMENTAL RESEARCH	10,802	3.835	4.315	0.018070
94	Corporate Social Responsibility and Environmental Management	1,477	2.852	4.294	0.001520
95	ECOLOGICAL INDICATORS	10,667	3.898	4.254	0.022660
96	American Economic Journal-Economic Policy	1,132	3.133	4.253	0.017240



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**APPENDIX G – Stop the Clock Letters**

**Office of the Dean and Director**  
*College of Natural Sciences,  
Forestry, and Agriculture  
Maine Agricultural and Forest  
Experiment Station*



5782 Winslow Hall  
Orono, Maine 04469-5782  
Tel: 207-581-3202  
Fax: 207-581-3207  
[www.umaine.edu](http://www.umaine.edu)

August 22, 2013

Dr. Jeffrey Hecker  
Executive Vice President for Academic Affairs and Provost  
University of Maine  
5703 Alumni Hall  
Orono, ME 04469  
CAMPUS

Dear Provost Hecker:

Please find the attached request from Dr. Sharon (Wagner) Klein requesting a one-year extension of her tenure clock. Her request is based upon her current pregnancy and related health problems. Dr. Klein is an assistant professor in the School of Economics.

I fully support this request as does Dr. Mario Teisl, Director of the School of Economics. (See attached letter.) Dr. Klein is a valued member of our faculty.

Sincerely,

A handwritten signature in black ink that reads 'E. Ashworth'.

Edward N. Ashworth  
Dean & Director

Enclosures

School of Economics  
www.umaine.edu/soe  
Phone: 207-581-3154



5782 Winslow Hall  
Orono, Maine 04469  
Fax: 207-581-4278

August 21, 2013

Ed Ashworth, Dean  
College of Natural Sciences, Forestry and Agriculture

Dear Dean Ashworth,

After conferring with our PEER committee, I approve of Sharon Klein's request for a one-year extension of her probationary period for exceptional life circumstances (attached). Sharon has experienced some difficult times and is deserving of this extension.

Sincerely,

A handwritten signature in black ink, appearing to read 'M. Teisl'.

Mario F. Teisl  
Professor and Director

School of Economics  
www.umaine.edu/soe  
Phone: 207-581-3154



5782 Winslow Hall  
Orono, Maine 04469  
Fax: 207-581-4278

August 16, 2013

To: Mario Teisl, Director  
Fr: Sharon Klein  
Re: Workload evaluation

I am requesting a one-year extension of my probationary period for exceptional life circumstances due to the emotional and physical effects I have experienced over the past 2 years associated with two miscarriages (at 12 and 10 weeks) and a current pregnancy that has involved much illness. During all three pregnancies, I have experienced severe nausea, exhaustion, and other pregnancy-related symptoms on a daily basis, which currently totals 43 weeks of illness over the past 2 years (and still counting). In addition, there have been several weeks during which I have grieved the loss of two pregnancies and had physical symptoms associated with the trauma of those losses. I am requesting the extension of my probationary period to be in effect for the 2013-2014 academic year.

Thank you for your time and consideration.

Sincerely,



Sharon Klein  
Assistant Professor  
School of Economics  
University of Maine  
Orono, ME

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**APPENDIX H: Email from Dr. Habib Dagher about NSF SRN Grant Proposal**

Gmail - NERSE Full proposal submission and confirmation number

<https://mail.google.com/mail/u/0/?ui=2&ik=0df8c24242&jsver=Ea...>



Sharon Wagner <[wagszoo@gmail.com](mailto:wagszoo@gmail.com)>

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**NERSE Full proposal submission and confirmation number**

**Habib Dagher** <[Habib\\_Dagher@umit.maine.edu](mailto:Habib_Dagher@umit.maine.edu)>

Tue, Apr 3, 2012 at 12:01 PM

To: [sharon.wagner@maine.edu](mailto:sharon.wagner@maine.edu)

Cc: Michael Eckardt <[Michael\\_Eckardt@umit.maine.edu](mailto:Michael_Eckardt@umit.maine.edu)>

Dear Sharon,

You are to be highly commended for originating the idea for this exciting NSF proposal, and for assembling and leading the team. Your ability to bring together peers at UMaine and from many other institutions have been light-years ahead of what is normally expected from a first-year faculty. The resulting proposal is extremely well written, thanks to your tireless efforts.

It has been a great pleasure interacting with you.

sincerely,

Habib

=====

Dr. H. J. Dagher, P.E.  
Director, The Advanced Structures and Composites Center  
Director, DeepCwind Consortium  
Professor of Structural Engineering  
BIW Professor of Civil Engineering  
AEWC Building  
University of Maine  
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[www.deepcwind.org](http://www.deepcwind.org)

Sharon Wagner <[sharon.wagner@maine.edu](mailto:sharon.wagner@maine.edu)> writes:

>Hi everyone,

>

>I would like to echo Kate in thanking you all for your hard work - we have become quite a team in the last few months! I have been consistently amazed by the talent and level of cooperation I have seen in this group.

Hopefully we will get the

>grant and all get to work together again soon. Here is a copy of the full submission and the confirmation from NSF. According to the email we got from NSF in January inviting us for the full proposal, we should know by end of May or early June