Renewal Proposal for the

Energy and Environmental Economics and Policy Initiative (EEEPI)

Submitted to the Earth and Environmental Systems Institute

By

Seth Blumsack and Karen Fisher-Vanden (Co-Directors)
April 20, 2020

List of Participating Faculty

In its present incarnation, the activities of the Energy and Environmental Economics and Policy Initiative (EEEPI) have involved more than twenty faculty members in the Colleges of Earth and Mineral Sciences; Agricultural Sciences; Engineering; School of International Affairs, and Business, along with more than two dozen graduate students and postdocs. The most active faculty participants are listed below.

- Jennifer Baka, Geography
- Seth Blumsack, Leone Family Department of Energy and Mineral Engineering
- Daniel Brent, Agricultural Economics, Sociology and Education
- Linlin Fan, Agricultural Economics, Sociology and Education
- Karen Fisher-Vanden, Agricultural Economics, Sociology and Education
- Klaus Keller, Geosciences
- Andrew Kleit, Leone Family Department of Energy and Mineral Engineering
- Melissa Kreye, Ecosystem Science and Management
- Joel Landry, Leone Family Department of Energy and Mineral Engineering
- Yizao Liu, Agricultural Economics, Sociology and Education
- Chiara Lo Prete, Leone Family Department of Energy and Mineral Engineering
- Rob Nicholas, EESI
- Wei Peng, Civil and Environmental Engineering and School of International Affairs
- Heather Preisendanz, Agricultural and Biological Engineering
- James Shortle, Agricultural Economics, Sociology and Education
- Mike Jacobsen, Ecosystem Science and Management
- Ted Jaenicke, Agricultural Economics, Sociology and Education
- Zhen Lei, Leone Family Department of Energy and Mineral Engineering
- Uday Shanbhag, Industrial and Manufacturing Engineering
- Martina Vecchi, Agricultural Economics, Sociology and Education
- Rob Weaver, Agricultural Economics, Sociology and Education
- Douglas Wrenn, Agricultural Economics, Sociology and Education
- George Young, Meteorology
- Kate Zipp, Agricultural Economics, Sociology and Education

Rationale for Continuing the Initiative

The Energy and Environmental Economics and Policy Initiative (EEEPI) was created in 2011 to unite a community of scholars at Penn State that has world-class talent, but has historically remained unfortunately fragmented. Initial support was provided by EESI and PSIEE, and EEEPI has partnered with other Institutes and Centers on campus to jointly sponsor activities. Partners over the last three years have included the Center for Climate Risk Management (CLIMA); Center for Energy Law and Policy (CELP); Environment and Natural Resources Institute (ENRI); EMS Energy Institute; and the Program on Coupled Natural and Human Systems (PCHES). EEEPI's activities have included:

- Establishment of a weekly seminar series featuring both internal and external speakers that has been well-attended by graduate students, post-docs and faculty (most seminars have had at least 20 attendees);
- Co-sponsorship with CLIMA of an Earth Talks seminar series in Fall 2019, focused on energy transitions and climate change;
- Targeted support for new research areas in the economics of coupled systems, energy transitions and the governance of the nation's power grid;
- Sponsoring meetings to plan joint research projects;
- Providing a platform for the organization of a new inter-college degree program in Energy, Environmental and Food Economics, which launched in 2018;
- Contributing to energy policy as one of the pillars of President Barron's "Energy University" Initiative, culminating in the creation of the Center for Energy Law and Policy.

Over the past nine years EEEPI has been a successful platform for building a University-wide community in energy and environmental economics, particularly among faculty with interests in interdisciplinary research. It has helped students and pre-tenure faculty advance and promote their research, and as such has become a focal point on campus for the study of economics and policy related to energy and environmental resources and systems. Over these nine years, we have built a model for the promotion of a robust interdisciplinary cross-campus research community that works.

