

**STEWARDED OUR PLANET'S RESOURCES  
AND  
INSTITUTES OF ENERGY AND THE ENVIRONMENT**

# **STRATEGIC PLANNING**

## **COMMUNITY FORUM #1**

**May 7, 2020**

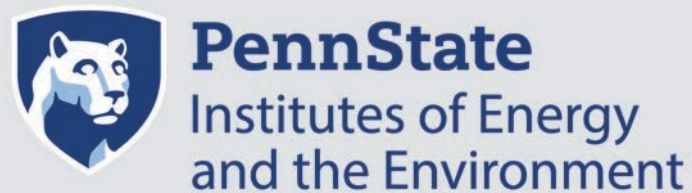


**PennState**



THE INSTITUTES OF ENERGY AND THE ENVIRONMENT  
IN COORDINATION WITH STEWARDING OUR PLANET'S RESOURCES

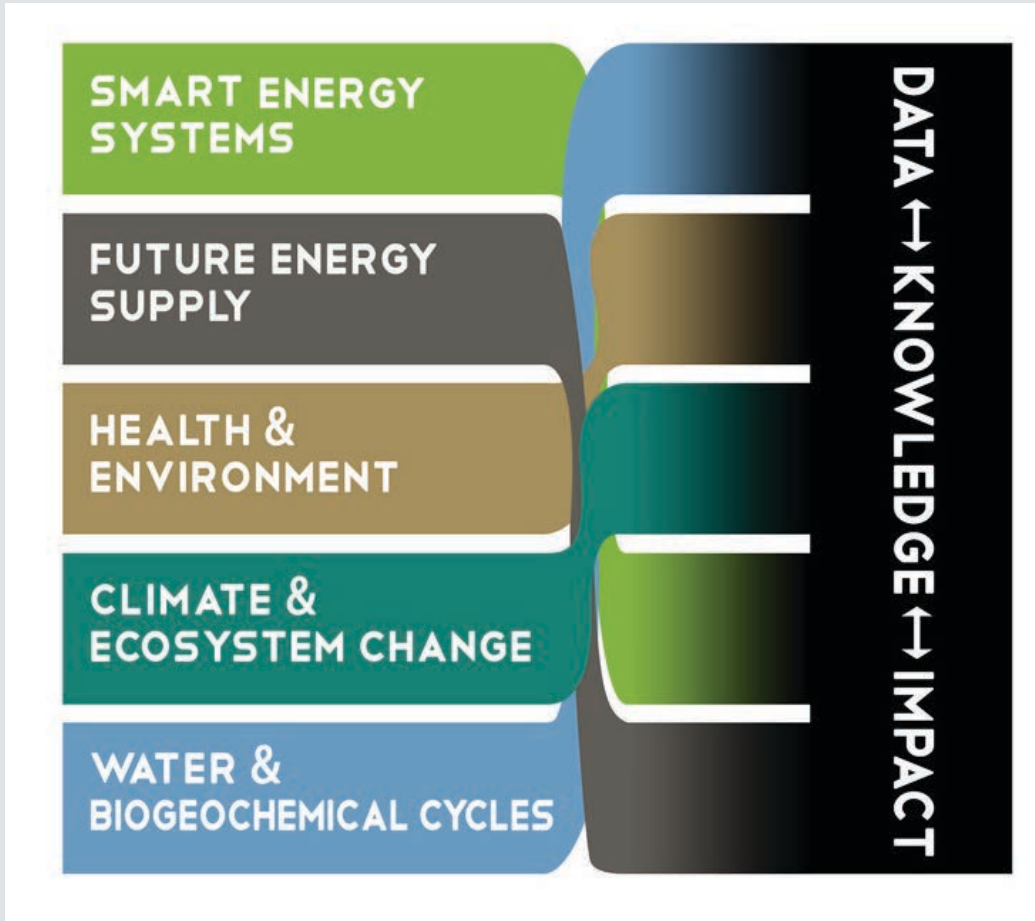
# STRATEGIC PLANNING COMMUNITY FORUM



TOM RICHARD • BRUCE LOGAN • ERICA SMITHWICK

MAY 7, 2020

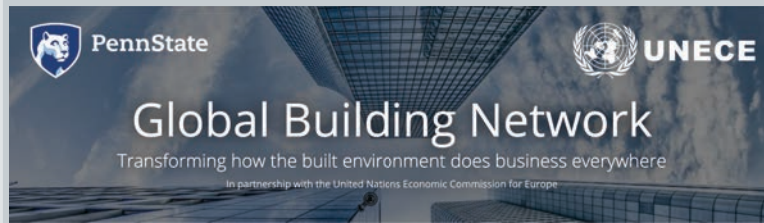
# IEE VALUES



- Creative and interdisciplinary research that addresses critical questions related to energy and environmental issues
- A diverse cohort of faculty, students, and staff focused on critical energy and environmental challenges
- Generating innovative technologies and implementation strategies that have positive impacts on society
- Translating research innovation into actionable knowledge to advance sustainability and improve the human condition

# IEE GOALS & ACCOMPLISHMENTS 2014-2019

Promote worldwide recognition for Penn State's **interdisciplinary scholarship** and work on energy and environmental challenges



Help Penn State researchers **communicate and develop partnerships** to address local and global concerns

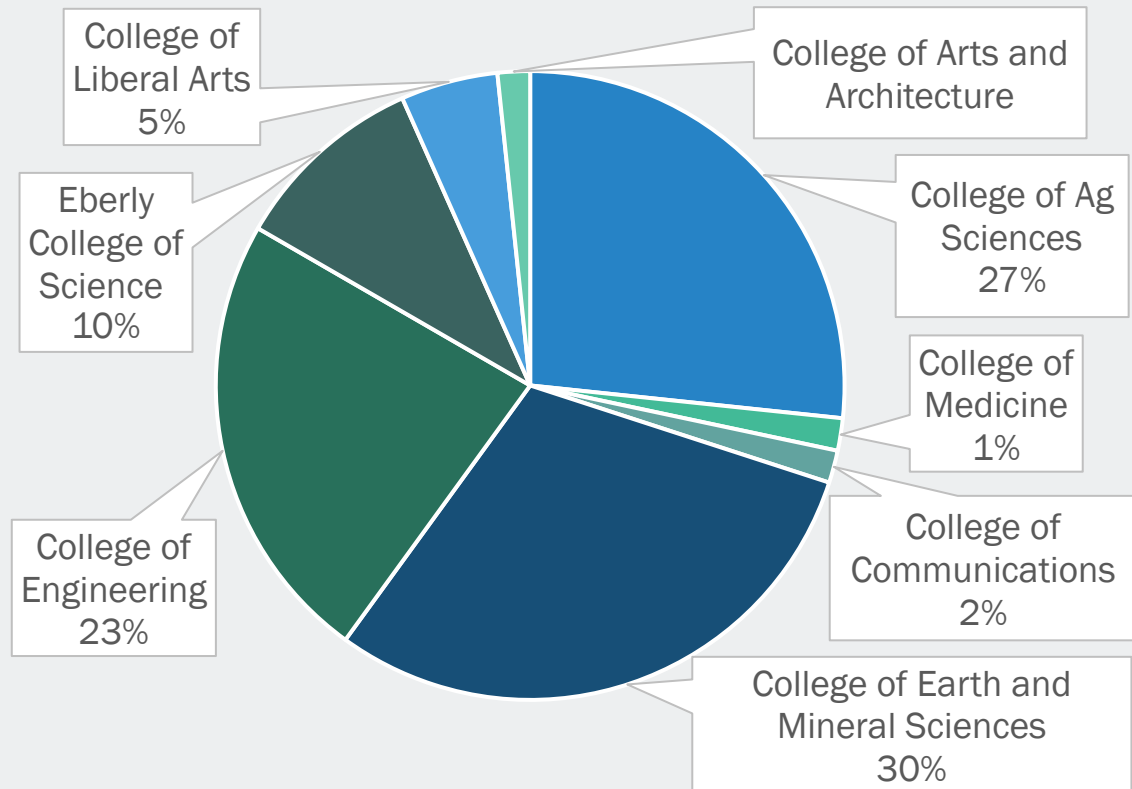


Provide innovative **state-of-the-art research infrastructure** to empower and support Penn State faculty, staff, students, and partners



# DEVELOP RESEARCH LEADERSHIP 2014-2019

**IEE FACULTY COFUND  
DISTRIBUTION BY COLLEGE**



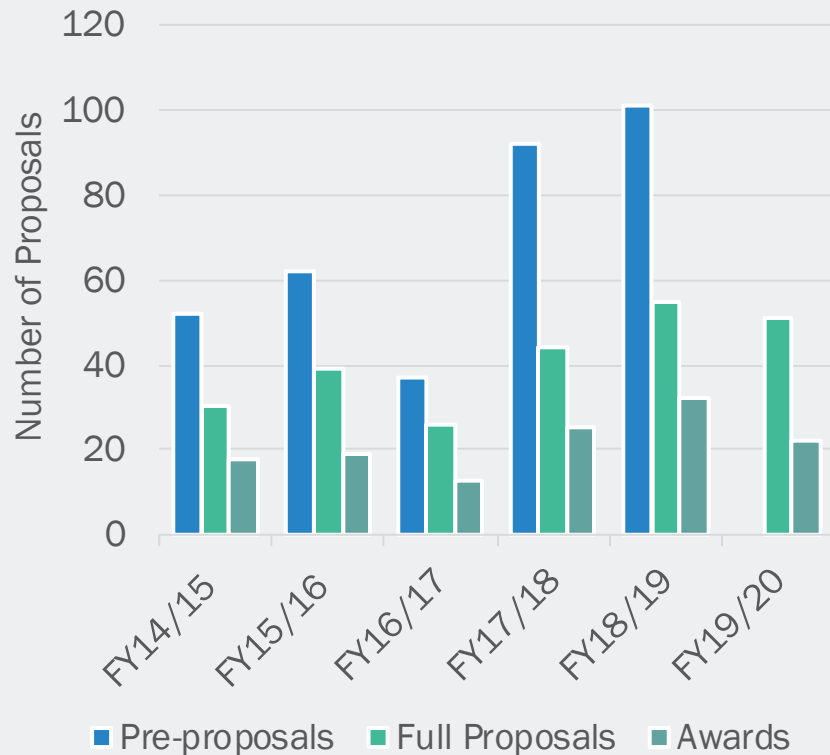
Total IEE Cofunds: 66

- 66 cofunded hires
  - 8 *environment* faculty
  - 7 *energy* faculty
- Established new partnerships
  - *College of Communications*
  - *College of Arts & Architecture*