Connections with Other Activities at Penn State

Despite the existence of several other activities at Penn State that involve energy and environmental economics (CELP, CLIMA, PCHES and SAFES in particular), EEEPI is unique is seeking to support a robust community of interdisciplinary study in topics focused on energy and environmental economics. Over the past three years, EEEPI has been particularly well aligned with the new intercollege graduate program in Energy, Environmental and Food Economics (EEFE). A major role of EEEPI in building up this new graduate degree program has been to promote connections between EEFE and relevant researchers in fields other than economics. The belief of the EEEPI Co-Directors is that these connections will help to build a brand for EEFE as a program that values interdisciplinary research around economic problems in energy, environment and food systems. Our ability to nurture and execute interdisciplinary research will, we believe, set Penn State apart in a very crowded applied economics marketplace.

Potential Funding Opportunities

Penn State faculty who would be affiliated with EEEPI have been highly successful in competing for large grants in which energy and environmental economics and policy play a central role. Many of these opportunities do not arise in the form of regular solicitations, but are issued by a variety of funding agencies in response to emerging energy or environmental issues.

A few examples of programs that will be emphasized include:

- NSF's INFEWS program targets an area (food/energy/water systems modeling) in which faculty active in EEEPI have built tremendous capabilities over the past three years.

- NSF's Dynamics of Integrated Socio-Environmental Systems (CNH2) funds research that couples human and natural systems in an integrated way.

- One EEEPI Co-Director (Fisher-Vanden) is the PSU PI on a large multi-institution grant from the Department of Energy's Office of Science, Multisector Dynamics program focused on multi-scale integrated assessment for food/energy/water systems. This program (administratively supported by EESI) involves a number of EEEPI-affiliated faculty

- Both NSF and DOE run cross-cutting research programs in the area of Smart and Connected Communities. DOE's grant opportunities are largely focused on community-scale distributed energy and NSF's opportunities are more broad. EEEPI faculty have been involved in proposals to both programs, and expectations are that these programs will continue at least for the next couple of years.

- Over the past three years EEEPI faculty have built a relationship with the energy program office at the Alfred P. Sloan Foundation. Two EEEPI-affiliated faculty (Seth Blumsack and Chiara Lo Prete) are running active research programs sponsored by Sloan, and there are good prospects for additional funding particularly in the area of electric power systems.

Center Needs

The purpose of EEEPI is to catalyze and organize research efforts across the university to propel Penn State into a position of national and international leadership in energy and environmental economics and policy. We primarily seek funds and administrative support to maintain our community-building activities (such as the seminar series) and to provide modest support for group of Center affiliates to collaborate on proposals in response to the opportunities listed above as well as others that may arise. We request $5,000 per year over three years from EESI and expect to have at least as much in matching support from CELP, SAFES and the EMS Energy Institute through the Initiative for Sustainable Electric Power Systems.

We have benefitted in recent years from excellent EESI administrative support to handle scheduling, advertisement of seminars, travel arrangements, and rembursements. Beth Tamminga (EESI) has done a fantastic job supporting the EEEPI seminar series and we hope that we can continue to have her support.

EEEPI is not requesting space at this time, although administration of some of our activities leverages space already provided by EESI for the support of Klaus Keller's SCRiM/CLIMA and Karen Fisher-Vanden's ongoing PCHES award.

Management Structure

EEEPI will be headed by two faculty directors from two different Colleges, Karen Fisher-Vanden and Seth Blumsack. The directors will be in charge of approving expenditures and overseeing Center activities. To involve some faculty more deeply in the Center, particularly pre-tenure faculty, we envision nominating individual faculty (other than the Co-Directors) and graduate student to help run the seminar series in each semester and to come up with themes for the seminars, where appropriate. Examples of representative theme areas might include unconventional natural gas development; renewable electricity generation; ecosystem services, and so forth. The co-directors see one another on at least a weekly basis and will meet additionally as needed to discuss EEEPI issues. Under EEEPI, the co-directors have set and maintained expectations that affiliate faculty will need to be active participants in Center activities (such as seminars or other meetings) in order to be viewed as competitive for grad-student funding, seed-grant opportunities or administrative support with proposal management.

EEEPI Activities in the Past Three Years

EEEPI has managed a budget of $10,000 over the past three years, which combines support from EESI, ENRI and PSIEE.