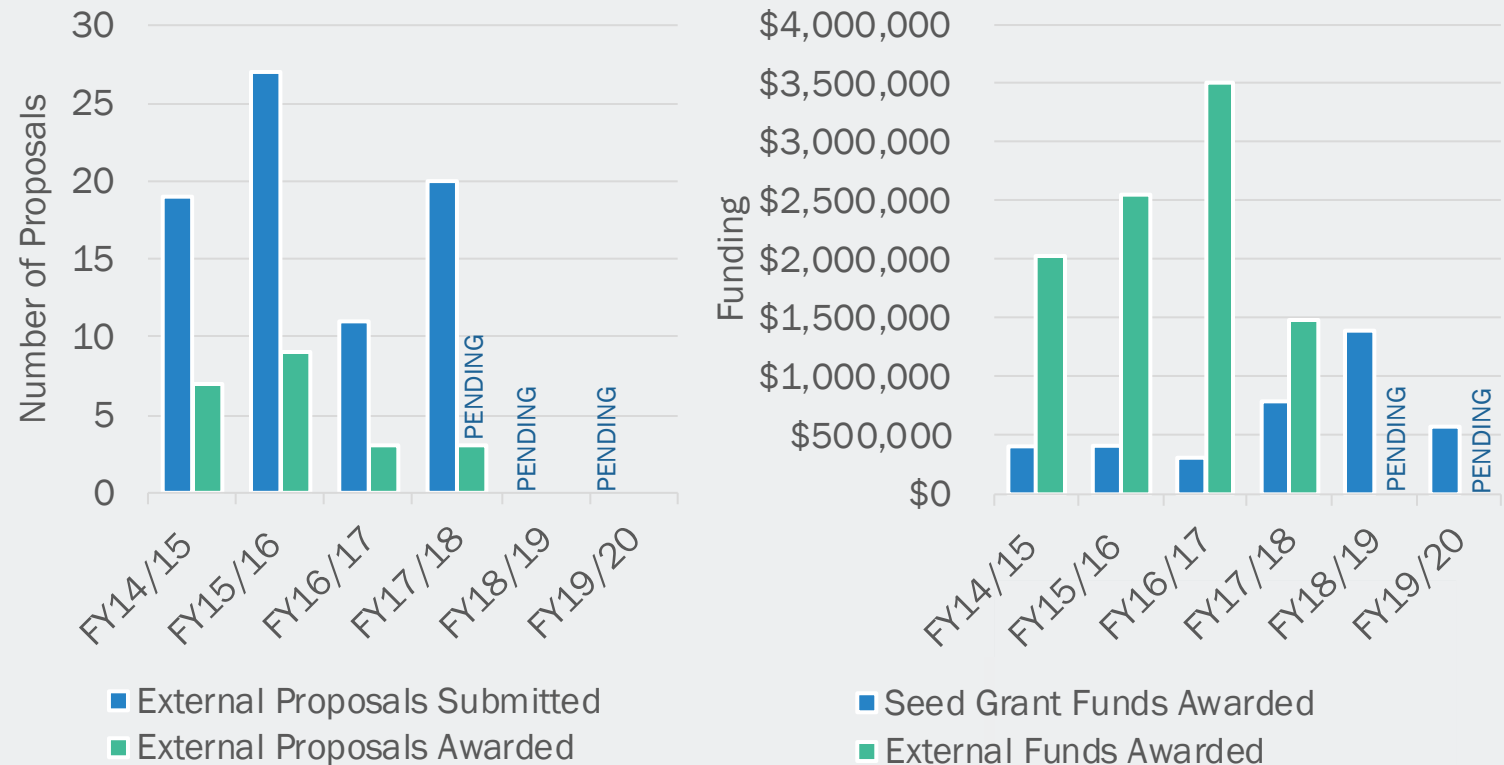


# IDENTIFY EMERGING RESEARCH TRENDS & ENGAGE RESEARCH COMMUNITIES 2014-2019

## IEE SEED GRANT SUBMISSIONS & AWARDS



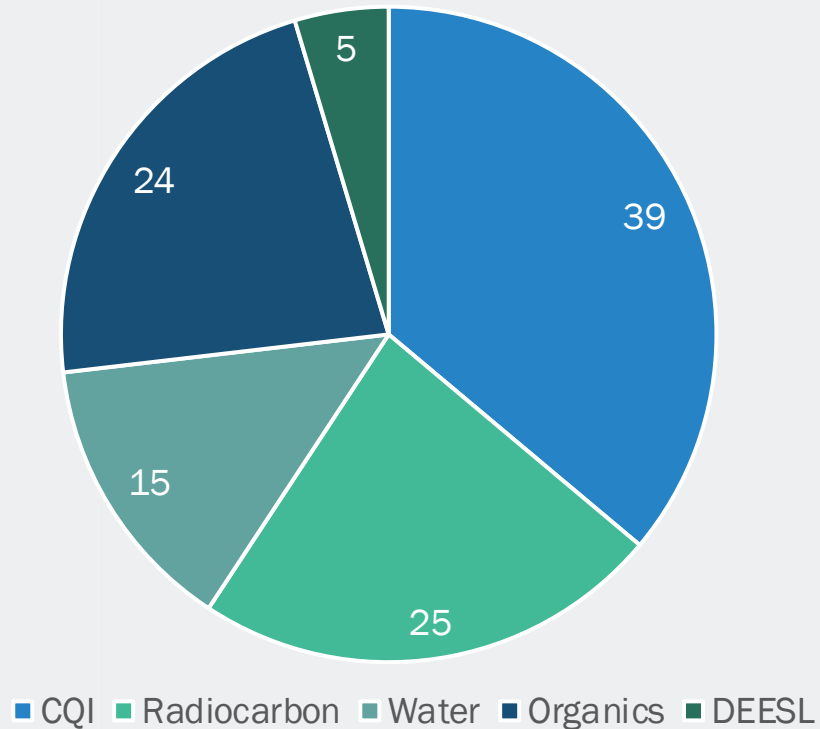
## IEE SEED GRANT RETURN ON INVESTMENT



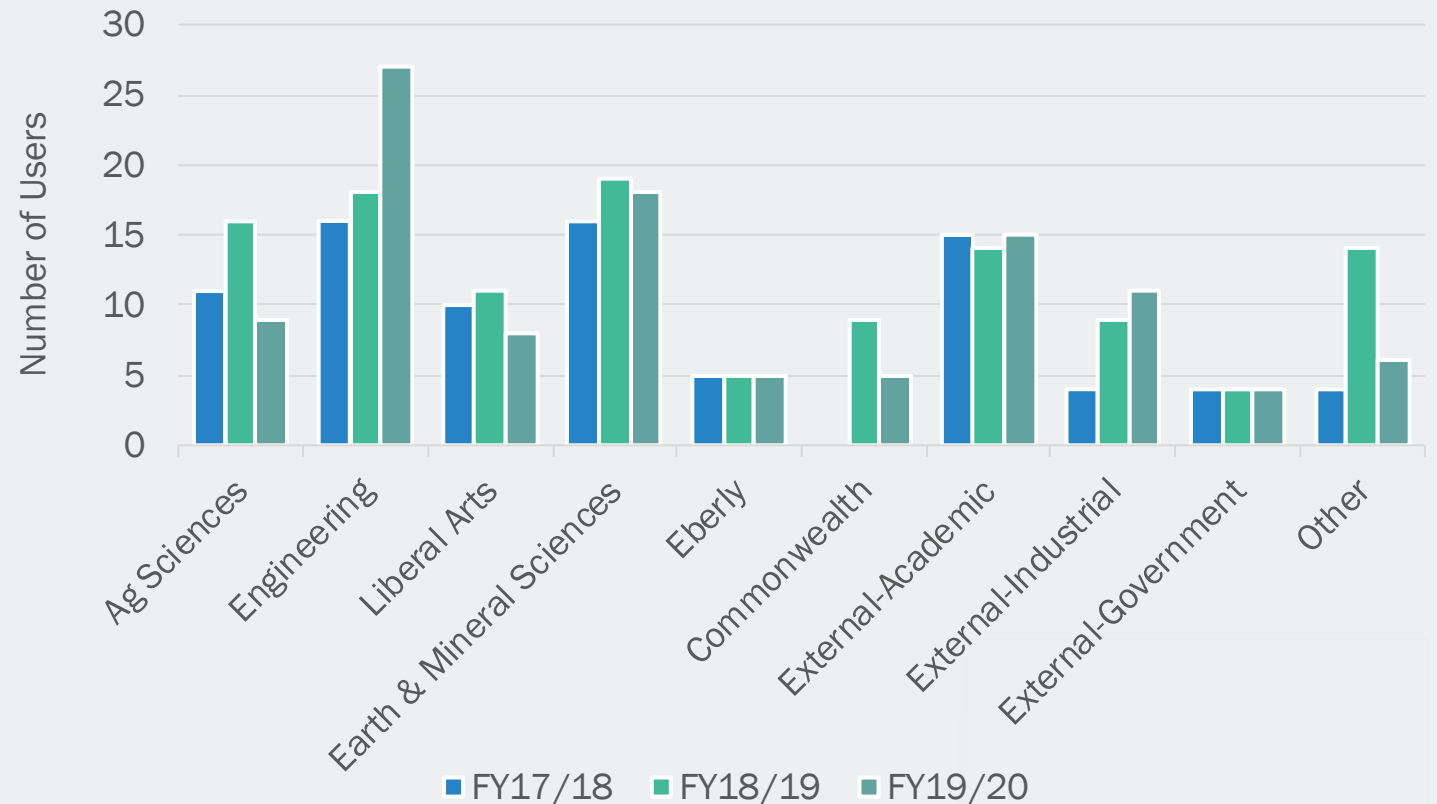
# SUPPORT RESEARCH INFRASTRUCTURE

## 2014-2019

**NUMBER OF USERS  
BY EESL LABORATORY  
FY19/20**



**NUMBER OF EESL USERS  
BY COLLEGE**



# FEEDBACK & NEXT STEPS

Join us for Community Forum #2.  
Strategies for the Future.  
May 13, 3-4:30 p.m.

What is IEE doing well?  
What could IEE do better?  
What should IEE start doing?  
What should IEE stop doing?  
How can IEE better engage with cofund and affiliate faculty?  
Are there areas of need at Penn State that IEE may help fill?

iee.psu.edu | iee@psu.edu | 814-863-0291 | Land and Water Research Building

 @IEEPennState



**PennState**  
Institutes of Energy  
and the Environment



# Stewarding Our Planet's Resources

Primary Role: assist in strategic seed grant process by hosting information sessions, providing feedback on proposals, reviewing proposals and providing input to the Oversight Committee.

## Seed Grant Summary

SOPR Proposals Submitted: 39 (265 total; 14.7%)

SOPR Proposals Funded: 9 (of 43 total; 20.9%)

Success Rate: 23.1%

Total Funding Received: \$2,238,529

Average Award: \$248,725

# Funded Proposals:

Energy University Partnership to Support the Commonwealth's Oil & Gas Strategy	1	\$250,000	Amy Bridger
E+D Proposal - Strategic Planning Initiative	1	\$242,603	Andy Cole
UNECE - High Performance Buildings	1	\$250,000	Jim Freihaut
Energy 2100	2	\$250,000	Bruce Logan
PA in the Balance	2	\$250,000	Matt Royer
PSIRC - Penn State Initiative for Resilient Communities	3	\$249,167	Lisa Iulo
Growing Penn State Forests	4	\$246,876	Margot Kaye
A systems Approach for Meeting Local & Global Food-Energy-Water Nexus Challenges	4	\$250,000	Rachel Brennan
Greening our stormwater: using campuses as living labs for green stormwater infrastructure	4	\$249,883	Wu Hong
		\$2,238,529	

# Funded Proposals - common elements

## Stewarding Our Planet's Resources



## Stewarding Our Planet's Resources + Ensuring a Sustainable Future





# Unfunded Proposals - common elements

## Stewarding Our Planet's Resources



## Stewarding Our Planet's Resources + Ensuring a Sustainable Future



# Gaps Identified



Chesapeake Bay



Coronavirus, risk management, impact on the environment both positive (reduced CO2) and negative (increased waste)



Linking pandemic risk & response to climate risk & response



Planetary health & human health



RISE and institutional resilience in the face of natural disasters and pandemics

# Strengths & Next Steps

## Outcomes

### 1. External Funding Generated

\$474,261 pre-seed grant award

\$4,246,955 post-seed grant award

### 2. Breadth of Participation

- ▶ Engineering, EMS, Ag Sci, Arts & Arch, Science, Liberal Arts, Communications, Business, Law/SIA
- ▶ Outreach, OPP, SI, IEE, Global Programs, Navy Yard
- ▶ Behrend, Beaver, Harrisburg, Mont Alto
- ▶ 12 External Partners

## Going forward

### 1. Reviewing Unit Strategic Plans for Stewarding Our Planet's Resources elements

### 2. Resilience as a bridging concept

“Further, to advance Penn State’s mission and vision for the next decade and beyond, the University is committed to empowering resilience as a unifying concept. Leveraging Our Commitment to Impact, Penn State is uniquely able to help individuals, our University community, and society to respond effectively to adversity and, even more impactfully, to “bounce forward,” creating new solutions in response to complex challenges of the 21st Century. This concept shapes the thematic priorities and supporting elements and is further guided by the foundations that drive all the work of the University.”



# College of Health and Human Development

## Energy, Environment, and Stewarding Our Planet's Resources: activities, initiatives and opportunities

Craig Newschaffer, Dean

### Existing Activities

- **Human Capital**
  - New RPTM faculty hires
    - **Sabuhoro** - sustainable tourism opportunities supported by, and supportive of, local communities
    - **Lawson** - inter-generational learning and environmental stewardship
  - HHD Sustainability Council
- **Research Initiatives**
  - Protected Areas Research Collaborative (PARC)
- **Educational Initiatives**
  - Undergraduate
    - Sustainability Leadership Minor
    - RPTM major options in Park Management and Environmental Interpretation (PMEI) and Outdoor Experiential Leadership (OEL)
  - Graduate program involvement: Human Dimensions Natural Resources, Landscape U
- **Outreach Initiatives**
  - Shaver's Creek Environmental Education Center
  - RPTM major through WC
  - One Penn State model approach with campuses

### Strategic Initiatives Underway

- **Environmental Health Sciences Program**
  - Six hires in three years (ISEE, ICDS, Rock, and potentially Huck and SSRI co-funds)
- **Expansion of Sustainability Leadership Minor**
- **Refresh of graduate educational programming**

### Strategic Opportunities

- **Population health – environmental health link**
- **PARC -> multi-college expansion around conservation research**
- **Continued campus and WC expansion of RPTM offerings**
- **Faculty – alumni – student coordinated experiences**
- **HHD student engagement (HHD Sustainability Council, Council of Sustainability Leaders, Student Sustainability Advisory Council)**

# Bellisario College of Communications / Science Comm. Program

## Research and collaboration on science communication issues

Lee Ahern, Associate Professor of Advertising / Director, Science Comm. Program

### Existing Activities

- Core faculty, Bellisario College of Comm.
  - Dr. Lee Ahern
  - Dr. Jessica Myrick
  - Dr. Juliet Pinto
  - Dr. Chris Skurka
- Invited speaker series (on hold due to COVID)
- Interdisciplinary research collaborations across the university
- Courses
  - Graduate seminar on Science Communication
  - Undergraduate online and in-resident classes
    - Science communication theory and practice
    - Science communication writing

### Strategic Opportunities

- Establish Penn State as a recognized leader in science communication research and practice
- Social-behavioral / broader impacts components on multidisciplinary grant applications
- Scholarly and community outreach activities
- Promoting science communication literacy
- Identifying areas of public misunderstanding and media miscommunication of science issues; researching and proposing solutions
- Exploring the intersections of science, mediated communications and public perceptions, understanding and behavior



# COE: Activities related to Stewarding our Planet's Resources

Bruce Logan, Director Engineering Energy & Environmental Institute



<https://energy2100.psu.edu/>

## Existing Activities

- Strategic focus of COE includes:
  - Resilient Infrastructure
  - Water-Energy-Food Nexus
- CIES: Consortium for Integrated Energy Systems
  - 2019 Faculty: 1 in Wind/Aero; wind energy training
  - 2020: 1 in Solar/ME confirmed; 1 paused/ChE; 1 declined/EE
- Drawdown-
  - COE emphasis area; Conference & UG Scholars
- Global Building Network
  - UN Initiative for energy efficient buildings
- Sustainability: Council with Sustainability Institute
- Water Council (primarily CEE)
- Centers/Institutes:
  - E<sup>3</sup>I; Larson Transportation Institute (LTI)
  - BEST; Gas turbine research, education, and outreach; H<sub>2</sub>E.

## Strategic Investments for this area

- Big 3: **Climate, Energy, Resilience**
- From Energy 2100, key theme: Energy University
  - Build in solar, wind; matching production and the grid/controls; re-envisioning bioenergy center; engaging our academic/industrial communities via IPACs; workforce planning; thermal & blue energy initiatives; enhance batteries and energy storage research.
  - Improve workforce training with emphasis areas: Renewable energy education (currently no COE solar energy courses); energy efficiency integration;
  - Electric and H<sub>2</sub> transportation; safe, robust, reliable vehicles and integration into infrastructure.
- CIES activities beyond faculty hires
  - New consortia model as facilitators of specific, multi-disciplinary themes that can often stimulate topic-focused centers, seminar series, etc.
- Designing Infrastructure resilience
  - Buildings, power sources/supplies, refrigeration/cooling; transportation
  - Small energy sources; energy efficiency; power electronics
- New research and outreach centers: (in development)
  - Center for Climate Translation and Implementation
  - Distributed Energy Innovation Partnership Center



# EMS SOPR Working Group

Alan Taylor, EESI, Geography

Dutton e-Education Institute, Earth and Environmental Systems Institute, Energy Institute, Energy and Mineral Engineering, Geography, Geosciences, Meteorology and Atmospheric Sciences, Materials Science and Engineering

## Strengthen, Integrate, Coordinate

- Research Programs
- Education Programs
- Stakeholder Programs



## National and Global Leadership in the Climate-Energy Transition

### A. Climate Science, Climate Change, Climate Impacts

- Climate and Weather Risk Forecasting
- Environmental Forecasting For Risk Management
- Earth risks: Science and Policy

### B. Sustainable Materials and Lifecycle Assessment

- Natural Polymers
- Energy Efficient Manufacturing of Materials
- Making Something From Nothing (Waste)

### C. Sustainable Energy Systems

- Renewables
- Net zero emissions in oil production with CO<sub>2</sub> injection
- Energy Storage

### D. Energy-Water-Food Nexus

- Resilience
- Water Scarcity

### E. Data Analytics



# Penn State Law

## Activities Related to Energy, Environment, and Stewarding Our Planet's Resources

Hari Osofsky, Dean

### Existing Activities

- **Faculty Hires:** Hannah Wiseman (IEE Co-Fund; EMS Cohire) (2020); Dan Walters (IEE Affiliate) (2019)
- **Strategic Focus:** Partnering across Colleges and Campuses to address legal issues critical to environmental and energy problems; helping law to address fast-moving science & technology
- **Centers:** Leader in launching university-wide Center for Energy Law and Policy and Center for Security Research and Education; Center for Agricultural and Shale Law
- **Other Key Relevant PSU Partnerships:** Law, Policy, and Engineering Initiative; Medical-Legal Partnership and Veterans Clinic; Entrepreneur Assistance Clinic; faculty participation in PCHES, SAFES, Distributed Energy Innovation Partnership, and water collaborations.
- **Curriculum:** New concentration in Energy and Environmental Law; online environmental law course for College of Agricultural Sciences interdisciplinary master's degree.

### Strategic Opportunities

- **Big Idea #1:** Energy and Environment Innovation Clinic/Initiative (developed in collaboration w/ Center for Energy Law & Policy): would work across PSU interdisciplinary environment and energy efforts and with stakeholders to help maximize impact of breakthrough science and technology by addressing legal issues and opportunities
- **Big Idea #2:** Development of new interdisciplinary energy and environment academic programs aimed at preparing students for solving emerging problems through science, engineering, law, education, health, communications, agriculture, architecture, etc
- **Little Idea #1:** PSL partnership with CELP, stakeholders, and other universities to advance legal dimensions of problem solving (smaller version of Big Idea #1)
- **Little Idea #2:** PSL partnership in development of additional law courses for existing and emerging interdisciplinary environment and energy programs across PSU (smaller version of Big Idea #2)

<https://pennstatelaw.psu.edu/energy-and-environmental-law>



# Penn State School of International Affairs (SIA)

## Projects Related to Energy, Environment, and Stewarding Our Planet's Resources

Dr. Hari Osofsky, Dean

### Existing Activities

- **Faculty Hires:** Elizabeth Ransom (Rock Ethics Co-Fund) (2018); Mare Sarr (2018); Wei Peng (Co-Hire CoE, Co-Fund ICDS 2019)
- **Strategic Focus:** Partnering across PSU/internationally to address global Environmental and Energy policy issues critical to Air Pollution, Food, Finance, Health Resilience, Migration
- **Concentrations:** Environment and Resources, International Energy Policy, International Public Policy
- **Centers:** Leader in launching university-wide Center for Energy Law and Policy and Center for Security Research and Education; Center for Climate Risk Management
- **Strategic Initiatives:** Partnerships with School of Public Policy to provide their International Public Policy Curriculum; Law, Policy and Engineering Masters/Initiative

### Strategic Opportunities

#### Big Idea #1:

Leverage through strategic hiring and collaboration SIA's unique interdisciplinary strengths in global sustainability policy

#### Big Idea #2:

Work with PSU Alumni Society and BoA Career Center to create Environmental and Energy Alumni Student Career Support Group

#### Little Idea #1:

Create PSU global environment and energy policy speaker series & forums



# College of Arts & Architecture/Ecology Plus Design:E+D

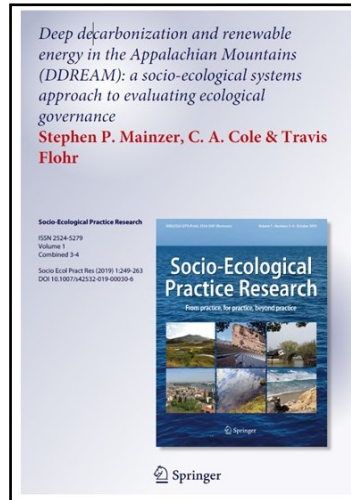
Activities Related to Energy, Environment, and Stewarding Our Planet's Resources



Andy Cole, Director

[cac13@psu.edu](mailto:cac13@psu.edu)