Past Expenditures
The biggest expenditure areas for EEEPI between 2017 and 2020 have been in running the energy and environmental economics seminar series, and in running a small-grants program for EEEPI affiliate faculty and PhD students. We acknowledge that EEEPI clearly needs to be shifting from a "community building" mode to a "research development" mode, and we are planning some substantial changes to expenditures over the next three years if renewed. In particular, we plan to transition the seminar series from being primarily an EEEPI activity to one that sponsors more joint events with CELP, CLIMA, PCHES and SAFES. We plan to devote more of EEEPI's resources to supporting new research initiatives. Our goal is to move EEEPI from its present position where most funds are spent on seminars to one where a greater share of funding is spent to promote new research ideas involving multidisciplinary teams of researchers including students.

Energy and Environmental Economics Seminars: The seminar series has been a weekly event run regularly during the fall and spring semesters over the past several years (with occasional seminars during the summer, though attendance at these has been lower). Attendance has typically been around 25-30 participants per seminar and has been made up primarily of graduate students and faculty from Earth and Mineral Sciences, Agricultural Sciences, and Engineering. Between one-half and two-thirds of the seminar speakers have been Penn State faculty and graduate students (consistent with the community-building mission of EEEPI), but we have regularly invited outside speakers as well. Approximately 80% of EEEPI's total annual expenditures in each of the past three years has been to support the seminar series (food for participants and travel support for external speakers).

Support for Travel and Research: EEEPI funds have periodically been used for investigative activities to identify potentially new research opportunities. Approximately 15% of EEEPI's total annual expenditures in each of the past three years has gone to these investigative activities and have borne some fruit in the form of new multi-year grants from the Sloan Foundation and the Heising Simons Foundation.

Programmatic or Proposal Planning: EEEPI has supported (largely through food purchase) meetings of Center affiliates to discuss proposal-writing opportunities or other areas of collaboration. Approximately 5% of EEEPI's budget has gone toward these activities. A few such examples include meetings for planning a new inter-college graduate program; work on proposals for the recently-funded jet fuel Center of Excellence (ASCENT, funded by FAA and led by Washington State University); and proposal planning meetings for a project on power grid governance funded by the Sloan Foundation.

Benefits to EMS and Penn State
EEEPI's successes in its first nine years of operation have largely come through increased coordination and collaboration among economists in four different departments across three Colleges at Penn State; integration of science and engineering into economics research; increased visibility for our research work; and participation of EEEPI affiliates in funded grant proposals.

- EEEPI has served as a platform for the development of a new inter-college graduate program in Energy, Environmental and Food Economics (EEFE).

- Leveraging funding from grants and individual student advisor support, over the past three years EEEPI has sponsored the following:
    - Four conference presentations at the American Economic Association annual meeting;
    - Four conference presentations at the Energy Economics Association annual meetings;
    - One conference presentation at the IEEE Power and Energy Society general meeting;

  Support for this conference travel has also been instrumental in the success of our PhD students finding jobs after graduation.

- EEEPI affiliates have continued to be successful in grant-writing and the number of proposals with the names of multiple affiliates is growing. Multiple EEEPI affiliates participated in a Sustainability Research Network proposal that made it to the final down-select round (involving a reverse site visit) but unfortunately was not funded. Important awards in food/energy/water systems and coupled energy infrastructures are examples of recent successes in targeted areas over the past three years.

- The EEEPI Co-Directors served on a working group to advise President Barron in formulating a vision for energy policy research at Penn State as part of his Energy University initiative. A major theme in the group's report to President Barron was that Penn State needs to maintain strength in energy and environmental economics for any energy policy initiative to succeed. One of the EEEPI Co-Directors (Blumsack) has worked with faculty from EMS and Penn State law on a pilot research project to show the interdisciplinary capabilities of Penn State faculty in evaluating policy options to address air emissions from natural gas operations.