<https://sites.psu.edu/eplusd/>



## Existing Activities

### 1 Symposium

**13** grants (incl. 2 strategic planning grants)

**4** publications

**19** conferences presentations,

**2** MS projects, 1 doctoral degree (Aug '20)

**6** E+D mini-grant projects

**3** sponsored speakers

**5** supported design studios

- Secured a water faculty position (on hold)
- Conducted the MG2V project
- Podcast series

## Strategic Opportunities

- Become the national center of research and education in ecological design;
- Advocate for research activated ecological design, and research-informed ecological design education/outreach, to improve the ecological health of the built and natural environment;
- Explore E+D transdisciplinary graduate offerings
- E+D journal special issue

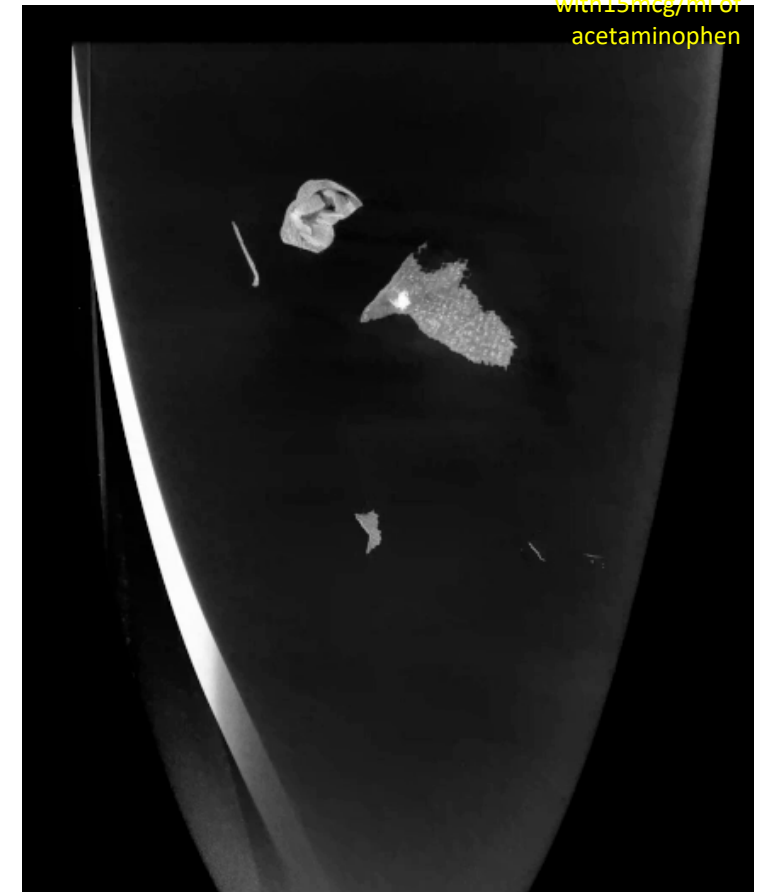
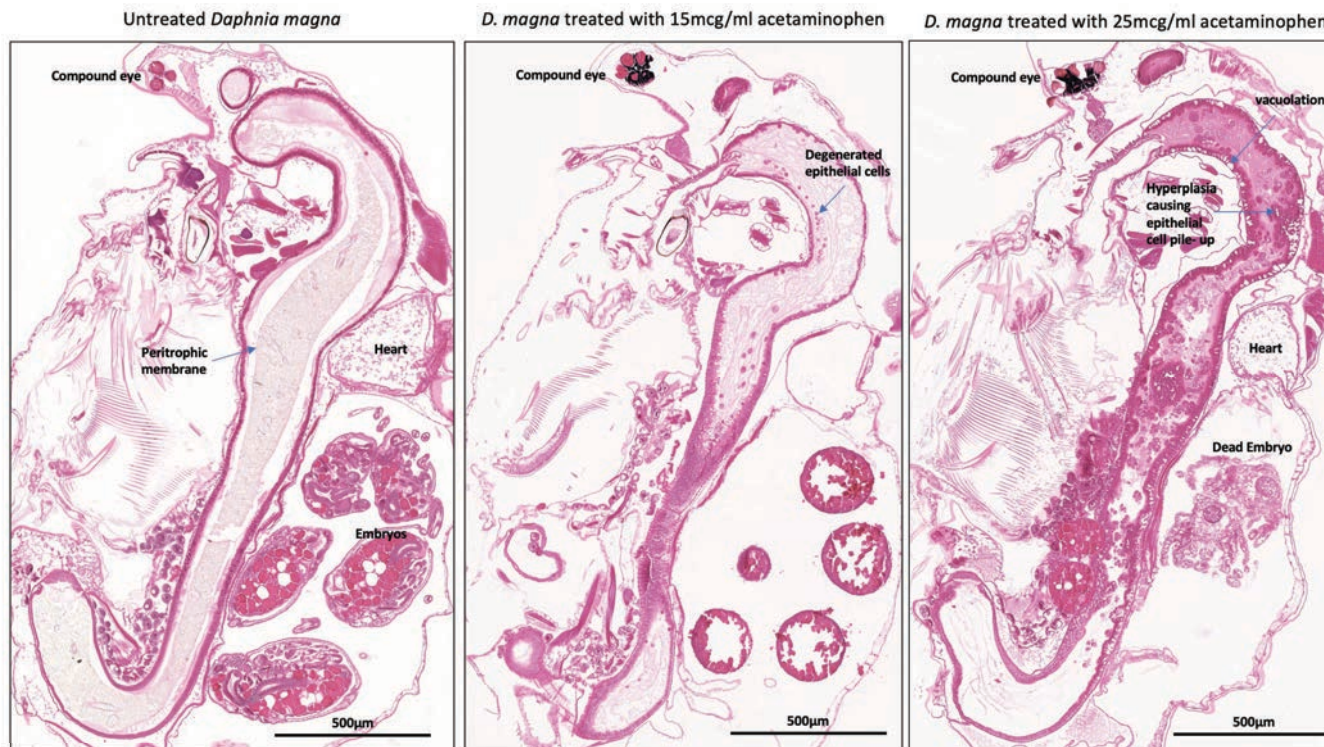
# *Daphnia*: Piloting Reference Atlas for Environmental Biomonitoring

Mee S. Ngu, Daniel J. Vanselow, Maksim Yakovlev, Jean E. Copper, Keith C. Cheng, Khai C. Ang

Dept. of Pathology, Penn State College of Medicine

## Existing Activities

- We aim to create reference atlas of meso-organisms using histology and micro-CT as a foundation for environmental biomonitoring<sup>1</sup>
- We used *Daphnia magna* as our first model because it is an established model for toxicology and are found in all freshwater bodies
- We also exposed *Daphnia magna* to acetaminophen (at therapeutic concentration)
- Preliminary histology reference atlas at <http://bio-atlas.com/Daphnia/>



# Penn State Altoona

## Activities Related to Energy, Environment, and Stewarding Our Planet's Resources

Lisa Emili, Sustainability Coordinator

### Existing Activities

- Sustainability Council-website, social media, outreach, workshops, internships, cleanups, guest speakers, Green Teams, Green Paws
- Seminar Forest-research, teaching, outreach, community use
- PEMN site-research, teaching, outreach, HVAC and operations
- Housing and Food Services-Green to Go
- Living Laboratory-partnership with Last 44 Farm
- Center for Community-Based Studies-AmeriCorps
- Community Garden
- Health and Wellness events, SportArt equipment
- Community Partnerships-IRC and Blair County Conservation District
- Sheetz Fellows, ENACTUS, RTE program
- ENVST program-research, internships, service projects, field courses
- SGA and Environmentalist Coalition, Moveout donations, Ecocoin

### Strategic Opportunities

- Big Idea #1: Full development of Seminar Forest as a demonstration forest and environmental center
- Big Idea #2: Solar array
- Big Idea #3: Green infrastructure, green roof
- ...
- Little Idea #1: Solar powered outdoor waste/recycling containers
- Little idea #2: Electric vehicle charging stations
- Little idea #3: Local paper purchasing
- ...

<https://sites.psu.edu/sustainabilityaltoona/>

<https://altoona.psu.edu/offices-divisions/academic-affairs/community-based-studies>



# Penn State Beaver Campus

## Activities Related to Energy, Environment, and Stewarding Our Planet's Resources

Dr. Angela Fishman, Associate Teaching Professor of Mathematics

### Existing Activities

- Student Farm Operation with 96-ft high tunnel and 12 raised beds
- S. Nilson's Research on ramps, goldenseal and ginseng; clove agroforestry in Indonesia
- Hired conservation biologist A. Sabo
- Courses: Biol 120N, BISC1 13, BIOL 60N, FOR 201, ERM 210, SUST 150N, SUST 200
- Annual Earth Day Festival
- Outreach Partners: Shell Oil, Salvation Army, Crop & Kettle, F.U.E.L of Ambridge, Children's Play North, Sisters of St. Joseph, Ambridge Area School District, various community gardens

### Strategic Opportunities

- Big Idea #1 – Continue student farm operation with produce being purchased by HFS
- Big Idea #2 – Improve campus trail access
- Big Idea #3 – Create walking trail around campus
- Little idea #1 – Allow composting and beehives
- Little idea #2 – Reduce plastic usage
- Little idea #3 – Improve recycling education on campus





# Penn State Harrisburg

## Existing Activities

- Recent Faculty and Staff Hires
  - Todd Camp, DBS (Sustainability Focus)
  - Will Driscoll, Biology (Eco-Evolutionary Algal Dynamics)
  - Grady Mathews, Civil Engineering (Sustainable Materials)
  - Ola Rashwan, ME (Photovoltaic Materials)
  - Abu Asaduzzaman, Chemistry (Environmental [Hg] Transport)
  - Daniel Mallinson, Public Affairs (Environmental Policy)
- Strategic Initiatives
  - Smart Home Research Initiative
  - Trash to Treasure
  - EnvironMentors
  - Sustainable Campus Living Option (Juniata Hall)
- Centers and Institutes
  - Institute of State and Regional Affairs
  - Electric Utilities Power Laboratory
  - PA Recycling Markets Center
  - Biofuels Laboratory



Richard Ciocchi, Associate Professor of Mechanical Engineering  
Shirley Clark, Professor of Environmental Engineering

- Curricula
  - Sustainability courses in SSET, PA, (required in EE/EET/MET)
  - Engineering Capstones, Honors Seminar
  - Service learning (industry, local gov, non-profits)
- Outreach and Events
  - Annual Earth Day activities, student clubs
  - Charles Cole Fund (speaker series)
  - GreenCon: U.S. Green Building Council of Central PA

## Strategic Opportunities

- Big Idea: \$40 million Applied Learning Center
  - Integrated design and construction
  - Energy and water conservation, renewable materials
- Little Idea: Lower Susquehanna Initiative Integration
- Little Idea: Environmental Training Center
- Little Idea: Sustainability Council



# Sustainability Institute

## Activities Related to Energy, Environment, and Stewarding Our Planet's Resources

Paul Shrivastava, Chief Sustainability Officer, Director, Sustainability Institute

### Existing Activities

- Scholar in Residence – Christina Grozinger
- Strategic Initiatives – Institutionalizing Sustainability through College/unit Councils
- Centers/Institutes – Sustainable Operations Council (SOC), Sustainable Experience Center (SEC), Student Farm
- Events – Transdisciplinary workshops, Climate Action events, Colloquium on Environment, Biodiversity Research Symposium
- Outreach – Sustainable Communities Collaborative, City Semester, Film Series
- Projects - LightSource BP solar project with electricity generation as well as student internships, research seed grants, ecological services enhancements and research.

### Strategic Opportunities

- Big Idea #1 - Carbon Negative by 2030
- Big Idea #2 - Implement Sustainability Experience Center for research, education and outreach on SOPR topics
- Big Idea #3 – Implementing convergence (transdisciplinary) research for impact at the university and across the world
- Little Idea #1 - 10K grants to Sustainability Councils at Colleges and Campuses to implement SOPR agenda
- Little Idea #2 - Energy curriculum, solar curriculum, interdisciplinary energy analysis, community decision-making





## Activities Related to Energy, Environment, and Stewarding Our Planet's Resources

Erica Smithwick, Director

### Existing Activities

- Flower Grants (current RFP active 5/29)
- Huck sabbatical scholar (S. Gergel)
- Spawned E+D, Initiative Center for Human Ecology
- Resilience/NCSE
- Community building activities
- Communication/marketing/website
- Strategic planning survey + faculty lunches

Ecologists are very used to system complexity and change – our science is more relevant than ever

### Strategic Opportunities

- **Big Idea #1 Faculty hires in climate, resilience, and/or conservation**
- **Big Idea #2 Distinguished Ecologist** [Speaker Series/Endowment?]
- **Big Idea #3 Ecology Fellows** [support junior faculty]
- **Medium Idea #1 Ecology Red Team Reviews**
- **Medium Idea #2 Storytelling/Strategic Communications**
- **Little Idea #1 Breakthrough of the Year award**
- **Little idea #2 Mentoring teams**
- **Little idea #3 Idea Lab/Pitch Slam events**

Ecology at the Interface



Resilience & Adaptation



Ecological Foundations



Rapid Evolutionary Change



Ecosystem Goods and Services



# Larson Transportation Institute

## Activities Related to Energy, Environment, and Stewarding Our Planet's Resources

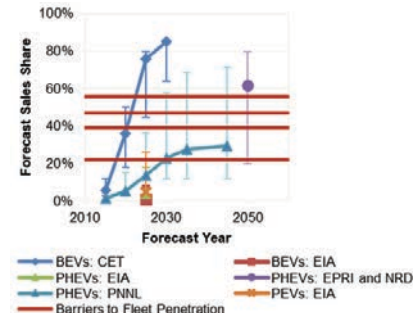
Eric Donnell, Director

### Existing Activities

- Center for Dirt and Gravel Roads Studies
  - Assessing road dust production and water quality impacts from dust suppressants
  - Road sediment quantification
  - Treating nitrogen from agricultural runoff using woodchip bioreactors
- FTA Bus Testing Program
  - Test hydrogen, battery-electric and other transit buses
  - Emissions and energy consumption research/testing
- Northeast Center of Excellence for Pavement Technology
  - Alternatives to petroleum-based asphalt binders
  - Winter maintenance leads to groundwater contamination, corrosion of pipes and concrete
- Other Research
  - Residential and public charging infrastructure for electric vehicles

### Strategic Opportunities

- Road and drainage feature assessment using UAVs → improved design/construction guidelines
- Develop sustainable binding materials for pavements (current demand > 110 million tons)
- Winter maintenance/deicing activities -- self-heating materials, use of hydrophobic coatings, and use of external heating sources (such as solar energy)
- Electric vehicle charging infrastructure; shared autonomous vehicle research
- Integration of driving simulator into fuel economy and emissions tests





# Institute for Sustainable Agricultural, Food, and Environmental Science (SAFES)

## Activities Related to Energy, Environment, and Stewarding Our Planet's Resources

Karen Fisher-Vanden, Director

Mission: to accelerate solutions to the complex interconnected challenges of feeding a growing population, environmental resilience, and economic sustainability.

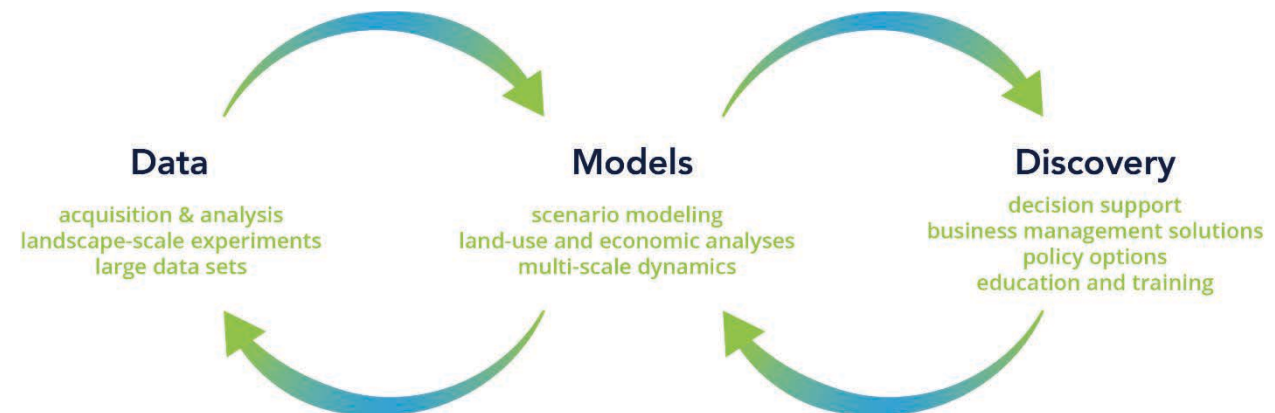
Approach: provide an entry point for connecting researchers and students from diverse knowledge groups with the aim to develop decision support and policy innovations through landscape-level analyses.