- The EEEPI Co-directors have each been asked to lead major new activities at Penn State. Blumsack is directing the Center for Energy Law and Policy and Fisher-Vanden is directing SAFES. These directorships are a direct outgrowth of the successes of the Co-Directors in promoting and executing cross-campus interdisciplinary research around major energy and environmental problems.

NSF BIOGRAPHICAL SKETCH

NAME: Karen Fisher-Vanden

NSF ID:

POSITION TITLE & INSTITUTION: Professor, Pennsylvania State University

A. PROFESSIONAL PREPARATION

INSTITUTION	LOCATION	MAJOR / AREA OF STUDY	DEGREE (if applicable)	YEAR YYYY
Univ. of California, Davis	Davis, CA	Economics, Math/Computer Sci	BA and BS	1985
Univ. of Calif., Los Angeles	Los Angeles, CA	Management Science	MS	1990
Harvard University	Cambridge, MA	Public Policy	PhD	1999

B. APPOINTMENTS

2014- Professor of Environmental and Resource Economics, Dept of Ag. Econ, Soc., and Educ, Pennsylvania State University
2008-2014 Associate Professor of Environmental and Resource Economics, Dept of Ag. Econ and Rural Soc., Pennsylvania State University
2007-2008 Associate Professor (with tenure) of Environmental Studies, Dartmouth College
1999-2007 Assistant Professor of Environmental Studies, Dartmouth College
1997-2001 Research Fellow, Center for Business and Government, John F. Kennedy School of Government, Harvard University.
1992-1994 Senior Research Scientist, Global Climate Change Group, Battelle, Pacific Northwest National Laboratories, Washington, DC.
1991-1992 Air Quality Specialist, Socioeconomic Analysis Group, South Coast Air Quality Management District, Los Angeles, CA.
1990-1991 Senior Consultant, The WEFA Group, Burlington, MA.
1989-1990 Research Assistant, UCLA Business Forecasting Project, Los Angeles, CA.
1985-1988 Software Support Engineer, Hewlett-Packard Company, Sunnyvale, CA.

C. PRODUCTS

Products Most Closely Related to the Project:

1. Fan, Q., K. Fisher-Vanden, and A. Klaiber, 2018, “Climate Change, Migration, and Regional Economic Impacts in the US,” *Journal of the Association of Environmental and Resource Economists*, 5(3): 643-671.
2. Calvin, K., K. Fisher-Vanden, 2017, “Climate Change Impacts on Agriculture: The role of Integrated Assessment Models,” *Environmental Research Letters,* 12:115004, https://doi.org/10.1088/1748-9326/aa843c
3. Davlasheridze, M., K. Fisher-Vanden, A. Klaiber, 2017, “The Effects of Adaptation Measures on Hurricane Induced Property Losses,” *Journal of Environmental Economics and Management*, 81:93-114.
4. Zaveri, E., D. Grogan, K. Fisher-Vanden, S. Frolking, R. Lammers, D. Wrenn, A. Prusevich, and R. Nicholas, 2016, “Invisible water, visible impact: groundwater use and Indian agriculture under climate change,” *Environmental Research Letters*, 11.
5. Fan, Q., A., Klaiber, K. Fisher-Vanden, 2016, "Does Extreme Weather Drive Interregional Brain Drain in the U.S.? Evidence from a Sorting Model,” *Land Economics,* 92 (2): 363–388.

Other Significant Products:

1. Olmstead, S., Fisher-Vanden, K., and Rimsaite, R., 2016, "Climate Change and Water Resources: Some Adaptation Tools and Their Limits." *Journal of Water Resources Planning and Management*, 142(6).
2. Butler, M., P. Reed, K. Fisher-Vanden, K. Keller, T. Wagner, 2014, “Inaction and climate stabilization uncertainties lead to severe economic risks,” *Climatic Change*, 127:463–474.

3. Fisher-Vanden, K., I. Sue Wing, E. Lanzi, and David Popp, 2013, “Modeling climate change feedbacks and adaptation responses: recent approaches and shortcomings,” *Climatic Change*, 117(3):481-495, DOI: 10.1007/s10584-012-0644-9.
4. Fisher-Vanden, K., K. Schu, I. Sue Wing, and K. Calvin, 2012, “Decomposing the impact of alternative technology sets on future carbon emissions growth,” *Energy Economics* 34(S3): S359-S365
5. Kober, T., P. Summerton, H. Pollitt, U. Chewpreecha, X. Ren, W. Wills, C. Octaviano, J. McFarland, R. Beach, Y. Cai, S. Calderon, K. Fisher-Vanden, A. Loboguerro Rodriguez, 2016, “Macroeconomic impacts of climate change mitigation in Latin America: A cross-model comparison,” *Energy Economics*, 56: 625–636.

D. SYNERGISTIC ACTIVITIES

1. I co-direct a large US Department of Energy project developing new, state-of-the-art, integrated modeling framework to drive advances in the quantitative understanding of coupled human and natural systems.
2. I serve on the Board of Directors of the Association of Environmental and Resource Economists.
3. I was a Lead Author for the fifth assessment report of the Intergovernmental Panel on Climate Change.
4. I am a member of the Science Advisory Board of the Environmental Protection Agency
5. I was a member of the Expert Review Panel for the Risky Business project chaired by Michael Bloomberg (Bloomberg Philanthropies), Hank Paulson (Office of Hank Paulson), and Thomas Steyer (Next Generation).

Seth A. Blumsack, Professor
Leone Family Department of Energy and Mineral Engineering and School of International Affairs
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Education and Training

B.A., Mathematics and Economics, Reed College (1998).
M.S., Economics, Carnegie-Mellon University (2003).
Ph.D., Engineering and Public Policy, Carnegie-Mellon University (2006).
Postdoctoral Research, Carnegie-Mellon University (2006-07).

Research and Professional Experience

Professor (2018 – present), Associate Professor (2013 – 2017) and Assistant Professor (2007 – 2013) Leone Family Department of Energy and Mineral Engineering, The Pennsylvania State University
Program Chair, Energy Business and Finance (2014 – 2017)
Associate Head, Leone Family Department of Energy and Mineral Engineering (2016 – 2020)
External Faculty, Santa Fe Institute (2017 – present)
Consulting Economist, Economic Insight, Inc., 1998 – 2001.

Ten Recent Publications (out of 55 total since 2007)

1. Tayari, Farid and Seth Blumsack, 2020. "Optimal Timing of Geologic CO_2 Sequestration in Depleted Shale Gas Formations," *Applied Energy* 26, 114491.

2. Mahabin, Tasnuva*, Alfonso Mejia, Seth Blumsack and Caitlin Grady, 2020. "Integrating embedded resources and network analysis to understand food-energy-water nexus in the US," *Science of the Total Environment* 709, 136153.

3. Wu, Daniel, Tiantian Ne, Kostya Turitsyn, and Seth Blumsack, 2019 (in press). "Estimating Loadability Regions for Natural Gas Systems via Monotone Inner Polytope Sequence," to appear in *IEEE Transactions on Networked Systems*.

4. Grady, Caitlin, Seth Blumsack, Alfonso Mejia, Catherine Peters, 2019. "The Food-Energy-Water Nexus: Security, Sustainability and Systems Perspectives," *Environmental Engineering Science* 36:7, pp. 761, 762.

5. Kleit, Andrew, Chiara Lo Prete, Seth Blumsack and Nongchao Guo*, 2019. "Weather or Not: Modeling the Welfare Effects of Natural Gas Pipeline Expansion," *Energy Systems* 10:3, pp. 593-633.

6. Lo, Helen, Paul Hines, Seth Blumsack and Sean Meyn, 2019. "Electricity Rates for the Zero Marginal Cost Grid," *Electricity Journal* 32:3, pp. 39-43.

7. Yoo, Kyungjin* and Seth Blumsack, 2018. "The Political Complexity of Regional Electricity Policy Formation" *Complexity* 3493942, 18 pp.

8. Blumsack, Seth, 2018. “Impacts of the retirement of the Beaver Valley and Three Mile Island Nuclear Power Plants on Capacity and Energy Prices in Pennsylvania, *Electricity Journal* 31:6, pp. 57-64.