Four Programmatic Domains: Data, Models, Discovery, Landscape-Scale Interactions

Recent activities:

- SAFES Rapid response RFP for COVID-19 research on interconnected challenges facing supply chains, food security, labor, and the environment posed by the global pandemic
- Planned soft launch of SAFES this month

- Big Idea: Collaborative space in central campus designed to promote university-wide rather than college-focused initiatives; e.g., proposed Joint Energy-Water-Environment Laboratory (JEWEL)
- Medium idea: Intercollege cohort of graduate students to connect expertise across colleges in a specific issue area; e.g., coastal flooding; drought.
- Small idea: Funding to connect junior faculty with established externally-funded PSU research projects.



# The Penn State Convergence Center for Living Multifunctional Material Systems

A Strategic Research/Educational Partnership between The Pennsylvania State University and University of Freiburg  
Zoubeida Ounaies, Director and Professor of Mechanical Engineering

## Planned Activities

- Joint **webinars** with University of Freiburg
- **Position papers** on living materials themes
- Bi-annual **newsletters** and **website**
- Research **seed grant program**
- Annual **student, researcher, and faculty exchange** between University of Freiburg and Penn State
- **Networking events** at Penn State
- **Presentations, posters and sessions** at Materials Day

## Strategic Opportunities

- Promote **convergent research** in *Adaptive Buildings and Building Materials*
- Stimulate **transformational ideas** for *future manufacturing of multifunctional multi-material systems* that are sustainable and resilient
- Create a **network of women researchers** who explore themes related to center's research
- Establish a **graduate student community**



# Center for Energy Law and Policy

## Activities Related to Energy, Environment, and Stewarding Our Planet's Resources

Seth Blumsack, Director – <https://celp.psu.edu> (under development)

### Existing Activities

#### Research and Education

- Support interdisciplinary teams that integrate research, education and stakeholder engagement
- Pilot project (2017-2018) on regulation of methane emissions from oil & gas activities
- Current project evaluating PA joining RGGI

#### Events

- Work with Center for Security Research and Education on infrastructure security (w/DHS)
- State energy transition workshops

#### Outreach and Engagement

- Planned hires for legal and policy research staff for Pennsylvania Energy Policy Group
- Service on state Clean Energy Programs Advisory Committee for DEP.

### Strategic Opportunities

#### Big Ideas

- PA Energy Policy Group could fill a gap in independent strategic thinking about energy in PA and the region
- CELP can help to build a larger community of interdisciplinary social and professional scientists with energy in their research portfolio – complements technical expertise at Penn State

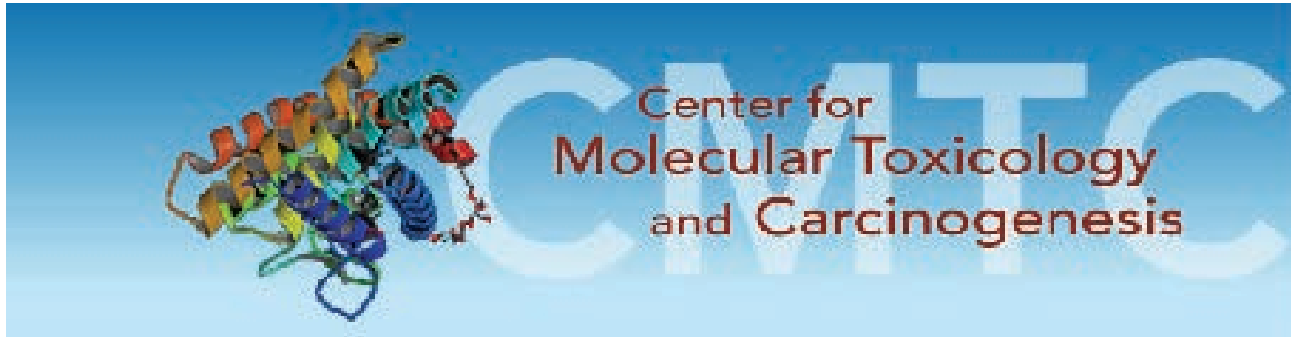
#### Little Ideas

- Partnerships with DOE labs and others around energy law, policy, economics



*Stakeholder Workshop on Methane Emissions, December 2017*

- Interdisciplinary initiative/center on GHG emissions and energy industry activity (outgrowth of methane project)



Gary H. Perdew, CMTC Director  
*Center supported by IEE and Huck*

## Existing Activities

- Seminar series: provide support
- Provide administrative support for training grants and multi-investigator grants
- Provide infrastructure for toxicology studies in Life Sciences Building
- Provide graduate student support for new projects in toxicology/cancer
- Provide leadership in securing new faculty positions and laboratory space
- Support expansion of Toxicology UG major to Pharmacology and Toxicology

## Strategic Opportunities

- Expand the focus on environmental toxicants and their influence the microbiome
- Incorporate metabolomics in studies on toxicant-mediated toxicity and cancer
- Increase capacity to utilize large datasets in metabolomics, genomics, and the microbiome
- Expand efforts in cancer research to engage the Penn State Cancer Center
- Assess environmental toxicants in central Pennsylvania
- Develop the capacity to permit high throughput screening of toxicants that interfere with the microbiome

<https://www.cmtc.psu.edu>



# Center for Security Research and Education

## Activities Related to Energy, Environment, and Stewarding Our Planet's Resources

VADM James Houck, Director; Distinguished Scholar in Residence, Penn State Law and School of International Affairs

### Existing Activities

- Annual Seed Grant Program; examples of relevant projects include:
  - Andrew Warner, IEE, \$25K, Water Security in PA
  - Luke Trusel, EMS, \$25K, Arctic Sea Ice and Maritime Transport
  - Wei Peng, SIA, \$TBD, Climate Change and Migration
  - Beth McGraw, AgSci, \$15K, Water Mgmt. and Health Outcomes
  - Abderrahim Ouarghidi, AgSci, \$15K, Water Scarcity and Political Stability
- Faculty Fellows
  - Caitlyn Grady; NSF CAREER Award, Food, Energy, and Water Systems
  - Bryan McDonald; writing book on food security
- Upcoming Events
  - Alice Hill, Council on Foreign Relations; guest lecture Sep. 23
  - Critical Infrastructure Interdependencies and Resilience conference, Dec. 3-4

### Strategic Opportunities

- Exploring 3-5 yr. strategy to better address requirements for Interdependencies and Resilience in Critical Infrastructure Sectors



Caitlin Grady, assistant professor of civil and environmental engineering and CSRE faculty fellow is examining the influences and interconnections between food, energy, and water systems thanks to a prestigious NSF CAREER Award.

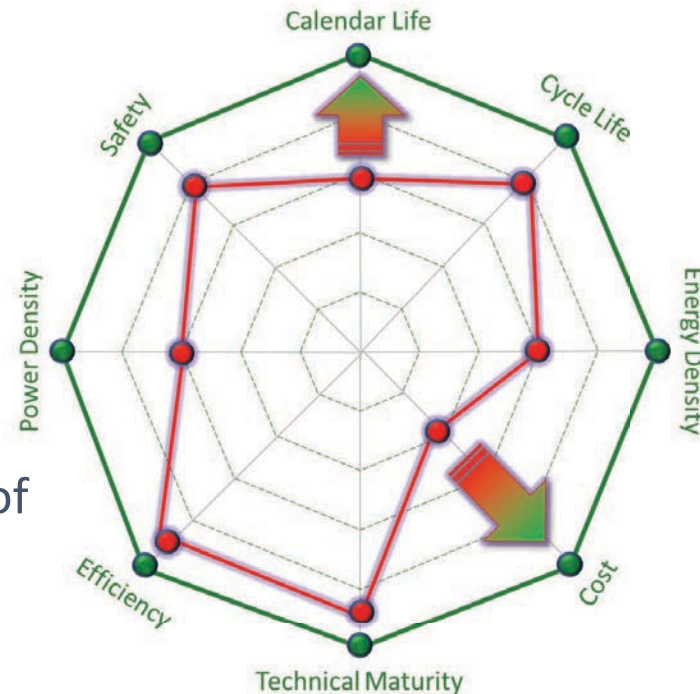
# Battery & Energy Storage Technology (BEST) Center

## Activities Related to Energy, Environment, and Stewarding Our Planet's Resources

Chris Rahn, Co-Director, Mechanical Engineering

### Existing Activities

- Penn State has led the nation in battery research, including the first EV battery fabrication facility in a US University.
- BEST faculty have successfully competed in almost every DOE program in batteries.
- Despite our early lead, other universities have surpassed us in terms of new hires and infrastructure.
- There are still grand challenges to solve in energy storage, the first of which is lowering costs.