9. Yoo, Kyungjin* and Seth Blumsack, 2018. “Can Capacity Markets be Designed by Democracy?” *Journal of Regulatory Economics* 53:2, pp. 127-151.

10. Bent, Russell, Seth Blumsack Pascal Van Hentenryck, Conrado Borraz-Sánchez and Mehdi Shahriari*, 2018. "Joint Electricity and Natural Gas Transmission Planning With Endogenous Market Feedbacks," *IEEE Transactions on Power Systems*, 33:6, pp. 6397-6409.

Service and Synergistic Activities:

1. *Research:* Director, Center for Energy Law and Policy; Co-Director, Energy and Environmental Economics and. Policy Initiative (EEEPI); External Faculty, Santa Fe Institute; Adjunct Research Professor, Carnegie Mellon Electricity Industry Center;
2. *Editorial:* Associate editor for *Journal of Reglatory Economics* and *Journal of Energy Engineering*, Reviewer for *Environmental Science and Technology*, *Environmental Research Letters, Energy, Energy Policy, IEEE Transactions on Power Systems, Energy Journal* and *Journal of Regulatory Economics.*
3. *Educational*: Program Chair, Energy Business and Finance, Penn State University; Associate Department Head, Penn State University; External advisor for the petroleum engineering program, University of the West Indies.
4. *Advisory:* Service on proposal review panels for NSF, DOE and Alfred P. Sloan Foundation; Member of EPA peer review panel for energy intensity indicators and peer review panel for power systems modeling; External advisory board for state EPSCoR programs in New Mexico and Wyoming; External advisory board for the Safety of Complex Systems program, University of York and Royal Academy of Engineering (United Kingdom)

Recent Grants and Awards

“Governance of Regional Transmission Organizations”
Funding Agency: Sloan Foundation and Heising Simons Foundation
Amount: $650,000
PI: Kate Konschnik
Period: 9/1/19 – 8/31/22
Annual Support: 1 person-month

“CRISP: Computable Market and System Models for Coupled Infrastructures”
Funding Agency: National Science Foundation
Amount: $177,596
PI: Seth Blumsack
Period: 9/1/16 – 8/31/19
Annual Support: 0.5 person-month

PennState
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Dr. Katherine Y. Zipp | kyz1@psu.edu | 814.863.8247

April 17, 2020

Dr. Susan Brantley
Distinguished Professor of Geosciences
Director of Earth & Environmental Systems Institute
2217 EES Building
University Park, PA 16802

I am writing to enthusiastically express my support for continued funding for the Initiative for Energy and Environmental Economics and Policy (EEEPI) co-directed by Seth Blumsack and Karen Fisher-Vanden. I have been involved with EEEP as a co-organizer of the weekly seminar series since 2017.

EEEPI supports a weekly seminar series that attracts a wide-range of internal and external speakers from leading scholars to upcoming junior faculty and graduate students all working on energy and environmental research. The EEEP seminar series is unique in its ability to successfully bring together social and natural scientists across campus interested in energy and environmental issues. There is no other seminar series on campus that I am aware of that attracts such a diversity of natural and social scientists who are all interested in energy and the environment. Given the University's and EESI's interests in promoting interdisciplinary exchange of ideas especially around important issues like energy, environmental quality, and sustainability, the EEEP provides the perfect platform to accomplish these strategic goals. The demand for such a seminar series has been demonstrated by strong weekly attendance with 20-25 faculty and undergraduate/graduate students participating each week.

Overall, I strongly support the Initiative for Energy and Environmental Economics and Policy. The interdisciplinary nature of EEEP seminar series has led to the cross-fertilization of ideas and techniques as well as new collaborations and relationships.

Please do not hesitate to contact me for further information.

Best regards,

Katherine Y. Zipp

Assistant Professor of Environmental and Resource Economics

Penn State University

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PENNSTATE

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April 16th, 2020

To whom it may concern:

I write to offer my enthusiastic support for the Energy and Environmental Economics and Policy Initiative (EEEPI) led by Drs. Seth Blumsack and Karen Fisher-Vanden. This Initiative has played a critical role in nurturing a vibrant multi-disciplinary research community working at the interface of public policy, economics, energy, and environmental sciences. The Initiative has supported a weekly seminar series in this space that delivers cutting-edge scholarship from internal and external speakers to an average audience of 20-30 students, faculty, and community members from departments and colleges across the University system. This seminar series has been instrumental in fostering new research collaborations and relationships both among individuals across Penn State as well as between Penn State and other institutions. EEEPI has also provided small seed and travel grants for graduate students and junior faculty to pursue some of these collaborations and to present their work. The service provided by this seminar series is unique in that it is the only mechanism at Penn State for bringing applied social scientists and natural scientists across campus together regularly for the purpose of interdisciplinary research exchange.

In addition, this Initiative plays an important role in cultivating ties between energy and environmental economists throughout the University system. Environmental, natural resource, and energy economics developed in many land grant universities as an outgrowth of agricultural economics. However, Penn State is somewhat unique in that energy economics had developed organically through Mineral Economics, in what is now the EBF/EMP programs in EME in the College of Earth and Mineral Sciences and environmental economics in AESE in the College of Agricultural Sciences. While this institutional evolution has given Penn State some unique benefits in its development of world-class research capacities in these spaces, it has also presented some challenges. By providing an opportunity for faculty and students from across these departments to regularly engage with students and faculty also working in these spaces throughout the University, the Initiative has helped foster a deep and valued community, in every sense of the word. This plays an important, if somewhat intangible, role in maximizing Penn State's human capital investment in faculty and students by providing opportunities for belonging and mentorship, in addition to research collaborations. In part because of this, this led faculty from EME, AESE, Smeal, and other departments to propose and have approved the new inter-college degree program in Energy, Environmental, and Food Economics which has unmistakably elevated Penn State's research contributions and profile in these spaces.

Without a doubt the Energy and Environmental Economics and Policy Initiative has led to a return on investment that is orders of magnitude larger than the direct investment in this Initiative historically. I fail to imagine any other investment one could make that could lead to a better return than that achieved by EEEPI under Drs. Seth Blumsack and Karen Fisher-Vanden careful and deliberate guidance. President Barron's goal of establishing Penn State as an energy university is intertwined with the success of Initiatives such as this. By all measures this

Initiative has succeeded and will continue to succeed and so is worthy of your continued vigorous support. Please feel free to contact me if you have any further questions or matters you wish to discuss further.

Sincerely,

Joel R. Landry

Assistant Professor of Environmental and Energy Economics

PENNSTATE

Klaus Keller
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Wednesday, April 15, 2020

(Via email)

Re: Enthusiastic Letter of Support for the EEEPI renewal proposal

Dear Karen and Seth:

Please accept this letter as evidence for my **enthusiastic and unreserved support for the EEEPI renewal proposal**.

EEEPI excels in bringing together social scientists from across the campus (and the nation!) working on energy and environmental questions. The seminar series rocks. The speaker list is amazing. This is one of the few seminar series I carefully watch. Having organized seminar series myself, I know how much work this is and how many tickets you have to punch to get these amazing speakers to present.

The seminar series also serves as a **condensation nucleus for new and exciting collaborations that span disciplines and provide research and training opportunities** in this fast-growing field**.** EEEPI provides crucial building blocks to link the social sciences with other relevant fields. Very few institutions succeed in this integration challenge. **EEEPI provides an important contribution to why Penn State is recognized as a place where these transdisciplinary collaborations truly succeed.**

EEEPI provides mission-critical linkages that provide amazing synergies to other institutes and centers (for example, the Center for Climate Risk Management).

In short, EEEPI covers a crucial niche. I sincerely hope that EEEPI can grow and flourish even more and that we can expand our existing collaborations.

Please do not hesitate to contact me if I can be of any assistance.

Many cheers,

Klaus Keller

Klaus Keller, Professor of Geosciences, Penn State