### Strategic Opportunities

- Increase funding and activities through strategic investment in research from materials to cells to systems.
- Grow our infrastructure and capabilities in grid storage, *e.g.*, Flow Batteries.
- Enhance research on new battery chemistries with lower cost, higher safety and performance, and longer life, *e.g.*, LMB, Solid State, Zn.
- Leverage recent advances in smart batteries that have built in intelligence, sensing, actuation, and multifunctional capabilities.

# Center for Pollinator Research/Insect Biodiversity Center

Activities Related to Energy, Environment, and Stewarding Our Planet's Resources

Christina Grozinger, Director

## Existing Activities

- **Graduate Fellowships** to foster transdisciplinary research and training (College of Ag, Huck, USDA-NNF, individual fellowships)
- **Apes Valentes and Dutch Gold Undergraduate and Graduate Awards** for science, arts, humanities (endowed program)
- **Stakeholder engagement** through Advisory Board and PA Pollinator Protection Plan
- **International research/education** (Africa, Asia, South America)
- **Extension education**
  - Bee Health Extension website (Beekeeping 101 has 28000+ registrants!)
  - Pollinator Garden Certification Program (PSU Master Gardeners)
  - Pollinator In-Service (100+ extension educators, biannually)
  - Collaborative research and decision support tools (Feral Bees, Beescape, BeeWinterWise)
- **Outreach collaborations** with Center for Science and the Schools and Learning, Design and Technology faculty (USDA, NSF)
- **Outreach Venues:** Pollinators' Garden at the Arboretum, Frost Entomological Museum, Discovery Space, PSU Solar Sites

## Strategic Opportunities

### Big Idea: Foster transdisciplinary research

- Sustainability Institute Symposium on “Mainstreaming Biodiversity in a Decade of Action”, Jan 2021, coupled with seed grant program
- Create a ‘Computational Data Science and Visualization Team’ to provide technical support for research projects in collaboration with SAFES Institute and ICDS-RISE

### Medium Idea: Foster transdisciplinary education

- online and residential, grad and undergrad courses
- Penn State-Freiburg Virtual Classroom
- National partnerships with education researchers, formal K-12 teachers and informal educators

**Little Idea: Broader community building** through research and technical workshops, colloquia, sabbatical visitors, art+science galas....



**PennState**

<https://ento.psu.edu/pollinators>

# Pennsylvania Water Resources Research Center

Activities Related to Energy, Environment, and Stewarding Our Planet's Resources

Beth Boyer, Director

## Existing Activities

- Facilitate supported small grants and student internships at PSU and other PA Universities.
- Provide educational materials/workshops for K-12 and informal-science educators.
- Co-sponsor conferences & colloquia.
- Hold meetings with representatives' offices in DC re: University research advancing water problems.
- Synthesized information on water-related centers & institutes, courses & degrees, & faculty-staff that have been used in various PSU strategic planning efforts and by the new PSU Water Consortium.
- Maintain institutional memberships in NIWR, CUAHSI, UCOWR.

## Strategic Opportunities

- Online water education (PSU courses, video vignettes, curated materials)
- Use small grants funds to synergize with PSU Water Consortium
  - Example: Just funded to PAWRRC (2020-21) is PSU Water Resources Research Graduate Scholars Program, providing PSU students with professional development & networking opportunities
    - Workshop 1: grand research challenges, use of state-of-the-art research methods and facilities to address them, and inclusive mentoring.
    - Activity: Engage with a professional society (e.g., AGU, ASCE, AMS) and present their research.
    - Workshop 2: communication of water resources research to broader audiences..

<https://www.pawatercenter.psu.edu/>



# Informatics Group

## Activities Related to Energy, Environment, and Stewarding Our Planet's Resources

Maurie Kelly, Director, PASDA & Data Commons, Informatics Group, IEE

### Existing Activities

- Projects span disciplines and support research, teaching, outreach by acquiring and providing access to data including climate, renewable energy, high resolution imagery, biodiversity, disaster impacts. Developing web services for consuming and visualizing large complex data.
- Supporting projects such as NSF Virtual Data Collaboratory.
- Deliver seminars in research data management, accessing data, using analysis tools. Participate in events such as ICDS Symposium, Energy Days; serve on ICDS Symposium Planning Committee, RCCI.
- Work with Federal (FEMA, USDA, USGS, NWS), state (PA DEP, PA DCNR, Governor's Office of Administration, DMVA), regional (Chesapeake Bay Program, Susquehanna & Delaware River Basin Commissions), local, and non profit organizations.
- Support PSU initiatives at the Arboretum, Lion Ambassadors, OPP, Sustainability Institute.

### Strategic Opportunities

- Big Idea #1 Data for the Planet: Penn State will become **the** leader in publishing and providing access to research data that supports our mission to steward our planet's resources. Penn State will build a data infrastructure that has broad application and supports collaborative research, teaching, outreach, and threat response capabilities related to stewarding our planet's resources. This can easily scale to serve high volume, high velocity and/or high variety information assets that integrates new forms of processing and analysis to enable enhanced decision making and discovery. This data infrastructure will support institutes, centers, and individual scientific endeavors but will also serve as a comprehensive resource.
- Little Idea #1 Project Drawdown Data Initiative: Identify and acquire Drawdown related data from PSU researchers.

[www.datacommons.psu.edu](http://www.datacommons.psu.edu)

[www.pasda.psu.edu](http://www.pasda.psu.edu)

[pafloodrisk.psu.edu](http://pafloodrisk.psu.edu)

[www.chesapeakeview.psu.edu](http://www.chesapeakeview.psu.edu)



**PennState**

# Penn State Water Initiative

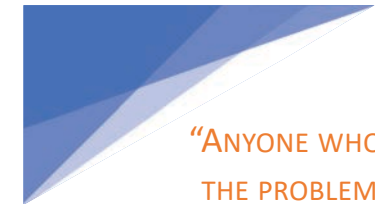
## Addressing the World's Most Pressing Water Challenges

Andrew Warner, Director

- Water is vital to the health and safety of people, productivity of ecosystems, vibrancy of economies, and even stability of nations, yet we fail to meet our water needs of today, let alone tomorrow.
- Penn State's breadth and depth of water-related expertise is wide-ranging spanning disciplines and geographies, but **coordination is needed to catalyze greater innovation and impact.**

### Recommendations

- **Support the Penn State Water Consortium** for excellence in interdisciplinary water research, education, and outreach.
- **Focus strategic investments on areas of emphasis**, including protecting public health and the environment and advancing resilient communities on a dynamic Earth.
- **Near-term:** Strengthen and coordinate Penn State Water as a community, transform educational opportunities, and develop strategic partnerships to increase funding and impact.



"ANYONE WHO CAN SOLVE  
THE PROBLEMS OF WATER  
WILL BE WORTHY OF TWO  
NOBEL PRIZES - ONE FOR  
PEACE AND ONE FOR  
SCIENCE."

President John F. Kennedy

# The Global Building Network

## Activities Related to Energy, Environment, and Stewarding Our Planet's Resources

Esther Obonyo, IEE/ Engineering Design/ Architectural Engineering

### Existing Activities

- UNECE + Philadelphia Navy Yard (Energy use in Buildings)
  - Combined Heat & Power & Passive House Activities with Ireland
- Recruitment
  - Over 30 institutions (Global Programs); Partnerships with American Council for an Energy Efficiency Economy (ACEEE), European Network, UN's Global ABC
- Education
  - Building Performance Institute (BPI) partnership
  - Distance learning with COE, library partnership, AE passive house course modules
- Seed grants
  - Psychosocial Health in Buildings (New Kensington); Student Housing (Penn State OPP)
- Outreach (2020 Residential Building Conference – 5 Sessions)

### Strategic Opportunities

- BIG IDEAS
  1. Research, education & outreach in Infectious Disease & Building Performance (Ventilation)
  2. Building and maintaining a Penn State-led Global Transdisciplinary Community
- LITTLE IDEAS
  1. Discussion at May 13 on High Performance buildings at the city scale
  2. Developing & disseminating seed grants on low carbon materials & energy efficiency

